

Cognitive Architecture.
From Biopolitics
to Noopolitics.
Architecture & Mind
in the Age of
Communication
and Information

Delft School of Design Series on Architecture and Urbanism

Series Editor

Arie Graafland

Editorial Board

K. Michael Hays (Harvard University, USA) | Ákos Moravánszky (ETH Zürich, Switzerland)

Michael Müller (Bremen University, Germany) | Frank R. Werner (University of Wuppertal, Germany)

Gerd Zimmermann (Bauhaus University, Germany)

Cognitive Architecture. From Biopolitics to Noopolitics. Architecture & Mind in the Age of Communication and Information

Editors Deborah Hauptmann and Warren Neidich

With contributions by **Andreas Angelidakis, Lisa Blackman, Ina Blom,**

Felicity Callard, Suparna Choudhury, Jordan Crandall, Elie During,

Keller Easterling, Lukas Ebensperger, Boris Groys, Janet Harbord,

Deborah Hauptmann, Patrick Healy, Maurizio Lazzarato, Daniel Margulies,

Markus Miessen, Yann Moulier Boutang, Warren Neidich, John Protevi,

Steven Quartz, Andrej Radman, Philippe Rahm, John Rajchman, Patricia Reed,

Gabriel Rockhill, J.A. Scott Kelso, Terrence Sejnowski, Elizabeth Sikiaridi,

Jan Slaby, Paolo Virno, Frans Vogelaar, Sven-Olov Wallenstein, Bruce Wexler,

Charles T. Wolfe

010 Publishers Rotterdam 2010

8 Acknowledgments

10 Introduction: Architecture & Mind in the Age of

Communication and Information Deborah Hauptmann

46 Noopolitics, Life and Architecture Sven-Olov Wallenstein

I Plasticity and Potentiality

64 Movement Paolo Virno 78 The Politics of I Can Patricia Reed

90 Comrades of Time Boris Groys 100 The Neural Basis of Cognitive

Development: A Constructivist Manifesto Steven Quartz & Terrence

Sejnowski 116 Metastable Mind J. A. Scott Kelso

II Epigenic Reconfigurations

142 Shaping the Environments that Shape Our Brains: A Long

Term Perspective Bruce Wexler 168 Deleuze and Wexler: Thinking

Brain, Body, and Affect in Social Context John Protevi 184 From

Spinoza to the Socialist Cortex: Steps Toward the Social Brain

Charles T. Wolfe 208 Other Minds, Other Brains, Other Worlds

Patrick Healy 232 Designing the Lifeworld: Selfhood and Architecture

from a Critical Neuroscience Perspective Lukas Ebensperger, Suparna

Choudhury & Jan Slaby

III Administering Attention

250 Disposition Keller Easterling **266 Loose Coexistence: Technologies**

of Attention in the Age of the Post-Metropolis Elie During

284 ScreenSpaces: Can Architecture Save You from Facebook Fatigue

Andreas Angelidakis **302 Technologies of Mediation and the Affective:**

A Case-study of the Mediated Environment of MediacityUK Lisa Blackman

& Janet Harbord **324 The Industrious Subject: Cognitive Neuroscience's**

Revaluation of 'Rest' Felicity Callard & Daniel Margulies

IV The Noo-Sensorium

348 Deleuze's Time, or How the Cinematic Changes Our Idea of Art

John Rajchman **368 Spectacle versus Cinematic Sociality: Art and**

the New Media Architecture Ina Blom **386 Edible Architecture** Philippe

Rahm **402 Movement, Agency, and Sensing: A Performative Theory**

of the Event Jordan Crandall **430 Figure, Discourse: To the Abstract**

Concretely Andrej Radman

V Capitalism and the Mutating Intellect

454 Mutations in Contemporary Urban Space and the Cognitive Turning

Point of Capitalism Yann Moulier Boutang **470 A Specter is Haunting**

Globalization Gabriel Rockhill **488 From a Politics of Nostalgia to**

a Politics of Change Markus Miessen **502 'Exiting Language,' Semiotic**

Systems and the Production of Subjectivity in Félix Guattari Maurizio

Lazzarato **522 Idensity** Elizabeth Sikiaridi & Frans Vogelaar **538 From**

Noopower to Neuropower: How Mind Becomes Matter Warren Neidich

582 Contributors Biographies

588 Credits

Acknowledgments

This book would not have been possible without the support of the Faculty of Architecture at Delft University of Technology. In 2008 my coeditor and I held a symposium entitled *Architecture in Mind: From Biopolitics to Noopolitics*, sponsored by the Delft School of Design. Several contributors to this volume were present at this conference and this volume owes much to their enthusiasm and dedication to the issues raised during these proceedings. Thus I would like to extend special thanks to the following contributors: Andreas Angelidakis, Yann Moulier Boutang, Jordon Crandall, Keller Easterling, Scott Kelso, Markus Miessen, John Protevi, Bruce Wexler and Charles Wolfe. I would also like to extend my appreciation to Abdul-Karim Mustapha, a participating member of the conference who elegantly summarized the proceedings in closing remarks, and who later contributed greatly to the early formulations of this volume.

Of course, developing the issues addressed at a conference into a volume of the scale of *Cognitive Architecture* entailed no small task: a task that would have been insurmountable without the intellectual efforts and accumulated knowledge of my co-editor, Warren Neidich. For over a decade, Neidich has been critically engaged in the discussions that underpin this volume. I believe that he has worked persistently and tirelessly, both within his art work and his theoretical contributions, to the discourse we here identify as noopolitics, what Neidich in his own work develops as neuro-power.

Finally, I would like to thank all the contributors to this volume as they have helped us to navigate the vague terrains of what to our mind remains very much a burgeoning discourse. The academy can be very unforgiving when its members are perceived to stray too far afield from the accepted boundaries of their so-called legitimate research. And thus I remain extremely grateful to the scholars and scientists who, coming from such varied disciplines, have agreed to support us in our transdisciplinary approach with their contributions to this volume.

Deborah Hauptmann
Rotterdam, November 2010

Introduction: Architecture & Mind in the Age of Communication and Information

Deborah Hauptmann

Cognitive Architecture begins with the basic premise that in a world increasingly populated by technologies of information and communication, the analysis on biopolitics must be expanded to include thinking on noopolitics. While the former acts on body, or populations of bodies, and inscribes habits and practices specific to life (*bios*), the latter operates on mind (*nous*), on general intellect and mental disposition. Here the concept of noopolitics is broadly posited as a power exerted over the life of the mind, including perception, attention, and memory. This volume will posit questions and put forward ideas pertaining to the conditions through which world, body, brain, and mind are coupled, influenced by, and inflected through contemporary forms of material and immaterial production and processes such as those found in our current communication and information age.

The Foucauldian discourse on biopolitics and power has for decades been considered a cornerstone of theories (throughout numerous disciplines including architecture) that address the formations of society and culture in relation to economy and politics in all their permutations. It is important to retain the distinctions that have been made between biopolitics and biopower; primarily the distinction between the integration and stratifications of forces by institutions and various agents, organizations, and the constellations of power, singular or multiple, as a set of relations of forces acting on forces outside what some might refer to as the body-politic itself. Equally relevant is to recall that these so-called institutions of organization do not solely generate various sources of power, but in fact themselves stem from these relations of power.¹ Furthermore, as readers of the work of Foucault will recognize, underpinning his entire discourse is the concern with the power to exercise freedom and the creative power of resistance. Which, to our mind, also remains as a central concern to what we are here discussing under the terms of noopower and the subsequent forms that the production of subjectivities (considered both positively and negatively) take in within noopolitical frameworks of what have become highly distributed networks of forces and organization.

Perhaps we should point out that we do not believe that the prefix *bio* with respects to politics or power can simply be supplanted by the prefix *noo*. Nor would we wish the reader to feel we have collapsed (or conveniently ignored) the mind-body problematic which, according to Fredric Jameson – who refers to this as the raw nerve of metaphysics – runs through the dualisms of Cartesian and Spinozan philosophy ‘all the way down to base and superstructure if not the mechanical-materialist mirage of the cognitive brain itself.’² We do, however, consider the issues raised in this volume to be less ideologically related to the (Marxist) subject/labor paradigm, or the subjugation of populations through integration and capture within the order of reproduction, and more dynamically related to modalities of power as a relation between ‘forces acting on forces’ through integration and differentiation, which within an order of invention create sublime and complex conditions of

¹ Of course this is taken up extensively in Deleuze's work **Foucault** (Minneapolis: University of Minnesota Press, 1986).

² See: Fredric Jameson, 'Critical Response: How not to Historicize Theory,' **Critical Inquiry** 34 (Spring 2008).

control and resistance. Maurizio Lazzarato has developed the importance of these distinctions in his well-known essay 'Life and the Living in the Societies of Control.' In this work he outlines the continuation of disciplinary societies (Foucault) into societies of control (Deleuze). Following Gabriel Tarde, he argues that media provide the conditions for 'the action at a distance of one mind on another, through the brain's power to affect and become affected, (which) is mediated and enriched by technology.'³ Identifying the importance of memory within action at a distance, he draws a distinction between 'life as memory from life as a set of biological characteristics ...' In other words, between the bio of biopower and bio as it is held in memory; Lazzarato thus turns to the term 'noopolitics' in order to distinguish the latter.⁴ Thus, the relevance of noopolitics in contemporary discourse and practice is integrally connected with memory and mind and to theorizing the relation between the forces and forms of communication. Networks of information and communication generate new logics of representation that are more topological than analogical. This action at a distance can be seen as an apparatus of noopolitics which emerged at the end of the nineteenth century with the advent of mass media in the form of something that today appears fairly innocuous: the newspaper.

Deleuze, in his essay 'Postscript on Control Societies,' also argues that the *dispositifs* of power and control that once operated primarily on the body (read *pace* Foucault) now operate on the mind through technologies of communication. With this we are no longer within the closed spaces of control outlined by geographic or political boundaries (sovereignities as such) of individuals or populations; but in the open spaces of public opinion, of multiple affiliations and dispositions dispersed across the globe. With this we witness not only the control of territories, but new forms of deterritorializations (Deleuze/Guattari), in other words, intensive modulations and temporal reconfigurations are both superimposed upon and subordinate extensive modalities of space. Or, as Lazzarato expresses it, 'we could say that noo-politics commands and reorganizes the other power relations because it operates at the most deterritorialized level (the virtuality of the action between brains).'⁵

Architecture and urbanism inhabit the same spaces and temporalities that characterize these new modes and relations; their presence also possesses the potential to bend and contort the very systems in which they operate. Architecture too often tends to be considered as autonomous, disengaged, and distanced from life as some form of hermetic (design-centric) endeavor. Quite the opposite is true – architectural technologies are embedded in the interwoven fabric of social, political, economic, psychological, historical, and spiritual relations of a community of differences and heterogeneity. Architecture has created its own set of *dispositifs* that provide for the smooth realization of new and diverse networks into planned conditions of the built environment. Put differently, architectural imaginations

produce practices that allow for the exploration of remote territories, like the paranormal, non-linear, psychic, and insensible, which pulsate beyond the reach of the formulaic methodologies of the logics of computational programs. Equally, the concept of the virtual has become increasingly important to the architecture and urban design discourse. In fact, architectural and urban processes, procedures, and products commingle to form complex systems of recurrent and recursive circuits, which, in the end, help produce novel forms of networks that empower the imagination and constitute the cultural landscape with new objects and subject relations.

The above briefly indicates the general concerns that motivated our interest in furthering the discussion on noopolitics. Of course, with this we remain primarily in the domain of philosophy and theory. However, as indicated above, our interests also lean heavily on thinking new relations between culture and the brain. By this we understand the brain not merely as the privileged metaphor for mind, consciousness, or cognition; but the brain as examined in contemporary neurosciences. Here we are interested in the manner in which the brain is transformed through cultural influences, and conversely, how the emerging knowledge on the brain informs both the limits and possibilities of our interaction with and effect upon our world. We wish to develop a better theoretical understanding of the emerging conditions that generate new continents of research and elicit forms of power and relations of power within the context of new economic, political, social, aesthetic, and cultural contingencies; a search that is also paralleled by many scientists who, in various manners, conduct research into our cognitive capacities in general, and the brain (whether psychological, physiological, biological, or neurological) specifically. Further, we believe that in addressing recent advents in architecture the relation between culture and the brain cannot be ignored, thus recent ideas emanating from neuroscience must be included in our understanding not merely of what architecture is, but how it acts.⁶

Further introduction to issues providing partial background for our discussion on cognitive architecture will be taken up in Sven-Olav Wallenstein's contribution, which acts as an introductory essay, extending much to the issues that underpin this collection. His paper, 'Noopolitics, Life and Architecture,' provides a critical survey of Foucauldian and Deleuzian theories related to biopolitics and noopolitics as situated in relation to the vitalist philosophy of thinkers such as Henri Bergson and Gabriel Tarde. His more subtle task, however, is to propose the possibility of a critical theory that may better account for thinking modes of 'affectivity and subjection' in the context of thinking new forms of discipline and control.

³ Maurizio Lazzarato, 'The Concepts of Life and the Living in the Societies of Control,' in *Deleuze and the Social*, eds. Martin Fuglsang and Bent Meier Sørensen (Edinburgh: Edinburgh University Press, 2006), 180.

⁴ Ibid., 186. With this it should be clear that we have taken this term from Lazzarato. Naturally, we hope that our work here will serve to offer something in return.

⁵ Ibid., 187.

⁶ For those readers interested in an overview of discussions on architecture and the brain, see Harry Francis Mallgrave, *The Architects Brain: Neuroscience, Creativity, and Architecture* (Oxford: Wiley-Blackwell, 2010). Although our own approach to this topic, as well as the issues that concern us here, differ quite substantially from Mallgrave, I regard his book as an excellent and timely contribution to this emerging area of study.

The volume has been divided into five sections: ‘Plasticity and Potentiality,’ ‘The Noo-Sensorium,’ ‘Administering Attention,’ ‘Epigenic Reconfigurations,’ and ‘Capitalism and the Mutating Intellect.’ We consider these terms as meta-stable and blinking, representing concepts and ideas that resonate in architecture, theory, philosophy, and neuroscience simultaneously. Thus, these titles serve only to indicate a selection of primary themes that we believe are woven into this compilation as a whole. In fact, the majority of papers included herein address more than one of these themes as none can actually be discussed in isolation. The contributions as outlined below are sketched in broad brush-strokes, as it proved impossible within the constraints of this introduction to provide a thorough review of the issues and arguments these authors address in their respective contributions. Finally, it should be noted that we have conceived the contributions as a series of dynamic contingencies to be read as a distributed and complex network of ideas, which, taken together, open up the possibility of new vocabularies and tools with which to develop the discourse on *cognitive architecture*, *noo-power* and *noopolitics*.

Plasticity and Potentiality Approached from a theoretical perspective, the concept of plasticity bears on questions pertaining to the conditions of the changing cultural milieu, what might be called cultural plasticity, which through its direct or indirect actions effect memory, perception, experience, and thinking. Further, these transformations can be directly related to technological developments as well. Of course, writings on such matters have echoed through discourses concerned with art and media and their effective relation to socio-cultural conditions and conditionings, whether considered as a virtual or an actual real. Developments in neuroplasticity, which sit within scientific research primarily within the fields of experimental and physiological psychology, cognitive psychology, cognitive science and cognitive neuroscience, have now been extended to the cultural realm. When coupled with technological developments on the one hand, and ontogenetically driven cognitive strategies on the other, plasticity and its effects bear heavily on our modes of understanding our life-world.

Henri Bergson, for instance, argued that people are inclined to project their psychic or mental states into spatial form; and in so doing, not only are these mental states themselves transformed, but simultaneously they return to generate alternative and new forms of experience when reflected back into consciousness. We might easily recall Walter Benjamin’s now canonical claim that ‘the mode of human sense perception changes with humanity’s entire mode of existence,’ and the vehicle of such change is determined by ‘historical circumstances’ (by which he was referring to the technology of film). While, a more current example can be seen in Fredric Jameson, who puts forward a similar perspective – specifically with respect to the architecture of the Bonaventure Hotel, Los Angeles – suggesting that built space is mutating into something that people do not yet possess

the perceptual faculties to understand.⁷ In other words, as architecture changes, so too must the mind that must fathom it.

As these examples portray, the plasticity at play in experience and perception (along a sensation-affect and memory-attention axis) can be extrapolated in terms of both bios and nous. Thus, we grasp the notion of plasticity as it generally indicates the idea of mutability, transformation, and the inherent potential for change (whether productive or prohibitive) within the spheres of both real and imagined states and processes within beings. For some of our contributors this is seen as a theoretical notion of (pluri)potentiality as a means to elucidate a diagrammatic concept applied to the process of social and cultural evolution, especially as it creates new forms in the built environment or elicits new cultural niches in various and nuanced ways (cultural plasticity). For others, this is discussed as a property of the brain (neuroplasticity), providing for a greater understanding of how contemporary science posits human evolutionary capacities.

Potentiality is also used as a notion within discourse on capitalist organizations, tertiary economies, and the public sphere of sociopolitical practices. In his contribution ‘Movement,’ Paolo Virno suggests this as nothing less than ‘the arena of struggle’ in which ‘human nature’ itself is at stake. Here Virno identifies the differential traits of the species (*Homo sapiens*) in such things as ‘verbal thought, the transindividual character of mind, neoteny, and the lack of specialized instincts’ and will situate these ‘specie-specific prerogatives’ within a complex meta-history of biology, power, and temporal contingents. Natural history, for Virno, takes on complex form in relation to sociopolitical configurations (experienced facts) and biological invariants (possibility of experience); with this he utilizes the diagram as a mechanism to identify this complex relation between what he refers to as the ‘just now’ (human nature) and ‘always already’ (biolinguistic capitalism): ‘I call *natural-historical diagrams* the sociopolitical states of affairs that display, in changing and rival forms, some salient features of anthropogenesis. The diagram is a sign that imitates the object to which it refers, meticulously reproducing its structure and the relation between its parts.’ Biolinguistic capitalism is here considered as a key element in the global movement and although Virno does not name it as such, we consider this as a specialized reading on noopolitics as it posits a central concern regarding the organization of intelligence and the mutation of intellect.

In respect to potentiality, the concept of *dynamis* is raised. Virno will address this as a ‘power’ evincing the ability of change. Similar to Patricia Reed (on Agamben) as we will see shortly, he identifies the *dynamis* as a non-presence (absence of presence). In Virno this is related to the ‘not-now’ of an eternal presence. The eternal, as ‘that which displays a high degree of invariance,’ is resistant to social and cultural change; thus it is the faculty of language that modulates the power (*in potentia*) of the non-actual, undefined and indeterminate. Virno further roots potentiality (the

⁷ See: Henri Bergson, *Time and Free Will: An Essay on the Immediate Data of Consciousness* (London: George Allen & Unwin Ltd., 1910); Walter Benjamin, ‘The Work of Art in the Age of Mechanical Reproduction,’ in *Illuminations*, translated by Harry Zohn (London: Fontana Press, 1992); and Fredric Jameson, *Postmodernism, or the Cultural Logic of Late Capitalism* (Durham: Duke University Press, 1991).

indefinite) in neoteny, the condition of a non-specialized organism that characterizes man. This idea of a continuous, 'uninterrupted learning process' is also found in the Deleuzian distinction between societies of discipline and control. Whereas the former indicates a progression, a passage from one state of capture to the next (from the home, to the school, to the factory, and so forth) the latter indicates recursive movements back and forth between these various modalities of training. Virno takes another step here, however, and it is a step particularly relevant to architecture thinking; whereby he argues that the non-specialized organism is also one that is perpetually 'out-of-place.' The 'human animal,' on this account, has no natural environment (no niche) in which he might insert himself 'with innate expertise once and for all.' In other words, he is an organism without organization. Thus '... our "essential nature" is characterized ... by the absence of a determinate environment, and therefore by and enduring disorientation.' Virno does not speak here of the built environment per se, but it remains possible to interpret his argument in relation to the indeterminate, the open-ended and (seemingly infinitely) modifiable conditions of the cultural environment in which architecture establishes its own diagrams and maps of possible worlds that 'portray the absence of a univocal environment.' In fact, we might suggest that one of the potentials of architecture could here be posited as the power to help make the 'human animal' less indeterminate in this regard, to sculpt through architectural languages the creation of a niche that acts on the neoteny of the human species, offering 'plausible diagrams' of an invariant human nature. Neotony is also related to neuroplasticity as it opens up the possibility for man to live in multiple domains that are in a state of constant flux; a multiplicity of natural as well as cultural niches of which architecture plays a role in forming. The above comments do not even begin to touch the complexity of the arguments Virno presents in his paper, arguments in which he succinctly takes on the traditional nature/culture divide with respect both to biology and history (not to mention regarding their socio-political interface with modes of capital production).

Giorgio Agamben has made the comparison between an architect and a child, arguing that although the architect has the potential to build (as the poet has the potential to write), he or she also possesses the power to decide 'not' to make a work but instead to maintain that potential in an unused state. The child, on the other hand, does not yet possess such knowledge (praxis), as he or she possesses a 'generic form of potentiality.' Thus, the child must 'suffer an alteration (a becoming other) through learning.'⁸ And, as Neidich will suggest, 'it is this alteration that is at the core of the administration of the pluri-potentiality of the nervous system.' Clearly, language and culture are powerful immaterial forces in sculpting the brain. In 'The Politics of I Can,' Patricia Reed provides a different reading on potentiality; through Agamben she dismantles the longstanding dialectic relation between potential and action. A necessary condition if we are to think noopolitics

in relation to action at a distance as opposed to an actualization, or rather an action manifested in discrete (contiguous rather than continuous) form. Reed points to the importance of 'in-action' in Agamben, writing that: 'It is within potentiality that Agamben finds the basis of life itself, lying in this zone of indistinction where a coincidence of two, seeming opposed systems – the capacity to act and the capacity not to act – meet and produce an unknown, unnamed topology.' Those familiar with Agamben will recognize this as taken from his reading of Aristotle's theory of *dynamis*. Further: 'The zones of indistinction exemplified in the existence of potentiality shift away from the dichotomous disposition of the term in its potential/actual configuration, and point to what Agamben calls "di-polarities," not as substantial but as tensional.' This idea of indistinctness ('the in-between state of potentiality') found in the 'I can' of Agamben is taken further in respect to its ethical dimension with the concept of political equality in a close reading of Jacques Rancière. Here Read identifies the 'sheer contingency' of any sociopolitical system as that which lacks no natural law or order. Thus a social order must be produced and this is what Rancière refers to as 'the police,' a term that, according to Read, denotes 'a particular sensible ordering of bodies, roles, places, identities, and functions.' The police, according to Rancière, allocate ways of 'doing,' of 'being' and 'saying,' it defines an order of the 'visible and sayable.' We are here reminded of Foucault's difficult and enigmatic relation (or non-relation) between the articulable and the visible (between strata of knowledge functioning in relations of power). Or as Deleuze puts it, in Foucault knowledge is defined by 'the combinations of visible and articulable that are unique to each historical formulation'; and as such, 'knowledge is a *practical assemblage*, a *mechanism* of statements and visibilities.'⁹ According to Read, politics (in Rancière) does not derive from the governing of life through rules and regulations, but is 'antagonistic' to these very structures and is linked to the process of 'testing the contingency of equality.' Politics 'happens' as a relational process, its enactment of statements and visibilities demarks the horizon where, one might say, act and potency (action and potential) converge and simultaneously disperse, disseminate, and disappear.

In speaking of potentiality in relation to time, the present, or, as with the above, the 'absence of presence,' the contribution by Boris Groys, 'Comrades of Time,' takes a different tack. In his paper, Groys puts forward an argument on the meaning of the term 'contemporary' in respect to time-based art (primarily in video and cinema). If modernity understood time as productive (stable in respect to a past-future axis) our contemporary time, Groys suggest, would be seen through these filters as unproductive (without historical perspective) 'wasted time.' Looking at this otherwise, as 'excess time,' Groys offers another perspective. If excess time is seen as suspended and delayed, in fact, the postponement of time, 'it is precisely because such a wasted, suspended, non-historical time cannot be accumulated and absorbed by its product that it can be repeated.' Touching on

⁸ Giorgio Agamben, **Potentialities: Collected Essays in Philosophy**, translated by Daniel Heller-Roazen (Stanford: Stanford University Press, 1999).

⁹ Gilles Deleuze, **Foucault**, translated by Sean Hand (Minneapolis: University of Minnesota Press, 1998). Originally published as **Foucault** (Paris: Les Éditions de Minuit, 1986).

Nietzsche's eternal return of the same and Bataille's excess as modernity's (repressive) ideology of progress (both of which are constituted in repetition), Groys points as well to Deleuze's 'literal repetition' as being 'radically artificial' as a means of 'initiating a rupture in the continuity of life by creating a non-historical excess of time through art.' But the author intends to propose a new way of thinking the term contemporary so as to be 'with time' rather than 'in time.' Suggesting that such art 'ceases to be present, to create the effect of presence – but it also ceases to be "in the present," understood as the uniqueness of the here-and-now. Rather, art begins to document a repetitive, indefinite, maybe even infinite present – a present that was always, already there, and can be prolonged into the indefinite future.'

Groys also points to the advent of mass communication networks (Facebook, MySpace, YouTube, Twitter, and so forth) as means of distribution through which 'contemporary art has today become a mass-cultural practice.' Of course, Benjamin posed this similarly with the advent of the media of 'the daily press' in which 'at any moment the reader is ready to turn into the writer.'¹⁰ However, the point here does not hinge on earlier critiques on the status of the author, but on a more contemporary distinction, which Groys reconfigures under the classical terms of *vita activa* (the predilection toward speed and movement as found in the modernist mentality precisely during the conception of film) and *vita contemplative* (with its roots in ancient philosophy, typically understood as a passive spectatorship), whereby he argues that if there is still a society of spectacle today (Debord), 'then it seems to be a spectacle without spectators.' The notion *vita contemplative* here is situated in relation to the spectator who is permanently active. Potentiality here lies in temporal formulations (as location as such is inaccessible) of nomadic movement, which with Virno indicates the absence of univocal actions in the presence of a perpetual stream of stimuli. Time-based art, he concludes, eradicates the distance between the active and the contemplative (time-based art transforms into art-based time).¹¹ This collapse of what we here might refer to respectively as the bios and nous, offers an example of how cultural plasticity operates by creating new modes of intensive temporalities. This point, as well as others raised in Groys might well be read against John Rajchman's contribution, in 'The Noo-Sensorium' section.

The brain has its potentiality embedded into its neuroplasticity and its static living appendages, its neurons, dendrites and synaptic entities as well as its dynamic and oscillatory potentials. As we will see, these are flexible entities and are sculpted and complexified by the world we interact with. This is done in the context of a genetically prescribed unfolding narrative responding to events both inside and outside of our intellectual grasp. Put simply, the neurobiologist Marcus Jacobson defined neural plasticity as a process through which the nervous system adjusts to changes in the internal and external milieus.¹²

Central to this discussion we have included an edited (abridged) version of a seminal paper by Steven Quartz and Terrance Sejnowski, 'The Neural Basis of Cognitive Development' (1997). This paper provides an account of 'neural constructivism' in terms of the 'dynamic interaction between neural growth mechanisms and environmentally derived neural activity.' Quartz and Sejnowski show how this relationship (between neural development and environment) provides for a dynamic and flexible form of learning identified as 'constructive learning.' Their constructivist model posits 'progressive growth' against that of the selectionist model (selective induction) which emphasizes 'regressive mechanisms.' By this they offer a way of understanding the complexity (and interactivity) of the brain as it becomes dependent on the environment as something other than what has been preconditioned or prescriptive (Edelman) by its neurobiological architecture. 'Our view is that the human brain's development is a prolonged period in which environmental structure shapes the brain activity that in turn builds the circuits underlying thought. In place of pre-wired modules, patterned activity builds up increasingly complex circuits, with areas staging their development.' For Quartz and Sejnowski, the environment is understood as active, dynamic and non-stationary. They suggest that while 'most natural systems are only confronted with ecological change, human cognition requires highly flexible and adaptive representations to accommodate both cultural and technological innovations. We see similar issues at work in Virno's paper and Neidich, in his own contribution, finds a middle ground through which to bind Neural Constructivism to Neural Darwinism together as a unified concept with which to explore how are networked environment in its intensity might affect the functional status of the brain's complex rhythmicity.

In his paper 'Metastable Mind,' Scott Kelso offers a reading from the perspective of brain science developed through his studies on what he refers to as 'coordination dynamics.' 'Coordination dynamics deals specifically with *informationally* coupled, self-organizing systems, where information is meaningful and specific to coordination tasks and functions: *functional information*.' Kelso poses that, in disciplines as diverse as physics and philosophy, it appears that thinking sits most comfortably in dualisms and binary (dialectic) oppositions. These contrary states are easily grasped by the structural logics contained in most epistemological systems. Much harder to grasp, Kelso suggests, is the notion that 'contraries are complementary.' Kelso puts forward the model of 'metastability' as, among other things, a new conception of brain organization; one that reduces hierarchical couplings between 'the parts of a complex system while allowing them to retain their individuality.' A theory that allows for both local ('segregative') and global ('interactive') processes to coexist as opposed to conflict. It is not possible to recount the scientific basis and nuances of his specific argument here; however, it is important to note that in many ways this argument accounts for an understanding of brain functions in a manner that contributes much to the Deleuzian account of a 'difference that makes a difference.' Particularly relevant in this regard would be the

¹⁰ Benjamin, 'The Work of Art in the Age of Mechanical Reproduction,' 224.

¹¹ In his contribution, Groys also deliberates on the distinction between what Marshall McLuhan termed 'hot and cool' media. In so doing he offers a twist to how the Internet (and other such hyper-media) might be situated in terms of a new form of 'cool contemplation,' which could be read against Andreas Angelidakis' contribution in the third section of this volume.

¹² Marcus Jacobson, *Developmental Neurobiology* (New York: Plenum Press, 1991), 26.

manner in which Kelso discusses time (dwell time and phase dynamics) in terms of persistence, distribution, and destabilizations that intricately ‘switch,’ or in the terms offered above, we might say modulate. As Kelso has written elsewhere, metastable coordination dynamics ‘also rationalizes William James’s beautiful metaphor of the stream of consciousness as the flight of a bird whose life journey consists of “perchings” ... and “flights” ... Both tendencies appear to be crucial: the former to summon and create thoughts, the latter to release individual brain areas to participate in other acts of cognition, emotion and action.’¹³

Epigenic Reconfigurations If plasticity can be understood as a state of having multiple possibilities, epigenesis is here understood in broad terms as the process through which select possibilities are made stable within a given context. Put otherwise, if plasticity is generally understood as an underlying property of the brain, epigenesis constitutes the process through which this property is reconfigured. Following, for instance, Gerald Edelman, the brain that one is born with, with its neural plastic potential, may become sculpted through a process of ‘neuronal group selection’ by existing environmental contingencies. Parallel to this, yet from a different perspective, as we saw above with Quartz and Sejnowski, is the ‘neural constructivist’ approach. Both of which delineate the ways and means by which neural biological matter might be organized through epigenesis by the man-made milieu (meaning nature is open, possessing varied biological propensities).

In other words, if the previous section concerned the conditions of the brain and mind at birth as a reservoir of potential; this section addresses a becoming brain that can through the forces of epigenesis be sculpted by the world. Here we deliberate on a world transformed from one of a natural kind to that of a cultural kind. Of course, culture is continuously transforming; and both philosophy and architecture mirror and engender many of these changes.

In thinking on the effects of the environment on the brain, Bruce Wexler, in ‘Shaping the Environments that Shape our Brains: A Long Term Perspective,’ offers a scientific contribution that is equally accessible by the more theory-situated reader. Sensory input provided by the environment (cultural and biological) generate complex ensembles of systems and functions that form brain and human activity. ‘Psychological processes and cognitive operations like perception, memory and thinking are properties of these ensembles and functional systems.’ Information, how it is processed and stored in culture through dynamic distributions of artifacts and institutions, takes on an importance equal to, if not greater than (at least in terms of rapidity, incrementality, and variability) biological processes stored in stable sequences (such as DNA molecules). Neuroplasticity, accordingly, provides a key function with respect to the evolution of the human brain both within an individual lifetime and during the evolution of the species over time. The potential of neuroplasticity (and the neurochemical mechanisms that

support it) also indicates the adaptive function of neurons to supplement selective processes (for instance the rerouting of visual with auditory input in the auditory cortex). Taken to an extreme, in aesthetic theory, this phenomenon is related to what is referred to as synesthesia. Wexler will, however, focus more closely on the human rearing environment in order to make his claims about the significance of cultural environments, in other words, the influences of a more localized environment on the evolution of human behavior as man incorporates, transforms, and extends his modalities of thinking and doing. Thus within a neuroscientific perspective we should grasp that ‘environment-induced neural activation shapes brain development to be consistent with the largely human-made environment.’ Here we are speaking directly of the matter that makes up the human sociocultural environment – music, architecture, art, media, and language, as well as political, social, and cultural institutions.

In addressing the emergence of cities, Wexler identifies ‘population density, increased leisure, role specialization and increasingly complex social organization’ as critical factors that fundamentally altered relationships between people and the physical environment (significantly altering the ‘rearing environment’ so crucial to the evolutionary capacity of the brain). He also points to the powerful shift that took place due to the advent of symbolic systems, which extended human memory and broke down the barrier between internal states and external manifestations of those states. Foucault, too, had pointed to the moment where life was introduced into history as the moment that economy, originally understood as the governing of families, and politics, or the governing of peoples, became intertwined forming new *dispositifs* of bio-power.¹⁴ And although he does not speak on this directly, Wexler also points to commerce as an influence that allows new forms of highly stable communities to emerge. In urban studies, for instance, against the long-held perspective that finds cities emerging out of the shift from hunter-gatherer communities to the cultivation of agrarian societies – primarily a Marxist archeology approach arguing the impact of (agricultural) surplus value (in V. Gordon Childe, for instance) – there are also those who find the development of nomadic migration and trade routes to be the critical factor in the formulation of cities (Jane Jacobs, for instance). In other words, cities do not emerge only as an agglomeration of their natural surroundings, but are a product of networks of complex resources and activities by which we understand a dynamics of mobility as highly relevant to the generation of constellations of exchange (economic, social, cultural, and political). Later developments (whether artisanal, manufacturing, industrial, or post-industrial) only served to establish cities as more intensified seats of material and immaterial production further extending the complexities of these networks of organization. Of course, this very schematic sketch does nothing to explain the more significant relationship between the formation of cities and formulation of societies. But, it is possible that there remain insights into these histories as they relate to the evolutions (and revolutions) of urban models through the filters of cognitive architecture.

¹³ In Kelso ‘perchings’ are viewed as ‘phase gathering, integrative tendencies,’ while ‘flights’ are understood as ‘phase scattering, segregative tendencies.’ See: J.A. Scott Kelso, ‘An Essay on Understanding the Mind,’ *Ecological Psychology*, 20:2 (2008): 180-208.

¹⁴ See: Maurizio Lazzarato, ‘From Biopower to Biopolitics,’ *Tailoring Biotechnologies 2* (2006): 11-20.

Regarding the general concerns of this section, it must be said that questions pertaining to the brain – its function, structure, relation to cognition and, of course, mind – are as old as philosophy itself. And if epigenesis can be broadly understood as the unfolding development in an organism, we have also taken this to indicate the unfolding of developments (specific histories) in thinking about matters of brain and as situated within certain philosophical, psychological, and neuroscientific perspectives on such things as cognition, mind, intellect, and self.

For instance, John Protevi, engages intricately with Wexler's work, here specifically his book *Brain and Culture*. In 'Deleuze and Wexler: Thinking Brain, Body, and Affect in Social Context,' Protevi provides a reading of Wexler in relation to the '4EA' approach (embodied, embedded, enactive, extended, affective). However, the primary focus of this contribution is to extend Wexler's arguments within the philosophical framework (thought models) of Gilles Deleuze. Protevi's focus is on three areas or conceptual underpinnings, which he finds particularly relevant to the concerns of this volume: 'an ontology of distributed and differential systems' as found in the notion of the virtual; the idea of 'multiple subjectification practices,' as opposed to an abstracted subject ('the' subject) as typically addressed in 'embodied mind' theories; and a recasting of the notion of affect into a thematizing of 'political affect.' The three are, of course, interwoven into the text; thus the entire paper can be read as a 'radical relationality' – a term Protevi utilizes in describing Wexler's work.

Much like Protevi, Charles Wolfe has also developed a highly specialized argument on the brain, which he points to as the 'social turn' in the past one to two decades in, for instance, theories of cognition. In 'From Spinoza to the Socialist Cortex: Steps Toward the Social Brain,' Wolfe traces a specific philosophical history of the brain that runs seamlessly through a network of relations from Spinoza and Marx to early Soviet neuropsychologists Lev Vygotsky and Alexander Luria, to the more recent European philosophies of Deleuze, Virno, and Toni Negri. In Wolfe this trajectory situates thinking regarding the brain within its sociopolitical framework and naturalistic aspects of development (forming a unique materialist perspective), which the author will describe as the 'Spinozist Brain.' The author briefly addresses the idea of an individual or individuated subject, but his focus is not the importance of inter-relationality between persons in a collective or 'common' environment. Communication on this account is not merely the transferring of information, but what would be understood as the 'affective dimension' of communication. Throughout this reading we are led to understand that the social (sociability) qualities of our mental being are considered a fundamental property of the brain. 'Exactly as a contemporary practitioner of "social" or "affective" neuroscience might have it,' Wolfe writes, 'the passions are not properties of an essential human nature, or an isolated individual, but rather of a relational spectrum between a plurality of individuals. Instead of Descartes' *cogito ergo sum*, Spinoza says *homo cogitat*, "man

thinks": there is no foundational self, but always a process – a network.' This is reminiscent of Bergson's formulation that 'consciousness *is*' as set against the Husserlian formulation that consciousness is always 'consciousness *of* something.' In other words, as Spinoza does not require an internal correlate (in the form of 'I') neither does Bergson require an external correlate (in the form of a 'thing.') These are externalist and relational concepts, which Wolfe will develop in some depth.

In 'Other Minds, Other Brains, Other Worlds,' Patrick Healy delivers an erudite reading of ancient discourses surrounding debates on mind and world primarily through the problem of language (speech) in relation to cognitive functions as they pose an account of intelligibility. He begins with an account of Merleau-Ponty's analysis of the structure of behavior which, he argues, provides an account of the ontological claims of understanding man's fundamental engagement with the problem of meaning as something other than functionally embedded codes and operational significations: 'Expression does not mirror an already given order,' Healy writes, 'but shapes and creates even as it is situated in the complex field of relations which are meaning-laden.' Healy argues that the philosophy of expression should be read – against methodological behaviorism and neo-Darwinian functionalism – as having direct implications for understanding the organization of the human nervous system. Healy further argues that, man is not defined by 'his capacity to create a second nature, economic, social or cultural – beyond biological nature, it is rather the capacity of going beyond created structures in order to create others.'

The real work of this contribution turns on Healy's Socratic reflections (and pre-Socratic thinking) as he carries the reader along a dialogic journey through a greatly neglected set of literary sources disclosing a complex history of thinking on the problem of thinking ('thinkery'). Living, dynamic speech and public enactment here open a different reading of nature and meaning in the Ancients. 'Talking is the searching murmur, the obscure enactment of ontic difference. It moves in difference, and remains open simply through its own activity.' Thus, against the reproduction of the already given, speech produces 'excess' (indeterminate, ambiguous), required for innovative production.

The papers in this section all, in one manner or another, open up questions on the formulation of self and in 'Designing the Lifeworld: Selfhood and Architecture from a Critical Neuroscience Perspective,' the authors, Lukas Ebensperger, Suparna Choudhury and Jan Slaby, address architecture in relation to ontologically driven formations of selfhood: 'architecture as an object (*objectum*) that materially opposes us, us as beings that are subjects – plastic, mimetic beings that are *sub-jected* to the structures imposed by architecture.' The authors sketch two contrasting models that have served to configure our possible experience of architecture. The first, being the

imposition of a geometric idealization of space that afforded all objects a location (measureable, fixed, controllable), whereby location becomes an ‘external property, projected onto and defined via a system of coordinates’ – the ‘geometric-mathematical predetermination of ontology.’ The second, being the phenomenological perspective that develops notions of space and time as directly derived from experience – with all its (internalized) quotidian practices. The point of this paper, however, is not to trace well-known perspectives on theories of architecture, but to examine how such empirical fascinations and ontologically driven matters contribute to our experience (not merely our understanding) of architecture as it relates to the formulation of selfhood. A question that remains central to many urban theorists as well. Architecture, the authors suggest, ‘shapes our existential-space, out of which we formulate our self-understanding’ – a proposition that they develop in some depth throughout the paper.

Importantly, Ebensperger, Choudhury and Slaby also point to studies in architecture and design that have leaned heavily on principles of environmental behaviorism, empirical and psychological studies, they suggest, which have no need to lean on the sciences that study the brain. Thus, they posit the question, why does the brain matter? Although they do not develop this observation, I have noted it here as it points to an earlier interest (ca. 1970s) in architecture and urban research that sought to illicit so-called positive behaviors of people(s) as a legitimate domain of design practice. Social engineering (planning practices similar to those discussed in Lazzarato, Tarde, Foucault, and Lefebvre, among others), hegemonic exertions, in fact, of what constituted a ‘good society.’ In relation to our concerns here, this can be seen as an example of a practice that sought to capture and reproduce (through biopolitical means) a homogeneous and well ‘disciplined’ society. However, the most insightful critique on architecture and urban practice launched by this trio warns that current discourses and practices adopting a ‘neuroarchitecture’ label tend to ‘prioritize ‘biologistic- and neuronally-reductionist descriptions’ of subject/object ontologies. Focusing on the ANFA (Academy of Neuroscience for Architecture), they suggest that there is danger in placing too much faith in neuroscience as a foundational approach to architecture as it validates the speculative claim that neuroscience has a privileged access to human nature. In other words, according to the authors, these (too facile) approaches somehow conflate ‘selfhood’ and ‘brainhood.’ We, too, believe in remaining wary of disciplines that install a technoscientific (‘reifying and objectifying’), or positivist outlook on the ‘quest for a satisfactory formulation of selfhood’; which, the authors of ‘Designing the Lifeworld’ contend, ‘remains at the core of every existentially relevant philosophy.’

Administering Attention Language and culture are powerful immaterial and material forces in the sculpting and administration of both experience and cognitive responses. Lazzarato identifies memory and attention as the key

components in understanding how noopower exerts force in societies of control. Here we find that it is the incorporeal dimension of bodies that are now fixed in the crosshairs of the forces (acting on forces) of our contemporary life-world.

We might also consider how institutions and organizations concerned with the exertion of power deploy means (in tertiary economies) to hype up selective nodes of information that accentuate administrative power over not only attention and memory, but also desire. Of course there is also a well-instantiated practice that puts these theories to work, I am speaking naturally of what is currently understood as the ‘attention economy.’ Consider, for instance, how commodities are now linked together as branded networks that intensify their desired quotient. The so-called ‘global market place’ now generates powerful and complex networks of attention that further define both political and aesthetic regimes.

And yet, equally, we can no longer speak solely within the rubrics of immaterial labor, and neither within that of the so-called ‘general intellect.’ Perhaps from the neuroscience perspective, with Kelso: ‘Active, dynamic processes like “perceiving,” “attending,” “remembering,” and “deciding,” that are associated with the word *thinking* are not restricted to particular brain locations but rather emerge as patterns of interaction among widely distributed neural ensembles and in general between human beings and their worlds.’¹⁵

Throughout this section we find discussions on attention framed within terms relating to the principle of motion/rest and time-space: dynamic processes, static states, properties, qualities, successions, simultaneities, hesitations, tendencies, intensities, potentials, propensities, etcetera. Of course, the reader will recognize the direction this very partial lexicon begins to take, although the meaning of terms (any term whatsoever) is in itself not what is relevant here. The point to be made is the importance of the relationality (perhaps, ‘radical relationality’) such terms articulate with respect to spatiotemporal predicates and organizations. For instance, Keller Easterling, in her paper ‘Disposition’ (another such term), unfolds a multiplicity of relations between the active form and inactive potential of this highly nuanced term. Disposition, she suggests, ‘locates activity, not in movement, but in relationship or relative position,’ in other words, it is ‘a relationship of potentials.’ This discourse implicates modes of change, and for our purposes here we might also say that it acts through (differential) modulations of perception, habit, memory and attention. Noopolitics, Easterling suggests, can be found in ‘interior virtual territory as well as exterior physical territory. For instance, ideation and habit of mind project scripts onto the urban sphere, and the interactions between these scripts and urban infrastructures gradually author the city.’ The author carries this discussion through the work of such thinkers as Gilbert Ryle, Bruno Latour and Gregory Bateson. Ryle describes disposition as a latent or inherent property of both materials and intentions, Latour retools social science techniques to account for the ever-unfolding

dispositional nature of sociotechnical networks. Bateson, perhaps most overtly landing in the noopolitical territory, posited the cybernetic model as a means to create equilibrium amid violent tensions in the mind, the group and the larger political scene.' In Bateson, disposition is a behavioral property inherent in groups. Although Easterling does not take up a direct discussion on attention per se, her paper turns on a similar leaning-towards, or being drawn-to, of both active and inactive forms and forces within the contemporary spatiotemporal 'scripting' of noopolitical organizations.

As Easterling, a practicing architect and theorist, provides an account of disposition in loose relation to variant activities potentially enacted upon the city, so too does Elie During, a philosopher, provide an account of certain spatiotemporal conditions impacting contemporary forms of life and living in contemporary cities. In 'Loose Coexistence: Technologies of Attention in the Age of the Post-Metropolis,' During suggests that new technologies of information and communication have erupted into new and unprecedented regimes of attention, which in turn generate new forms of spatiotemporal organizations inseparable from those affecting contemporary urban life. Of course the 'post'-metropolis expands on early theories of the metropolis as found in the writings of such thinkers as Simmel, Kracauer, and Benjamin as well as figures such as Baudelaire's *flâneur*. The author points to various themes that emerged due to the conditions of the early metropolis, such as 'shock,' 'fragmentation,' 'hyperstimulation,' and 'disassociation.' During recognizes this as a pathology commonly attributed to those who dwell in large urban centers and likened often to 'sheer neurasthenia,' he notes Simmel's correlation between 'hyperesthesia and latitude,' resulting in some cases as a 'dulling of sensitive skills.' It is easily imaginable that each reader of this volume will have his or her own associative memories paralleling these critiques of almost one hundred years ago.

However, the focus of this paper does not linger in the past, as the author turns his attention to the mechanisms such conditions trigger within man's perceptive skills, developing means with which to process the affects of such things on overstimulation within a regime of attention and its necessary correlate, inattention. The term 'distraction' here has become the catch phrase for all the misgivings associated with technologies of information and communication – from broadcasting to telecommunications, Internet interfaces and digital devices in all their major and minor keys. But During suggest that new forms of distributed attention (as neither 'scattered' nor 'diffused'), 'better suits the new figure of the *flâneur* emerging from the context of ubiquitous technologies.' Clearly, the spatiotemporal logic of these new environments, whether in the screen space of our personal computers or maneuvering the city, needs to be thought on new terrain. In so doing the author argues convincingly that discourses that overemphasize the nature of speed – immediacy of forces acting on mental states and perceptual awareness –

have distorted concepts of coexistence and simultaneity, now an issue of some importance for both theories and practices concerned with spatial and temporal interconnectedness. During argues that there is no such thing as instantaneous action at a distance, not, that is, for living, embodied subjects. That it is not only a sense of connectedness, that our hyper-networked era achieves, but equally produces 'specific forms of desynchronization and disconnection.' Attention then becomes a matter of an individual's ability to organize her own dispersion. Notions such as split attention and distributed attention, rather than distraction, better estimate the 'polyphonic immersion' of the contemporary subject within the material and immaterial fabric and forces of coexistence within urban life and urban form.

Theories on the urban today turn as equally on the concept of dynamic action as the idea of static form. In fact, while most contributions to this volume have implicitly taken on the task of thinking toward what we refer to as cognitive architecture, in Blackman and Harbord we find explicit articulation on one of its possible contours. In 'Technologies of mediation and the affective,' Lisa Blackman and Jane Harbord discuss attention, or the remaking of attention, within 'the paradigm of co-enaction, co-constitution and co-evolution,' within the relation between actors and agents and the built environments that they both populate and invent. Addressing new technologies of information and communication the authors point to the rising development of so-called media cities – dedicated developments 'more precise and precisely designed than the global city and more tactile and fluid than the modernist city' – explored through a case-study of MediacityUK. The authors suggest that through the entangling of both ambient communication and digital technologies the *place* in a media city is at once virtual and actual, which leads them to investigate the distinction between the concepts of media and mediation. The latter possesses virtual potential, and more directly suggests informational processes and better identifies somatic experiences in affective as well as cognitive relations. As with During, Blackman and Harbord point to the problem of attention as arising in the late nineteenth century 'tied to the problem of how a subject maintains a coherent and practical sense of the world' (here citing Jonathan Crary). Yet the notion on which this paper critically turns is that of memory, which the authors develop extensively in such terms as trans-subjective, co-enacted, co-emergent, and post-memory. The dynamic transmission of memory is more *affective* than cognitive, and it is through the discussion on memory, the authors argue, that it is possible to 'consider questions of affect, bodies' and the task of 're-thinking and re-modeling sensation, perception, memory, attention, listening, and emotion – what we understand as cognitive architecture.'

Henri Bergson once wrote that the brain does not so much have thinking as its primary function, 'but that of hindering the thought from becoming lost in dream,' and as such the brain is seen as

‘the organ of *attention to life*.’¹⁶ The state of dreaming, like that of distraction as discussed in *During*, also has another interpretation when read directly from a cognitive neuroscience perspective. As the title indicates, in ‘The Industrious Subject: Cognitive Neuroscience’s Revaluation of Rest’ the authors, Felicity Callard and Daniel Margulies, will explore the other side of attention, that is, what happens in the mind when it is in a so-called state of ‘rest.’ True to the aims of this volume, the authors begin by situating their own highly specialized concerns within a broader theoretical context. Sketching upon well-founded discourse regarding the knowledge economy (knowledge commodity *pace* Harvey), and following Virno’s account of post-Fordism as it eradicates all distinction between labor and non-labor time, the authors write: ‘Labor-time now draws upon, indeed depends upon, the life of the mind.’ But the work of these authors is not to reiterate theories founded in philosophy, the social sciences and such, in fact they issue a small (albeit respectful) challenge to move beyond ‘generic abstractions’ in an attempt to ‘explicate the history and scope of terms and constructs that indicate humans’ “cognitive capacities.” Thus, under the ‘rubric of cognitive productivity,’ they open the discussion (within the framework of neuroscience) on the brain during ‘activation’ versus when at ‘rest.’ With this we are led to understand that, here too, such distinctions remain perched upon a certain valorization of assiduousness over idleness. Even daydreaming, distraction, and the pale thoughts that accompany idle imagination, it seems, cannot escape attempts to be harnessed by capitalism’s modes of production (a point similarly taken up in the final section).

Callard and Margulies deliver a faceted and succinct genealogy of ‘rest state’ research as it emerged in debates surrounding the cognitive neurosciences over the past decade, suggesting that the studies on ‘rest’ have now developed their vocabulary so significantly that they are ‘primed for a neuroscientific reframing of inner mental life.’ The careful steps taken by these authors need not be summarized here. But I would like to highlight a few key points. First, the authors convincingly argue that resting state research has significant implications for advancing our theoretical understandings of self and subjectivity. For instance, they show how research in cognitive psychology re-conceptualized understandings of the default mode, leading to hypotheses on such things as the ‘future-oriented’ nature of the resting brain, the importance of ‘stimulus independent,’ ‘mind wandering’ and ‘*Self-related processing, episodic memory, social cognition, and sense of agency*.’ The default mode function subsumed in what would emerge as a default mode network. Inattention, it seems, may indeed be very creative (as Virno too has suggested), certainly it needs to be reconsidered on new grounds. The authors suggest that the research carried out, advancing understanding of ‘rest,’ also points to a possible reorientation of thought models within the humanities and social sciences in theorizing a notion of self in respect to non-purposeful (non-deliberate) activity. They write: ‘It is our contention that through the reconfiguration of

rest, the resting brain has been territorialized: it is conceptualized and materialized as a matrix that is constituted as perpetually productive, as intrinsically creative, and as thrown toward the future.’ This further extrapolates to possible reconfigurations of our understanding of memory. Through such things as ‘mind wandering,’ daydreaming, or the otherwise heretofore perceived ‘aimless’ journeys of the mind, memories themselves become created. Memories are not memories of perceptions, or mere recollections of events; their purpose may well be, ‘less for leisured reminiscing ... and more as a knowledge-base that guides our lives in an increasingly formed manner’ (authors here citing William James). We are no longer in the domain of Proust’s *mémoire involuntaire*; but, I would like to suggest perhaps still in that of Bergson’s *mémoire pure* with its intimate relation to the present.¹⁷

The modernist tendency to see distraction, absentmindedness and the like as opposed to attention is suffuse, and as *During* also shows, today this opposition very much still holds. However, we also now find that ‘network brain activity “at rest” is mapped on to the psychological category of attention, such that attention’s opposite no longer exists.’ Yet, concerns over capitalism’s desire to harness all forms of creativity in cognitive capital might give us pause. And the authors, too, raise the concern that ‘uncovering the mystery of the resting state might also be the moment in which its mystery is colonized.’ And in conclusion the authors remind us that ‘resting-state research demands exploring whether such research contributes to the bolstering or to the degradation of the creative capabilities of human subjects.’ It is impossible not to agree with the authors when they suggest that their colleagues in the humanities and social sciences might well have something here to learn

The Noo-Sensorium The implications of questions on the nature of such things as sensation, affect, perception, memory, and experience may once have sat comfortably in the categories of vitalist and aesthetic philosophy, yet today they extend to the neurosciences and economic and political theory as well. This section was earlier titled ‘the governing of the senses’ – owing to ‘the distribution of the Sensible’ following Rancière, whereby politics and arts construct ‘material rearrangements of signs and images’ producing real effects that define ‘variations of sensible intensities, perceptions and the abilities of bodies.’¹⁸ However, once the issue of individuality and commonality are set against notions of the bios and nous in all their permutations, matters of materiality come under fire affecting the logics of perception and experience. As with the section on plasticity, the capacity of art and architecture to generate new modes of temporalities is crucial to understanding what we here term the ‘noo-sensorium.’ Here we are no longer dealing with the sensorium as the sum of perception seated in sensation and focused on space or the relation to objects (visual or haptic), nor on traditional modes of aesthetic representation. Time now becomes the horizon on which the contours of perception, experience, memory, and sensation are traced.

¹⁶ Henri Bergson, *The Creative Mind*, trans. Mabelle L. Andison (New York: Carol Publishing, 1992 [1941]), 74.

¹⁷ I have addressed Benjamin’s account of Bergson and Proust in: ‘The Past which Is: The Present that Was,’ in *Cities in Transition*, ed. D. Hauptmann (Rotterdam: 010 Publishers, 2000).

¹⁸ Jacques Rancière, *The Politics of Aesthetics* (New York: Continuum, 2004).

Time-technologies as apparatuses and social machines reconstitute sensibilia through both affective and intellectual processes. We wish to consider not only the processing of data (immediate and mediated) in relation to the body (active/reactive), as such, but also the processing of data within a mind that is increasingly directed toward the future (active/prognosticating).

This was touched upon in the description of Callard and Margulies above, in referring to the way we now construct memories during states of 'rest' – not memories *of* perceptions, but memories *forming* perceptions. Or, as one neuropsychologist has put it: 'To conjure up an internal representation of the future, the brain must have an ability to take certain elements of prior experience and reconfigure them in a way that in its totality does not correspond to any actual past experience. The ability to manipulate and recombine internal representation critically depends on the prefrontal cortex and the emergence of this ability parallels the evolution of the frontal lobes.'¹⁹

David Cronenberg's 1999 film *eXistenZ* mapped the new technologies of information and communication upon biotechnologies giving us a futuristic projection of an intensive virtuality immersed in a fully sensorial environment. This *novum*, 'the interface of the human psyche with bioelectronic devices, is a sort of analogue to Freud's notion of drive (*Trieb*) ... conceived as an entity bridging the mental and the somatic, the interface of mind and body,' producing, in fact, a 'psychic reality.'²⁰ If *eXistenZ* can be seen as an example of a cultural *bio*-imaginary, then the more recent example of Christopher Nolan's 2010 film *Inception* exemplifies the current *noo*-imaginary. *Inception* conceives of neuro-technologies capable of remapping minds within minds, dream convergences, constructions of perceptual and sensorial realities within a scripted landscape of neuroarchitecture, leading ultimately to the fabrication of memory. The concept of minds acting on minds (action at a distance) resonates. One final distinction remains relevant. While *eXistenZ* takes its impetus from virtual models of gaming (play), *Inception* projects a new form of corporate espionage and thus situates directly upon noopower in the *dispositif* of cognitive capitalism.

These examples only serve as a glimmer to indicate the cultural imaginary at work. The real work of cinematic analysis, the theories and arguments to help us conceive and understand the noo-sensorium, are seen in the first two contributions to this section.

We have opted to include John Rajchman's well-known paper, 'Deleuze's Time, or How the Cinematic Changes Our Idea of Art.' This contribution begins with a reminder that there are times when our thoughts and ideas can no longer be held in old thought models, when new constellations arise in which 'upheavals in sensibilities' call for an entirely 'new image of thought,'²¹ and in taking up his work on cinema Deleuze sought to address mutations occurring in society in relation

to images, to space and time, and pace. Time, as Deleuze too points out, that no longer can be grasped as succession; space no longer held by simultaneity. Memory too, will come under reconsideration as something other, something more, than mere recollection or the draw toward remembrance. Though we do not here see the disposition to the future as discussed just above, there is a multivalent present. In Rajchman's rendering of Deleuze, sensibilia, refracted through Kant, become freed from schematic links to understanding, releasing them to artistic 'experimentation or invention.' Of course, for Deleuze there is a meaningful correlation between the terms experiment and experience.

Cinematic sensibilia emerge from the problematic relation between psychology and the image; 'images' here are not understood as inner representations located or held in our brains or minds, they are related instead to the new questions explored in neurology and psychology. And as Deleuze's work on cinema left off in the mid-1980s, the question of how to extend his thinking further in light of new developments remains one that Rajchman takes up in discussion on the visual arts. Architecture here comes into play as new spatiotemporal experiences of movement within time-images: 'The cinema hall or gallery is "architecture", just when architecture itself is seen in terms of a given *dispositif* – the darkened room itself deriving from a theatrical *dispositive* transformed by opera, the first modern mass form.' The above reference to Benjamin on the manner in which technologies and media of mass production transform our very possibilities of experience is fundamental here. But the comparison runs deep, for we are not merely addressing transformations affecting architecture, cinema and art; but shifts within sensorial registers that are not yet internalized in human perception. Jameson's appraisal of architecture (inaccessible to perception) reverberates. Rajchman points too a problem with respect to the audience, a problem which 'Deleuze associates a problem with "thinking with cinema" – and, in a singular way, thinking with time-image cinema – is that the "the people are missing"; they must yet be invented along with making the film itself.' So too was the conclusion of Benjamin on the public's lack of resonance with lyric poetry in one of his masterworks on Baudelaire.²²

Thus we might say that the noo-sensorium as we are here conceiving it, much like the time horizon it reflects, is always receding before our grasp. Ina Blom also addresses memory, thinking, and the image – the transformative aspect of art as a means to 'govern the senses.' In 'Spectacle versus Cinematic Sociality: Art and the New Media Architecture,' she does not explore the image as

¹⁹ Elkhonon Goldberg, *The Executive Brain: Frontal Lobes and the Civilized Mind* (Cambridge, MA: Oxford University Press, 2001), 25.

²⁰ Teresa de Lauretis, 'Becoming Inorganic,' *Critical Inquiry* (Summer 2003): 547.

²¹ This 'new image of thought' is that which Deleuze and Guattari have termed noology. See, for instance, the section 'Treatise on Nomadology – The War Machine' in *A Thousand Plateaus*, where they write: 'Problem II. Is there a way to extricate thought from the State model? Proposition IV. The exteriority of the war machine is attested to, finally, by noology.'

²² Walter Benjamin, 'Some Motifs in Baudelaire' in *Charles Baudelaire, a lyric poet in the era of high capitalism*, (New York: Verso, [1939] 1997). 'Baudelaire envisaged readers to whom the reading of lyric poetry would present difficulties... if conditions for a positive reception of lyric poetry have become less favorable, it is reasonable to assume that only in rare instances is lyric poetry in rapport with the experience of its readers. This may be due to the change in structure of their experience.'

such, but instead the rejection, the eradication of the image within certain artistic inventions/interventions. Ruptures in time, refusals to capture attention, a refusal at the very site where media imagery is said to confront and shape subjects. Questioning how media interacts with and challenges ‘the conditions for collective creation under an advanced capitalism that engages not just working bodies, but the entire human sensory apparatus – including our capacity for perception, cognition, and thinking.’ Guy Debord’s *Hurlements en faveur de Sade* (1952), an early critique on spectacle – interrogating what had begun to be seen as a radical shift in the structuring of temporalities of individual and social memory, and Tobias Rehberger’s *8r Years* (2002), a prolonged yet a-temporal event – contains infinitesimal whisperings on the chromo-luminescence logic of the senses. These are two examples the author cites as ‘rejections of imagery,’ each attesting to ‘different understandings of the way in which media interact with human perception, and the social and political implications of this interaction.’

Blom suggest that in these works, although they are radically different, we see less of a concern for the ‘production of images and forms than in an interventionist of engagement with the forces that structure our everyday life.’ Many readers will recognize Debord’s social critique of mass media by what would become his moniker – the ‘society of spectacle.’ Here we understand life as no longer authentically lived, but merely sustained through endless representations. Similarly, Rajchman points out that one of Deleuze’s projects was to reinstall ‘life’ in place of the subject or ‘self.’ The spectacle as such structures time and reorganizes memory (a theme we now recognize in many contributions herein). Estrangement in the ‘world picture’ is intensified in the ‘image-world.’ However, if the former, in Heidegger, spoke to an externalization – we cannot enter the picture, but must observe it from the outside; the latter, in Blom’s reading of Debord, speaks to an internalization – we cannot escape the concentration of the gaze, the continuous flow of images that ‘capture both eye and mind, man’s ‘entire cognitive and sensorial apparatus.’

As one might imagine with half a century separating Debord and Rehberger’s works, Rehberger’s reduction of experience works differently. In fact, the author suggests, *8r Years* even seems to pass beside the paradigm of ‘watching’ ... as the ‘nothing to see’ derives here not from the lack of visual events, [but] from the sheer duration of a piece’ that cannot be held within the span of human attention. Time out of joint, indeed. Images, here not as a ‘phenomenon that springs out of subjective imagination,’ but as ‘autonomous material instances’: streams of light and the flow of signals, not meanings. Signalitic material ‘registering a sensation of movement that is impossible for natural perception,’ and yet, producing new ‘sensorial and perceptual effects.’ Blom exemplifies this further with a turn to architecture, or more precisely, an intimate spatiotemporal exchange between a film and a set (not the film-set) by Philippe Parreno and Francois Roche respectively. What the reader will find in her rendering of this work – entitled *Hybrid*

Muscle by the architect and *The Boy from Mars* by the film-maker – is the permeability of succession with simultaneity, two perfectly reiterative material durations. An opening onto ‘time-in-general [is] a form of radical temporalization,’ as Blom suggests, ‘whose only real correlate is the “sense of time” produced in the human brain.’ We might understand this as an example of the permeability between matter and time, between the senses and their new modes of experience as located in the contours of the noo-sensorium. I would like to further recall Benjamin’s conception of the aura as ‘the unique phenomenon of a distance, however close it may be,’ so that today, in the light of our contemporary technology, we might rethink this as the unique consciousness of proximity, however distant it may be.

In his contribution, Jordan Crandall exposes a different reading of proximity and distance, of coordinates (co-ordinations) of spatiotemporal and cognitive-sensorial events. In ‘Movement, Agency, and Sensing: A Performative Theory of the Event,’ Crandall provides us with a virtual lexicon of the terms and conditions within which both human and machinic agency interact, interoperate, inter-immense. A Borgesian taxonomy on technologies of information: networks of networks within networks. Through techniques of tracking, of tracing (codifications of movements), cartographies of surveillance, data-mining, (locationing of agential articulation), sensors, processors, and filters (‘centers of indetermination’), the author unfolds a new continent in thinking the agent as the actor. Or, perhaps I should speak rather of *an* actor in following Deleuze in his conceptualization of ‘a life’ as ‘expressing singularities or events that coexist with the accidents of *the* life that corresponds to it.’²³

There is something at once inhuman and vital²⁴ in Crandall’s reading of agency, of apparatuses and prosthetic devices of extension that both expand and contract human and non-human perception and action into realms that even the imagination is just able to touch. The sensorium in Crandall is related to something other, something much more, than (mere) sensory faculties of animate bodies. Charles Wolfe, in his paper, reminds us that ontology makes no clear-cut distinction between the natural and artificial. And his account of agency in Negri (which he cites as ‘inseparable from ... the “set of prostheses”’), as well as that of ‘scaffolding’ (*pace* Clark among others) could be instructively read in relation to Crandall. Of course, the human body itself ‘can already be understood as a distribution system ... in the case of these distributed cognitive systems, the human is one kind of actor among many others.’ A body, in Deleuze, much like the agent in Crandall, can be most anything; it can be an animal, a body of sounds, a linguistic corpus, a social body; yet, a body must be defined as a unity of parts, parts held together relationally and having a capacity to affect and be affected both internally and externally. But in all the bodies and their actions and interpenetrations, which Deleuze sometimes calls resonance and interference,

²³ Gilles Deleuze, *Two Regimes of Madness* (New York: Semiotext(e) (Foreign Agents Series), 2007), 391. From the essay entitled ‘Immanence: a Life.’ The above excerpt continues with: ‘... but they are not arranged and distributed in the same way. They relate to one another in a completely different way than individuals do. It even seems that a singular life can do without any individuality at all, even without any of the concomitants that individualize it.’ I include this here as a rendering that somehow summarizes the dispositional status of ‘actor’ which we find throughout Crandall’s contribution.

²⁴ These words are taken from Rajchman’s paper, there used to describe an ‘underground element in the kind of time and movement the cinematic image makes visible.’ (Deleuze qua Bergson).

there is also the incorporeal, which for the stoics lies in making a line of separation pass no longer between the sensible and the intelligible.²⁵ Affect, in Crandall's account, is a vitality, a pure potentiality. And further, it is 'an undifferentiated, moving kaleidoscope of sensations and states ... a form of activation that is not necessarily available to the conscious mind, but is shared nonetheless by the synaesthetic perceptual faculties of the body substrate – including the proprioceptive [and] the visceral.' Agency acts through combinatory practices, assemblages 'that span familiar designations and ontological distinctions, and which connect deep into the realms of ... the somatic-sensorial, and the imaginary.'

Bergson's pathology of duration is here echoed in what I would like to call Crandall's pathology of the (performative) event. What actors may become, what new molar organizations take place – that is the concept of organism or machine – depends also on the event as understood by science. In the theory of science as *événementielle*, scientists are more and more concerned with singular events of an incorporeal nature that are effected in bodies, in states of bodies, in completely heterogeneous assemblages. In Crandall there are heterogeneous actors, bodies and the events that pass across irreducible domains, there are lines that shoot between domains – interregnums – and science and technology are part of a new geography of resonances to which the term 'radical relationality' may here well apply.²⁶

The final contribution to this section diverges from the three just discussed. In 'Figure, Discourse: To the Abstract Concretely,' Andrej Radman addresses a fundamental problem within architecture, which is its tendency toward establishing a literal correspondence between ideas and forms. While Crandall discusses the effects of tracking, spatial sensor networks, and manners of coding movement as matters of relevance to urban planning and practices, Radman reminds us that in the hands of the architect such relations of correspondence can too often end in mere mimetic representation. In other words the author argues against isomorphic relations between 'statements and visibilities.' Radman writes: 'Formed materiality (territorialization) and its expressivity (coding) are irreducible and must not be confused with specialized lines of expression.'

Radman will take from J.J. Gibson's 'ecological perception' the importance of the relation between perception and action, as well as from C.S. Peirce regarding the 'centers of indetermination,' where an 'interval between perception and action is inserted' (identified as the brain). The author turns to Brian Massumi who has recently 'cautioned against the military and right-wing monopoly over the "soft power" of *Noopolitik* where perception is targeted not on the level at which actions are decided but on the level at which the very capacity for action is forming.' And further, (Radman quoting Massumi): 'This is a point before "knowability" and "actability" are differentiated from one another. At that point modulation of perception is directly and immediately a change in the parameters of what a body can do.'

In the *Logic of Sense*, Deleuze writes that 'aesthetics suffers from a wrenching duality. On the one hand, it designates the theory of sensibility as the form of possible experience; on the other hand it designates the theory of art as the reflection of real experience.' Radman too refers to the 'logic of sensation,' to Deleuze's turn to the figural in Francis Bacon who turns sensation into the very material of his work. Cézanne, too, took sensation as the basis of his work, and with this believed himself to be impenetrable: beyond the confines of rational thought. As Radman reminds us as well, there is nothing discursive in the practice of architecture. 'The architect too might be said to be in the business of the "distribution of the sensible."'

Radman's paper points to ideas taken up by various contributors to this collection. But in the end his concern returns to the following: 'Knowledge, whether intellectual or intuitive, becomes relative only when the faculty of knowing applies to things it is not made for. Such is the knowledge of life that conceptual intelligence (mechanism) claims to give us; and such was the way we represented matter long ago, with images taken from the world of life (hylozoism).'²⁷ With this passage I have taken the liberty to quote Bergson, however, I am quite certain that the author would well agree.

Capitalism and the Mutating Intellect Here we would like to contend that there is an important distinction to be made between so-called neoliberal economies (global capitalism) and emerging theories on cognitive capitalism. Not that the mental and cognitive were absent in the earlier forms of capitalism, but that the degree to which the mind and the mental are engaged by those power structures and how they have been inflected into the very thought patterns of humans has never been as rigorously pursued or intense. One might add simply that if globalization can be generally said to act to spatially reconfigure our geographic world, then cognitive capital further acts through a reconfiguration of the temporal structures that also serve to mediate such things as memory and attention. We are no longer referring to capitalism solely as a mode of production of material goods and labor nor simply to immaterial labor and goods prevalent in neoliberal economies (and the organizations of power and distribution of intensive networks such production reproduces). But we must now recognize highly complex sets of tangible and intangible forces and factors simultaneously integrated and dispersed in the production of new political-aesthetic cosmologies and socioeconomic ecologies, networks of relations, and subjectivities. These are both empowering and coercive means and distributions of relations of forces – biopower and noopower, operating through and within both biopolitics and noopolitics.

In architecture and urbanism we might point, for instance, to the well-known example of Frank Gehry's Guggenheim Bilbao, not merely as it appears as material form (though iconic, and

²⁵ This reading on the body in Deleuze is extracted from my opening statement in **The Body in Architecture** (Rotterdam: O10 publishers, 2006). If one replaced the term body with actor and the name Deleuze with Crandall, this passage would, with minor exceptions, hold.

²⁶ See previous note, different here, however, is that I have revised my account with respect to Crandall. Four years ago, when I wrote the opening statement for **The Body in Architecture** I recognized that the contributions to the publication did not quite reach to the implications of this statement. Implications that I myself have now only grasped while preparing this volume.

²⁷ Henri Bergson, 'Letter to Harold Höfding,' in Höfding's **La Philosophie de Bergson: Exposé et Critique** (Paris: Editions Alcan, 1917), 163. I have taken the translation from: Henri Bergson, *Key Writings*, eds. K.A. Pearson and J. Mullarkey (New York: Continuum, 2002), 367.

now embedded in cultural memory and imagination); but as it functions as an economic generator of cultural industry (the so called 'Bilbao Effect'), evidencing a direct impact on *ethos*, city and life.

By the 'mutating intellect' we wish to indicate the moving, shifting, and transformative capacity of ideas, or we might say of 'thinking' as opposed to 'thought.' It is not necessarily evolutionary (if evolution implies an ascendance to a more refined or advanced organization); neither do we intend a so-called 'global-mind' or 'universal-consciousness.' Thus we have steered away from the concept of the 'Noosphere' as initiated by Vladimir Verdansky or Teilhard de Chardin (although, as we will see, Yan Boutang utilizes this term to great effect). This does not, of course, mean that the mutated intellect is not based in a collective or commons, in fact it may well loosely approximate the *Ego Sum = Eco Cum* as formulated by Jean-Luc Nancy. And naturally, as the above should have already made clear, we do not consider the notion of intellect as solely belonging to the domain of 'human' thinking, as it transgresses into both natural and artificial agency in all its complex and nuanced permutations. Finally, although none of the papers in this section speak to this concept directly, we understand it as an underlying disposition on which many contributions to this collection lean.

We open this section with a paper that holds particular significance for architecture and urban practice. In 'Mutations in Contemporary Urban Space and the Cognitive Turning Point of Capitalism,' Yan Moulier Boutang presents an insightful reading of the current state of political economy and cognitive capitalism grafted upon the economy of contributions and an ecological argument based upon what he refers to as 'beeconomics,' concluding with a compelling call to urban designers. Situating the discussion of noopolitics primarily upon a reformulation of the 'noosphere,' his opening comments point out that since the scientific turning point that enunciated man's capacity to decimate the globe (identified with Oppenheimer at Los Alamos), what once sat comfortably in the domain of the biosphere shifted to the noosphere: 'The potential of catastrophic actions are both implicit and explicit within the efforts of intellectual activity.'

Both literally and figuratively, Boutang extols the beehive as an exemplary model of a healthy socioeconomic and ecologically viable society. Bee colonies are endangered and the author reminds us that without bees the entire ecosystem will collapse. Literally. He projects the idea of pollination (one of the bee's most fundamental functions) on society. Corresponding to pollination we find the various modes of 'circulation of information, knowledge, affect, and care.' In turn, we might say, this corresponds well to our understanding of noopower. According to Boutang, an information-based society (whether codified or implicit) increasingly relies on intangibles. But, as previously discussed, these immaterialities are reconfiguring the entire socioeconomic system through growing intensities of

diffusion ('networks of networks') at a virtually global scale. The question to ask, the further parallel to be made, is how capitalism can engender 'positive externalities' such as those found in pollination? Positive externalities (negative ones as well) are understood as conditions resulting indirectly from the activity of a primary function. Positive (or negative) spin-offs some might say in a simplified way.

If industrial and mercantile capitalism captured the value of mental effort through such things as patents and copyrights and intellectual property (still belonging to internal models of equivalency); cognitive capitalism has long understood that greater value can be extracted from such 'pollinations' than from material production; opening, in fact, an entirely 'new continent of wealth for capitalist valorization.' Examples such as data mining, information search engines, and on-line networking exemplify new forms of cognitive capitalism that have become apt at capturing externalities. The problem, Boutang points out, is that economics based on market output (relations of equivalencies in their measurable or monetary form) has yet developed a model to correctly value these externalities. 'The noosphere as such can provide criteria or motivations' for such economies.

Borrowing from Karl Polanyi's *The Great Transformation* of 1944 (identifying three fundamentals of market economy in capital, labor, and money), Boutang suggests that there is a 'new' 'great transformation' taking place due to new relations between ownership and property. And with this he turns to the crisis of the city, as such transformations cannot help but have 'great repercussions and impacts on the conception of space (both noosphere and biosphere).' Structures, form, geometric segregations, conventions, order, and hierarchies are discussed, so too the advent of digital techniques, computational repetition and networks – *res extensa* extended. Boutang offers brief glimpses of the history of architecture. 'The complex coexistence of pieces of Euclidian space situated between a global arrhythmic fabric reflects the incorporation of the virtual through digital devices with respect to the way in which the brain works, communicates and lives.' But then, there is the 'chiasmus' of political economy and ecology: a structure that requires urban architecture to fundamentally change. If bee populations are in danger, then so too are human populations, at least if a city is meant to provide a nourishing thriving environment for its inhabitants, equally in danger of bringing about their own collapse. I will not recount the author's arguments, but he seamlessly weaves arguments on the biosphere with matters related to noopolitics, raising the relevance of intangibles such as implicit knowledge – apprenticeship, knowhow, cooperation, trust, and care – in relation to innovation: cognitive capitalism's contribution to renewable urban space.

Of course the terms we use to identify these relatively new configurations, as we will see in many contributions to this volume, must also be held to scrutiny. For instance Callard and Margulies, as well as Ebinsperger, Choudhury and Slaby warn against the tendencies in the humanities and social sciences to appropriate terms and ideas issuing from the neuro and cognitive sciences too

quickly. Here we find not so much a guarding of disciplinary boundaries as an entreatment to grasp the full consequences of the cross-application of terminologies within diverse discursive practices. And, as Gabriel Rockhill will argue, we must also challenge the moniker of ‘globalization’ as a reckless ‘conceptual abbreviation’ that holds everything from economics, politics, society, culture, to technology within its grasp. In ‘A Specter is Haunting Globalization,’ Rockhill argues that the implicit belief that globalization is actually as geographically extended as the term itself implies identifies the distance that exists ‘between words and things.’ Reminding us that if globalization has indeed, as it purports, created a singular world – a unified economic market, world-wide information network, homogenized cultural products, and so forth – then ‘globalization allows us to resist its consequences only if we are already subject to its effects.’ The implications of such a reality (virtual or actual) should be seen to have profound effects on cognitive constructions of self and world. Naturally, globalization cannot be captured as a ‘word,’ or reproduced as a ‘thing,’ as the author argues, it ‘emerges from practices linked to specific schematization of the world, practices that have, moreover, been effective insofar as they have helped produce “the thing” supposedly described by “the word.”’ Biopower and noopower are clearly implicated here.

But it is to the ‘specter of vulgar Marxism’ that Rockhill turns his focus. The ‘supposed adversary of globalization,’ it would seem, unwittingly providing the tenants for its (historical) inevitability. Globalization’s ‘historical center of gravity’ seems indeed to be immense. The consequence of accepting such an inevitability, the author shows, leads to an abandonment of all political and economic responsibility. The invisible hand of the market instantiated from Thatcher’s acclaim of neoliberalism in her ‘There Is No Alternative’ slogan, to Bush’s bail out of the US economy (businesses and institutions that had become too large to be allowed to fail), as well as his non-apologetic hubris that delivered a blow to the US constitution (from the Patriot Act, to illicit wiretapping, the list goes on and on). This, the author sees, as ‘naturalizing the economy and transforming it into an autonomous authority,’ which acting independently of any singular or collective agency has the unfortunate consequence of promoting ‘passive reactivity.’ Rockhill, borrowing from Rancière, speaks of the *idée-force*, which ‘intertwined with political, social, technological, and economic practices ... has played a fundamental role in the imposition of a new world image in which a determinist teleology dictates our destiny.’ And indeed, when any image of thought becomes a ‘world-image’ then we are witnessing the (noopower) effects of an action at a distance (*resisting the consequences of globalization only once we are already subject to its effects*).

So easy it is, or so it appears, to fall into the dark matter of such intellectual constructs. Of course, Rockhill does not let off with any such conclusion. Against ideology he puts forward instead the idea of ‘political imaginaries: ‘a “mode of intelligibility” ... anchored in the practical sense of agents.’ A political imaginary, on this account, allows for a world-image that is ‘interwoven with practical, dis-

cursive, perceptive dispositions.’ And dispositions, according to Easterling, offer an unfolding relationship between potentials, and resists codification in favor of practice. Certainly, if Rockhill is concerned with the power of words, their force of form as codifications into what some may see as ideological meta-narratives working toward the production of subjectivities. Then the contribution of Maurizio Lazzarato offers much for consideration.

The work of Maurizio Lazzarato, it is no doubt clear, is central to many of our own concerns. However, we have opted not to include a reprinting of his critical essay ‘Life and the Living in Societies of Control,’ but requested instead a new entry for this publication. In response he has provided a paper that hinges on linguistic theory; in fact, though it was not our intention, it seems that this contribution contains the only such directed address of capitalism and selfhood through the semiotic register.²⁸ In his paper, “‘Exiting Language”, Semiotic Systems and the Production of Subjectivity in Félix Guattari,’ he speaks to the construction of subjectivity as that which is now most widely produced by modes of capitalism within a ‘global mass industry.’ Subjectivity, he suggests, must be considered a ‘key commodity’ in Guattari. The author begins by outlining ‘pitfalls’ of structuralist theories of subjectivity as constructed through language and subsequently utilizes Guattari’s work (as well as others) as a foil with which to conceptualize a more adequate understanding of our contemporary capitalist condition. A critical point, at least for the purpose of this brief overview, is his argument that the world is no longer logo-centric, but instead has become ‘machine-centric.’ Machines here include not only those of technology, but equally those produced by ‘scientific, social, theoretical, economic, [and] immaterial’ models; in other words, machine-centric productions of subjectivity as they have been posited in various forms throughout this collection, albeit without the application of this moniker. Lazzarato argues that ‘statements are issued and received not by individuals, speakers and listeners – as in a communicative version of methodological individualism,’ but instead (and here citing Guattari) ‘by complex assemblages of individuals, organs, material and social machines, of semiotic, mathematical and scientific machines.’ And importantly, such machine-centric modalities, or ‘expression machines’ are as much ‘extra-human, extra-personal’ (economic, scientific, technological, etcetera) as they are ‘infra-human, infra-personal’ (perception, memory, sensibility, affect).

But this brief reiteration only identifies the starting point for this work, as the paper articulates an account of relevant semiotic systems (symbolic semiologies and semiologies of signification) and theories necessary in order to ‘work toward a semiotic theory beyond the semiotics of the human,’ one which will better address contemporary modes of capitalist organization. Semiotic systems which, as modes of operation, simultaneously organize the ‘production of subjectivity’ and the ‘production of the real.’ Here we find Guattari’s assertion that we must ‘exit language.’ An assertion that Lazzarato will reiterate in discussing what he finds to be Guattari’s most ‘ground

²⁸ In developing this publication we originally had a section on language and for various reasons this section was pruned. We hope to revive it in a subsequent volume, in the meantime, my apologies to those readers who will no doubt consider this an oversight.

breaking innovation' – the notion of a-signifying semiotics. 'A-signifying semiotics are the semiotics of mathematics, stock quotes, money, business and national accounting, computer languages, the functions and equations of science; but they are also the semiotics of music, art, and so on.' They work outside the necessity of human (linguistic) signification, or systems of correspondence, whereby meaning can be said to take place. Here, correspondence takes the form of equivalencies based on an entirely other measure – diagrammatic, functional, operative, etcetera; in other words, citing Guattari, we simply 'exit the semiotic register.' Of course, no single semiotic register operates in isolation (though they can be analyzed as such), semiotic systems are 'mixed' and Lazzarato will return to the signifying semiologies on two accounts: first, that of economics to show the power of the market to bring about a 'mutation of subjectivity,' secondly, that of human 'mixed semiotics' in respect to the emergence of the 'senses of self.' The paper concludes with a critique applying 'mixed semiotics' to the language and organization of film.

My co-editor, Warren Neidich, concludes this collection with a tour de force handling of virtually every issue I have so far raised in this introduction. Perhaps I should refrain from the reciprocal contamination of interlacing my words within his: as in doing so the pronoun 'we' which I have often employed in the above will be emptied of all meaning. Still, I would like to comment on a few things. Neidich's paper, 'From Noopower to Neuropower: How Mind becomes Matter,' is directed at a future, one that recapitulates the future upon which cognitive capitalism is now coursed. He discusses this under the figure of 'neoliberal cognitive capitalism.' Here he identifies processes so embedded in our contemporary society that they have fallen beyond the pale of internal or external critique. Thinking is hereby repressed and dominated by 'structures of thought'. This exemplifies the domain of noopolitics. Neidich will further expand the discussion on noopower and noopolitics with a concept he calls 'neuropower.' As he writes: 'I would like to extend this idea of noo-politics to include a new focus of sovereignty: that of neural plasticity itself and its potential as a generator of fields of difference. I am referring to this as Neuropower especially when it administers the pluripotential of neuroplasticity in the *curating* of a homogenous people both in the present and future.'

In traversing the issues raised in this publication the concept of neuropower is developed at length throughout Neidich's paper. Impossible to summarize here, I will however point to two primary aspects which can be said to underpin his argument: First, the author believes that neuropower is exemplified by economic and political systems, and new forms of sovereignty as they are now involved in exercising the administration of neuroplasticity; thus installing systems that serve to delimit and determine what people in the future may or may not become. This point is more or less a reiteration of the quote included just above. Secondly, neuropower is not so much concerned with the production of subjects within a

sensorial (bottom-up) mediation between self and environment; but instead directs itself to the decision making processes of the brain in (top-down) strategies effecting prognostication, faculties inherently involved in the newly evolved regions of the brain such as the prefrontal lobes.

Additionally, it is worth noting for those readers unfamiliar with Neidich's work, that his contribution will span areas ranging from highly specific readings on neuroscience through to nuanced discussions on philosophy, architecture and particularly art, for instance in the context of John Cage's (noise-music) composition 4'33".

Before these section introductions close it is necessary to point to an absence, or perhaps instead non-presence. Within this collection we have included contributions from four practicing architects. We consider these to act like hubs or attractors, moments inserted as flickering intervals, or perhaps again, we might think in terms of 'perchings' as opposed to 'alightings.' These contributions can be found in various sections and yet I did not discuss them above. This is because we did not wish to over filter these contributions through our own critique. This said I would nevertheless like to take a moment to briefly comment on each.

The work of Andreas Angelidakis exemplifies the potential of architecture to engage both critically and spontaneously with the mechanisms of computer based and Internet technologies. In 'Screen Spaces: Can Architecture Save you From Facebook Fatigue,' Angelidakis examines the interface between the virtual and the real (this is, naturally, not to say that the virtual is not in itself very 'real') and exposes new forms of spatiotemporal relations resulting in vital new modes of experiences. Here we find the 'screen' as a *dispositif* that garners attention, mutates memory and facilitates the emergence of multifarious subjectivities.

Philippe Rahm, in his contribution entitled 'Edible Architecture,' reveals an architecture that returns to the 'biochemical' core of the human body. Architecture here is no longer considered as an autonomous object with external relation to beings or things; it is internalized within the biologic and neurologic systems and processes of bodies. With what he identifies (in modern biology) as corporeal and extracorporeal space, Rahm proposes the potential of architecture to act upon (and integrate) both the internal and external concerns of the body within its environment. Suggesting that it is time to consider other forms of perception and sensorial relations, he relocates architecture within new domains, which offer clues to a further understanding of the noosensorium.

In 'From Politics of Nostalgia to Politics of Change,' Markus Miessen offers insights into thinking inclusionary and exclusionary practices related to architecture as it unfolds within the public sphere. In challenging the notion of democratic participation he reminds us of the complex relation between the audience (as actor) and the protagonist of architecture and the urban (be they designers or economic and political agents). Miessen argues that democratic models of con-

sensus are fundamentally flawed and that ‘mass intellectuality,’ as such, needs to be challenged by new forms of criticality. Agonism, as described by Chantal Mouffe among others, might be considered as an essential theoretical principle through which Miessen’s discussion plays out. Conflict on this account can be understood as a creative generator of noo-power and a deterritorializing force in urban politics and practices.

Finally, Elizabeth Sikiaridi and Frans Vogelaar, develop a network theory (and practice) of hybridity (hybrid space) that fuses physical and informational space. Arguing that our contemporary condition is one in which both media and the physical environment have been reconfigured into hybrid relations which course through every aspect of our daily lives. The space we now live in is diffuse and ambivalent (at once digital, analogue, virtual material, local, global, tactile and abstract), and thus new form of intensities and identities emerge. This they refer to as ‘Idensity,’ this is also the title their paper. These authors offer a theoretically informed account of many of the issues discussed above, and they provide filters and mechanisms for thinking agency and agents within new cognitive regimes.

The reader may feel I have said to little about these contributions, but, in fact, I fear I might have said too much as we feel that these pieces should be left open to be encountered by the creative reader. These contributions naturally contain both text and images and although we agree that there can be ‘no isomorphism between statements and visibilities,’ it is nevertheless perhaps worth our effort to imagine the possibility that, for some, the eye-writes and the voice-sees.²⁹

In concluding this general introduction it remains to make a brief comment on what may be seen as a subtext regarding the cosmology of this collection itself, being that of the approach to the topic of *Cognitive Architecture* from a transdisciplinary perspective. Brian Massumi has written, that ‘just as the body lives between dimensions, designing for it requires operating between logics... A translogic is different from a metalogic. It doesn’t stand back and describe the way multiple logics and the operative levels they model hold together. It *enters* the relations and tweaks as many as it can to get a sense of what may come.’³⁰ Thus, this volume includes contributions by scholars, scientists, and practitioners in the areas of philosophy, neuroscience, economics, sociocultural theory, and architecture and sets to task a transdisciplinary approach³¹ to the issues at hand; it does not attempt to offer a comprehensive or definitive account within any of the areas of research it draws upon. Although we support the idea that there is much to be learned from transgressing previously constituted (methodologically sanctioned) research boundaries, this book certainly makes no claims toward developing new research methodologies. In fact, the idea of transdisciplinarity does not only occur ‘between’ the text presented here, but also ‘within’ the individual contributions – philosophers and scientists discussing art, film, architecture, and urban

theory and practices; architects and architecture, culture, media theorists treating psychology and neuroscience – evincing both the nature and necessity of transtinking through multiple discourses and logics. What we are searching for with this publication is a vocabulary, one that will open new constellations of thoughts and ideas that are not only relevant to our time, but critical if we are to keep up with a rapidly transforming world, a reality, in fact, that is set to leave the academy behind.

Finally, it is our hope that just as we have drawn together a diverse set of voices, that with this will follow a diverse readership. We understand that various texts included herein will be graspable by many and others only by a few; however, whatever potential dangers of failure (or incommensurability) lurk within the manner in which different disciplines approach an understanding of what we here term cognitive architecture and noopolitics, the point remains that if we are going to extend our theoretical understanding of these highly complex conditions, we must seek to grasp not only the methodological instants, but the theories and movements that fluctuate and thereby exceed our analytic filters.

²⁹ See: Christian de Portzamparc and Philippe Sollers, **Writing and Seeing Architecture** (Minneapolis: University of Minnesota Press, 2008), for which I wrote the foreword.

³⁰ Brian Massumi, **Parables For the Virtual: Movement, Affect, Sensation** (Durham: Duke University Press, 2002), 207.

³¹ Transdisciplinarity (a term introduced in the early 1970s by Jean Piaget), aims at an understanding of the present world. In architecture transdisciplinary discourse attempts to bridge the sciences and humanities, it thinks within and between art, technology, science, and philosophy. The prefix ‘trans’ indicates that which is at once between, across, and even beyond individual disciplines. According to Basarab Nicolescu, transdisciplinarity can be outlined with three postulates: the existence of levels of reality, the logic of the included middle, and complexity.



[1]



[2]

1, 2 Warren Neidich: **Resistance is Futile / Resistance is Fertile**, 2006
Neon sculpture, 2 x 30', Kunsthaus Graz,
Graz Austria

Noopolitics, Life and Architecture

Sven-Olov Wallenstein

In the following, I will attempt to survey a theoretical development in recent years, which has come to connect architecture to a new kind of philosophy of life. This new line of research draws on earlier philosophies based in older traditions of vitalist thinking from the turn of the previous century, for instance in Henri Bergson and Gabriel Tarde, but it also rethinks these themes in the context of contemporary global capitalism, which is increasingly geared towards the dimension of affectivity and corporeality, and attempts to penetrate into the sphere that underlies our conscious mental operations and extends all the way down to our biological existence.

A starting point for this development could be located in the research of Michel Foucault on what he calls ‘biopolitics’ and ‘biopower,’ that is, those mechanisms and forms of power that invest the human body as a locus of productivity and action, and in this sense also situate the subject as free, or at least endowed with a certain agency. These theories, developed by Foucault in the latter half of the 1970s, mostly on the basis of a reading of the transformations of political theory in the eighteenth century, have been picked up and developed in different ways by Gilles Deleuze in his writings on the informational structure of our current ‘control society,’ and Maurizio Lazzarato in several books and essays that deal with the emergence of a modern structure of power that extends even further into the mind, and becomes a kind of ‘Noopolitics.’

Within architecture theory, similar ideas have developed, although here often with the inverse intent of dismantling or even rejecting the kind of ‘critical’ perspective that underlies the theoretical work that in one way or another draws of Foucault. Ideas of a ‘post-critical’ or ‘projective’ architecture have been used to underscore the necessity to move beyond inherited models of resistance, negativity, and rupture, sometimes even as a rejection of the idea of ‘theory’ as such, in order to invest in a more fluid and affirmative attitude. Some have even claimed that we should speak of a general ‘affective turn’ within the humanities and social sciences, with profound implications for how we think theoretical work as such. A more precise investigating of how our contemporary sensorial and noetic environment impacts on our existence renders impossible, so it is sometimes argued, the categories that were once used to underwrite the claims of a critical theory.

My contribution consists of a critical survey of these new developments, more importantly however, I will also attempt to locate them as part of a discussion on the possibility of developing a critical theory that would have bearings on our present. I will argue that ‘noetic,’ ‘affective,’ and biopolitical dimensions of power by no means render critical theory unnecessary or useless, but that they demand of us that we invent a theory that would be able to analyze the modes of affectivity and subjection that occur within this new formation of power. In this sense the problem of how to analyze politics, capitalism, and the possibility of resistance has not disappeared, but become increasingly acute, and it must now be reformulated at a depth that goes beyond inherited models of mind and consciousness.

Foucault, Deleuze, and the Power of Life Foucault develops the concepts of biopower and biopolitics (which I here take to be roughly synonymous) at a crucial juncture in his work, where he begins to doubt the explicative force of the disciplinary model of power, developed systematically in *Discipline and Punish* of 1975. From this point onward Foucault's research begins to diverge in a prismatic fashion, which also means that the rather clear-cut tri-part division of his work that we find for instance in Deleuze's beautifully coherent reading¹ must be questioned, at least with respect to the last phase. In Deleuze's interpretation, an 'archeological' phase, focused on the regularities of discourse, is followed by a 'genealogical' period where Foucault investigates the mechanisms of power in their interplay with discourse, eventually leading up to a third stage, revolving around the theory of 'subjectivation,' where he draws on Greek and Roman material in order to reinscribe the subject, although in a more historically flexible and conditioned way than in traditional philosophies of consciousness (which Foucault had been fighting at least since the mid-1960s). This division is based on Foucault's published works, where there is large gap between 1976, the year of the first volume of *The History of Sexuality*, and the subsequent two and final volumes on sexuality published shortly before his death in 1984 – a long caesura which was a time of reflection but probably also of crisis (the 'inability to cross the line,' of which he speaks in the preface to the second volume), that seemed to have ended with the return to a modified reflection on subjectivity, ethics, and freedom. Today however, this eight-year gap has been filled with the published courses from the Collège de France, and reading these texts we can see how Foucault already around the time of the 1976 lectures on 'Society Must Be Defended' in fact began to reorient himself in multiple and not necessarily coherent ways: he develops the idea of a history of forms of governing, or 'governmentality,' he works on the idea of the technologies of the self and on the idea of candor and truth-telling (*parrheisa*) in Greek and Roman texts, he returns to Kant and the enlightenment, and claims to pursue the question of modernity as a question of the 'ontology of actuality,' in the wake of Weber and the Frankfurt School – all of which can hardly be brought together into a unified set of problems that would amount to a distinct third phase. And it is in this context that the idea of biopolitics emerges, sometime between 1976 and 1977, and, in Foucault's own development it appears, in fact, more as a transitional idea than a sustained theme.

When the concept of biopolitics first appears in the first volume of *The History of Sexuality*, it seems like an extension of the analysis of discipline. *Discipline and Punish* had already pursued this in terms of the inscription of the body into an institutional field: the army, school, hospital, prison, etcetera, and this is where Foucault could be said to undertake a kind of proto-architectural analysis, most famously in the case of Jeremy Bentham's Panopticon. The investigation of disci-

plinarity had traced a transformation from the naked violence of visible punishment to a form of correctional techniques that assembled around the body, and generated a form of political technology that produced a *soul* as a new object of knowledge – the soul, which in this sense also becomes the 'prison of the body.' Discipline, Foucault famously says, is not primarily about prohibiting (just as power in a more general sense is not essentially repressive), but works in terms of a positive organization of space and time, a partition and creation of segmented unities, and a breaking down and analysis of movements down to their smallest detail (as in military exercise, control of body postures in school, and so forth). Space, time, and bodies are parceled up, and then reassembled so as to become parts of larger and more efficient unities.

Military camps, prisons, hospitals, school, factories each in their respective ways become places for the creation of 'docile bodies,' and in conjunction with this, there is a development of corresponding discourses on military regulations, criminal law, pedagogy, political economy, and so forth. Discipline encounters new types of discourse, and together they form the power/knowledge complex that increasingly focuses on that which escapes it: the emphasis on norms instead of law produces an infinity of possible deviations, which do not pre-exist the norm, but emerge as infinitesimal fluctuations around it, and the object of the legal as well as sexual apparatus can thus be understood as the production of various forms of criminality, which it then can integrate into larger wholes.

The question often posed to Foucault, is where he can locate the possibility of resistance. If power and knowledge, although without being reducible to each other, still form an interlocking totality, where is the outside that would provide thinking and acting with a point of leverage? The theoretical model for such a resistance can undoubtedly be found already in Nietzsche's genealogy of consciousness and conscience, in his reflections on the amount of 'pre-historical work' that is required for the formation of a responsible agent, on which Foucault draws implicitly.² This outside would be something like the element or milieu in which the creation of 'docile bodies' becomes possible, but something which would then also subsist under any such body as a virtual double, or a kind of non-bound multiplicity.

Here Foucault seems be particularly influenced by the ideas of Deleuze in *Nietzsche and Philosophy* (1962), where Deleuze suggests that Nietzsche's genealogy should be understood as a critical analysis of power relations that takes the *body* as a focal point of analysis, not in the sense of phenomenological ground of living sense (the *Leib* as opposed to the external *Körper*), but a constantly undone and reconstructed assemblage of affects and responses. 'Taking the body as a guide to philosophy' is also the proposal that would later open Deleuze's second book on Spinoza,

¹ Gilles Deleuze, **Foucault** (Paris: Minuit, 1986).

² Foucault sometimes appears close to the phenomenology of Merleau-Ponty, with its 'vertical' or 'savagery' being outside of institutionalized and sedimented forms of experience and discourse. He, however, always rejected this, undoubtedly because of the teleology inherent in phenomenology, where the ante-predicative layers exists only in order to be taken into signifying acts and be brought to consciousness, and as Deleuze notes, for Foucault there is an 'archeological break' rather than a continuity between the discursive and the non-discursive, at least in his early work. The final lectures on the hermeneutics of the self in fact seem to reopen many of these issues again, and would merit a more detailed discussion than I can undertake here.

Spinoza, philosophie pratique (1981), which develops the idea that the soul, or more precisely a certain interpretation of the soul, constitutes the prison of the body, and that we are not aware of what a liberated body might be capable of outside of its relation to the soul understood in terms of its Aristotelian 'form.' As Spinoza writes in the *Ethics*: 'In fact, no one has been able to determine what a body is capable of (*quid corpus possit*), that is, experience has not yet enlightened us as to what the body – to the extent that is not determined by the soul – can or cannot do according to the laws of nature, if the latter is considered solely as corporeal.'³

This domain that in Deleuze's metaphysics underlies the formed body, of which he has provided many versions, drawing on Nietzsche, Bergson, but also writers and painters like Artaud and Bacon, is also what he uncovers in micro-physical domains of power in Foucault. It is precisely because of its instability – virtual relations are a kind of 'extra-being' that while being perfectly real also go beyond the actual and envelop in a 'becoming' – that power relations remain unstable and that, as Foucault says, a 'distant roar of battle'⁴ can always be heard behind the official eloquence of institutionalized discourses of knowledge. This does not mean that there is some true or authentic corporeal life beneath the discursive order, a life that would be deformed by a simple external force, only that it remains a source of resistance and it indicates why it is, in fact, resistance that *comes first*, as Foucault often suggested. The 'diagram' of power relations can only be actualized if it simultaneously releases a multiplicity of forces that can only become integrated to the extent that they fundamentally oppose themselves to integration.

This proximity notwithstanding, we must also note some important differences between Deleuze's (and Guattari's) philosophical constructivism and Foucault's analytic of power, which in a certain way reflect the difference in temperament and style between the philosopher and the historian, as Deleuze himself notes in his essay on 'Desire and Pleasure.'⁵ Foucault's questions bear upon how we have *become* those subjects that we are (sexed, normalized, deviant, etcetera), in an interplay with technologies, discourses, and mechanisms of power, and in the latter part of the 1970s his investigations tend to become more and more historical in a traditional sense; whereas Deleuze and Guattari appear to be fascinated with synthetic and universal-historical models, and their project is to discern those 'lines of flight' that always open up in every assemblage, on the basis of a general theoretical model, for which 'desire' is the most well-known rubric. Foucault, however, becomes increasingly critical of all such non-historical and ontological conceptions of desire as a productive force, and he will come to see it as a product of modern confessional technologies. And in fact, it is precisely over the issue of biopolitics that the clash between Deleuze and Foucault breaks out, and regardless of what other reasons (political and personal) there may be for the split between them in the 1970s, the question of the metaphysics of life seems

the philosophically most interesting one to examine. We should thus look more precisely at this point of divergence, which is also the place where Foucault begins to question his earlier work on discipline and his inquiries begins to proliferate in many divergent lines.

As we noted above, the first presentation of the theme of biopolitics, as found in the final section of the first volume of *The History of Sexuality*, still largely remains within the disciplinary model. This mode of power works in three ways: on the micro-level it works by individualization, or more precisely by *producing individuality*, sexed and desiring subjects are endowed with a depth to be deciphered, with Freud as a culmination of a long development. On the macro-level we see the emergence of *population*, which is a statistical phenomenon, individuals as they appear in terms of collective health, birth and mortality rates, etcetera. Between them there is an intermediary link, the *family* as the site of exchange between individuality and collectivity, the relay through which all individuals have to pass in order to become members of the reproductive body politic. On all three levels, life becomes the object of regulation and discipline, but at the same moment there emerges a power inside of life that resists, that is, the possibility of philosophical vitalisms from Nietzsche onwards. In this sense, the power exerted *over* life, Foucault suggests, is also an emancipation of a resistant force *inside* of life, and just as the disciplinary diagrams could not be deployed without creating a swarm of virtual actions and reactions that overflow them, the model of biopower can in this sense be taken to develop the analysis of discipline on another level. Here, too, we may locate architectural implications, for instance in the sustained discussion on the role of the hospital and the medicalization of urban space, where the Vitruvian paradigm comes to an end and architecture begins to be understood as an ordering and production of space instead of a representation of a pre-existing order.⁶

But, and I think is important to note that this line of thought is *not* the one that Foucault subsequently takes in the lectures on *Security, Territory, Population* (1977–78) and *The Birth of Biopolitics* (1978–79), of which both series shed light on the differences that Deleuze noted in 'Desire and Pleasure.' In these lectures, in addition to the idea of population, Foucault points to the emergence of the concept of *security*, which becomes central since threats now emanate from *within*, from the population itself and its inherent tendency to create imbalances, deviations, and unpredictable crises; whereas the old model of sovereignty, which aimed to seize and preserve control over a territory, predominantly understood dangers and enemies as coming from *without*. In the lectures from 1977–78, biopolitics thus comes to be connected to security, and it is explicitly dissociated from discipline, which, as Foucault himself has noted, was tantamount to a fundamental self-critique.

Drawing on the problem of theft, Foucault discerns three possible avenues. First, theft can be understood as an infraction that must be punished according to a predetermined scale of punish-

³ Baruch Spinoza, *Ethics*, Book III, Theorem 2, Remark.

⁴ Michel Foucault, *Discipline and Punish*, translated by Alan Sheridan (London: Penguin, 1977), 308.

⁵ Gilles Deleuze, 'Désir et plaisir,' in *Deux régimes de fous* (Paris: Minuit, 2003).

⁶ I have attempted to discuss some aspects of this shift in in *Biopolitics and the Emergence of Modern Architecture* (New York: Princeton Architectural Press, 2009).

ment, that is as a *juridical* problem with a basis in law; second, as a form of deviant behavior that must be corrected through various techniques, that is as a *disciplinary* problem; but third and finally, it can be theorized as a statistical phenomenon, where one must balance the losses and gains of disciplinary measures, and perhaps allow for a certain latitude of crime, which is a way to formulate the problem in terms of *security* – a model based on probabilities, a calculus of cost, and one which attempts to attain an optimal balance.

If sovereignty is exerted over a territory and a multiplicity of political subjects, and discipline is applied to singular bodies, to their affects and passions, then security can be said to work with a set of fluid conditions, constantly fluctuating quantities, and future probabilities. Posing the problem in terms of security means to invent a multifunctional order, and to calculate the negative and positive outcome of any given measure: security does not apply to a fixed state, but relates to a series of future events. If sovereignty monopolizes a territory and locates a central command, and discipline structures a space and sets up a hierarchy, security attempts to plan an environment or ‘milieu’ in relation to a set of possible events. Discipline is centripetal, it isolates spaces and creates segments, it focuses and encloses; apparatuses of security, on the other hand, are centrifugal, and they aim to integrate new things in ever widening circuits. Discipline strives toward a regulation of details, whereas security allows things to run their course at a certain level, it ‘lets things be,’ and in this sense biopolitical power is what is truly at stake in the doctrine of *laissez-faire* of early liberalism. Discipline, Foucault says, divides things into licit and illicit, and to this extent it is still based on a law supposed to be increasingly specified. In law, order is what is supposed to remain once everything prohibited and disorderly has been removed, all of which is intensified in discipline, since it also tells you what to do, which is why the convent can be taken as the ideal form. In all of this, we can undoubtedly detect an important shift away from the earlier work, where the juridical conception based in binary divisions was *opposed* to the attention to detail and modulations in discipline; here they sometimes appear as two stages of the same process, whose opposite would be security, whose correlate is *freedom*, not as some abstract faculty of quality of the will but as that which is always presupposed as the other side of apparatuses of security, the vital condition that they must learn to master.

In the apparatuses of security, the question is not panoptic *surveillance*, but how to take a step back and *observe* the nature of events, not in order to attain some immutable essence of things but to ask whether they are advantageous or not, and how one can find a support in reality itself that makes it possible to channel them in an appropriate direction. In this respect we can say that the law operates in the *imaginary*, it imagines something negative; discipline is applied in a sphere which is *complementary* to reality; security, finally, operates within *reality itself*, in order to make its components interact and cohere in a more profitable fashion – which is what the Physiocrats meant, Foucault suggests, when they said

that economy in fact is a physics, and that politics still belongs to nature. If the idea of life as an unbound multiplicity set free by biopolitical power was the earlier source for a theory of resistance, the later lectures shift the perspective: the process of life and nature becomes a correlate to security, which means that the vitalist ontology that subtended the work on discipline is put in question and the correlation seems to imply a much more ‘functionalist’ coexistence. The ontology of life is replaced by a more thoroughgoing historicizing, which also comes across in Foucault’s rejection of the ontology of desire that we noted above.

Vitalism, Noopower, and the Philosophy of Life The history of the idea of philosophical vitalism would in general no doubt take us back to Greek philosophy, for instance to the divide between Plato’s forms, which are based in mathematics and geometry (the *mathemata*, the ‘knowable things’ that precede individual objects), and Aristotle’s individual substances, which are modeled on the living being who strives to sustain itself, overcome obstacles, and reach its maximum state of actuality, the *entelechia* or ‘having-itself-in-the-end,’ as Heidegger translates it.⁷ In this more encompassing perspective, the *mathema* and the *bios* and/or *zoe* thus form a couple that traverses the history of Western metaphysics, and it is by no means peculiar to modernity.⁸

In the present context the historical shift suggested by Foucault must however take precedence over these long historical continuities. In modernity life becomes the object of a science that emphasizes its history and depth (evolution), it appears as a multiplicity that must be surveyed and channeled, both on the level of the individual (sex) and the collective (population), but as the other side of this new mode of knowledge and power, there also emerges a life that resists, a series of counter-definitions that extend at least from Nietzsche, through pragmatism (James, Dewey), the ontologies of Bergson and the sociology of Tarde, but also important strands of phenomenology from Husserl through the early Heidegger and Merleau-Ponty, and up to Foucault, Deleuze and his present-day followers. Whether Foucault in fact eventually breaks with this tradition or not is disputable, as we saw in the previous section; many have, however, in parallel to Foucault or as an explicit continuation of his work, understood this type of vitalism as his essential legacy. However, the relevance of a philosophical vitalism, or a theoretic work that takes the contested nature of the living being as its issue, can obviously not be settled by simply discussing the merits of various exegetical investigations of Foucault. In fact, the ideas of biopower and biopolitics have been developed in so many different directions that the differences between the different versions seem more relevant than the similarities, even though Foucault, rightly or wrongly, remains a central reference in most of them.⁹

⁷ Martin Heidegger, *Nietzsche II* (Pfullingen: Neske, 1961), 405.

⁸ This is discussed by Giorgio Agamben in *Homo Sacer: Sovereign Power and Bare Life*, translated by Daniel Heller-Roazen (Stanford: Stanford University Press, 1998). For a critical discussion of Agamben’s claim, especially the sharp distinction between *zoe* (qualified life) and *bios* (mere life in general), see Jacques Derrida, *Séminaire: Le bête et le souverain*, vol. 1 (2001-2002) (Paris: Galilée, 2008), 419ff. The alternative is also staked out by Alain Badiou, in his review of Deleuze’s *Le Pli*, in *L’annuaire philosophique*, 1988-1989, which is a much more nuanced confrontation than the more known, although rather one-sided reading proposed in Deleuze: *‘La clameur de l’Être’* (Paris: Hachette, 1997).

⁹ Other competing versions of biopolitics would, apart from Giorgio Agamben’s *Homo Sacer*, also include Antonio Negri and Michael Hardt, *Empire* (Cambridge, MA: Harvard University

Here I will just look at one particular version, the work of Maurizio Lazzarato, which draws freely on both Foucault and Deleuze, and begins from Foucault's analysis of disciplinary societies, which he develops further by drawing on Deleuze's theory of the 'societies of control.'¹⁰ In this short essay Deleuze suggests that discipline and panopticism are precisely what we have left behind, and his account, while obviously not referencing Foucault's at the time still unpublished lectures, has exerted a considerable influence. The structure of individuation and localization once brought about by discipline, Deleuze proposes, today works through the 'dividual' – a waveform that supersedes the old individual as a basic unit. The centralizing function (the Panopticon tower with its unidirectional visibility) has been fragmented into a multiplicity of flexible monitoring instances, and a structure of universal *modulation* has replaced the disciplinary mold. In discipline we moved from one closed segment to another – from the school to the factory, from the factory to the hospital, the prison, and so forth, but today these compartmentalized milieus are replaced by new, smooth functions. Control is exerted over open spaces; it locates an element in an open environment, as in the case of an electronic bracelet worn by a prisoner, which provides or denies access to a given segment of space at a certain point in time. If the carceral system produced independent but analogous subsets, control spaces are interconnected and numerical, like a sieve whose mesh constantly shifts its permeability. Unlike the former disciplinary matrix, the new structures operate through passwords that regulate access to information banks. What all this signals is a fundamental mutation of capitalism: the enclosed factory has been replaced by a service economy characterized by dispersal. The disappearance of the factory as the model of production in advanced capitalist societies is reflected in similar transformations of other spaces, above all offices, in which older forms of spatial hierarchies have long since been replaced by flattened structures that promote an ideal of flexibility and participation (the corporation has acquired a 'soul,' as Deleuze says).¹¹

For Lazzarato, these brief remarks by Deleuze form the starting point for his theory of 'noopolitics,' which also draws considerably on the sociology of Gabriel Tarde, whose 'micro-sociological' analyses of imitation and invention, and of the individual as a 'monadic' entity (in Leibniz's sense), or a society of its own are only beginning to be appreciated.¹² Contemporary capitalism, Lazzarato suggests, no longer bases itself on labor, the factory, and the institutions that regulate the relations between them, but on a 'collaboration of brains.'¹³ For instance the networked intelligence that we find in contemporary software development, which the capitalist mode of organization taps into and over which it attempts to seize control. Noopolitics implies that capitalism not so much exploits our labor as our cognitive capacities, those new productive forces that it must contain and channel into the corporate network. In order to achieve this, modern capitalism works by creating a consent through images, sound bites, brands, and various visual tech-

nologies that impact directly on our brain, bypassing the censorships and reflective mechanisms of consciousness – all of which demand that we reflect on the way in which images, but also on what kind of 'image of thought', make this possible, not just as a passive causal effect, but as an active and constructive response.¹⁴ In a certain way, this remains close to what Foucault said about early liberalism: which is thus first and foremost not an ideology in the sense of a false, distorted, or imaginary representation of reality, but a technology of power, or a way to work *with* reality; liberalism does not provide us with a theoretical and/or ideological smokescreen behind which 'other' and more 'real' things (actions, practices, material events) are taking place, instead, itself a practice, it is a way to make certain things real by working with and intensifying, tempering, or redirecting processes already underway in reality itself.

In a wider context, visual arts, architecture, advertising, and media in general can be seen as part of the same process, whereby our minds are 'sculpted' in order to attain new levels of action and reac-

Press, 2000); Roberto Esposito, **Bios: Biopolitics and Philosophy**, translated by Timothy Campbell (Minneapolis: University of Minnesota Press, 2008); Andrea Cavalletti, **La città biopolitica: Mitologie della sicurezza** (Turin: Mondadori, 2005), to cite but a few. The reference to Foucault is common to them all, although they interpret it in highly different ways.

¹⁰ Gilles Deleuze, 'Postscript on the Societies of Control,' translated by Martin Joughin, in **Negotiations: 1972-1990** (New York: Columbia University Press, 1995).

¹¹ Deleuze's idea of control has also been used in ways that appear to be more 'generative' than critical, which indicates the symptomatic malleability of such concepts; see, for instance, the analysis of shopping facilities in terms of 'control space,' in Rem Koolhaas, Stefano Boeri, Sanford Kwinter, et al., **Mutations: Rem Koolhaas, Harvard Project on the City** (Barcelona: Actar, 2000).

¹² The current presence of Tarde in theoretical work is a significant phenomenon, and many lay claim to be the true interpreters of his legacy; for an overview of the recent reception, see David Toews, 'The New Tarde: Sociology After the End of the Social,' **Theory Culture Society** 5 (2003): 81-98. It seems likely that the context for Tarde's return is necessity to rethink our inherited conceptions of individuality and collectivity in the light of current modes of exertion of power in the age of telematics and electronic space. Here too, there is a link to Deleuze, and many have pointed to his footnote in **Difference and Repetition**, where he, already in 1968, rejects the psychologistic reading imposed on Tarde by Durkheim and his followers, and suggests that 'the little ideas of little men' and the 'interferences between imitative currents' constitutes a '**microsociology**' already at the level of the person: 'hesitation understood as an "infinitesimal social opposition" or invention as an "infinitesimal social adaptation."' **Difference and Repetition**, translated by Paul Patton (London: Athlone Press, 1994), 313-4, note 3. Equally important – although for some reason often overlooked – references to Tarde in Deleuze can be found in **Le Pli** (Paris: Minuit, 1988), 147 (on the relation between the ontology of 'being' and the 'ecology' of 'having'), and in the monograph on Foucault, where Deleuze locates Foucault's analysis of power in the wake of Tarde's appreciation of 'diffuse and infinitesimal relations, neither great totalities nor great men, but small ideas of small men, the signature of a bureaucrat, a new local custom, a linguistic deviation, a visual twist that propagates itself.' **Foucault**, 81, note 6.

¹³ See Lazzarato, **Les Révolutions du capitalisme** (Paris: Empêcheurs de penser en rond, 2004). Lazzarato's recent ideas have grown out of his earlier work on 'immaterial labor,' although I will here stick to the theory as it is formulated in this particular work.

¹⁴ Deleuze and Guattari develops the idea of 'noology' as a study of the various images of philosophy that lie before the development of any specific theories, particularly in **What is philosophy?**, but the theme is announced already in works from the late 1960s, for instance **The Logic of Sense** and **Difference and Repetition**. Perhaps we could understand noopower and noopolitics in the same vein, that is as ways to shape our sense of what it means to act and exist politically, before we make any particular political choices (and in this sense it would bear on **the political** and not on **politics**, to use a distinction from Carl Schmitt that has become widely regarded today.

tion. Here the 'noetic' has, in a sense that by far transcends the traditional analysis of ideology, become a site of conflict and even of political struggle at a level that extends below that of human subjectivity and integrates consciousness in a process of transformation which is neither nature nor culture. This power and this politics would inscribe themselves on the most fundamental level of mental life, where our most basic affects and ideas are organized, where memory, fantasy, and intelligence emerge, perhaps even where a certain 'neural plasticity' is at work.¹⁵

Lazzarato's proposal moves in the direction of a possible 'General Intelligence' that must be conquered, similar to ideas that have been developed by Paolo Virno in his analysis of post-Fordist labor as subjectivity and the development of a new 'virtuosity'.¹⁶ The question is whether we still need to think the capacity of the work of art, for instance the architectural work, to open up a space of freedom in the same way as we have been doing since late modernist theory – basically as an internalizing of the formal contradictions of society – which in the second moment produces a critical distance (transcendence, reflection, negation, or whatever vocabulary we might use); whether, if the rethinking of critical theory that has been underway at least since the 1970s in fact entails a dismantling of the very idea of resistance and the critical, or, as will be my proposal here, a mutation into something else?

This mutation must be understood as transcending the sphere of art as well as politics, and it affects the very fabric of life, the underlying substructures of the mind. The political challenges of such a shift are of course formidable: How should we conceive of an ethics or a politics, how should we account for a possible formation of a possible ethical or political agency, when the 'multitude' that it must organize and integrate – without reducing it into the all-too classical form of a subject, individual or collective – extends beyond what we normally circumscribe by the use of our inherited political categories? There is an unmistakable utopian energy in many of today's radical political thinkers, which call upon the 'virtuosity' inherent in 'immaterial labor,' or the potentials that are set free by the advent of a 'Cognitive Capitalism.' Whether this is a radical shift, or a mirage produced by the powerful logic of Capital itself, as many of those who uphold the ethos of the traditional Left have argued, remains to be seen.

Critique and Beyond If we accept the claim that the current mode of production has moved not only beyond the level of material goods, but also that of information and communication and entered into the space of the noetic and affective, and that it invests our mind as a plastic entity before all reflexive and conscious response, then the question might be asked if it is at all possible to uphold the ethos a critical culture bases on ideas of resistance and negation, and beyond this, whether the idea of resistance at all makes sense. In the name of what should we resist, and what resources could be mobilized if our bodies and

cognitive faculties are formed and sculpted all the way down to the neural substratum by forces that exceed consciousness?

The claim that we must move beyond the critical approach to architecture, and perhaps to cultural production at large – a discussion that has mostly occurred within architectural discourse, although the claims, if correct, obviously must have a general applicability¹⁷ – need not base itself in a theory of the noetic and affective, although this connection is probably what gives it its highest persuasive power. In an essay that triggered a lot of the following discussion, 'Notes around the Doppler Effect and other Moods of Modernism,'¹⁸ Robert Somol and Sarah Whiting wanted to discern a move from the 'critical' to the 'projective,' claiming that the inherited notions of autonomy as a precondition for engagement had in fact become defunct and that what was required was not so much a critique of reification or a dialectical opposition to society, as an analysis of the conditions of emergence that would develop a more fluid tactics. As an example of this different stance, they cite Rem Koolhaas's appropriation of American mass culture, where architecture produces social life and not a 'text' meant for reflexive reading: its aim is to *seduce* and instigate new events and behaviors. His tools for this are 'force' and 'affect,' which Somol and Whiting develop on the basis of the project for the Downtown Athletic Club (included in Koolhaas's book *Delirious New York*). The Club, as Koolhaas himself proposes, represents the complete conquest, floor by floor, of the Skyscraper by social activity; with the Downtown Athletic Club the American way of life, know-how, and initiative definitively overtake the theoretical lifestyle modifications that the various twentieth-century European avant-garde have been insistently proposing without ever managing to impose them. The skyscraper becomes a machine to generate and intensify desirable forms of human intercourse, which in this case means that the metropolitan bachelor is the ultimate form of life and the Club the ultimate bachelor machine.¹⁹

¹⁵ The connection to visual arts is here particularly intriguing: what position do they occupy, indeed what position can they at all occupy, in this transformation, which concerns not only images as we normally apprehend them through media or in institutionalized spaces of art, but in fact extend into the sphere of what used to be called the unconscious, the articulation of life and consciousness on a pre-subjective level, and even the foundational biological features of living beings? Should art and artists attempt to provide pockets of resistance, residual modes of experience that yet remain to be colonized by technology, or must they be content with simply recording and reflecting on a process whose determining factors are located elsewhere? Or is there some other option? I discuss this further in relation to the work of Warren Neidich, who has developed a sustained reflection on the implications of neuroscience for art, in 'Diagrams of the Mind,' in **Warren Neidich: Lost Between the Extensivity/Intensivity Exchange** (Eindhoven: Onomatopoe, 2009).

¹⁶ See for instance Paolo Virno, **A Grammar of the Multitude** (Los Angeles: Semiotext(e), 2004).

¹⁷ For a general survey of this discussion, see George Baird, 'Criticality and Its Discontents,' **Harvard Design Magazine** 21 (Fall 2004/Winter 2005).

¹⁸ Robert Somol and Sarah Whiting, 'Notes around the Doppler Effect and other Moods of Modernism,' **Perspecta** 33 (2002).

¹⁹ We should note that Koolhaas's writing as always incorporates massive doses of almost diabolical irony, where different claims seem to cancel each other out, which is a dimension that gets wholly lost in interpretations such as the above. This is his superbly tongue-in-cheek description of the project: 'With its first 12 floors accessible only to men, the Downtown Athletic Club appears to be a locker room the size of a Skyscraper, definitive manifestation of those metaphysics – at once spiritual and carnal – that protect the American male against the corrosion of adulthood. But in fact, the club has reached the point where the notion of a 'peak' condition

Instead of dialectics and negation, Somol and Whiting see in this what they call a 'Doppler effect,' where perception depends on the location and speed of the viewer and the source. The 'disciplinary' quality of architecture lies in performance, and here we can note that discipline as analyzed by Foucault (who is cited repeatedly in the essay) is transformed into an ideal for practice: the diagram and the distribution of singularities, particularly as these concepts have been analyzed by Deleuze, have simply become design tools. In the projective mood, Somol and Whiting continue, no doubt consciously echoing a kind of pop art sensibility (Jean Baudrillard is referenced), we move from hot to cool, architecture ceases to worry about separating itself from the everyday in terms of autonomy and resistance, and becomes just as relaxed about reality as television. Curiously enough, Somol and Whiting end by ascertaining that such a projective practice 'does not necessarily entail a capitulation to the market forces, but actually respects or reorganizes multiple economies, ecologies, information systems, and social groups.'²⁰

That this conclusion undoubtedly contains an element of wishful thinking was ruthlessly brought forth by Michael Speaks, in a series of essays that unabashedly called for the end of theory as critique, and an adaptation to the forces of the market. Architecture schools, he claims, have failed to develop an intellectual culture that is in tune with the real world, and instead 'Deconstruction and Marxism' rules, creating an 'aversion to the marketplace, the very milieu of intervention and shaper of any future architecture.'²¹ Unlike the rather subtle theoretical exercises of Somol and Whiting, Speaks makes no excuses: the text can be read as call to order, a demand that we should abandon theory in general, and instead opt for a stance that is unapologetically fashionable and desirable. 'Theory,' Speaks claims, is not just irrelevant but was and continues to be an impediment to the development of a culture of innovation in architecture.'²²

Such claims could easily be dismissed because of their intellectual vulgarity, or because they are merely the echoes of generational conflicts and skirmishes in American academia. And yet they point to a deeper problem, which as we noted above, questions to what extent the emphasis on the affective, the senses, and the dimension of the 'noopolitical' can create concepts that would allow us to gain a distance from the world. Jeffrey Kipnis has argued that the strategies of negation must give way to a resistance that works by way of *sensations* when he suggests that architecture should work more like a soundtrack in a film, since its political dimension resided in its impacts on our affectivity, on our nervous system, the metaphor is somehow telling. For what is a soundtrack if not a highly specialized service called upon to support the main action, but never endowed with an agency and critical power of its own?²³ The task of architecture as resistance, Kipnis claims, would be to create new sensations, new alliances, and in this he comes close to Lazzarato where the possibility of resistance in the society of con-

trol and noopower lies in creating connections that resist being appropriated, which is a task that can never be completed.

The emergence of something like a control on the noetic level, regardless of whether we see it as an intensification of biopower in the sense of Foucault, requires that the idea of a critical theory be rethought. The claim that adversary models based in negation, dialectics, and contradiction are obsolete, no matter how exaggerated and one-sided such claims may be, point in the same direction and they cannot be simply dismissed. Here there are of course many avenues that open up and, unlike the theorists of noopower, almost as an inversion of their claims some theorists take the step into a full-blown naturalizing of consciousness – akin to the 'neuro-materialism' that has become widespread in certain strands of analytical philosophy – and attempt to ground aesthetic and formal solutions to architectural and artistic problems directly in a neuroscience and evolutionary biology. This, however, seems to largely bypass the question of historical mediation, and render the question of a theory that would understand architecture on the basis of an analysis of contemporary society and 'power' vacuous from the start.²⁴

But what, then, is this thing that we have referred to in a rather imprecise way as 'critical theory'? What is 'critical' about it, and in what sense is it a 'theory'? These questions cannot be settled by

transcends the physical realm to become cerebral. It is not a locker room but an incubator for adults, an instrument that permits the members – too impatient to await the outcome of evolution – to reach new strata of maturity by transforming themselves into new beings, this time according to their individual designs. Bastions of the antinatural, Skyscrapers such as the Club announce the imminent segregation of mankind into two tribes: one of Metropolitanites – literally self made – who used the full potential of the apparatus of Modernity to reach unique levels of perfection, the second simply the remainder of the human race. The only price its locker-room graduates have to pay for their collective narcissism is that of sterility. Their self-induced mutations are not reproducible in future generations.' **Delirious New York: A Retroactive Manifesto for Manhattan** (New York: Monacelli Press, 1994), 157-8. The theme of a division between non-communicating spaces ('two tribes') can in fact be read as way to reinvent critique not as opposition, but as materializing of contradictions, as I have attempted to show in 'Looping Ideology: Rem Koolhaas and the CCTV project,' in **Media Houses: Architecture, Media, and the Production of Centrality**, eds. Staffan Ericsson and Kristina Riegert (New York: Peter Lang, 2010).

²⁰ Somol and Whiting, 'Notes around the Doppler Effect,' 77.

²¹ Michael Speaks, 'After Theory,' **Architectural Record** (June 2005): 73.

²² Ibid., 74.

²³ Jeffrey Kipnis, 'Is Resistance Futile?,' **Log 5** (Spring/Summer 2005). Kipnis cites Francis Bacon's painting, and his reading of them in terms of affects and sensations is indebted to Deleuze, **Francis Bacon: Logique de la sensation** (Paris: Editions de la Différence, 1981). Something of this transpires already in Kipnis's essay on 'The Cunning of Cosmetics,' **El Croquis** 84 (1997), which discusses the role of surface, ornament, and the 'transformative power of the cosmetic' in Herzog & de Meuron's work, in where he discerns an 'urbane, cunning intelligence, and an intoxicating, almost erotic allure,' 407. These works function like 'sirens,' Kipnis says, recalling the famous analysis of Horkheimer and Adorno, although obviously providing a wholly different reading of the moment of seduction. The discourse of affects and seduction has become widespread in architecture; see for instance the contributions by Sylvia Lavin, Jeffrey Kipnis, and Alejandro Zaera-Polo, in **Quaderns** 245 (April 2005), and the special issue of **Archplus** 178 (2006): 'Die Produktion von Präsenz,' and its various uses, from the 'urbane and cunning' to the desire to simply attract clients, testifies to the malleability of these concepts.

²⁴ This seems to me to be the claim by Harry Francis Mallgrave, in his recent **The Architect's Brain: Neuroscience, Creativity, and Architecture** (London: Blackwell, 2010).

any references to the past, or to any particular form of artistic practice, but themselves require acts of invention. Such acts cannot help but be inextricably bound up with the current state of affairs, and they must draw on the most advanced productive forces while still trying to imagine other possible social relations. In this they always run the risk of becoming indistinguishable from what they attempt to analyze, which is, however, not something to be deplored (it is in substance the same situation as that of Marx's *Capital* with respect to the world of nineteenth-century capitalism). Critical theory can obviously not congeal into some incessant referencing of the past (the historical avant-garde, the 1960s, or some other moment in time), nor can it leap ahead into a utopian future where it would become sealed in the purely imaginary. Critical theory must be an immanent practice, moving with its time, always ready to invent new tools. At present, the society of control – which, one must remember, is only one part of a global order that contains many levels of technological refinement, and from which the power regimes of sovereignty and discipline have by no means receded – constitutes our horizon, it generates many images of thought, from the most complex to the most imbecile, and to extract from them a transformative power of philosophy, art, and politics is a formidable task that we must not reject.

I

Plasticity and Potentiality

Movement

Paolo Virno

Always Already Just Now The content of the global movement that ever since the Seattle revolt has occupied (and redefined) the public sphere is nothing less than human nature. The latter constitutes both the arena of struggle and its stake. The arena of struggle: the movement is rooted in the epoch in which the capitalist organization of work takes on as its raw material the differential traits of the species (verbal thought, the transindividual character of the mind, neoteny, the lack of specialized instincts, etcetera). That is, it is rooted in the epoch in which human praxis is applied in the most direct and systematic way to the ensemble of requirements that make praxis human. The stake: those who struggle against the mantraps placed on the paths of migrants or against copyright on scientific research raise the question of the different sociopolitical expression that could be given, here and now, to certain biological prerogatives of *Homo sapiens*.

We are therefore dealing with a historically determinate subversive movement, which has emerged in quite peculiar, or rather unrepeatable, circumstances, but which is intimately concerned with that which has remained unaltered from the Cro-Magnons onwards. Its distinguishing trait is the extremely tight entanglement between ‘always already’ (human nature) and ‘just now’ (the biolinguistic capitalism that has followed Fordism and Taylorism). This entanglement cannot fail to fuel some Rousseauian conceptual muddles: the temptation to deduce a sociopolitical ideal from the biological constitution of the human animal seems irrepressible, as does the idea of a naturalist corrective to the distortions produced by an irascible history. Think of the political Chomsky, for whom the crucial point is to constantly reaffirm some innate capabilities of our species (for example, the ‘creativity of language’), against the claims, unjust because *unnatural*, of this or that system of power. To my mind, there is both truth and falsehood in the ‘Chomskyianism’ that pervades the common sense of the movement. Truth: it is absolutely realistic to hold that the biological invariant has today become a fulcrum of social conflicts, in other words that immutable metahistory surges up at the centre of the most up-to-date labor and communicative processes. Falsehood: the biological invariant becomes the raw material of social praxis only because the capitalist relation of production mobilizes to its advantage, in a historically unprecedented way, the specie-specific prerogatives of *Homo sapiens*. The undeniable preeminence of the meta-historical plane entirely depends on a contingent state of affairs.

To clarify the link between global movement and human nature it is necessary to tackle, be it tangentially, some tricky problems. First, an apodictic thesis: how and why is human nature, far from being only the condition of possibility of historical praxis, also at times its manifest content and operational field. Second, a synoptic definition, itself also apodictic, of those phylogenetic constants which are simultaneously the condition of possibility and the manifest content of historical praxis. On the basis of these premises,¹ the real discussion begins. It consists in confronting the rather different ways in which the background, that is human nature, comes to the foreground, in the guise of an empirical phenomenon, in traditional societies and in contemporary capitalism.

¹ Which are fully argued in Paolo Virno, **Quando il verbo si fa carne. Linguaggio e natura umana** (Turin: Bollati Boringhieri, 2003).

This crucial difference helps us to better understand the specific weight which the political action of the global movement carries, or could carry.

Maps of Human Nature The decisive question is broadly the following: can human beings *experience* human nature? Note that experiencing something, for instance an object or an event, does not at all mean representing it with some degree of scientific precision. Rather, it means perceiving it in its phenomenal manifestness, being emotionally involved, reacting to it with praxis and discourse. If that is so, our case immediately confronts us with a difficulty: the expression ‘human nature’ effectively denotes the ensemble of innate dispositions that guarantee the very possibility of perceiving phenomena, to be emotionally involved, to act and discourse. Accordingly, the decisive question takes on a paradoxical air: is it possible to experience, in the full sense of the term, that which constitutes the presupposition of experience in general?

The answer depends on the way in which we conceive of eternity in time. Make no mistake: by ‘eternal’ I simply mean that which displays a high degree of invariance, not being subject to social and cultural transformations. In this mild acceptance, ‘eternal,’ for instance, can be said of the language faculty. There are basically two ways, opposed to one another, of conceiving the eternal in time. The first, which I reject, can be loosely defined as ‘transcendental.’ Its point of honor lies in arguing that the invariant presuppositions of human nature, on which really experienced facts and states of affairs depend, never present themselves in turn as facts or states of affairs. The presuppositions remain confined in their recondite ‘pre-.’ That which grounds or permits all appearances does not itself appear. This approach rules out that human beings may experience human nature. The second way of considering the eternal in time can be defined, once again loosely, as ‘natural-historical.’ It consists in demonstrating that the conditions of possibility of human praxis possess a peculiar empirical counterpart. In other words, there are contingent phenomena that reproduce point-by-point the inner structure of the transcendental presupposition. Besides being their foundation, the ‘eternal’ exposes itself, as such, in such and such a given sociopolitical state of affairs. Not only does it *give* rise to the most varied events, but it also *takes* place in the flow of time, taking on an eventual physiognomy. In other words, there are historical facts that show in filigree the conditions that make history itself possible. This second approach, which I share, implies that human beings can experience human nature.

I call *natural-historical diagrams* the sociopolitical states of affairs that display, in changing and rival forms, some salient features of anthropogenesis. The diagram is a sign that imitates the object to which it refers, meticulously reproducing its structure and the relation between its parts. Think of a map, a mathematical equation, a graph. However, the contingent historical fact, which offers the abridged image of a biological condition, is not a necessary condition of the latter,

since its roots lie instead in a particular social and cultural conjuncture. The diagram faithfully reproduces the object that it stands for but, unlike an index, it is *not* caused by it. A geographical map is something other than the knock on the door that attests to the presence of a visitor.

Recall the question we formulated above: Is it possible to experience, in the full sense of the term, that which constitutes the presupposition of experience in general? I can now reply: Yes, if and when there are adequate phenomenal diagrams of this presupposition; yes, if and when a historical event offers the map or the equation of certain fundamental meta-historical constants. The diagrams of human nature institute an endless circularity between the transcendental and the empirical, the condition and the conditioned, the background and the foreground. To get an approximate idea of the diagram, consider this observation by Peirce on self-reflexive diagrams (I thank Tommaso Russo for having brought it to my attention): ‘On a map of an island laid down upon the soil of that island there must, under all ordinary circumstances, be some position, some point, marked or not, that represents *qua* place on the map the very same point *qua* place on the island.’² The map is the diagram of a territory, part of which is constituted by the diagram of that territory, part of which ... to infinity. The same happens, in effect, when you formulate a mental image of your own mind; accordingly, the image of the mind includes an image of the mind that includes an image ... to infinity. Unlike the map discussed by Peirce, the diagrams of human nature are not scientific constructions or conventional signs; they are concrete phenomena, sociopolitical states of affairs, historical events. What’s more, the paradoxical oscillation implied by these diagrams is not spatial but temporal. That is, it consists in the infinite circularity between ‘just now’ and ‘always already’ (experienced facts and conditions of possibility of experience); not in the circularity between part and whole, as in the case examined by Peirce.

Natural history, in the particular sense I am giving to it here, meticulously collects the multiple sociopolitical *diagrams* of the biological invariant. Accordingly, it concerns itself with all the circumstances, rather different over the course of time, in which *anthropos*, working and speaking, retraces the salient stages of anthropogenesis. Natural history inventories the ways in which human beings *experience* human nature. Having the latter as its content, the global movement should be considered as an episode of natural history. It can rightfully be compared to the map of an island that is laid down on a precise point on the island itself.

The Potential Animal Our theme is and remains the existence of natural-historical facts that have the value of diagrams (graphs, maps, and so forth) of human nature. However, in order to discuss these diagrams with greater precision, it is necessary to establish some aspect of the object that they designate. What are we speaking about when we speak of species-specific prerogatives, of phylogenetic metahistory, of biological invariant? The following annotations are merely offered by way of orientation: nothing more than a road sign. Whoever doesn’t share them, or

thinks they fall short, can replace or complement them at will. The crucial point, I repeat, is not an exhaustive definition of that which in *Homo sapiens* remains unaltered from the Cro-Magnons onwards, but the ways in which the mutable course of history sometimes thematizes the ‘eternal,’ even exhibiting it in concrete states of affairs.

The biological invariant that characterizes the existence of the human animal can be referred back to the philosophical concept of *dynamis*, power. From a temporal angle, power means *not-now*, untimeliness, a deficit of presence. And we should add that if there were no experience of the not-now, it would also be impossible to speak of a ‘temporal angle’; it is precisely *dynamis* that, by dissolving the ‘eternal present’ of God and the non-human animal, gives rise to historical time. The potentiality of *Homo sapiens*: a) is attested by the language faculty; b) is inseparable from instinctual non-specialization; c) originates in neoteny; d) implies the absence of a univocal environment.

a) The language faculty is something other than the ensemble of historically determinate languages. It consists in a body’s inborn capacity to emit articulate sounds, that is in the ensemble of biological and physiological requirements which make it possible to produce a statement. It is mistaken to treat the indeterminate power-to-speak as a protolanguage spoken by the entire species (something like a universal Sanskrit). The faculty is a generic disposition, exempt from grammatical schemas, irreducible to a more or less extended congeries of possible statements. Language faculty means language *in potentia* or the power of language. And power is something non-actual and still undefined. Only the living being that is born aphasic has the language faculty. Or better: only the living being that lacks a repertoire of signals biunivocally correlated to the various configurations – harmful or beneficial – of the surrounding environment.

b) The language faculty confirms the instinctual poverty of the human animal, its incomplete character, the constant disorientation that sets it apart. Many philosophers argue that the language faculty is a highly specialized instinct. But they go on to add that it is a specialization for polyvalence and generalization, or even – which amounts to the same – an instinct to adopt behaviors that have not been preset. Now, to argue that the linguistic animal is supremely able in ... doing without any particular ability is really to participate in the international festival of the sophism. Of course, the language faculty is an innate biological endowment. But not everything that is innate has the prerogatives of a univocal and detailed instinct. Despite being congenital, the capacity to speak is only *dynamis*, power. And power properly speaking, that is as distinguished from a well-defined catalogue of hypothetical performances, coincides with a state of indeterminacy and uncertainty. The animal that has language is a potential animal. But a potential animal is a *non-specialized* animal.

c) The phylogenetic basis of non-specialization is *neoteny*, that is the ‘retention of formerly juvenile characteristics produced by retardation of somatic develop-

ment.’³ The generic and incomplete character of the human animal, the indecision that befalls it, in other words the *dynamis* which is consubstantial with it, are rooted in some of its organic and anatomical primitivisms, or, if you prefer, in its congenital incompleteness. *Homo sapiens* has ‘a constitutively premature birth,’⁴ and precisely because of this it remains an ‘indefinite animal.’ Neoteny explains the instability of our species, as well as the related need for uninterrupted learning. A chronic infancy is matched by a chronic non-adaptation, to be mitigated in each case by social and cultural devices.

d) Biologically rooted in neoteny, the potentiality of the human animal has its objective correlate in the lack of a circumscribed and well-ordered environment in which to insert oneself with innate expertise once and for all. If an environment [*ambiente*] is the ‘ensemble of conditions ... which make it possible for a certain organism to survive thanks to its particular organization.’⁵ it goes without saying that a non-specialized organism is also an *out-of-place* [*disambientato*] organism. In such an organism perceptions are not harmoniously converted into univocal behaviors, but give rise to an overabundance of undifferentiated stimuli, which are not designed for a precise operational purpose. Lacking access to an ecological niche that would prolong its body like a prosthesis, the human animal exists in a state of insecurity even where there is no trace of specific dangers. We can certainly second the following assertion by Chomsky: ‘The way we grow does not reflect properties of the physical environment but rather our essential nature.’⁶ Provided we add, however, that ‘our essential nature’ is characterized in the first place by the absence of a determinate environment, and therefore by an enduring disorientation.

We said that the primary task of natural history consists in collecting the social and political events in which the human animal is put into direct relation with metahistory, that is with the unmodifiable constitution of its species. We call natural-historical those maximally contingent phenomena which offer plausible *diagrams* of an invariant human nature. The terse definitions we proposed above allow us to specify the overall argument. The questions that natural history must face up to are accordingly the following: In what sociopolitical situations does the non-biological specialization of *Homo sapiens* come to the fore? When and how does the generic language faculty, as distinct from historical languages, take on a leading role within a particular mode of production? What are the *diagrams* of neoteny? Which are the maps or graphs that will adequately portray the absence of a univocal environment?

The answer to these questions will shed light on an essential difference between traditional societies and contemporary capitalism. In other words, it will shed light on the unprecedented features of the historical situation in which the global movement of Genoa and Seattle finds itself operating.

³ Stephen Jay Gould, *Ontogeny and Phylogeny* (Cambridge, MA: Belknap Harvard, 1977), 483.

⁴ See Marco Mazzeo, *Tatto e linguaggio* (Rome: Editori Riuniti, 2004); Adolf Portmann, *Aufbruch der Lebensforschung* (Zurich: Rhein Verlag, 1965).

⁵ Arnold Gehlen, *Philosophische Anthropologie und Handlungslehre* (Frankfurt am Main: Klostermann, 1983), 112.

⁶ Noam Chomsky, *Language and the Problems of Knowledge: The Managua Lectures* (Cambridge, MA: MIT Press, 1988), 151.

Cultural Apocalypses In traditional societies, including to some extent classic industrial society, the potentiality (non-specialization, neoteny, etcetera) of the human animal takes on the typical visibility of an empirical state of affairs only in an emergency situation, that is in the midst of a *crisis*. In ordinary circumstances, the species-specific biological background is instead concealed, or even contradicted, by the organization of work and solid communicative habits. What predominates thus is a robust discontinuity, or rather an antinomy, between ‘nature’ and ‘culture.’ Anyone who would object that this discontinuity is merely a mediocre cultural invention, to be chalked up to the bilious anthropocentrism of spiritualist philosophers, would be making his own life too easy, neglecting what is by far the most interesting task: to individuate the *biological* reasons for the enduring bifurcation between biology and society. A program to naturalize mind and language that would forsake a *naturalist* explanation of the divergence between ‘culture’ and ‘nature,’ preferring to reduce the whole affair to a ... clash of ideas, would be shamelessly incoherent.

Let’s stick with well-known, even stereotypical formulations. We call potential the corporeal organism which, lacking its own environment, must wrestle with a vital context that is always partially undetermined, that is with a *world* in which a stream of perceptual stimuli is difficult to translate into an effective operational code. The world is not a particularly vast and varied environment, nor is it the class of all possible environments: rather, there is a world *only* where an environment is wanting. Social and political praxis provisionally compensates for this lack, building *pseudo-environments* within which omnilateral and indiscriminate stimuli are selected in view of advantageous actions. This praxis is thus opposed to its invariant and meta-historical invariant. Or rather, it attests it to the very extent that it tries to rectify it. If we wanted to turn once again to a concept drawn from Charles S. Peirce’s semiotics, we could say that culture is a ‘Sign by Contrast’ of a species-specific instinctual deficit: a sign, that is, which denotes an object only by virtue of a polemical reaction to the object’s qualities. Exposure to the world appears, above all and for the most part, as a necessary immunization from the world, that is as the assumption of repetitive and predictable behaviors. Non-specialization finds expression as a meticulous division of labor, as the hypertrophy of permanent roles and unilateral duties. Neoteny manifests itself as the ethico-political defense of neotenic indecision. As a device which is itself biological (that is, functional to the preservation of the species), culture aims at stabilizing the ‘indefinite animal,’ to blunt or veil its disorientation [*disambientamento*], to reduce the *dynamis* that characterizes it to a circumscribed set of possible actions. Human *nature* is such as to often involve a contrast between its expressions and its premises.

On this background, which we’ve evoked with all the brevity of a musical refrain, there stands out a crucial point, which is instead redolent with nuances and subtleties. We’ve already alluded to it: in traditional societies, the biological

invariant (language as distinct from languages, raw potentiality, non-specialization, neoteny, etcetera) acquires a marked historical visibility when, and only when, a certain pseudo-environmental setup is subjected to violent transformative traction. This is the reason why natural history, if it is referred to traditional societies, coincides for the most part with the *story of a state of exception*. It scrupulously describes the situation in which a form of life loses any obviousness, becoming brittle and problematic. In other words, the situation in which cultural defenses misfire and one is forced to return for a moment to the ‘primal scene’ of the anthropogenetic process. It is in such conjunctures, and only in such conjunctures, that it is possible to garner vivid *diagrams* of human nature.

The collapse of a form of life, with the ensuing irruption of metahistory into the sphere of historical facts, is what Ernesto de Martino, one of the few original philosophers in twentieth-century Italy, called a ‘cultural apocalypse.’ With this term he designated the historically determinate occasion (economic disruption, sudden technological innovation, etcetera) in which the very difference between language faculty and languages, inarticulate potentiality and well-structured grammars, world and environment, becomes visible to the naked eye, and is dramatically thematized. Among the multiple symptoms which for De Martino presage an ‘apocalypse,’ there is one that possesses strategic importance. The undoing of a cultural constellation triggers, among other things, ‘a semantic excess which is not reducible to determinate signifieds.’⁷ We witness a progressive indetermination of speech: in other words, it becomes difficult to ‘bend the signifier as possibility towards the signified as reality’;⁸ untied from univocal referents, discourse takes on an ‘obscure allusiveness,’ abiding within the chaotic domain of the power-to-say (a power-to-say that goes beyond any spoken word). Now, this ‘semantic excess not reducible to determinate signifieds’ is entirely equivalent to the language *faculty*. In the apocalyptic crisis of a form of life, the biologically innate faculty fully exhibits the gap which forever separates it from any given language. The primacy attained by an undulating power-to-say is matched by the abnormal fluidity of states of affairs and the growing uncertainty of behaviors. As de Martino writes: ‘things refuse to remain within their domestic boundaries, shedding their quotidian operability, seemingly stripped of any memory of possible behaviours.’⁹ No longer selectively filtered by a complex of cultural habits, the world shows itself to be an amorphous and enigmatic context. The conflagration of the ethico-social order thus reveals two correlated aspects of invariant ‘human nature’: a language faculty distinct from languages and a world opposed to any (pseudo-)environment whatsoever.

This twofold revelation is nevertheless transitory and parenthetical. The ultimate outcome of the apocalypse or state of exception is the institution of new cultural niches, capable of concealing and blunting once again the biological ‘always already,’ that is the inarticulate and chaotic *dynamis*. Rare and fleeting are the apocalyptic diagrams of human nature.

⁷ Ernesto De Martino, *La fine del mondo. Contributo all’analisi delle apocalissi culturali* (Turin: Einaudi, 2002 [1977]), 89.

⁸ De Martino, *La fine del mondo. Contributo all’analisi delle apocalissi culturali*, 632.

⁹ Ibid., 91.

Metahistory and Social Praxis What was said in the preceding section only counts for traditional societies. Contemporary capitalism has radically modified the relation between unalterable phylogenetic prerogatives and historical praxis. Today, the prevailing forms of life do not veil, but rather flaunt without any hesitation the differential traits of our species. In other words: the prevailing forms of life are a veritable inventory of *natural-historical diagrams*. The current organization of work does not allay the disorientation and instability of the human animal, but on the contrary takes them to their extreme and systematically valorizes them. Amorphous potentiality, that is the chronic persistence of infantile characteristics, does not menacingly flare in the midst of a crisis. Rather it permeates every aspect of the tritest routine. Far from dreading it, the society of generalized communication tries to profit from the 'semantic excess not reducible to determinate signifieds,' thereby conferring the greatest relevance to the indeterminate language faculty. According to Hegel, philosophy's first task is to grasp its time with thought. This proverbial precept, akin to the chalk that grates against the blackboard for those who delight in studying the ahistorical mind of the isolated individual, needs to be updated in the following way: the paramount task of philosophy is to come to grips with the unprecedented superimposition of the eternal and the contingent, the biologically invariant and the sociopolitically variable, which exclusively connotes the current epoch.

Let it be noted in passing that this superimposition accounts for the renewed prestige that for some decades now has been accorded to the notion of 'human nature.' It does not depend on the impressive tectonic shifts within the scientific community (Chomsky's pitiless critique against Skinner's *Verbal Behavior* or suchlike) but on an ensemble of social, economic and political conditions. To believe the opposite is yet another demonstration of culturalist idealism (of a very academic sort, to boot) on the part of those who nonetheless never fail to toot the horn of the program to naturalize mind and language. Human nature returns to the centre of attention not because we are finally dealing with biology rather than history, but because the biological prerogatives of the human animal have acquired undeniable historical relevance in the current productive process. That is, because we are confronted with a peculiar empirical manifestation of certain phylogenetic, which is to say metahistorical, constants that mark out the existence of *Homo sapiens*. If a *naturalist* explanation of the autonomy enjoyed by 'culture' in traditional societies is certainly welcome, so is a *historical* explanation of the centrality attained by (human) 'nature' in the midst of post-Fordist capitalism.

In our epoch, the object of natural history is not a state of emergency, but everyday administration. Instead of dwelling on the erosion of a cultural constellation, we now need to concern ourselves with the way it is fully in force. Natural history does not limit itself to scavenging through 'cultural apocalypses.' Instead it tightens its grip on the totality of contemporary events. Because biological metahistory no longer surges up at the edges of forms of life, where they get stuck

and idle, but installs itself durably at their geometric centre, testifying to their regular functioning, all social phenomena can be rightfully considered as *natural-historical phenomena*.

The dearth of specialized instincts and the lack of a definite environment, which have been the same from the Cro-Magnons onwards, today appear as noteworthy economic resources. It is not difficult to register the patent correspondence between certain salient features of 'human nature' and the sociological categories which are best suited to the current situation. The biological non-specialization of *Homo sapiens* does not remain in the background, but gains maximal historical visibility as the universal *flexibility* of labor services. The only professional talent that really counts in post-Fordist production is the habit not to acquire lasting habits, that is the capacity to react promptly to the unusual. A univocal competence, modulated in its last detail, now constitutes an authentic handicap for those obliged to sell their labor-power. Again, neoteny, that is chronic infancy and the related need for continual training, translates, without any mediation, into the social rule of *permanent formation*. The shortcomings of the 'constitutively premature birth' are converted into productive virtues. What matters is not what is progressively learned (roles, techniques, etcetera) but the display of the pure power to learn, which always exceeds its particular enactments. What's more, it is entirely evident that the *permanent precarity* of jobs, and even more the instability experienced by contemporary migrants, mirror in historically determinate ways the congenital lack of a uniform and predictable habitat. Precarity and nomadism lay bare at the social level the ceaseless and omnilateral pressure of a *world* that is never an environment. They induce a paradoxical familiarity with the stream of perceptual stimuli that do not allow themselves to be translated into univocal actions. This overabundance of undifferentiated solicitations is no longer true only in the final analysis, but it is true in the first analysis. It is not a disturbance to be dispelled, but the positive soil on which the current labor-process develops. Lastly, what is perhaps the most relevant and comprehensive point: inarticulate power, which is not reducible to a series of preset potential acts, acquires an extrinsic, or better pragmatic aspect in the commodity *labor-power*. This term effectively designates the ensemble of generically human psycho-physical faculties, which are precisely considered as mere *dynamis* that have yet to be applied. Today labor-power largely coincides with the language faculty. And the language faculty, qua labor-power, unmistakably shows its difference with regard to grammatically structured languages. Language faculty and labor-power lie on the border between biology and history – with the added proviso that in our epoch this very border has taken on precise historical lineaments.

To affirm that contemporary forms of life have as their emblem the language faculty, non-specialization, neoteny, loss of environment, does not at all entail arguing that they are unruly. Far from it. Being conversant with omnilateral potentiality demands, as its inevitable counterpoint, the existence of far more detailed norms than the ones in force in a cultural pseudo-environment. Norms so detailed that they tend to hold for a single case, for a contingent and non-reproducible

occasion. The flexibility of labor services implies the unlimited variability of rules, but also, for the brief period in which they remain in force, their tremendous rigidity. These are ad hoc rules, of the kind that prescribe in minute detail the way of carrying out a certain action and only that action. Precisely where it attains the greatest sociopolitical relevance, the innate language *faculty* mockingly manifests itself as a collection of elementary *signals*, suited to tackling a particular eventuality. The 'semantic excess which is not reducible to determinate signifieds' often flips over into a compulsive reliance on stereotyped formulae. In other words, it takes on the seemingly paradoxical guise of a semantic *deficit*. In both of its polarities, this oscillation depends on the sudden absence of stable and well-articulated *pseudo-environments*. No longer screened by a protective cultural niche, the world is experienced in all its indeterminacy and potentiality (semantic excess); but this patent indeterminacy, which each time is to be contained and diluted in different ways, provokes by way of reaction halting behaviors, obsessive tics, the drastic impoverishment of the *ars combinatoria*, the inflation in transient but harsh norms (semantic defect). Though on the one hand permanent formation and the precarity of employments guarantee the full exposure to the world, on the other they instigate the latter's recurrent reduction to a spectral or mawkish dollhouse. This accounts for the surprising marriage between generic language faculty and monotonous signals.

The Demand for the Good Life Let's sum up. In traditional societies, the biological invariant was thrust to the fore when a form of life imploded and came undone; in contemporary capitalism, when everything functions regularly. Natural history, usually busy registering with seismographic precision crises and states of exception, is instead concerned today with the ordinary administration of the productive process. In our epoch, the biological requirements of *Homo sapiens* (language faculty, non-specialization, neoteny, etcetera) match up point-by-point with the most significant sociological categories (labor-power, flexibility, permanent formation).

Two phrases by Marx, taken from the *Economic and Philosophical Manuscripts of 1844*, are perfectly suited to the current situation. The first says: 'It can be seen how the history of *industry* and the *objective* existence of industry as it has developed is the *open* book of the essential powers of man, man's psychology present in tangible form.... A *psychology* for which this book ... is closed can never become a *real* science.'¹⁰ To paraphrase: today's industry – based on neoteny, the language faculty, potentiality – is the externalized, empirical, pragmatic image of the human psyche, of its invariant and metahistorical characteristics. Today's industry therefore constitutes the only dependable textbook for the philosophy of mind. Here is Marx's second phrase: 'The whole of history is a preparation, a development, for "man" to become the object of *sensuous* consciousness.'¹¹ Once we expunge the eschatological emphasis (history doesn't prepare anything, let it be

clear) we can paraphrase as follows: in the epoch of flexibility and permanent formation, human nature now constitutes an almost perceptual evidence, as well as the immediate content of social praxis. In other words: every step they take, human beings directly experience that which constitutes the presupposition of experience in general.

The raw material of contemporary politics is to be found in natural-historical phenomena, that is in the contingent events in which the distinctive traits of our species come to light. I say *raw material*, not a canon or a guiding principle. All political orientations are effectively faced with a situation in which human praxis is systematically applied to the ensemble of the requirements that make praxis human. But they do so in the name of contrasting interests. The shared attention to the differential traits of the species gives rise to diametrically opposed aims, whose realization depends on the balance of forces they enjoy, not on their greater or lesser conformity to 'human nature.' It is in vain that Chomsky appeals to the unalterable biological endowment of *Homo sapiens* to rectify the inherent injustice of contemporary capitalism. Rather than constituting the platform and parameter for a possible emancipation, the congenital 'creativity of language' appears today as an ingredient in the despotic organization of work; or better, it appears as a profitable economic resource. To the extent that it attains an immediate empirical consistency, the biological invariant is part of the problem, and certainly not the solution.

The global movement is inscribed in this context. Not unlike its enemies, that is, not unlike the politics that prolongs oppression, it too has considerable familiarity with the metahistory that incarnates itself in contingent states of affairs. But it strives to discern the various forms that could take on the manifestation of the 'always already' in the 'just now.' That the congenital *potentiality* of the human animal fully manifests itself at the socioeconomic level is an irreversible matter of fact; but that in manifesting itself, this potentiality is obliged to take on the features of the commodity *labor-power* is by no means an inescapable fate. On the contrary, it is a momentary outcome, which one should intransigently struggle against. Likewise, it is not set in stone anywhere that the phenomenological correlate of the biological *non-specialization* of our species will continue to be, always and regardless, the servile *flexibility* flaunted by the contemporary labor-process. The sociohistorical prominence of human nature does not attenuate, but rather immeasurably enhances the specific impact (and the irreparable contingency) of political action.

The global movement is the conflictual interface of biolinguistic capitalism. It is precisely because (and not in spite) of this that it presents itself on the public stage as an *ethical* movement. The reason for this is easy to intuit. We have said that contemporary production implicates all the attitudes that distinguish our species: language, reflexivity, instinctual deficiency, and so forth. With a simplifying but not empty formula, we could even say that post-Fordism puts to work *life* as such. Now, if it is true that biolinguistic capitalism appropriates 'life,' that is the set of specifically human faculties, it is pretty obvious that insubordination against it must focus on this same

¹⁰ Karl Marx, 'Economic and Philosophical Manuscripts of 1844,' *Early Writings*, translated by Rodney Livingstone and Gregor Benton (London: Penguin, 1975), 354.

¹¹ Marx, 'Economic and Philosophical Manuscripts of 1844,' 355.

fact. The life that is included in flexible production is countered by the demand (which is pertinent because it is itself 'non-specialized') of a *good life*. And the search for the *good life* is the only concrete theme of the 'science of mores.' As numerous as its misfortunes may be, it is beyond doubt that the global movement has indicated the point of intersection between natural history and ethics.

Translated by Alberto Toscano

* This is a revised version of a paper previously published as: 'Natural-Historical Diagrams: The "New Global" Movement and the Biological Invariant,' *Cosmos and History, The Journal of Natural and Social Philosophy* 1 (2009).

The Politics of I Can...

Patricia Reed

But thought, in its essence, is pure potentiality; in other words, it is also the potentiality not to think, and, as such, as possible or material intellect, Aristotle compares it to a writing tablet on which nothing is written.¹ *Giorgio Agamben*

It is symptomatic of the current plight of ‘potentiality’ that one must often add a prefix like ‘pluri’ in order to infer an understanding of a highly diversified notion of the term. The dichotomous relationship that has been instantiated between the potential and the actual is an unfortunate simplification, in which potentiality is reduced to a state of waiting for a catalytic event in order to render it productive, to render it *actual*, to render it *other*. This generic turn towards the binarization of the potential and the actual is inferred by such statements as a ‘child has the potential to know,’² signifying that the child ‘must suffer an alteration (a becoming other) through learning.’³ Such a binary conception avoids the question of potentiality altogether, ‘reducing it to terms of will and necessity,’⁴ whereas potentiality, as expounded upon by Aristotle, goes far beyond such generic binaries. He addresses those who already possess ‘knowledge,’ and are therefore not obliged to undergo an ‘alteration,’ but rather by ‘having’ that knowledge can both bring it and not bring it into actuality. A more complex understanding of potentiality is not merely a trivial matter to be taken up in the sheltered journals of academia, but acts as a foundational concept in grasping the presuppositions that go into the ontological partitioning of places, bodies, and roles, and their legitimation therein. As Giorgio Agamben notes: ‘Until a new and coherent ontology of potentiality ... has replaced the ontology founded on the primacy of actuality and its relation to potentiality, a political theory freed from the aporias of sovereignty remains unthinkable.’⁵

The ‘I Can’ The verb ‘can’ is central to a more complex understanding of the notion of potentiality, and it is the verb that Agamben has gone so far as to declare the singular term denoting his entire body of philosophical enquiry.⁶ Agamben describes the verb ‘can’ not as referring to a directed course of action, but as a verb that marks out something vastly more arduous: ‘For everyone a moment comes in which she or he must utter this “I can,” which does not refer to any certainty or specific capacity but is nevertheless, absolutely demanding. Beyond all faculties, this “I can” does not mean anything – yet it marks what is, for each of us, perhaps the hardest and bit-terest experience possible: the experience of potentiality.’⁷ The verb ‘can,’ in all of its troubling ambiguity, is a liminal verb in that ‘I can’ signifies that one has the capacity to do something, but this capacity or faculty does not necessarily entail a moment of actualization. Agamben proceeds

¹ Giorgio Agamben, **The Coming Community**, translated by Michael Hardt (Minnesota: University of Minnesota Press, 1993), 36.

² Giorgio Agamben, ‘On Potentiality,’ in **Potentialities**, translated by Daniel Heller-Roazen (Stanford: Stanford University Press, 1999), 177-84.

³ Ibid.

⁴ Giorgio Agamben, ‘Bartleby, or On Contingency,’ in Agamben, **Potentialities**, 243-71. Originally published as ‘Bartleby o della Contingenza,’ in Giorgio Agamben and Gilles Deleuze, **Bartleby, la formula della creazione** (Macerata: Quodlibet, 1993).

⁵ Giorgio Agamben, **Homo Sacer: Sovereign Power and Bare Life**, translated by Daniel Heller-Roazen (Stanford: Stanford University Press, 1998), 44.

⁶ Agamben, ‘On Potentiality.’

⁷ Ibid.

to qualify the originary problem of potentiality in Western thought, as that pertaining to the question faculty. What does it mean to have the faculty of speech, of vision – which only implies that something ‘is or is not in one’s power,’⁸ thereby locating it within the domain of potentiality. This ‘*is or is not*’ essence of potentiality points to the complex nature of its existence, namely that it is ‘not simply non-Being, simple privation, but rather the existence of non-Being, the presence of an absence; and this is what we call a faculty or power.’⁹ Potentiality, or rather the *existence of potentiality* (the present non-Being), becomes just as much about the potential to act (to pass into actuality) as about the potential not to act (not to pass into actuality). It is in the relation of potential to impotential where the existence of potentiality is constituted, where one is capable of one’s own incapacity. We all know the bad, adolescent joke, which, in spirit, embodies the profound depth of potentiality, when as teenagers, our parents would say ‘can you clean your room?’ and one replies ‘yes I can,’ but of course never actualizes this gesture of cleaning, never raises a finger, since ‘can you clean your room’ is not an imperative order but rather a question as to the existence of one’s capacity to clean.

It is this *can-ness* that distinguishes potentiality from possibility, and it is crucial to the understanding of potentiality that the differences be made clear – that the terms are not interchangeable. Agamben describes three levels of potentiality, calling on the reference of Avicenna, the prince of *falasifa* (disciples of Aristotle in Islam),¹⁰ who deploys the example of writing. There is ‘material’ potentiality, that is our colloquial dichotomous understanding of the term, embodied by the child who does not yet know how to write, but may very certainly learn to do so – and therefore undergoing an alteration. Secondly, there is ‘possible’ potentiality, where a child has begun to write and learned to form the first letters, but is by no means fully endowed with the capacity to write. And lastly there is ‘perfect’ potentiality that belongs to the scribe who is ‘in full possession of the art of writing in the moment in which he does not write.’¹¹ Avicenna’s ‘perfect’ potentiality, is Agamben’s existence of potentiality, and from this point onwards, all use of the term potentiality should be grasped in this ‘perfect’ or existential sense.

It is within potentiality that Agamben finds the basis for life itself, lying in this zone of indistinction where a coincidence of two, seemingly opposed systems – the capacity to act and the capacity not to act – meet and produce an unknown, unnamed topology. It is within these indistinct zones, that the need for ethics arises, since, again, like our lazy adolescent, there is no mere task that must be fulfilled, no moral imperative, but rather an ongoing negotiation of one’s capacity (and the inherent inverse, incapacity) that constitutes the seat of ethical being. Rather than formulating a notion of potentiality that is forever bundled with the productive capacity of actualizing, we are instead confronted with the troubling position of a radical inoperativeness situated within the notion of capacity itself

in the fullness of its meaning. Agamben calls on various examples of people who fulfill their incapacity as potentiality, like the poet who does not write and the much discussed Bartleby, the scrivener, who instead of refuting his job, simply ‘*prefers not to*,’ to the bafflement and agitation of his employer. These figures exist in potentiality, for they actively contemplate the relation between their capacity to-act and their incapacity not-to-act. By engaging the capacity of incapacity in dialogic-thought, potentiality is not something that grinds-to-a-halt when actualized, it is rather a form of potentiality that ‘gives itself to itself,’ that ‘preserves itself’¹³ in actuality and perpetuates its very existence.

From the Dichotomous to the Di-Polar The zones of indistinction exemplified in the existence of potentiality shift away from the dichotomous disposition of the term in its potential/actual configuration, and point to what Agamben calls ‘di-polarities,’ not as substantial, but as tensional.¹⁴ Within this conception of potentiality it is the maintenance of tensionality that produces indistinction, and is therefore purely anti-synthetical. The di-polarity that constitutes the seat of potentiality in its complexity could better be imagined as a Moiré pattern of sorts – where two categories of shape meet and produce a visual interference. The interference pattern is not a result of an emergent synthesis, but rather the result of the optical tensions of overlapping systems of pattern. Important in this example is that the different categories (those of opposing shape) *must* interfere and overlap to produce the optical illusion – the categories of difference do not cancel each other out in their overlapping, but coincide as a result of the tension between different forms and categories of pattern.

The existence of potentiality, in its tensional, capacity-incapacity ‘di-polarity,’ is the underlying crux of the more overtly political argument posited by Agamben in his, perhaps, most well-known figure *Homo Sacer*. Above all, *Homo Sacer*, as a sacred being who can be ‘killed and yet not sacrificed, [who is] outside both human and divine law ...’¹⁵ is reduced to bare life and banished from the polis, outside the jurisdiction of normal law. *Homo Sacer*’s existence opens up a zone of indistinction insofar as he is simultaneously a being who can be killed, (and not sacrificed as in a godly order), yet if he is killed, he can be killed with impunity. *Homo Sacer*’s situation as a marginalized, banished *object* reduces life to its most basic biological function (in Greek *zoē*, which is the domain of life associated with all living things, kings, gods, animals).¹⁶ The *bios* (in Greek there are two words for ‘life,’ *zoē* described above and *bios* the domain of political life enjoyed by citizens of the polis) of *Homo Sacer* has been stripped foregoing the status of the citizen-subject of the polis, who has a political (and therefore juridical) status. *Homo Sacer*, however, does not merely get pushed outside

8 Ibid.

9 Ibid.

10 Agamben, ‘Bartleby, or On Contingency.’

11 Ibid.

12 Agamben, **The Coming Community**, 43.

13 Agamben, ‘On Potentiality,’ 184.

14 Erinn Cunniff Gilson, ‘Zones Of Indiscernibility: The Life Of A Concept From Deleuze To Agamben,’ **Philosophy Today** (January 2007): 98-106. http://findarticles.com/p/articles/mi_7696/is_200701/ai_n32231355/?tag=content;col1 (accessed on 22 February 2010).

15 Agamben, **Homo Sacer: Sovereign Power and Bare Life**, 73.

16 Ibid., 1.

of the bounds, or live outside of political citizenship, but remains included in a relation to the sphere of legislative decision making, of juridical distinction making due to his passing-through of the exceptional juridical order. It is, however, important to recognize that the exclusive inclusiveness involved in the designation of bare life, of banishment and marginalization, are not restricted to those blatant examples of Nazi camps or Guantánamo Bay, but constitute 'the decisive event of modernity [that] signals a radical transformation of the political-philosophical categories of political thought'¹⁷ where *zoē* enters the sphere of the polis, and bare-life itself becomes a political *object*, and naked life is wholly desubjectivized.

The existence of potentiality and its inherent zones of indistinction, exemplified by a diverse set of figures, from the lazy adolescent, to Bartleby the scrivener, to *Homo Sacer*, is a testament to its liminal ethical status. After all, where else could one situate and write about such drastically different figures as pertaining to a common order? The zone of indistinction is neither good nor evil as such, but exists as a conceptual topology in the understanding that such indistinctions underlie the articulation and enactment of all distinctions, and orders of partitioning drawn out on places, bodies, and roles. It is the recognition of the existence of potentiality, the un-named and undelineated foundation of indistinctiveness that calls out for an ethics of such an order. The in-between state of potentiality, the state before distinctions are carved out or actualized, is the seat of such an indistinct, or undelineated ethics, and leads us to a concept of equality elaborated by Jacques Rancière which can help us to better formulate a politics of the 'I can,' a politics of potentiality.

The Contingency of Equality In one of Rancière's seminal texts 'Disagreement: Politics and Philosophy,' he sets up an axiom of equality that forms the basis for all conceptions of hierarchical inequality as played out in the realm of the social. The an-archic precondition of equality that underlies all modes of social structuring is, paradoxically, that which makes inequality possible. Rancière sets up his description of a radicalized notion of equality, by firstly outlining the plight symptomatic of any social order: the foundation of politics is not in fact more a matter of convention than of nature, it is the lack of foundation, the sheer contingency of any social order. Politics exists simply because no social order is based on nature, no divine law regulates human society.¹⁸ After pointing out the sheer contingency upon which any social order rests, Rancière goes on to say:

Before the logos [an argument of reason] that deals with the useful and the harmful, there is the logos that orders and bestows the right to order. But this initial logos is tainted with a primary contradiction. There is order in society

because some people command and others obey, but in order to obey an order at least two things are required: you must understand the order and you must understand that you must obey it. And to do that, you must already be the equal of the person who is ordering you. It is this equality that gnaws away at any natural order. Doubtless inferiors obey 99 percent of the time; it remains that the social order is reduced thereby to its ultimate contingency. In the final analysis, inequality is only possible through equality.¹⁹

The social order is that to which Rancière applies the term 'the police' denoting (in a non-pejorative fashion) a particular sensible ordering of bodies, roles, places, identities, and functions. The police should not be grasped as that petty order of people imposing the law, but is rather (a far more complex) symbolic constitution of the social itself, and delineates a party's part or absence of it. The operations of ordering inscribed by the police define 'the allocation of ways of doing, ways of being, and ways of saying, and sees that those bodies are assigned by name to a particular place and task; it is an order of the visible and the sayable that sees a particular activity is visible and another is not, that this speech is understood as discourse and another as noise.'²¹

The police, as such, is synonymous with the delineation of forms of life that govern and are already visible and accounted for within a given community. Politics, on the other hand, is that which is antagonistic (and therefore stands in exclusive relation to) a hegemonic structuring of the social, the police. In opposition to the police, politics 'is whatever shifts a body from the place assigned to it or changes a place's destination. It makes visible what had no business being seen, and makes heard a discourse where once there was only place for noise.'²² The antagonism of politics is linked to a process of equality, not equality *proper*, but processes of testing the contingency of equality constitutive of any ordering of the police. Politics occurs in the meeting of these heterogeneous processes (the hegemony of the police and the antagonism in the processes of equality of politics). Politics, as such, is a relational mechanism denoting 'the open set of practices driven by the assumption of equality between any and every speaking being and by the concern to test this equality.'²³ In describing politics as a relational process, rather than thinking politics as a standalone phenomenon, Rancière extracts the (often presumed), direct correlation of politics with power relations – noting that, nothing is political in itself merely because power relationships are at work in it. For a thing to be political, it must give rise to a meeting of police logic and egalitarian logic that is never set up in advance.²⁴ Politics *happens*, rather than *is*, it happens as a *doing* of an eruptive, spontaneous abutment of two heterogeneous systems of logic between the police and the mechanisms of equality that operate and uphold its fragile structures and modes of demarcation.

¹⁷ Ibid., 4.

¹⁸ Jacques Rancière, **Disagreement: Politics and Philosophy**, translated by Julie Rose (Minnesota: University of Minnesota Press, 1998), 16.

¹⁹ Ibid.

²⁰ Ibid., 29.

²¹ Ibid.

²² Ibid.

²³ Ibid., 30.

²⁴ Ibid., 32.

The operativity of the police is enacted through a ‘distribution of sensibility’ or partitioning of the sensible (*le partage du sensible*: in French *partage* means both to divide and to share). The partitioning of the sensible ‘defines the “forms of part-taking” by first defining the modes of perception in which they are inscribed.’²⁵ The partitioning of the world within the order of the police into sensory experience must be grasped in its double entendre intended in the original French expression: firstly, partitioning operates to exclude and to separate; and second as that which is shared, or common. The partitioning of the sensible is thus a ‘relation between a shared “common” ... and the distribution of exclusive parts’²⁶ manifesting in that which can be experienced sensorially, in that which is perceptible. The distribution of the sensible is where politics and aesthetics meet. The shared exclusivity of parts operating through the sensible territory of police structuring is the aesthetic modality that effectuates the common of the community, to the exclusion of any supplement.²⁷ The supplementary exclusion concerns that which does not fit, that which has no part in the sensible configuration in the common community. As an antagonistic eruption, politics *happens* when those who have no part reassert and test out the contingent equality through which the inequal distribution of the sensible operates; politics asserts itself as a sensible disruption of the aesthetic coordinates of the police by the part that has no part.

Reflecting back on the example of Bartleby, the scrivener, we can trace his mode of being (that which embodies the essence of potentiality) as a political eruption of the sensible order. The particular formula, identified by Gilles Deleuze, at work within the mode of ‘resistance’ enacted by Bartleby is what linguists would define as agrammatical.²⁸ ‘*I would prefer not to*,’ is of course, grammatically correct, ‘but its abrupt termination NOT TO ... leaves what it rejects undetermined,’²⁹ it is neither an affirmation, nor a negation, but a ‘logic of negative preference, a negativism beyond all negation.’³⁰ The force of Bartleby’s secret agrammaticality is the disconnect between ‘words and things, words and actions, but also speech acts and words – it severs language from all reference.’³² Bartleby’s agrammaticality creates a suspension of the given forms of speech and behavior associated with the operative performance of a scrivener, the performance of work. His patiently spoken words, without comprehensible reference, are evocative of Austin’s ‘*performative utterance*,’³³ where a statement does not operate merely in a descriptive capacity; but where the utterance *becomes* the performance of an action. Bartleby’s is a contestation of the partitioning of the sensible of the world of the attorney to whom he speaks; his agrammaticality disorganizes a particular, and reasonable, organization of life and work: ‘It shatters not just the hierarchies of a world but also what supports them: the connections between causes and effects we expect from that world, between the behaviours and the motives we attribute to them and the means we have to modify them.’³⁴ Bartleby’s formula suspends the orders of ‘operative’ being through an agrammaticality that destroys the syntax of rea-

sonable organization. By neither negation nor affirmation, he opens up a relation of tension between the two oppositional states of ‘yes’ or ‘no.’ His is a calmly repeated, radical utterance that enacts a testing of the fundamental contingency of the reasonable operations of things.

Dissensus as Politics

A world is always as many worlds as it takes to make a world.³⁵ *Jean-Luc Nancy*

The *doing* of politics is the bringing together of the non-relationship into relationship;³⁶ it is the bringing into aesthetic existence of that which had no part in the partitioning of the sensible, it is the struggle for the forms of life that abut with divergent systems of logic in the (ac)counting of and for the community. Politics is not a matter of the meaning represented by an action, but rather the linking of meaning and action itself, meaning becomes the action of attaining visibility; of enacting a *logos* that creates symbolic enrolment within a community. Rancière names the enactment of politics ‘dissensus,’ defining it as ‘not a conflict of interests, opinions and values; [but as] a division inserted in “common sense”: a dispute over what is given and about the frame within which we see something as given.’³⁷

The relating of two separate worlds into ‘one and the same world,’³⁸ a confrontation of one world with another world; operating through the making perceptible of the fact of equality, that there exists a belonging to a shared world, that the police or *nomos* cannot perceive. Dissensus is the clash of sense and sense; a struggle between the distribution of the sensible and the ways of making sense out of it, it is the redrawing of the ‘frame within which common objects are determined.’³⁹ It is through the enactment or demonstration of dissensus that the fragile and fleeting event of politics reconfigures the sensibility of the *nomos*, scattering the sensuous coordinates of

²⁵ Jacques Rancière, ‘Ten Theses on Politics,’ in **Dissensus: On Politics and Aesthetics**, translated by Davide Panagia and Rachel Bowlby (London: Continuum, 2010), 27-44. Originally published in **Theory and Event** 3 (2001).

²⁶ Ibid.

²⁷ Jacques Rancière, ‘Biopolitics or Politics?’ in **Dissensus: On Politics and Aesthetics**, 91-6.

²⁸ Agamben, ‘Bartleby, or On Contingency.’

²⁹ Gilles Deleuze, ‘Bartleby; or, The Formula,’ in **Essays Critical and Clinical**, translated by Daniel W. Smith and Michael A. Greco (New York: Verso, 1997), 68-90. Originally published in Agamben and Deleuze, **Bartleby, la formula della creazione**.

³⁰ Ibid.

³¹ Agamben, ‘Bartleby, or On Contingency.’

³² Ibid.

³³ J.L. Austin, ‘Performative Utterances,’ in **Philosophical Papers** (Oxford: Oxford University Press, 1979), 233-52.

³⁴ Jacques Rancière, **The Flesh of Words: The Politics of Writing**, translated by Charlotte Mandell (Stanford: Stanford University Press, 2004), 146-7.

³⁵ Jean-Luc Nancy, **Being Singular Plural**, translated by Robert D. Richardson and Anne E. O’Byrne (Stanford: Stanford University Press, 2000), 15.

³⁶ Rancière, **Disagreement: Politics and Philosophy**, 89.

³⁷ Jacques Rancière, ‘Who is the Subject of the Rights of Man?’ in **Dissensus: On Politics and Aesthetics**, 62-75. Originally published in **The South Atlantic Quarterly** 2/3 (Spring/Summer 2004): 297-310.

³⁸ Ibid.

³⁹ Jacques Rancière, ‘The Paradoxes of Political Art,’ in **Dissensus: On Politics and Aesthetics**, 134-51.

that which is apprehensible. The logic of dissensus is a struggle for the (ac)counting of community and the aesthetic modalities that demarcate that which is perceived as *given*, through which the presupposition of equality can be tested and potentially rendered sensible.

Potentiality of Equality The an-archic presupposition of equality that underlies the sphere of ‘actualized’ unequal, social structuring, rests on the shared capacity for *aisthesis* of speech; that is, on the presupposition of the shared capacity to recognize a sonorous emission as speech, and not merely as a noise. As we have seen, the capacity to possess (*hexis*) and deliver a speech act, and have it understood as such, is wholly contingent on the given partitioning of the sensible order – possession of the *logos* of the speech act is socially contingent. The equality of the *apprehension* of the speech act is where one can locate the existence of potentiality in the sense elaborated upon by Agamben (via Aristotle) since it is precisely at this point where all human-animals can be understood as having the shared capacity of comprehension (without undergoing an alteration in acquiring new knowledge). The shared capacity of comprehension of speech acts, *inclusive* of the excluded supplement of the parts-which-have-no-part is the shared existence of potentiality, the actualization of which is conditional on the given forms of life that govern the inequal perceptible order. If, as Agamben has formulated, the existence of potentiality is the possibility of an ongoing negotiation with one’s capacity/incapacity in the face of actualization, what are the consequences in terms of the demonstration of dissensus, within a conception of the perceptible order? Seeing as the comprehension of speech acts as *speech* is the presupposed ground of equality upon which hierarchies are built and upon which roles, places, and identities are delineated, the demonstration of dissensus can be understood as taking shape in the articulation of an incapacity to understand such modalities of delineation. The *enactment* of misunderstanding; the demonstration of the capacity of one’s incapacity to understand, is an event of dissensus in which the conflict of sense and sense releases the orders of inequality from its actual configuration, testing out the fundamental potentiality of an-archic equality. The enactment of the incapacity to understand a specific distribution of sensibility is the demonstration of a wrong, the setting in motion of an interruption in the (ac)counting for social structuring – the wrong described here is a contestation of the sensible situation itself, where those who have no-part ‘make themselves of some account, setting up a community by the fact of placing in common a wrong that is nothing more than this very confrontation, the contradiction of two worlds in a single world.’⁴⁰

It is not my intention here to conflate the philosophical worlds of Rancière and Agamben, between whom there exist well-known, intricate, and fundamental disagreements.⁴¹ What is of interest, however, is the ways in which the existence of potentiality works upon the axiom of equality, how the axiom of equality

becomes a struggle *with* potentiality, rather than a struggle *for* potentiality. Since every social order rests on this elementary potentiality of equality, every system of power and hierarchy rests on this fundamental virtuality before the operations of actualization take over and parcel out roles, delineate bodies and map out places. The equal capacity presupposed by any social system is that of an aesthetic order, for it is precisely the equal capacity to perceive and recognize the distribution of inequality, of power, vis-à-vis the inequality in the possession of power. The aesthetic order evoked here does not refer to that which comes to be known today as that which *thinks* art, nor should it be understood as the ‘perverse commandeering of politics by a will to art, by a consideration of the people qua work of art.’⁴² Aesthetics, here, takes on the Kantian sense ‘as the system of a priori forms determining what presents itself to sense experience. It is a delimitation of spaces and times, of the visible and the invisible, of speech and noise, that simultaneously determines the place and the stakes of politics as a form of experience.’⁴³

Rancière’s use of the term aesthetics is a revival of the eighteenth-century connotation of the term as a form of experience, which has nothing to do with art or the production of an art work destined for a hierarchical system of display, but as a description of experience of sensation without a specific audience in mind. In resurrecting such a conception of aesthetics as an open form of that which can be apprehended by the senses, as a way of ‘mapping the visible ... the intelligible and also of the possible,’⁴⁴ it reopens the possibility of equality, insofar as it situates that perceptibility as an originary capacity of human kind, before the distribution of inequality. The unpossessability of aesthetics is where the shared equality of comprehension is manifest, in the appearance of that which cannot be apprehended.

The problem is not to accentuate the difference between the existing equality and all that belies it. It is not to contradict appearances but, on the contrary, to confirm them. Wherever the part of those who have no part is inscribed, however fragile and fleeting these inscriptions may be, a sphere of appearance of the demos is created ... the power of the people exists.⁴⁵

The domain of aesthetics is where one can recapture the equality of the existence of potentiality and release it from its restricted twinning with perpetual actualization. The equality of potentiality at work (or un-work) in the unpossessability of sensation – of the aesthetic experience itself, operates upon the fundamental plasticity of subjectification processes that dis-identify and re-identify given fields of experience. The potentiality of the plastic-subject, having the competence

⁴⁰ Rancière, *Disagreement: Politics and Philosophy*, 27.

⁴¹ For instance: Rancière’s specific disagreements with Agamben are pointedly articulated in essays such as: ‘Who is the Subject of the Rights of Man?’ (2004) and ‘Biopolitics or Politics?’ (2010). Likewise, Agamben addresses his critical perspective on Rancière, in *The Time That Remains: A Commentary on the Letter to the Romans* (2005).

⁴² Rancière, *The Politics of Aesthetics*, 12.

⁴³ *Ibid.*, 13.

⁴⁴ Jacques Rancière, Interview in *Palinurus*: ‘Engaging Political Philosophy’ series, ‘Our Police Order – What can be Said, Seen, and Done: An Interview with Jacques Rancière,’ (February 2007), <http://anselmocarranco.tripod.com/id18.html> (accessed 4 March 2010).

⁴⁵ Rancière, *Disagreement: Politics and Philosophy*, 88.

of *aisthesis* – of sensation equal to all, is one who reconfigures fields of possible experience through said competence or faculty. The plastic-subject is a born translator, translating signs into other signs, sense into other sense, and who proceeds via comparisons without the need of an expert-guide. Such is the emancipatory potential of aesthetics; as fragile and un-grandiose as it may be, for it is through sensation working upon the inherent plasticity of subjectification that the apprehension of other modes of identification are made possible, made perceptible, made thinkable.

The Ethos of Potentiality The ethos of politics proper is not the calling out, or pointing to the existent actualized order of roles, people and places, but rather the ongoing excavation of the fundamental equality grounding any social system and the legitimating apparatuses of that system. Re-inscribing potentiality where only actuality appears is an effort to intervene in the core processes of delineation and partitioning; of releasing the imposition of actuality from the generic notion of potentiality. The operativeness of the actual, the demarcated and the unequal are held in di-polar relation to the inoperativeness of the existence of potentiality, the zone of fundamental equality. The ethical relationship implied by the inoperativeness of the existence of potentiality (for Agamben, life itself) is one of openness and confrontation with one's impotential – it is a grasping and ongoing witnessing of one's incapacity, an ethics *before* actualization and distinction-making. The ethics of potentiality are only effective precisely because there is no clear-cut moral certainty, as Agamben points out, there are no mere tasks that *must* be fulfilled in the enactment of human existence, just as there is no divine, nor naturally given ordering of humanity. The existence of potentiality is embodied, in the virtuality of the ellipsis⁴⁶ – the literary device of suspensions that both closes yet leaves open, while not fading away as it is inscribed and actualized. The ellipsis 'deposes the power of syntactical ties,'⁴⁷ it redistributes sensibility by suspending the completeness of meaning, by revealing the gap between sense and sense. Where the period declares and states, the ellipsis exposes an indefinition that is the root of potentiality, an indefinition that brings with it the arduous struggle of its modes of (non)/articulation. The 'I can' of potentiality is further diversified as the 'I can ...' in the richness of its political signification, it is nothing less than a movement of de-actualization, an unraveling of the thresholds that delineate the instantiation of inequality and modes of sensible distinction-making. Potentiality is the contingent state of equality that constitutes the root of all forms of social organization. It is the very faculty of non-consensus which both *can* and *can-not* instigate the appearance of other worlds and other *grammars* of being; the metaphorical syntax of which is the aesthetical stake of politics ...

⁴⁶ Agamben, 'Absolute Immanence,' in *Potentialities*, 220-39.

⁴⁷ Ibid.

Comrades of Time

Boris Groys

The Present Contemporary art deserves its name if insofar as it manifests its own contemporaneity – and this is not simply a matter of being recently made or displayed. Thus, the question ‘What is contemporary art?’ implicates the questions ‘What is the contemporary?’ and ‘How could the contemporary as such be shown?’

Being contemporary can be understood as being immediately present, as being here-and-now. In this sense, art seems to be truly contemporary if it is authentic, if for instance it captures and expresses the presence of the present in a way that is radically uncorrupted by past traditions or strategies aiming at success in the future. Meanwhile, however, we are familiar with the critique of presence, especially as formulated by Jacques Derrida, who has shown – convincingly enough – that the present is originally corrupted by past and future, that there is always absence at the heart of presence, and that history, including art history, cannot be interpreted, to use Derrida’s expression, as ‘a procession of presences.’¹

But rather than further analyze the workings of Derrida’s deconstruction, I would like to take a step back, and to ask: What is it about the present – the here-and-now – that so interests us? Already Wittgenstein was highly ironical about his philosophical colleagues who from time to time suddenly turned to contemplation of the present, instead of simply minding their own business and going about their everyday lives. For Wittgenstein, the passive contemplation of the present, of the immediately given, is an unnatural occupation dictated by the metaphysical tradition, which ignores the flow of everyday life – the flow that always overflows the present without privileging it in any way. According to Wittgenstein, the interest in the present is simply a philosophical – and maybe also artistic – *déformation professionnelle*, a metaphysical sickness that should be cured by philosophical critique.²

That is why I find the following question especially relevant for our present discussion: How does the present manifest itself in our everyday experience – before it begins to be a matter of metaphysical speculation or philosophical critique?

Now, it seems to me that the present is initially something that hinders us in our realization of everyday (or non-everyday) projects, something that prevents our smooth transition from the past to the future, something that obstructs us, makes our hopes and plans become not opportune, not up-to-date, or simply impossible to realize. Time and again, we are obliged to say: Yes, it is a good project but at the moment we have no money, no time, no energy, and so forth, to realize it. Or: This tradition is a wonderful one, but at the moment there is no interest in it and nobody wants to continue it. Or: This utopia is beautiful but, unfortunately, today no one believes in utopias, and so on. The present is a moment in time when we decide to lower our expectations of the future or to abandon some of the dear traditions of the past in order to pass through the narrow gate of the here-and-now.

¹ Jacques Derrida, **Marges de la philosophie** (Paris: Editions de Minuit, 1972), 377.

² Ludwig Wittgenstein, **Tractatus Logico-Philosophicus**, translated by C.K. Ogden (London: Routledge, 1922), 6.45.

Ernst Jünger famously said that modernity – the time of projects and plans par excellence – taught us to travel with light luggage (*mit leichtem Gepäck*). In order to move further down the narrow path of the present, modernity shed all that seemed too heavy, too loaded with meaning, mimesis, traditional criteria of mastery, inherited ethical and aesthetic conventions, and so forth. Modern reductionism is a strategy for surviving the difficult journey through the present. Art, literature, music, and philosophy have survived the twentieth century because they threw out all unnecessary baggage. At the same time, these lightened loads also reveal a kind of hidden truth that transcends their immediate effectiveness. They show that one can give up a great deal – traditions, hopes, skills, and thoughts – and still continue one's project in this reduced form. This truth also made the modernist reductions transculturally efficient – crossing a cultural border is in many ways like crossing the limit of the present.

Thus, during the period of modernity the power of the present could be detected only indirectly, through the traces of reduction left on the body of art and, more generally, on the body of culture. The present as such was mostly seen in the context of modernity as something negative, as something that should be overcome in the name of the future, something that slows down the realization of our projects, something that delays the coming of the future. One of the slogans of the Soviet era was 'Time, forward!' Ilf and Petrov, two Soviet novelists of the 1920s, aptly parodied this modern feeling with the slogan 'Comrades, sleep faster!' Indeed, in those times one actually would have preferred to sleep through the present – to fall asleep in the past and to wake up at the endpoint of progress, after the arrival of the radiant future.

Disbelief But when we begin to question our projects, to doubt or reformulate them, the present, the contemporary, becomes important, even central for us. This is because the contemporary is actually constituted by doubt, hesitation, uncertainty, indecision – by the need for prolonged reflection, for a delay. We want to postpone our decisions and actions in order to have more time for analysis, reflection, and consideration. And that is precisely what the contemporary is – a prolonged, even potentially infinite period of delay. Søren Kierkegaard famously asked what it would mean to be a contemporary of Christ, to which his answer was: It would mean to hesitate in accepting Christ as Savior.³ The acceptance of Christianity necessarily leaves Christ in the past. In fact, Descartes already defined the present as a time of doubt – of doubt that is expected to eventually open a future full of clear and distinct, evident thoughts.

Now, one can argue that we are at this historical moment in precisely such a situation, because ours is a time in which we reconsider – not abandon, not reject, but analyze and reconsider – the modern projects. The most immediate reason for this reconsideration is, of course, the abandonment of the communist project in

Russia and Eastern Europe. Politically and culturally, the communist project dominated the twentieth century. There was the cold war, there were communist parties in the West, dissident movements in the East, progressive revolutions, conservative revolutions, discussions about pure and engaged art – in most cases these projects, programs, and movements were interconnected by their opposition to each other. But now they can and should be reconsidered in their entirety. Thus, contemporary art can be seen as art that is involved in the reconsideration of the modern projects. One can say that we now live in a time of indecision, of delay – a boring time. Martin Heidegger has explained boredom precisely as a precondition for our ability to experience the presence of the present – to experience the world as a whole by being bored equally by all its aspects, by not being captivated by this specific goal or that one, such as was the case in the context of the modern projects.⁴

Hesitation with regard to the modern projects mainly has to do with a growing disbelief in their promises. Classical modernity believed the future to be infinite – even after the death of God, even after the loss of faith in the immortality of the soul. The notion of a permanent art collection says it all: archive, library, and museum promised secular permanency, an infinitude that substituted the religious promise of resurrection and eternal life. During the period of modernity, the 'body of work' replaced the soul as the potentially immortal part of the Self. Foucault famously called such modern sites in which time was accumulated rather than simply being lost, heterotopias.⁵ Politically, we can speak about modern utopias as post-historical spaces of accumulated time, in which the finiteness of the present was seen as being potentially compensated for by the infinite time of the realized project: that of an art work, or a political utopia. Of course, this perceived compensation obliterates time invested in the production of a certain product – when the final product is realized, the time that was used for its production disappears. However, the time lost in realizing the product was compensated for in modernity by a historical narrative that somehow restored it, using a narrative that glorified the lives of the artists, scientists, or revolutionaries that worked for the future.

But today, this promise of an infinite future holding the results of our work has lost its plausibility. Museums have become the sites of temporary exhibitions rather than spaces for permanent collections. The future is ever newly planned – the permanent change of cultural trends and fashions makes any promise of a stable future for a work of art or a political project improbable. And the past is also permanently rewritten – names and events appear, disappear, reappear, and disappear again. The present has ceased to be a point of transition from the past to the future, becoming instead a site of the permanent rewriting of both past and future – of constant proliferations of historical narratives beyond any individual's grasp or control. The only thing that we can be certain about in our present is that these historical narratives will proliferate tomorrow as they are

³ See Søren Kierkegaard, *Training in Christianity* (New York: Vintage, 2004).

⁴ See Martin Heidegger, 'What is Metaphysics?' in *Existence and Being*, ed. W. Brock (Chicago: Henry Regnery Co, 1949), 325–49.

⁵ See Michel Foucault, 'Des Espace Autres', (conférence au Cercle d'études architecturales, 14 mars 1967), *Architecture, Mouvement, Continuité* 5 (October 1984): 46–9.

proliferating now – and that we will react to them with the same sense of disbelief. Today, we are stuck in the present as it reproduces itself without leading to any future. We simply lose our time, without being able to invest it securely, to accumulate it, whether utopically or heterotopically. The loss of the infinite historical perspective generates the phenomenon of unproductive, wasted time. However, one can also approach this wasted time more positively, as excessive time – as time that attests to our life as pure being-in-time, beyond its value within the framework of modern economic and political projections.

Excess Time Now, if we look at the current art scene, it seems to me that a certain kind of so-called time-based art best reflects this contemporary condition. It does so because it thematizes the non-productive, wasted, non-historical, excessive time – a suspended time, *stehende Zeit*, to use a Heideggerian notion. It captures and demonstrates activities that take place in time, but do not lead to the creation of any definite product. Even if these activities do lead to such a product, they are presented as being separated from their result, as not completely invested in the product, absorbed by it. We find exemplifications of excessive time, that which is not completely absorbed by the historical process.

As an example let us consider the animation by Francis Alÿs, *Song for Lupita* (1998). In this work, we find an activity with no beginning and no end, no definite result or product: a woman pouring water from one glass to another, and then back. We are confronted with a pure and repetitive ritual of wasting time – a secular ritual beyond any claim of magical power, beyond any religious tradition or cultural convention.

One is reminded here of Albert Camus' Sisyphus, a proto-contemporary-artist whose aimless, senseless task of repeatedly rolling a boulder up a hill can be seen as a prototype for contemporary time-based art. This non-productive practice, this excess of time caught in a non-historical pattern of eternal repetition constitutes for Camus the true image of what we call 'lifetime' – a period irreducible to any 'meaning of life,' any 'life achievement,' any historical relevance. The notion of repetition here becomes central. The inherent repetitiveness of contemporary time-based art distinguishes it sharply from happenings and performances of the 1960s. Now, a documented activity is not a unique, isolated performance – an individual, authentic, original event that takes place in the here-and-now. Rather, this activity is itself repetitive – even before it was documented by, let us say, a video running in a loop. Thus, the repetitive gesture designed by Alÿs functions as a programmatically impersonal one – it can be repeated by anyone, recorded, then repeated again. Here, the living human being loses its difference from its media image. The opposition between living organism and dead mechanism is obscured by the originally mechanical, repetitive, and purposeless character of the documented gesture.

Francis Alÿs has also spoken about the time of rehearsal as a similarly wasted, non-teleological time that does not lead to any result, any endpoint, any climax. An example he offers – his video *Politics of Rehearsal* (2007), which centers on a striptease rehearsal – is in some sense a rehearsal of a rehearsal, insofar as the sexual desire provoked by the striptease is itself unfulfilled. In the video, the rehearsal is accompanied by a commentary by the artist, who interprets the scenario as the model of modernity, always leaving its promise unfulfilled. For the artist, the time of modernity is the time of permanent modernization, never really achieving its goals of becoming truly modern and never satisfying the desire that it has provoked. In this sense, the process of modernization begins to be seen as wasted, excessive time that can and should be documented – precisely because it never led to any real result. In another work, Alÿs presents the labor of a shoe cleaner as an example of a kind of work that does not produce any value in the Marxist sense of the term, because the time spent cleaning shoes cannot result in any kind of final product required by Marx's theory of value.

But it is precisely because such a wasted, suspended, non-historical time cannot be accumulated and absorbed by its product that it can be repeated – impersonally and potentially infinitely. Already Nietzsche has stated that the only possibility for imagining the infinite after the death of God, after the end of transcendence, is to be found in the eternal return of the same. And Georges Bataille thematized the repetitive excess of time, the unproductive waste of time, as the only possibility of escape from the modern ideology of progress. Certainly, both Nietzsche and Bataille perceived repetition as something naturally given. But in his book *Difference and Repetition* Gilles Deleuze speaks of literal repetition as being radically artificial and, in this sense, in conflict with everything natural, living, changing, and developing, including natural law and moral law.⁶ Hence, practicing literal repetition can be seen as initiating a rupture in the continuity of life by creating a non-historical excess of time through art. And this is the point at which art can indeed become truly contemporary.

Vita Activa Here I would like to mobilize a different meaning of the word 'contemporary.' To be con-temporary does not necessarily mean to be present, to be here-and-now; it means to be 'with time' rather than 'in time.' 'Con-temporary' in German is *zeitgenössisch*. As *Genosse* means 'comrade,' to be con-temporary – *zeitgenössisch* – can thus be understood as being a 'comrade of time' – as collaborating with time, helping time when it has problems, when it has difficulties. And under the conditions of our contemporary product-oriented civilization, time does indeed have problems when it is perceived as being unproductive, wasted, meaningless. Such unproductive time is excluded from historical narratives, endangered by the prospect of complete erasure. This is precisely the moment when time-based art can help time, to collaborate, become a comrade of time – because time-based art is, in fact, art-based time.

⁶ See Gilles Deleuze, *Difference and Repetition*, translated by Paul Patton (London: Continuum, 2004 [1968]).

Of course, traditional works of art (paintings, statues, and so forth) are time-based as well, because they are made with the expectation that they will have time – even a lot of time, if they are to be included in museums or in important private collections. But time-based art is not based on time as a solid foundation, as a guaranteed perspective; rather, time-based art documents time that is in danger of being lost as a result of its unproductive character – a character of pure life, or, as Giorgio Agamben would put it, ‘bare life.’⁷ But this change in the relationship between art and time also changes the temporality of art itself. Art ceases to be present, to create the effect of presence – but it also ceases to be ‘in the present,’ understood as the uniqueness of the here-and-now. Rather, art begins to document a repetitive, indefinite, maybe even infinite present – a present that was always, already there, and can be prolonged into the indefinite future.

A work of art is traditionally understood as something that wholly embodies art, lending it an immediately visible presence. When we go to an art exhibition we generally assume that whatever is there on display – paintings, sculptures, drawings, photographs, videos, readymades, or installations – must be art. The individual art works can of course in one way or another make reference to things that they are not, maybe to real-world objects or to certain political issues, but they are not thought to refer to art itself, because they themselves are art. However, this traditional assumption has proven to be increasingly misleading. Besides finding works of art, present-day art spaces also confront us with the documentation of art. We see pictures, drawings, photographs, videos, texts, and installations – in other words, the same forms and media in which art is commonly presented. But when it comes to art documentation, art is no longer presented through these media, but is simply stored within them. For art documentation *is per definition* not art. Precisely by merely referring to art, art documentation makes it quite clear that art itself is no longer available, but is absent and hidden. Thus, it is interesting to compare traditional film and contemporary time-based art – which has its roots in film – to better understand what has happened to our life.

From its beginnings, film pretended to be able to document and represent life in a way that was inaccessible to the traditional arts. Indeed, as a medium of motion, film has frequently displayed its superiority over other media, whose greatest accomplishments are preserved in the form of immobile cultural treasures and monuments, by staging and celebrating the destruction of these monuments. This tendency also demonstrates film’s adherence to the typically modern faith in the superiority of *vita activa* over *vita contemplativa*. In this respect, film manifests its complicity with the philosophies of praxis, of *Lebensdrang*, of *élan vital*, and of desire; it demonstrates its collusion with ideas that, in the footsteps of Marx and Nietzsche, fired the imagination of European humanity at the end of the nineteenth and the beginning of the twentieth centuries – in other words, during the very period that gave birth to film as a medium. This was the era when the

hitherto prevailing attitude of passive contemplation was discredited and displaced by celebration of the potent movements of material forces. While the *vita contemplativa* was for a very long time perceived as an ideal form of human existence, it came to be despised and rejected throughout the period of modernity as a manifestation of the weakness of life, a lack of energy. And playing a central role in the new worship of *vita activa* was film. From its very inception, film has celebrated all that moves at high speeds – trains, cars, airplanes – but also all that goes beneath the surface – blades, bombs, bullets.

However, while film as such is a celebration of movement, in comparison to traditional art forms it paradoxically drives the audience to new extremes of physical immobility. While it is possible to move one’s body with relative freedom while reading or viewing an exhibition, the viewer in a movie theater is put in the dark and glued to a seat. The moviegoer’s peculiar situation in fact resembles a grandiose parody of the very *vita contemplativa* that film itself denounces, because cinema embodies precisely the *vita contemplativa* as it would appear from the perspective of its most radical critic – an uncompromising Nietzschean, let us say – namely as the product of frustrated desire, lack of personal initiative, a token of compensatory consolation and a sign of an individual’s inadequacy in real life. This is the starting point of many modern critiques of film. Sergei Eisenstein, for instance, was exemplary in the way he combined aesthetic shock with political propaganda in an attempt to mobilize the viewer and liberate him from his passive, contemplative condition.

The ideology of modernity – in all of its forms – was directed against contemplation, against spectatorship, against the passivity of the masses paralyzed by the spectacle of modern life. Throughout modernity we can identify this opposition between passive consumption of mass culture and an activist opposition to it – political, aesthetic, or a mixture of the two. Progressive, modern art has constituted itself during the period of modernity in opposition to such passive consumption, whether of political propaganda or commercial kitsch. We know these activist reactions – from the different avant-gardes of the early twentieth century to Clement Greenberg (Avant-Garde and Kitsch), Adorno (Cultural Industry), or Guy Debord (Society of the Spectacle), whose themes and rhetorical figures continue to resound throughout the current debate on our culture.⁸ For Debord, the entire world has become a movie theater in which people are completely isolated from one another and from real life, and consequently condemned to an existence of utter passivity.

However, at the turn of the twenty-first century, art entered a new era – one of mass artistic production, and not only mass art consumption. To make a video and put it on display via the Internet became an easy operation, accessible to almost everyone. The practice of self-documentation has today become a mass practice and even a mass obsession. Contemporary means of communications and networks like Facebook, MySpace, YouTube, Second Life, and Twitter give

⁷ See Giorgio Agamben, *Homo Sacer: Sovereign Power and Bare Life*, translated by Daniel Heller-Roazen (Stanford: Stanford University Press, 1998).

⁸ See Guy Debord, *Society of the Spectacle* (Oakland: AKPress, 2005).

global populations the possibility to present their photos, videos, and texts in a way that cannot be distinguished from any post-conceptual work of art, including time-based art works. And that means that contemporary art has today become a mass-cultural practice. So the question arises: How can a contemporary artist survive this popular success of contemporary art? Or: How can the artist survive in a world in which everyone can, after all, become an artist?

One may further speak about our contemporary society as a society of the spectacle. However, we are now living not among the masses of passive spectators, as described by Guy Debord, but among the masses of artists. In order to recognize himself or herself in the contemporary context of mass production, the artist needs a spectator who can overlook the immeasurable quantity of artistic production and formulate an aesthetic judgment that would single out this particular artist from the mass of other artists. But it is obvious that such a spectator does not exist – while it could be God, we have already been informed of the fact that God is dead. If contemporary society is, therefore, still a society of spectacle, then it seems to be a spectacle without spectators.

On the other hand, spectatorship today – *vita contemplative* – has also become quite different from what it was before. Here again the subject of contemplation can no longer rely on having infinite time resources, infinite time perspectives – the expectation that was constitutive for Platonic, Christian, or Buddhist traditions of contemplation. Contemporary spectators are spectators on the move; primarily, they are travelers. Contemporary *vita contemplativa* coincides with permanent active circulation. The act of contemplation itself functions today as a repetitive gesture that can not and does not lead to any result – to any conclusive and well-founded aesthetic judgment, for example.

Traditionally, in our culture we had two fundamentally different modes of contemplation at our disposal to give us control over the time we spent looking at images: the immobilization of the image in the exhibition space, and the immobilization of the viewer in the movie theater. Yet both modes collapse when moving images are transferred to museums or exhibition spaces. The images will continue to move – but so too will the viewer. As a rule, under the conditions of a regular exhibition visit, it is impossible to watch a video or film from beginning to end if the film or video is relatively long – especially if there are many such time-based works in the same exhibition space. And in fact such an endeavor would be misplaced. To see a film or a video in its entirety, one has to go to a cinema or to remain in front of his or her personal computer. The whole point of visiting an exhibition of time-based art is to take a look at it and then another look and another look – but not to see it in its entirety. Here, one can say that the act of contemplation itself is put in a loop.

Time-based art as shown in exhibition spaces is a cool medium, to use the notion introduced by Marshall McLuhan.⁹ According to McLuhan, hot media lead to social fragmentation: when reading a book, you are alone and in a focused state of mind. And in a conventional exhibition, you wander alone from one object to the next, equally focused – separated from the outside reality, in inner isolation. McLuhan thought that only electronic media such as television are able to overcome the isolation of the individual spectator. But this analysis of McLuhan's cannot be applied to the most important electronic medium of today – the Internet. At first sight, the Internet seems to be as cool, if not cooler, than television, because it activates users, seducing, or even forcing them into active participation. However, sitting in front of the computer and using the Internet, you are alone – and extremely focused. If the Internet is participatory, it is so in the same sense that literary space is. Here and there, anything that enters these spaces is noticed by other participants, provoking reactions from them, which in turn provoke further reactions, and so forth. However, this active participation takes place solely within the user's imagination, leaving his or her body unmoved.

By contrast, the exhibition space that includes time-based art is cool because it makes focusing on individual exhibits unnecessary or even impossible. This is why such a space is also capable of including all sorts of hot media – text, music, individual images – thus making them cool off. Cool contemplation has no goal of producing an aesthetic judgment or choice. Cool contemplation is simply the permanent repetition of the gesture of looking, an awareness of the lack of time necessary to make an informed judgment through comprehensive contemplation. Here, time-based art negatively demonstrates the infinity of wasted, excessive time that cannot be absorbed by the spectator. However, at the same time, it removes from *vita contemplativa* the modern stigma of passivity. In this sense one can say that the documentation of time-based art erases the difference between *vita activa* and *vita contemplativa*. Here again time-based art turns a scarcity of time into an excess of time – and demonstrates itself to be a collaborator, a comrade of time, its true contemporary.

* This is an edited version of a paper previously published in the journal *e-flux* 11 (December 2009).

The Neural Basis of Cognitive Development: A Constructivist Manifesto

Steven R. Quartz and Terrence J. Sejnowski

Abstract *How do minds emerge from developing brains? According to 'neural constructivism,' the representational features of cortex are built from the dynamic interaction between neural growth mechanisms and environmentally derived neural activity. Contrary to popular selectionist models that emphasize regressive mechanisms, the neurobiological evidence suggests that this growth is a progressive increase in the representational properties of cortex. The interaction between the environment and neural growth results in a flexible type of learning: 'constructive learning' minimizes the need for prespecification in accordance with recent neurobiological evidence that the developing cerebral cortex is largely free of domain-specific structure. Instead, the representational properties of cortex are built by the nature of the problem domain confronting it. This uniquely powerful and general learning strategy undermines the central assumption of classical learnability theory, that the learning properties of a system can be deduced from a fixed computational architecture. Neural constructivism suggests that the evolutionary emergence of neocortex in mammals is a progression toward more flexible representational structures, in contrast to the popular view of cortical evolution as an increase in innate, specialized circuits. Human cortical post-natal development is also more extensive and protracted than generally supposed, suggesting that cortex has evolved so as to maximize the capacity of environmental structure to shape its structure and function through constructive learning.*

1 Introduction If cognitive and neural processes really do interact, then an added degree of complexity arises in analyzing development, for learning may induce large changes in the very structures involved in learning. This complicates matters, because now learning can alter what can be subsequently learned. To borrow a phrase from physics, systems with time-dependent properties are said to be 'nonstationary.'¹ This term applies to the 'learning mechanism' or 'acquisition device,' roughly defined as the set of processes and structures that transform input data into the steady state representing the mature competence. The nonstationary learner is thus one in which learning causes large scale changes to its basic mechanisms. Pursuing a popular though perhaps misleading metaphor, learning causes major changes to the underlying hardware. Developmental theorists are accordingly confronted with the challenge of characterizing a nonstationary learning mechanism. [537]

1.1 A neurocomputational approach to nonstationarity (...) We will explore three possible measures for representational change: synaptic numbers, axonal arborization, and dendritic arborization. Applying the above methodology, we will then examine the neurobiology of these changes during development, the involvement of intrinsic and extrinsic factors in regulating them, and their adequacy as indicators of representational complexity.

Two themes emerge from finding a structural measure of representational complexity: 1) development is a progressive increase in the structures underlying representational complexity,

and 2) this increase depends on interaction with a structured environment to guide development. These form the basis of neural constructivism, the developmental theory we present. This name reflects the Piagetian view that there is an active interaction between the developing system and the environment in which it is embedded. Like Piaget's theory, ours too emphasizes the constructive nature of this interaction, with representational structures progressively added during development. Our primary concern in this target article, however, is to examine the neural processes regulating structural change and their implications for representational change. In particular, dendritic development fulfills important requirements for a nonstationary learning mechanism, suggesting how dendritic development under the influence of environmentally derived activity conforms to cognitive schemes for the construction of mental representations. Although cortical development is often thought limited primarily to the first two years of life, this development is far more extensive, prolonged, and progressive. This indicates that the extent of human cortical postnatal development has been widely underestimated along with its potential role in building mental representations under the guidance of environmentally derived information.

This environmentally-guided neural circuit building is a form of learning, 'constructive learning,' a unique and powerful response to the learning pressures confronting a developing system undermining the central assumptions of classical formal learning theory. The central problem confronting a cognitive system is to find an appropriate class of representations for specific problem domains. Many views suppose that these representations have to be pre-existing, but constructive learning builds these under the influence of the environment, acting alongside the general constraints that are imposed by the neural architecture. As a result, it offers powerful learning abilities while minimizing the need for domain-specific prespecification and so avoiding the heavy burden that nativism places on genetic mechanisms. Ours is not a return to *tabula rasa* learning, however; learning is a dynamic interaction between a changing, structured environment and neural mechanisms.

Ours is not a return to *tabula rasa* learning, however; learning is a dynamic interaction between a changing, structured environment and neural mechanisms. The neural machinery is extensively shaped by activity stemming from the environment, while its intrinsic properties also constrain this modulation and play an indispensable role in shaping the resulting structures. This interaction, however, is sufficient to determine the mature representational properties of cortex with no need for domain-specific predispositions somehow embedded a priori in the recipient cortex. As a consequence, this makes the relation between environmental changes – whether natural or cultural – and brain structure a direct one. This suggests an evolutionary perspective as a progression to more flexible representations, in contrast to evolutionary psychology.² (...) [538-539]

2 Measures of representational complexity The brain is above all a representational device.³ By 'representation' we mean the neural encoding of environmentally-derived information and transformations resulting from the application of mental operations. The best-known account of mental representation is in terms of language-like systems with a primitive lexicon and syntactic rules corresponding to mental operations.⁴ Neural networks offer alternative representational encodings, particularly distributed representations.⁵ Although representational complexity can be defined for both types of representations,⁶ neural network measures depend on structural properties, making the relationship between complexity and structure a direct one. [539]

Selectionism's learning mechanism operates by reducing an overly complex set of representations to a subset in the mature state. In an important selectionist statement, Changeux and Dehaene bluntly put it this way: 'activity does not create novel connections, but, rather, contributes to the elimination of pre-existing ones.'⁷ Indeed, completing the evolutionary analogy, allowing for directed growth in development would be akin to allowing for Lamarckian processes in evolution. For selectionism, then, development marks a reduction in representational complexity. In contrast, neural constructivism sees development as a progressive increase in representational complexity. Since these differ over changes in representational complexity, it is important to ask, what do these accounts use as a measure of representational complexity?

There are three main candidates for this measure: synaptic numbers, axonal arborization, and dendritic arborization. Although these are all related, it is worthwhile to examine them separately, as a change in one does not necessarily imply a change in the others. In the remainder of this section, we consider the support for changes in these measures along with their adequacy as measures of representational power. [540]

2.1.1 Synaptic numbers over development (...) With a larger sample, they found that synaptic density reached a peak around two months of age and did not begin to decline until puberty. Even then, the decline was a gradual one, lasting until 20 years of age (their last sample point). It is hard to reconcile this finding with the claim that selective synapse elimination underlies cognitive development since no such process appears to operate in the prefrontal cortex during the most formative years of cognitive development. Indeed, an additional complication comes from studies showing that brain volume increases during this period, particularly in prefrontal cortical

² For example: J. H. Barkow, L. Cosmides and J. Tooby, ed., **The adapted mind: Evolutionary psychology and the generation of culture** (New York: Oxford University Press, 1992); and S. Pinker, **The language instinct: how the mind creates language** (New York: W. Morrow & Company, 1994).

³ For a detailed discussion, see: Z. Pylyshyn, (1984) **Computation and cognition: Toward a foundation for cognitive science** (Cambridge, MA: Bradford Books, 1984); and P. Churchland and T.J. Sejnowski, **The computational brain** (Cambridge, MA: MIT Press, 1992).

⁴ N. Chomsky, 'Rules and representations,' **Behavioral and Brain Sciences** 3 (1980): 1 – 61.

⁵ P. Churchland and T.J. Sejnowski, **The computational brain** (Cambridge MA: The MIT Press, 1994)

⁶ S.R. Quartz, 'Nativism, neural networks, and the plausibility of constructivism,' **Cognition** 48 (1993): 123–44.

⁷ J.P. Changeux and S. Dehaene, 'Neuronal models of cognitive functions,' **Cognition** 33 (1989): 82.

areas.⁸ Even if synaptic density remains constant, these volume increases imply synapse addition. [540]

2.1.2 Environmental conditions and synaptic numbers This paradigm has also been used to examine whether the number of synapses changes in mature forms of plasticity⁹ have shown that the formation of new synapses accompanies motor learning tasks in behaving animals. To distinguish between the possibility that motor activity and not motor learning caused the increases in synaptic number, a control group underwent exercise on tasks that were easily mastered and required little learning. In these cases, there were no significant increases in cortical synapses. There was, however, angiogenesis (increased capillary support), as one would expect from increased demands. In contrast, cerebellar Purkinje cells in rats that learned complex locomotor tasks showed a 25% increase in synaptic numbers. [541]

2.1.3 Synapse number as a measure of circuit complexity In many real neurons the spatial arrangement of pre- and postsynaptic elements is thought to be crucial to their response properties. One reason for this is the presence of active conductance properties in the cell's membrane; these amplify or otherwise change the incoming signal in nonlinear ways. Nonlinear dendritic conductance properties, now well established,¹⁰ shift the emphasis from absolute synaptic numbers to the spatial arrangement of synapses and the branching patterns of postsynaptic structures. This suggests that axonal and dendritic arborization may be more central determinants of circuit complexity than absolute synaptic numbers. [541-542]

2.2 Axonal arborization Patterns of axonal arborization have been widely used as a measure of representational complexity. Indeed, studies of axonal arborization have largely contributed to selectionism. [542]

2.2.1 Axonal arborization over development The electrophysiological, developmental, and anatomical study of early vision is central to modern neuroscience. In particular, the retinogeniculocortical pathway, and especially the development of ocular dominance (OD) columns of layer IV... (while) ocular dominance columns are alternating, anatomically defined regions of input from primarily one eye... two hypotheses regarding their development have been suggested. One, conforming to selectionism, emphasizes two phases in OD development: a period of exuberant axonal growth followed by selective axonal pruning. The other, more constructivist, hypothesis emphasizes the general expansion of axon collaterals alongside selective pruning.

Hence, although selectionism has dominated modeling work, the experimental work points to more balance between both selective elimination and selective

growth, with a progressive increase in the complexity of the arbors underlying OD (right eye) formation. As Antonini and Stryker conclude, '[N] development thus appears to involve both selective elimination of widely extended branches and considerable growth and elaboration.'¹¹ [543]

2.3 Dendritic development As we noted in section 1, nonstationarity, while perhaps increasing the learning capacities of a developing system, introduces a number of complications. The main reason for this is that changes to the underlying architecture can be unwieldy. Even small architectural changes can have severe consequences for the system's overall performance. One way this may happen is if changes to an architecture undo previous learning by reconfiguring structural elements that represented already acquired knowledge (a phenomenon sometimes referred to as 'catastrophic interference'). Such a process could also have negative consequences for learning if it introduced large-scale changes rather than incremental ones. For example, large-scale changes could make learning too sensitive to small details of training (resulting in overfitting) and would undo the dependency on previous states that makes learning incremental, and thereby stable.

These concerns lead to the following two related conditions that a nonstationary mechanism must satisfy:

- 1 The Locality Condition. The addition of structure must be at the appropriately local scale and must not result in wholesale changes in representation with each new elemental change;
- 2 The Stability Condition. Under normal circumstances, local changes must not undo previous learning. [545]

2.3.1 Dendrites as learning structures Dendritic growth satisfies the locality condition in that, unlike the retraction of an axon which might alter the connectivity of thousands of cells, dendritic segments are local processing elements, whose elimination will not cause large-scale changes in the overall pattern of connectivity. Hence, the constructivist learning scheme operates at the level of individual dendritic segments, rather than the whole cell, thereby building in these conditions. Hence, the constructivist learning scheme operates at the level of individual dendritic segments, rather than the whole cell, thereby building in these conditions.

It is also important that dendrites grow much more slowly than do axons. Axons grow at

⁸ See: A.S. Dekaban and D. Sadowsky, 'Changes in brain weights during the span of human life: Relation of brain weights to body heights and body weights,' *Annals of Neurology* 4 (1978): 345-56; T.L. Jernigan, S.L. Archibald, M.T. Berhow, E.R. Sowell, D.S. Foster, and J.R. Hesselink, 'Cerebral structure on MRI, Part I: Localization of age-related changes,' *Biological Psychiatry* 29 (1991): 55-67 (and references therein).

⁹ J.E. Black, K.R. Isaacs, B.J. Anderson, A.A. Alcantara and W.T. Greenough, 'Learning causes synaptogenesis, whereas motor activity causes angiogenesis, in cerebellar cortex of adult rats,' *Proceedings of the National Academy of Sciences USA* 87 (1990): 5568-72.

¹⁰ G.J. Stuart and B. Sakmann, 'Active propagation of somatic action potentials into neocortical pyramidal cell dendrites,' *Nature* 367 (1994): 69-72; and Z.F. Mainen, J. Joerges, J.R. Huguenard and T.J. Sejnowski, 'A model of spike initiation in neocortical pyramidal neurons,' *Neuron* 15 (1995): 1427-39.

¹¹ A. Antonini and M.P. Stryker, 'Development of individual geniculocortical arbors in cat striate cortex and effects of binocular impulse blockade,' *Journal of Neuroscience* 13 (1993): 3572.

approximately 500 microns/day compared to 15–35 microns/day for dendrites.¹² This suggests that the two are sensitive to statistical structure at different time-scales and that dendrites are extracting this structure on a much longer temporal scale.

A more important and general reason for examining the growth of dendrites in relation to the construction of representations is that dendrites are the primary receptive surface of a neuron. Moreover, since dendrites do not just conduct passively, but amplify the incoming signal in nonlinear ways, their processing properties make them central to how information is processed by neural systems. (...) [545]

2.3.2 Dendritic arborization (...) As dendrites grow, the integration of synaptic activity is altered in ways that depend on the geometry of the branches and the placement of synapses (Segev et al., 1995 contains an excellent collection of classic and contemporary views on dendritic function).¹³ (...) It should be borne in mind that although there is a reduction in synapses per micron of dendritic length, the increasing dendritic surface area of these cells implies an overall increase in the number of synapses. [545]

2.3.3 Environmental conditions and dendritic development Whereas studies such as Valverde's illustrate the dependence of dendritic form on afferent pathways, the study of Mooney et al. (1992) illustrates the striking malleability of developing dendrites. Mooney et al. (1992) examined the effects of neonatal enucleation on the dendritic morphology of superior collicular (sc) neurons.¹⁴ Like Valverde, they found that the dendrites of sc neurons were redirected toward sources of residual input, the deep layer of the sc, whose input is from somatosensory axons. But when they examined these cells' physiological response properties they found that a majority of them were no longer visually responsive, as in the normal case, but now had somatosensory response properties.

This leads to an important result: in the enucleated animal, the dendrites redirected their growth to find active afferents; where these were of a different modality, the cells changed their response properties to reflect this residual source. So, these response properties corresponding to the cell's function are not predetermined, but depend on interacting with the information modality latent in the pattern of incoming activity. [546]

2.3.4 Directed dendritic development and patterns of activity The finding that dendrites actively seek out incoming activity and shape their responses to mirror that activity calls for a closer look. (...)

What is the signal that regulates this development? As Katz et al. (1989) note, one likely source of this signal derives from correlated activity within a column, since it originates from one eye, but is discontinuous at the borders between

stripes from different eyes.¹⁵ This change in correlated activity might therefore underlie the bias away from the neighboring region if the postsynaptic cell maximized the amount of correlated input it received. What would the role of such a developmental signal be? The most direct role would be in the development of the response properties of the cell. Cells [of a specific] layer are almost exclusively monocular, that is, they respond to stimulation from only one eye. So, by maximizing correlated input and avoiding uncorrelated input, a cell's dendrites would come to arborize within a single column, and would thus help to maintain monocularly. In addition, by taking advantage of a signal that was intrinsic to the afferents, this organization would come about without the need for pre-specifying it. Similar themes of dendritic development in the somatosensory cortex have also been observed.¹⁶

(...) As in the Katz et al. (1989)¹⁷ study, it is the degree of correlation in the afferent activity rather than simply the presence of activity that underlies dendritic organization.¹⁸

An interpretation of these results is that dendritic segments function as detectors of correlated activity and grow preferentially in such regions. Support comes from Tieman and Hirsch's (1982) finding that exposure to lines of only one orientation during development has specific effects on dendritic development.¹⁹ The dendritic field orientations of cells from cats raised with exposure to lines of a single orientation were significantly elongated in conformity with this shift in the visual environment.

An insight from this study is that a dendritic tree samples its input space actively in response to the environmental structure. A similar result has been obtained for layer IV stellate cells by Coleman et al. (1981), who suggest: 'If an alteration of the spatio-temporal pattern of the afferent activity is sufficient to lead to dendritic alterations during development, this implies that dendritic

12 See: H.B.M. Uylings, C.G. Van Eden, J.G. Parnavelas and A. Kalsbeek, 'The prenatal and postnatal development of the rat cerebral cortex,' in *The cerebral cortex of the rat*, eds. B. Kolb & R. C. Tees (Cambridge, MA: MIT Press, 1990); and M.J. Katz, E.B. George and L.J. Gilbert, 'Axonal elongation as a stochastic walk,' *Cell Motility* 4 (1984): 351–70.

13 I. Segev, J. Rinzel and G.M. Shepherd, *The theoretical foundations of dendritic function: Selected papers by Wilfrid Rall with commentaries* (Cambridge, MA: MIT Press, 1995).

14 R.D. Mooney, M.M. Nikolettseas, T.D. King, S.V. Savage, M.T. Weaver and R.W. Rhoades, 'Structural and functional consequences of neonatal deafferentation in the superficial layers of the hamster's superior colliculus,' *Journal of Comparative Neurology* 315 (1992): 398–412.

15 L.C. Katz, C.D. Gilbert and T.N. Wiesel, 'Local circuits and ocular dominance columns in monkey striate cortex,' *Journal of Neuroscience* 9 (1989): 1389–99.

16 W.T. Greenough and F.L. Chang, 'Plasticity of synapse structure and pattern in the cerebral cortex,' in *Cerebral cortex*, vol. 7: *Development and maturation of cerebral cortex*, ed. A. Peters & E. G. Jones (New York: Plenum Press, 1988).

17 Katz, et al., 'Local circuits and ocular dominance columns in monkey striate cortex.'

18 Differences in the degree of rostral-caudal dendritic bias between normal and stripe-induced cells support the view that this development involves progressive growth rather than elimination of exuberant structure, see L. C. Katz and M. Constantine-Paton, 'Relationships between segregated afferents and postsynaptic neurones in the optic tectum of three-eyed frogs,' *Journal of Neuroscience* 8 (1988): 3160–80 (3178). The conclusion according to L. C. Katz et al. is that, 'the pattern of afferent segregation has played a significant role in shaping the structure of the postsynaptic dendritic field of cortical neurons,' 'Local circuits and ocular dominance,' 1393. (Editorial comment: this refers to note 4 in the original text).

19 S.B. Tieman, S. Hirsch, 'Exposure to lines of only one orientation modifies dendritic morphology of cells in the visual cortex of the cat,' *Journal of Comparative Neurology* 211 (1982): 353–62.

trees may develop in a form that will optimize spatio-temporal summation for the postsynaptic neuron.’²⁰ [546–548]

3 Directed dendritic development and representational change

What sort of representations does the brain use? One of the most important principles of cortical representation involves ‘geometric principles of information processing design.’²¹ Mead states:

Computation is always done in the context of neighboring information. For a neighborhood to be meaningful, nearby areas in the neural structure must represent information that is more closely related than is that represented by areas further away. Visual areas in the cortex that begin the processing sequence are mapped retinotopically. Higher-level areas represent more abstract information, but areas that are close together still represent similar information. It is this map property that organizes the cortex such that most wires can be short and highly shared; it is perhaps the single most important architectural principle in the brain.

From this principle, the physical structure of a neural area corresponds to a representational space. In this representational space, nearby things are more closely related semantically than things that are far apart. This map property is extremely powerful as a representational system. When brain areas can communicate, increasingly rich representations can be successively built up. Each area is a layer in an increasingly abstract feature space. Just as information in a map is held by such spatial properties as physical distance, the physical structure of cortex encodes information. With geometric principles of information processing the information is held in the three-dimensional pattern of neural connectivity. As constructive factors play a central role in building this physical structure, they also shape the representational properties of cortex. Building neural circuits with directed growth thereby builds the brain’s representational properties.

These spatial properties of representation are largely lost in the traditional connectionist network because of the way the connectionist neuron integrates information, typically summing its input and sending a (perhaps graded) output if some threshold is exceeded. This makes the entire cell the basic computational unit. In contrast, biological neurons are thought to segregate into sub-regions that function as autonomous processors. Local dendritic segments might be the brain’s basic computational units.²² Dendrites are not simple signal integrators with passive conductance properties, as in classical cable models.²³ Imaging studies have found that some dendritic systems (for example, CA1 hippocampal neurons) have a heterogeneous distribution of voltage-gated Ca²⁺ channels, suggesting nonlinear membrane properties.²⁴ Intradendritic recordings in these cells likewise reveal strong nonlinearities in their electrical properties.²⁵ (...)

Nonlinear properties give a cell more computational power than traditionally thought.²⁶ A cell with active dendritic segments can perform the nonlinear discrimination that requires a hidden-layer network of connectionist neurons. The spatial properties of a cell may also determine many of its functional properties. Connecting this back with our earlier discussion of geometric principles of information processing, when such a cell is embedded in a representational space, its spatial structure takes on additional significance. A phenomenon referred to as the ‘clustering’ of related inputs onto dendritic segments results in a pattern of termination mirroring the informational structure of input: electrotonically close synapses encode common features of the input space and effectively fire the cell.²⁷ The presence of cluster-encoded features significantly alters both the representational properties of cortex and its computational power. [549]

3.2 Hierarchical representation construction Much of non visual cortical development, in contrast, displays an extensive and more protracted development. Cells in frontal cortex are far

20 P.D. Coleman, D.G. Flood, M.C. Whitehead and R.C. Emerson, ‘Spatial sampling by dendritic trees in visual cortex,’ *Brain Research* 214 (1981): 19.

21 R. Durbin and G.J. Mitchison, ‘A dimension reduction framework for understanding cortical maps,’ *Nature* 343 (1990): 644–47; Churchland and Sejnowski, *The computational brain*; C. Mead, *Analog VLSI and neural systems*. (Reading, MA: Addison-Wesley, 1989); and G.J. Mitchison and R. Durbin, ‘Optimal numberings of an N X N array,’ *S.I.A.M. Journal on Algebraic and Discrete Methods* 7 (1986): 571–82. (Editorial comment: extended citation refers to Mead, 277).

22 See also: C. Koch, T. Poggio and V. Torre, ‘Retinal ganglion cells: A functional interpretation of dendritic morphology,’ *Philosophical Transactions of the Royal Society of London, B: Biological Sciences* 298 (1982): 227–63, and ‘Nonlinear interactions in a dendritic tree: Localization, timing, and role in information processing,’ *Proceedings of the National Academy of Sciences USA* 80 (1983): 2799–802; G. M. Shepherd and R.K. Brayton, ‘Logic operations are properties of computer-simulated interactions between excitable dendritic spines,’ *Neuroscience* 21 (1987): 151–65; B.W. Mel, ‘NMDA-based pattern discrimination in a modeled cortical neuron,’ *Neural Computation* 4 (1992): 502–17, and ‘Information processing in an excitable dendritic tree,’ *CNS Memo* 17, Computational and Neural Systems Program, California Institute of Technology (1992), and ‘Information processing in dendritic trees,’ *Neural Computation* 6 (1994): 1031–85; S.W. Jaslove, ‘The integrative properties of spiny distal dendrites,’ *Neuroscience* 47 (1992): 495–519; I. Segev, et al., *The theoretical foundations of dendritic function*.

23 W. Rall, ‘Theoretical significance of dendritic trees for neuronal input/output relations,’ in *Neural theory of modelling*, ed. R.F. Reiss (Stanford: Stanford University Press, 1964).

24 O.T. Jones, D.L. Kunze and K.J. Angelides, ‘Localization and mobility of omega-conotoxin-sensitive Ca₂ channels in hippocampal CA1 neurons,’ *Science* 244 (1989): 1189–93; and W.G. Regehr, J.A. Connor and D.W. Tank, ‘Optical imaging of calcium accumulation in hippocampal pyramidal cells during synaptic activation,’ *Nature* 341 (1989): 533–36.

25 R. K. Wong, D. A. Prince and A.I. Basbaum, ‘Intradendritic recordings from hippocampal neurons,’ *Proceedings of the National Academy of Sciences USA* 76 (1979): 986–90; and L.S. Bernardo, L.M. Masukawa and D.A. Prince, ‘Electrophysiology of isolated hippocampal pyramidal dendrites,’ *Journal of Neuroscience* 2 (1982): 1614–22.

26 J.A. Feldman and D.H. Ballard, ‘Connectionist models and their properties,’ *Cognitive Science* 6 (1982): 205–54; R. Durbin and D.E. Rumelhart, ‘Product units: A computationally powerful and biologically powerful extension to backpropagation networks,’ *Neural Computation* 1 (1989): 133–42; B.W. Mel and C. Koch, ‘Sigma-Pi learning: On radial basis functions and cortical associative learning,’ in *Advances in neural information processing systems*, ed. D. S. Touretzky (San Francisco: Morgan Kaufmann, 1990); and C. Koch and T. Poggio, ‘Multiplying with synapses and neurons,’ in *Single neuron computation*, ed. T. McKenna (Boston: J. Davis, S. Zornetzer, Academic Press, 1992).

27 Mel, ‘NMDA-based pattern discrimination in a modeled cortical neuron,’ and ‘Information processing in an excitable dendritic tree.’

slower to develop and undergo the majority of their growth after two years of age.²⁸ In addition, the extent of their postnatal development is dramatic – they grow to over thirty times their dendritic length at birth. Scheibel (1993) likewise reports a long period of dendritic development in Broca's area in which mature forms emerge only after six to eight years.²⁹ Why, then, is human non-visual cortical development so slow to develop and so extensive?

Our view is that the human brain's development is a prolonged period in which environmental structure shapes the brain activity that in turn builds the circuits underlying thought. In place of pre-wired modules, patterned activity builds up increasingly complex circuits, with areas staging their development. Cortical areas further away from the sensory periphery wait in anticipation of increasingly complex patterns of activity resulting from development in lower areas. As this development proceeds, areas of the brain become increasingly specialized for particular functions, reflecting a cascade of environmental shaping. Some brain circuits close to the sensory periphery, such as in our early visual system, are in place by six months of age; but those in language areas, further away from the sensory periphery, do not begin to complete their development until the eighth year of life. [550]

3.3 What is the role of regressive events in development? The evidence we have examined demonstrates that the popular view of development as largely a regressive event must be reconsidered. We suggest that regressive events are simply the consequence of reduced neural specificity, as indicated by the counter-evidence to Sperry's chemoaffinity hypothesis. Any theory, whether selectionist or constructivist, that rejects a strong view of neural specificity will thus need to posit regressive events. If cells do not bear nearly unique molecular addresses, then stochastic sampling mechanisms must be posited. These will by their very nature introduce some structure into a system that will later be eliminated. Neural constructivism allows these sampling mechanisms to be directed, but they are still stochastic. Structural elimination, or error-correction, are likewise required, but this does not mean that error-correcting processes are the only developmental mechanisms, or that developmental selection occurs only among intrinsically generated structures.³⁰ Rather, selection is only one kind of process in a dynamic interaction between environmentally derived activity and the neural growth mechanisms that activity regulates. This changes the emphasis from synaptic elimination to synaptic turnover. New techniques that allow the same structures to be examined successively over time³¹ reveal that constructive and selective events co-occur as required for directed sampling mechanisms. [550-551]

4 A learning-theoretic approach to development

4.1.1 Adding a neurobiological constraint Once we are talking about natural systems, it is worthwhile to raise a neurobiological constraint. So far, this discussion

has proceeded as though the only significant factors were learning-theoretic pressures, but it is particularly important to consider whether the views coming out of learning theory are consistent with neurobiological constraints on development. For natural systems, the constraint that a learning theory should be consistent with underlying neural mechanisms has been severely underestimated. Indeed, in our opinion this biological constraint has equal footing with the learning-theoretic one and both must be viewed as complementary constraints that developmental systems must satisfy.

As suggested by Quartz and Sejnowski (1994),³² the view that strong, domain-specific knowledge is built into cortical structures runs into severe difficulties from developmental neurobiological evidence. Although we will not review that material in detail here, recent experiments on heterotopic transplants,³³ cross modal rewiring³⁴ and clonal analysis of cell migration³⁵ all establish that

28 J.P. Schade and W.B. van Groenigen, 'Structural organization of the human cerebral cortex. I. Maturation of the middle frontal gyrus,' *Acta Anatomica* 47 (1961): 72–111.

29 A.B. Scheibel, 'Dendritic structure and language development,' in **Developmental neurocognition: Speech and face processing in the first year of life**, ed. B. de Boysson-Bardies (Dordrecht: Kluwer Academic Publishers, 1993).

30 A widely used metaphor to describe this process is that of error-correction. It should not be assumed, however, that the exuberant connections are strictly in error, since they may serve a useful purpose in instances in which a changes in connectivity is required (as in the case of blindness). (Editorial comment: this refers to note 7 in the original text).

31 N.A. O'Rourke, H.T. Cline and S.E. Fraser, 'Rapid remodeling of retinal arbors in the tectum with and without blockade of synaptic transmission,' *Neuron* 12 (1994): 921–34; N.A. O'Rourke and S.E. Fraser, 'Dynamic aspects of retinotectal map formation revealed by a vital-dye fiber-tracing technique,' *Developmental Biology* 114 (1986): 265–76, and 'Dynamic changes in optic fiber terminal arbors lead to retinotopic map formation: An in vivo confocal microscopic study,' *Neuron* 5 (1990): 159–71; D. Purves and R.D. Hadley, 'Changes in the dendritic branching of adult mammalian neurones revealed by repeated imaging in situ,' *Nature* 315 (1985): 404–06; D. Purves, R.D. Hadley and J.T. Voyvodic, 'Dynamic changes in the dendritic geometry of individual neurons visualized over periods of up to three months in the superior cervical ganglion of living mice,' *Journal of Neuroscience* 6 (1986): 1051–60; D. Purves, J. Voyvodic, L. Magrassi and H. Yawo, 'Nerve terminal remodeling visualized in living mice by repeated examination of the same neuron,' *Science* 238 (1987): 1122–26; and M.E. Dailey and S.J. Smith, 'The dynamics of dendritic structure in developing hippocampal slices,' *Journal of Neuroscience* 16 (1996): 2983–94.

32 S.R. Quartz and T.J. Sejnowski, 'Beyond modularity: Neural evidence for constructivist principles in development,' *Behavioral and Brain Sciences* 17 (1994): 725–26.

33 B.B. Stanfield and D.D.M. O'Leary, 'Fetal occipital cortical neurons transplanted to the rostral cortex can extend and maintain a pyramidal tract axon,' *Nature* 313 (1985): 135–37; B.L. Schlaggar and D.D.M. O'Leary, 'Potential of visual cortex to develop an array of functional units unique to somatosensory cortex,' *Science* 252 (1991): 1556–60; and reviewed in D.D.M. O'Leary, B.L. Schlaggar and B. B. Stanfield, 'The specification of sensory cortex: lessons from cortical transplantation,' *Experimental Neurology* 115 (1992): 121–26.

34 D.O. Frost, 'Anomalous visual connections to somatosensory and auditory systems following brain lesions in early life,' *Brain Research* 255 (1982): 627–35; M. Sur, P.E. Garraughty and A.W. Roe, 'Experimentally induced visual projections into auditory thalamus and cortex,' *Science* 242 (1988): 1437–41; A.W. Roe, S.L. Pallas, S. J. Hahm and M. Sur, 'A map of visual space induced in primary auditory cortex,' *Science* 250 (1990): 818–20; A.W. Roe, S.L. Pallas, Y.H. Kwon and M. Sur, 'Visual projections routed to the auditory pathway in ferrets: Receptive fields of visual neurons in primary auditory cortex,' *Journal of Neuroscience* 12 (1992): 3651–64; S.L. Pallas, A.W. Roe and M. Sur, 'Visual projections induced into the auditory pathway of ferrets. Novel inputs to primary auditory cortex (AI) 59 from the LP/pulvinar complex and the topography of the MGN-AI projection,' *Journal of Comparative Neurology* 298 (1990): 50–68; C.J. Schatz, 'How are specific connections formed between thalamus and cortex?,' *Current Opinion in Neurobiology* 2 (1992): 78–82; and reviewed in M. Sur, S.L. Pallas and A.W. Roe, A. W. 'Cross-modal plasticity in cortical development: Differentiation and specification of sensory neocortex,' *Trends in Neuroscience* 13 (1990): 227–33.

the regional characteristics of mature cortex depend fundamentally on interaction with afferent input. While the cortex is not a tabula rasa, as there may be a common basic circuitry and repetitive arrays of cell types,³⁶ it is largely equipotential at early stages (in agreement with studies on cortical plasticity and early brain damage).³⁷

Consistent with this view, O'Leary (1990)³⁸ refers to the immature cortex as protocortex, which shares a common laminated structure, cell types, and basic circuitry but which diminishes the need for prespecification. It is the differing pattern of afferent activity, reflective of different sensory modalities, that confers area-specific properties onto the cortex – not predispositions that are somehow embedded in the recipient cortical structure. In addition, the fact that many of these processes operate before birth, as in the case of spontaneous visual activity,³⁹ suggests that cortical specification could begin by the very mechanisms that will be used postnatally through interaction with an environment. Hence, the fact that various regions of cortex receive different patterns of afferent termination and activity seems to be the prime determinant of specialized cortical functions. A system in which the cortex is 'enslaved by the periphery' has a number of clear advantages in terms of responding flexibly to varying environmental pressures, plasticity, and changing body size.⁴⁰ In the previous section, we tried to suggest how this interaction between developing cortex and environmentally derived activity builds up the neural circuits underlying cognition.

Adding the neurobiological constraint to the learning-theoretic one results in yet another impasse. From the perspective of learning theory, it appeared that the only response to the learnability problem was to build in much of the problem domain a priori in the form of highly specialized structures. Yet, from the perspective of biological constraints it appeared that cortical structures do not build in this knowledge, but rather allow both pre- and post-natal activity to determine features of the cortex. In the following section, we suggest that the neural constructivism offers a powerful means of escaping this impasse. [552–553]

4.2 Constructive learning The constructivist learner shows its advantages here. It does not involve a search through a pre-defined hypothesis space, and so it is not one of selective induction (also known as model-based estimation, or parametric regression). Instead, the constructivist learner builds its hypothesis space as it learns. This has shifted the problem from one of parameter estimation to a nonparametric regime. We must accordingly ask, what is the effect of allowing a system to add structure – to build representations – as it learns?

Here again nonstationarity poses a challenge since we are asking about the effects of building representations according to the features of the learning problem. Neural network research has been particularly helpful in characterizing this sort of nonstationarity because the close relation between a network's architecture and its representational properties provides a constrained framework for looking at representational change during learning.

An increasingly sophisticated literature on the formal properties of neural networks has emerged. For example, a number of general results on the approximation properties of neural networks have been established.⁴¹ From a nonparametric framework,⁴² has demonstrated that a network that adds units at an appropriate rate relative to its experience is what statisticians call a consistent nonparametric estimator. This asymptotic property means that it can learn essentially any arbitrary mapping. The intuition behind this result, which will play a central role in characterizing constructive learning, follows a general nonparametric strategy: slowly increase representational capacity by reducing bias at a rate that also reduces variance. Since network bias depends on the number of units, as a network grows, its approximation capacities increase. The secret is regulating the rate of growth so that variance's contribution to error does not increase. (...)

The general strategy of constructivist learning is this. Rather than start with a large network as a guess about the class of target concepts, avoid the difficulties associated with overparameterized networks by starting with a small network. The learning algorithm then adds appropriate structure according to some performance criterion and where it is required until a desired error rate is achieved. Since the construction of the learner's hypothesis space is sensitive to the problem domain facing the learner, this is a way of tailor making the hypothesis space to suit the demands of the problem at hand. This allows the particular structure of the problem domain to determine the connectivity and complexity of the network. Since the network has the capacity to respond to the structure of the environment in this way, the original high bias is reduced through increases in network complexity, which allows the network to represent more complex functions. Hence, the need to find a good representation beforehand is replaced by the flexibility of a system that can respond to the structure of some task by building its representation class as it samples that structure to learn any polynomial learnable class of concepts. Research on constructive algorithms has

35 C. Walsh and C.L. Cepko, 'Clonally related cortical cells show several migration patterns,' *Science* 241 (1988): 1342–45, 'Widespread dispersion of neuronal clones across functional regions of the cerebral cortex,' *Science* 255 (1992): 434–40, and 'Clonal dispersion in proliferative layers of developing cerebral cortex,' *Nature* 362 (1993): 632–35.

36 See, O'Leary, et al., 'The Specification of sensory cortex: lessons from cortical transplantation.'

37 For example, H. Neville, 'Neurobiology of cognitive and language processing: effects of early experience,' in *Brain maturation and cognitive development*, eds., K. R. Gibson & A. C. Peterson (New York: Aladine de Gruyter Press, 1991).

38 D. D. M. O'Leary, 'Do cortical areas emerge from a protocortex?,' *Trends in Neurosciences* 12 (1990): 400–406.

39 L. Maffei and L. Galli-Resta, 'Correlation in the discharges of neighboring rat retinal ganglion cells during prenatal life,' *Proceedings of the National Academy of Sciences USA* 87 (1990): 2861–64; M. Meister, R. Wong, D. Baylor and C.J. Shatz, 'Synchronous bursts of action potentials in ganglion cells of the developing mammalian retina,' *Science* 252 (1991): 939–43.

40 See: Walsh and Cepko, 'Widespread dispersion of neuronal clones across functional regions of the cerebral cortex,' and 'Clonal dispersion in proliferative layers of developing cerebral cortex.'

41 For example: G. Cybenko, 'Approximation by superpositions of a sigmoid function,' *Mathematics of Control, Signals, and Systems* 2 (1989): 303–14; K. Hornik, M. Stinchcombe and H. White, 'Multilayer feedforward networks are universal approximations,' *Neural Networks* 2 (1989): 359–66; and F. Girosi and T. Poggio, 'Networks and the best approximation property,' *Biological Cybernetics* 63 (1990): 169–76.

42 H. White, 'Connectionist nonparametric regression: Multilayer feedforward networks can learn arbitrary mappings,' *Neural Networks* 3 (1990): 535–49.

become increasingly sophisticated, and the results with constructive learners are impressive.⁴³

The research we have just examined indicates a fundamental distinction between the constructivist strategy and models of selective induction. For the latter to have any chance of learning, the network must build in much of the problem domain a priori. Besides the neurobiological implausibility of this strategy, there are more general reasons why using highly biased networks is not a sound strategy in the biological case. Primary among these is that the highly biased network will only work for the specified application, but if the nature of the application is not properly predicted, the network will be a poor performer. Hence, tailor-making network architectures to suit the particular demands of some problem domain may be a useful heuristic strategy for artificial networks whose problem space is defined, or at least delimited, in advance by the designer. Biological learners, however, face an additional problem: not only is the problem space not defined beforehand, it is changing – the environment is highly nonstationary. Systems that are highly specialized for the anticipation of a particular problem domain will fail in the event of significant changes to that domain. The upshot is that specialization may bring efficiency, but it comes at the expense of flexibility. Although most natural systems are only confronted with ecological change, human cognition requires highly flexible and adaptive representations to accommodate both cultural and technological innovations. We doubt that the pace of this change can be met by a representational scheme requiring a major intrinsic specification. [553–554]

5 Conclusions Although psychologists and neurobiologists both study development, communication and collaboration between fields have been limited. Reasons for this vary. Until recently, there was a lack of pertinent neurobiological data. In addition, reductive works such as Lenneberg (1967)⁴⁴ viewed advances in the biological basis of development as lessening the cognitive contribution. So, where connections were made, they reinforced the opposition of neural and cognitive descriptions of development, an opposition that was perhaps most strongly made in the functionalist contention that neural descriptions were irrelevant for cognitive explanations (the so-called arguments from ‘multiple instantiability’).

The extent and duration of large-scale brain changes during development have also been underappreciated. Whereas many researchers believe that the major events in brain development end by 2 years of age, the evidence we have reviewed illustrates these continue well past the first decade of life. Rather than being strictly reductive, neural constructivism points to the interaction between cognitive and neural processes in development, suggesting that cognitive and neural levels of description will need to be integrated into a single explanatory framework to explain this prolonged growth. Neural constructivism thus provides a meeting ground for cognitive scientists and neuroscientists. Although we

are only beginning to understand how the world and brain interact to build the mind, the story that is unfolding already makes nativist theories appear implausible. What lies ahead promises to be an exciting – and far richer – account in which the mind emerges from a prolonged interaction with a structured world. [555]

* The editors would like to thank Dr. Sejnowski for generously allowing us to publish a highly abridged version of this seminal paper of 1977. The full text can be found under the same title in the journal *Behavioral and Brain Sciences*, 20, pages: 537–596. There are also numerous online versions easily accessible.

It is the hope of the editors that this excerpted version will provide the major conceptual foundation for a greater understanding of the other articles both scientific and philosophical found in the *Cognitive Architecture* volume.

Please note:

- Excerpts are indented in hard brackets by page reference to the original version.
- Figures and Tables have been excluded.

⁴³ For example: M.R. Azimi-Sadjadi, S. Sheedvash and F.O. Trujillo, ‘Recursive dynamic node creation in multilayer neural networks,’ *IEEE Transactions on Neural Networks* 4 (1993): 242–56; S.E. Fahlman and C. Lebiere, ‘The cascade-correlation architecture,’ in *Advances in neural information processing systems*, ed. D. S. Touretzky. (San Mateo: Morgan Kaufmann, 1990); M. Frean, ‘The upstart algorithm: A method for constructing and training feedforward neural networks,’ *Neural Computation* 2 (1990): 198–209; Y. Hirose, K. Yamashita and S. Hijya, ‘Back-propagation algorithm which varies the number of hidden units,’ *Neural Networks* 4 (1991): 61–66; V. Kadiramanathan and M. Niranjana, ‘A function estimation approach to sequential learning with neural networks,’ *Neural Computation* 5 (1993): 954–75; J.C. Platt, ‘A resource-allocating network for function interpolation,’ *Neural Computation* 3 (1991): 213–25; Y. Shin and J. Ghosh, ‘Ridge polynomial networks,’ *IEEE Transactions on Neural Networks* 6 (1995): 610–22; T.R. Shultz, D. Mareschal and W.C. Schmidt, ‘Modeling cognitive development on balance scale phenomena,’ *Machine Learning* 16 (1994): 57–86; and M. Wynne-Jones, ‘Node splitting: A constructive algorithm for feedforward neural networks,’ *Neural Computing and Applications* 1 (1993): 17–22.

⁴⁴ E. H. Lenneberg, *Biological foundations of language* (New York: Wiley, 1967).

Metastable Mind

J. A. Scott Kelso

Could he whose rules the rapid comet bind, describe or fix one movement of his mind.

Alexander Pope, Eulogy to Newton

On Nature, Life and Mind This brief essay attempts to sketch a theory of thoughts and thinking that: 1) accommodates *both* the content of thoughts *and* the dynamics of thinking; and 2) narrows the gap between the language and science of molecules and cellular machinery (genetics, neuroscience) and the language and science of mind and behavior (cognitive science, neurology, psychiatry). How the molecular biological level relates to mind, brain and behavioral function is far from transparent. As Kandel has recently concluded, a conceptual shift is needed from studying elementary processes such as single proteins, genes, and cells to studying complex systems of nerve cells, the functioning of whole organisms and the interactions of organisms. 'Biology,' says Kandel, 'will have to focus more on human beings as the model system of choice.'¹ He kids not.

The central thesis of the paper can be stated bluntly: Minds, brains, and bodies, yours and mine, immersed as they are in their own worlds, both outside and inside, share a common underlying dynamics. They are cut fundamentally, as Maxine Sheets-Johnstone says, from the same dynamic cloth.² The dynamics here refers to equations of motion for key *coordination variables* or *order parameters* that characterize patterns of behavior on multiple levels of description: patterns of brain activity, patterns of cognition and emotion, patterns of human interaction, patterns of the mind. The dynamics are not of a system described by states parameterized or forced by environmental signals though they may be conceived as such.³ The dynamics refer to both environment and animal in a way that ordinary physics does not.⁴ The dynamics deal with coordination, not (or not only) with matter and motion: *coordination dynamics*. Coordination dynamics deals specifically with *informationally* coupled, self-organizing systems, where information is meaningful and specific to coordination tasks and functions: *functional information*.⁵ Coordination dynamics stresses, in the words of the late James Gibson, himself a genius, that the organism and the environment are *complementary*.⁶ Indeed, as we shall see, coordination dynamics shows how many apparently contradictory aspects such as whole versus part, integration versus segregation, individual versus collective, cooperation versus competition, stability versus instability, etcetera, are complementary. In doing so, coordination dynamics opens up a path to reconciling contradictions,

¹ E.R. Kandel, **In Search of Memory: The Emergence of a New Science of Mind** (New York: Norton, 2006), 423.

² Maxine Sheets-Johnstone, 'Preserving Integrity against Colonization,' **Phenomenology and the Cognitive Sciences** 3 (2004): 249-61.

³ Cf. R. Rosen, **Life Itself** (New York: Columbia University Press, 1991).

⁴ J.A. Scott Kelso, 'The informational character of self-organized coordination dynamics,' **Human Movement Science** 13 (1994): 393-413.

⁵ For the origins of the notion of information as form, see references and discussion in P.N. Kugler, J.A.S. Kelso and M.T. Turvey, 'Coordinative structures as dissipative structures I. Theoretical lines of convergence,' in **Tutorials in motor behavior**, eds. G.E. Stelmach and J. Requin (Amsterdam: North Holland, 1980), 3-47.

⁶ James J. Gibson, (1979), **The Ecological Approach to Visual Perception** (Boston: Houghton Mifflin, 1979).

dualisms, binary oppositions, and the like in all walks of life, illuminating thereby *the complementary nature*.⁷

Toward a Complementary Science of Body, Brain, Mind, and Behavior It is worth noting that up until the time of Bohr, Heisenberg, and Pauli, physics debated over whether light, sound, and atomic scale processes were more basically particle-like or wave-like in character. Philosophy spoke of thesis and antithesis, of dialectic tension, of self and not self, of the qualitative and the quantitative, the objective and the subjective, as if they were either/or divisions. This tendency to dichotomize, to divide the world into opposing categories appears to be a ‘built in’ property of human beings, perhaps arising very early in development and independent of cultural background.⁸

For Bohr, Pauli, and Heisenberg, three of the chief architects of quantum mechanics, it became abundantly clear that sharp dichotomies and contrarities must be replaced with far more subtle and sophisticated complementarities. For all of nature, human nature (and human brains) included. Probably Pauli expressed it best:

To us the only acceptable point of view appears to be one that recognizes both sides of reality – the quantitative and the qualitative, the physical and the psychological – as compatible with each other. It would be most satisfactory of all if physics and psyche could be seen as complementary aspects of the same reality.⁹

The remarkable developments of quantum mechanics demonstrating the essential complementarity of both light and matter should have ushered in not just a novel epistemology but a generalized complementary science. However, they did not. Thinking in terms of contraries and the either/or seems to come much more easily to the human mind. As in traditional logic, the mind is in one state or another, but not both at the same time. Much harder to grasp is the notion that contraries are complementary: *Contraria sunt complementa* as Bohr’s famous coat of arms says. That mindset might change, however, if complementary aspects and their dynamics were found not just at the remote level of the subatomic processes dealt with by quantum mechanics, but at the level of human beings, human brains and human behavior. In particular, over the last 25 years or so, due to the efforts of people working in and across many fields, a multilevel, interdisciplinary science of coordination has emerged called *coordination dynamics*. A broad range of coordinative phenomena have been studied and explained using the concepts, methods, and tools of coordination dynamics.¹⁰ Since coordination dynamics deals in the currency of informational quantities, it’s there where we might look for insights into understanding the mind.

Coordination Dynamics: Multistability, Phase Transitions, and Metastability New empirical and theoretical developments in the science of coordination suggest that the reason the mind fragments the world into dichotomies (and more important how opposing tendencies may be reconciled) is deeply connected to the way the human brain works, in particular its multi- and metastable dynamics.¹¹ Etymologically, ‘metastability,’ comes from the latin *meta* (beyond) and *stabilis* (able to stand). In coordination dynamics, metastability corresponds to a regime near a saddle-node or tangent bifurcation in which stable coordination states no longer exist (for example, in-phase synchronization where the relative phase between oscillating components lingers at zero), but attraction remains to where those fixed points used to be (‘remnants of attractor~repellers,’ see Figure 1). This gives rise to a dynamical flow consisting of both phase trapping and phase scattering. Metastability is thus the simultaneous realization of two competing tendencies: the tendency of the components to couple together and the tendency for the components to express their intrinsic independent behavior. According to a recent review by Fingelkurts and Fingelkurts: ‘Metastability is an entirely new conception of brain functioning

⁷ The symbol of the complementary nature relating contrarities, opposites and their kin is the tilde or squiggle (~). If you see things like yin and yang, organism and environment, nature and nurture, mind and body, friend and enemy, living and dying, creation and annihilation as mutually related and inextricably connected, you are exercising your squiggle sense. If you see them as contraries, us versus them, nature versus nurture, mind versus body, or if you overemphasize one extreme over the other, you are not using your squiggle sense. Integration~segregation, local~global, individual~collective, part~whole, competition~cooperation, creation~annihilation, convergence~divergence, dwell~escape, states~tendencies, symmetry~dynamics, form~function, and so forth are some of the complementary pairs that constitute the **base set** of complementary pairs of coordination dynamics. Note the squiggle is not a bridge: it doesn’t stand for glue holding complementary aspects together or mediating between them. It is a way to write and think about complementary aspects in a way that emphasizes their relational and dynamic character. The squiggle exposes a basic truth: both complementary aspects and their dynamics are required for an exhaustive account of phenomena.

See: J.A.S. Kelso and D.A. Engström, **The Complementary Nature**, (Cambridge, MA: MIT Press, 2006); and, J.A.S. Kelso, ‘The complementary nature of coordination dynamics: Toward a science of the in-between’, in **Uncertainty and Surprise**, ed. R. McDaniel and D. Driebe (Berlin-Heidelberg: Springer-Verlag, 2005), 77-85.

⁸ E. Spelke, ‘The Baby Lab by Margaret Talbot’, **New Yorker**, 4 September 2006.

⁹ Wolfgang Pauli, **Writings on Physics and Philosophy**, ed. C.P. Enz and K. von Meyenn (Berlin: Springer-Verlag, 1994 [1950]), 205.

¹⁰ For reviews see: J.A.S. Kelso, **Dynamic Patterns: The Self-Organization of Brain and Behavior** (Cambridge, MA: MIT Press, 1995); **Coordination Dynamics: Issues and Trends**, eds. V.K. Jirsa and J.A.S. Kelso (Berlin-Heidelberg: Springer-Verlag, 2004); **Coordination: Neural, Behavioral and Social Dynamics**, eds. A. Fuchs and V.K. Jirsa (Berlin: Springer, 2008); and, **The Dynamical Systems Approach to Cognition: Concepts and Empirical Paradigms Based on Self-Organization, Embodiment and Coordination Dynamics**, eds. W. Tschacher and J.P. Dauwalder (Singapore: World Scientific, 2003).

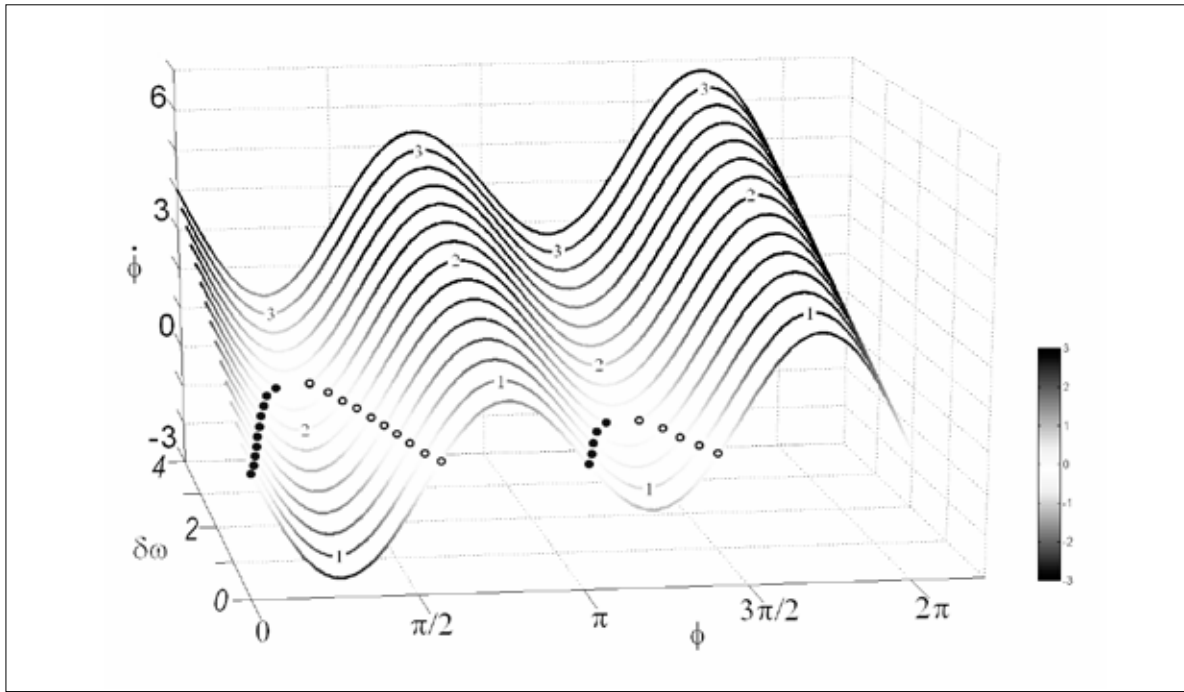
¹¹ For reviews see: S.L. Bressler and J.A.S. Kelso, ‘Cortical coordination dynamics and cognition,’ **Trends in Cognitive Sciences** 5 (2001): 26-36; An. A. Fingelkurts and Al. A. Fingelkurts, ‘Making complexity simpler: multivariability and metastability in the brain,’ **International Journal of Neuroscience** 114 (2004): 843-62; K.J. Friston, ‘Transients, metastability, and neuronal dynamics,’ **Neuroimage** 5 (1997): 164-71; **Coordination Dynamics: Issues and Trends**, eds. Jirsa and Kelso; Kelso, **Dynamic Patterns: The Self-Organization of Brain and Behavior**; O. Oullier and J.A.S. Kelso, ‘Neuroeconomics and the metastable brain,’ **Trends in Cognitive Sciences**, 10 (2006): 363-4; **The Dynamical Systems Approach to Cognition: Concepts and Empirical Paradigms Based on Self-Organization, Embodiment and Coordination Dynamics**, eds. Tschacher and Dauwalder; and, J.L. Velazquez, ‘Brain, behaviour and mathematics: Are we using the right approaches?,’ **Physica D: Nonlinear Phenomena**, 212 (2005): 161-182.

where the individual parts of the brain exhibit tendencies to function autonomously at the same time as they exhibit tendencies for coordinated activity.¹²

A number of neuroscientists have embraced metastability as playing a role in various cognitive functions, including consciousness.¹³ Metastability's significance lies not in the word itself but in what it means for understanding systems like the brain and its complementary relation to the mind. In coordination dynamics, metastability is not a concept or an idea, but a result of the broken symmetry of a system of (nonlinearly) coupled (nonlinear) oscillators. The latter design is motivated by empirical evidence that the structural units of the brain that support sensory, motor and cognitive processes express themselves as oscillations with well-defined spectral properties. At least 12 different rhythms from the infraslow (less than 1Hz) to the ultrafast (more than 100Hz) have been identified, all connected to various behavioral and cognitive functions.¹⁴ Indeed, brain oscillations are considered to be one of the most important phenotypes for studying the genetics of complex (non-Mendelian) disorders.¹⁵ The mechanisms that give rise to rhythms and synchrony exist on different levels of organization: single neurons oscillate due to voltage-gated ion channels depolarizing and hyperpolarizing the membrane; network oscillations, such as in the hippocampus and neocortex, strongly depend on the activity of inhibitory GABAergic interneurons in the central nervous system (so-called 'inhibition-based' rhythms);¹⁶ neuronal groups or assemblies form as transient coalitions of discharging neurons with mutual interaction. Neuronal communication occurs by means of synapses and glia. Synaptic connections between areas may be weak but research shows that synchrony among different inputs strengthens them, thereby enhancing communication between neurons.¹⁷ Phase coupling, for example, allows groups of neurons in distant and disparate regions of the brain to synchronize together.¹⁸ According to coordination dynamics, nonlinear coupling among oscillatory processes that possess different intrinsic frequencies is necessary to generate the broad range of behaviors observed, including pattern formation, multistability, phase transitions, switching (sans 'switches'), hysteresis and so forth. Although the mechanisms of coupling multiple oscillations within and between levels of organization are manifold, the principle is clear enough: patterns of behavior arise as an emergent consequence of self-organized interactions among neurons and neuronal populations and this self-organization is a fundamental source of cognitive, behavioral, and social function.¹⁹

Metastability was originally discovered when experimental observations of sensorimotor coordination²⁰ made it necessary to extend the elementary HKB coordination law²¹ to handle the interaction of oscillatory components with *different* intrinsic properties.²² This *breaks the symmetry* of the original HKB equation, which describes changes of the order parameter relative phase over time (ϕ):

- ¹² Fingelkurts and Fingelkurts, 'Making complexity simpler: multivariability and metastability in the brain.' This comment references the following: Kelso, 1991; 1992; 1995; Bressler & Kelso, 2001; see also Bressler, 2003
- ¹³ See, for example: G.M. Edelman, 'Naturalizing consciousness: a theoretical framework,' **Proceedings of the National Academy of Science USA** 100 (2004): 520-4; G.M. Edelman and G. Tononi, **A Universe of Consciousness** (New York: Basic Books, 2004); W.J. Freeman and M.D. Holmes, 'Metastability, instability, and state transition in neocortex,' **Neural Networks** 18 (2005): 497-504; Friston, 'Transients, metastability, and neuronal dynamics'; C. Koch, **The Quest for Consciousness** (Englewood, CO: Roberts and Co, 2005); O. Sporns, 'Complex neural dynamics,' in **Coordination Dynamics: Issues and trends**, eds. V.K. Jirsa and J.A.S. Kelso (Berlin: Springer-Verlag, 2004), 197-215; F.J. Varela, J.-P. Lachaux, E. Rodriguez and J. Martinerie, 'The brainweb: Phase synchronization and large-scale integration,' **Nature Reviews Neuroscience** 2 (2001): 229-39; For review, see also: J.A.S. Kelso and E. Tognoli, 'Toward a complementary neuroscience: Metastable coordination dynamics of the brain,' in **Neurodynamics of Higher-level Cognition and Consciousness**, eds. R. Kozma and L. Perlovsky (Heidelberg: Springer, 2007).
- ¹⁴ Y. Chen, M. Ding and J.A.S. Kelso, 'Task-related power and coherence changes in neuromagnetic activity during visuomotor coordination,' **Experimental Brain Research** 148 (2003): 105-16.
- ¹⁵ H. Begleiter and B. Porjesz, 'Genetics of human brain oscillations,' **International Journal of Psychophysiology** 60 (2006): 162-71.
- ¹⁶ M.A. Whittington, R.D. Traub, N. Kopell, B. Ermentrout and E.H. Buhl, 'Inhibition-based rhythms: experimental and mathematical observations on network dynamics,' **International Journal of Psychophysiology** 38 (2000): 315-36.
- ¹⁷ For one of many recent examples, see: T. Womelsdorf, J.-M. Schoffelen, R. Oostenveld, W. Singer, R. Desimone, A.K. Engel and P. Fries, 'Modulation of neuronal interactions through neuronal synchronization,' **Science** 316 (2007) 1609-12.
- ¹⁸ For example: R.T. Canolty, E. Edwards, S.S. Dalal, M. Soltani, S.S. Nagarajan, H.E. Kirsch, M.S. Berger, N.M. Barbaro and R.T. Knight, 'High gamma power is phase-locked to theta oscillations in human neocortex,' **Science** 313 (2006): 1626-8.
- ¹⁹ E. Başar, **Memory and Brain Dynamics: Oscillations Integrating Attention, Perception, Learning, and Memory** (Boca Raton: CRC Press, 2004); G. Buzsáki, **Rhythms of the Brain** (Oxford: Oxford University Press, 2006); Hermann Haken, **Principles of Brain Functioning** (Berlin: Springer, 1996); J.A.S. Kelso, **Dynamic Patterns: The Self-Organization of Brain and Behavior** (Cambridge: MIT Press, 1995); G.C. Van Orden, J.G. Holden and M.T. Turvey, 'Human Cognition and 1/f Scaling,' **Journal of Experimental Psychology: General** 134 (2005): 117-23; O. Oullier, G.C. DeGuzman, K.J. Jantzen, J. Lagarde and J.A.S. Kelso, 'Social coordination dynamics: Measuring human bonding,' **Social Neuroscience** 3 (2008) 178-92; and R.C. Schmidt and M. Richardson, 'Dynamics of interpersonal coordination,' in **Coordination: Neural, Behavioral and Social Dynamics**, eds. A. Fuchs and V.K. Jirsa (Berlin: Springer, 2008).
- ²⁰ J.A.S. Kelso, J. DelColle and G. Schöner, 'Action-Perception as a pattern formation process,' in **Attention and Performance XIII**, ed. M. Jeannerod (Hillsdale, NJ: Erlbaum, 1990), 39-169.
- ²¹ H. Haken, J.A.S. Kelso and H. Bunz, 'A theoretical model of phase transitions in human hand movements,' **Biological Cybernetics** 51 (1985): 347-56; G. Schöner, H. Haken and J.A.S. Kelso, 'A stochastic theory of phase transitions in human hand movement,' **Biological Cybernetics** 53 (1986): 247-57.
- ²² Research has established that the oscillators are self-sustaining and contain Rayleigh and Van der Pol terms (for instance Beek, et al., 'Linear and nonlinear stiffness and friction functions in biological rhythmic movement,' **Biological Cybernetics** 73 (1996) 499-507; Beek, et al., 'Limit cycle properties of rhythmic forearm movements,' **Journal of Experimental Psychology: Human Perception and Performance** 22 (1997): 1077-93; Haken, et al., 'A theoretical model of phase transitions in human hand movements'; Kay et al., 'The space-time behavior of single and bimanual rhythmical movements: Data and a limit cycle model,' **Journal of Experimental Psychology: Human Perception and Performance**, 13 (1987), 178-92). More than the functional form of the oscillator, per se, the key to emergent coordination is the nonlinear coupling. The simplest, perhaps most fundamental coupling that guarantees multistability, switching and primitive memory (hysteresis) is:
- $$\mathbf{K}_{12} = (\mathbf{X}_1 - \mathbf{X}_2) \{ \alpha + \beta (\mathbf{X}_1 - \mathbf{X}_2)^2 \}.$$
- Where $\mathbf{X}_1$ and $\mathbf{X}_2$ are the individual components, the dots are their time derivatives and α and β are coupling parameters (Haken, Kelso and Bunz, 'A theoretical model of phase transitions in human hand movements'). A nontrivial aspect of HKB is that it **derives** patterns of coordination



[1]

1 Elementary coordination law (Eq. 1). Surface formed by a family of flows of the coordination variable ϕ (in radians) for increasing values of $\delta\omega$ between 0 and 4. For this example, the coupling is fixed: $a=1$ and $b=1$. When ϕ reaches zero (flow line becoming white), the system ceases to change and fixed point behavior is observed. Note that the fixed points here refer to **emergent collective states** produced by nonlinearly coupled elements. Stable and unstable fixed points at the intersection of the flow lines with the isoplane $\dot{\phi} = 0$ are represented as filled and open circles respectively.

To illustrate the different regimes of the system, three representative lines labeled 1 to 3 fix $\delta\omega$ at increasing values. Following the flow line 1 from left to right, two stable fixed points (filled circles) and two unstable fixed points (open circles) exist. This flow belongs to the multistable (here bistable) regime. Following line 2 from left to right, one pair of stable and unstable fixed points is met on the left, but notice the complete disappearance of fixed point behavior on the right side of the figure. That is, a qualitative change (bifurcation; phase transition) has occurred due to

the loss of stability of the coordination state near anti-phase, π rad. The flow now belongs to the monostable regime. Following line 3 from left to right, no stable or unstable fixed points exist, yet coordination has not completely disappeared. This flow corresponds to the **metastable** regime, a subtle blend of coupling and intrinsic differences between the rhythmic elements in which behavior is neither completely ordered (synchronized) nor completely disordered (desynchronized).

$$\dot{\phi} = \delta\omega - a \sin \phi - 2b \sin 2\phi + \sqrt{Q}\xi_t$$

where ϕ is the relative phase between two interacting components, a and b are parameters setting the strength of attracting regions in the system's dynamical landscape, $\sqrt{Q}\xi_t$ is a (delta-correlated) noise term of strength Q , and $\delta\omega$ is a symmetry breaking term expressing the fact that each coordinating element possesses its own intrinsic behavior.²³

See Figure 1 as the following relates directly to this image.

The introduction of the symmetry breaking term $\delta\omega$ in Equation 1 changes the entire coordination dynamics (layout of the fixed points, bifurcation structure) of the original HKB system. This is important to realize because it is the subtle interplay between the coupling ($k=b/a$) and the symmetry breaking term $\delta\omega$ in Equation 1 that gives rise to metastability.²⁴

Equation 1 is weird. Even though it is an order parameter equation of motion that is designed to describe *collective behavior* (in words, $\dot{\phi}$ is a function of ϕ), it includes also a parameter that arises as a result of differences among the *individual components*. Equation 1 is thus a strange mixture of the whole and the parts, the global and the local, the cooperative and the competitive, the collective and the individual. Were the components identical, $\delta\omega$ would be zero and we would not see component differences affecting the behavior of the whole. Equation 1 would simply reflect the behavior of the collective untarnished by component properties, a purely emergent interaction – the HKB equation. It is the fact that *both* the components *and* their (nonlinear) interaction appear at the same level of description that gives rise to the array of coexisting tendencies characteristic of metastability. Equation 1 is a basic representation of a *synergy*: a low dimensional

from the individual components and their nonlinear interaction (see Kelso, 'The Haken-Kelso-Bunz Model,' **Scholarpedia (Computational Neuroscience/Dynamical Systems)** (2007) for steps and rationale). See also: Kelso, et al., 'Action-Perception as a pattern formation process'; and Kelso, **Dynamic Patterns: The Self-Organization of Brain and Behavior**, ch. 4.

23 Kelso, DelColle and Schöner, 'Action-Perception as a pattern formation process.'

24 Sometimes in the literature Equation 1 is referred to collectively as the Haken-Kelso-Bunz equation. Though convenient, this is technically incorrect and fails to recognize both the intellectual contributions to its extension and the conceptual consequences thereof. For reasons of symmetry and simplicity, the original HKB equation did not contain the symmetry breaking term, $\delta\omega$ (Kelso, et al., 'Action-Perception as a pattern formation process') nor did it treat fluctuations explicitly (Schöner, Haken and Kelso, 'A stochastic theory of phase transitions in human hand movement') both of which are crucial for capturing the broad range of phenomena observed and testing further predictions. In particular, without $\delta\omega$ there is: a) no fixed point shift, a sign of adaptation to changing circumstances, see Figure 1; b) the bifurcation is a saddle node not, as in the original HKB equation, a pitchfork. These are different normal forms, see Kelso, 'Elementary coordination dynamics,' in **Interlimb Coordination: Neural Dynamical and Cognitive Constraints**, eds. S. Swinnen, H. Heuer, J. Massion and P. Casaer (San Diego: Academic Press, 1994) 301-18; and 3) most important of all, the original HKB equation does not and cannot exhibit metastability which is the key to understanding the complementary relationship between the synergic tendency of the oscillators to couple (integration) and at the same time to express their individual differences (segregation). The oscillators in the original HKB formulation were identical thereby excluding metastability. For these reasons, it seems wise to refer to Equation 1 as the extended HKB equation. For a further discussion, see: J.A.S. Kelso, 'The complementary nature of coordination dynamics: Self-organization and the origins of agency,' **Journal of Nonlinear Phenomena in Complex Systems** 5 (2002): 364-71.

dynamic of a metastable organization in which the tendency of the parts to act together coexists with a tendency of the parts to do their own thing.²⁵ It is metastability that endows the synergy with robustness and flexibility, enabling the same parts to participate in multiple functions. If the synergy is a unit of life, then it is metastability that brings it alive.

The flow of the coordination dynamics across a range of $\delta\omega$ values is shown in Figure 1 for a fixed value of the coupling parameter, $k=b/a=1$ where $a=1$ and $b=1$). Stable fixed points (attractors) are presented as filled circles and unstable fixed points (repellers) as open circles. Note these fixed points refer to the coordination variable or order parameter, and are not known in advance, but have to be experimentally identified.²⁶ Here, fortuitously for the brain, fixed points of the coordination variable ϕ represent the phase- and frequency relationship between oscillatory processes. The surface shown in Figure 1 defines three regions under the influence of the symmetry breaking term $\delta\omega$. In the first region present in the lower part of the surface, the system is multistable: two stable attracting fixed points (filled circles) represent possible alternative states. Which one the system settles in depends on initial conditions and the size of the basin of attraction. In an intermediate region, following the line labeled 2 from left to right, the weakest attractor near anti-phase (right side) disappears after it collides with its associated repeller somewhere near $\delta\omega = 1.3$, but the strongest attractor (left side) is still present as well as its repeller partner. Finally, in the third region in the upper part of the surface, the dynamics become metastable. Following the line labeled 3 from left to right, no fixed points exist anymore: this part of the surface no longer intersects the isoplane $\phi = 0$ where the fixed points are located. Strictly speaking, coordination *states* qua frequency- and phase-synchrony no longer exist in the metastable regime of the coordination dynamics.

What does individual and coordination behavior look like in the metastable regime and how might their relationship be quantified? A unique flow now exists in which the dynamics may be characterized by places where the trajectory of the coordination variable relative phase converges and pauses around the horizontal and places where the trajectory drifts or diverges from the horizontal. Let us define the former as a *dwell time*, and the latter as an *escape time*. In Figure 2 (2c specifically) we show two locations for the dwell times: one that lingers a long time before escaping (for instance, Figure 2c, annotation 1) slightly above the more stable in-phase pattern near 0 rad (modulo 2π), and the other that lingers only briefly (for instance, Figure 2c, annotation 2) slightly above π (modulo 2π). These inflexions recur over and over again as long as the system self-organizes in the metastable regime, that is, as long as it does not undergo a phase transition to a locked or unlocked state. Despite the complete absence of phase-locked attractors, the coordinating elements in the metastable regime do not behave totally

independently. Rather, their interdependence takes the form of dwellings (phase gathering) nearby the remnants of the fixed points (compare Figure 1) and may be nicely expressed by concentrations in the histogram of the relative phase.²⁷

Metrics for Metastability: A Start In the following some potential measures of metastable coordination dynamics are introduced. Notice that all the usual measures used previously in coordination dynamics to measure and quantify *stability* and *loss of stability* such as local and global relaxation times, switching times, fluctuations, and so forth no longer apply in the metastable regime (for reviews of theory and experiments establishing the utility of these quantities, see notational references).²⁸ The reason of course is that in the metastable regime all fixed point states have vanished leaving only traces of coordination, 'ghosts' or 'remnants' of where the fixed points once were. Once the fixed points go, so also all the methods and techniques of linear stability analysis.²⁹ This means we have to be creative about finding new ways to capture metastable coordination.

Pure cases: A dwell time may be defined by how long a collective or coordinative tendency persists in a system or data set; an escape time is how long the coordinating elements express their individual autonomy in a system or data set.³⁰ Consider first the pure cases. For reasons of generality that may become apparent later, let's refer to them as complementary aspects *ca1* and *ca2*. An example of a **pure case** is illustrated in Figure 2d: there is no coupling and the oscillators are completely independent (*ca1*). Examples of another pure case are illustrated in Figures 2a and 2b. Whether in the mono- or bistable regimes, the oscillators are locked together, coupled in phase- and frequency-locked states (*ca2*), which constitute asymptotically stable states of the coordination dynamics. The metastable regime is in-between the two pure cases and is a blend of two tendencies:

²⁵ J.A.S. Kelso, **Dynamic Patterns: The Self-Organization of Brain and Behavior**, see: Ch. 4; J.A.S. Kelso, 'Synergies,' **Scholarpedia (Computational Neuroscience/Dynamical Systems)** (2007); and, J.A.S. Kelso, 'The Haken-Kelso-Bunz Model.'

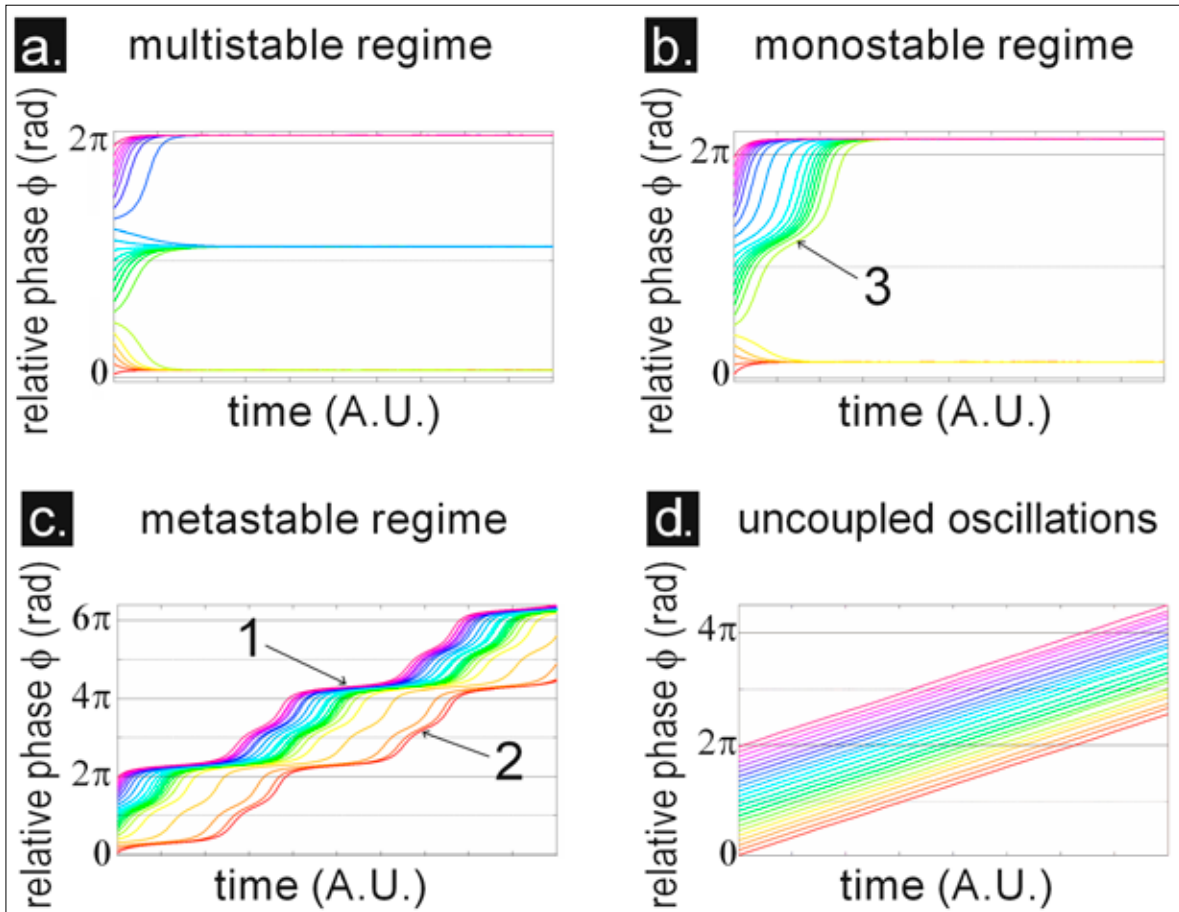
²⁶ For a full discussion, see: J.A.S. Kelso, 'Principles of dynamic pattern formation and change for a science of human behavior,' in **Developmental science and the holistic approach**, eds. L.R. Bergman, R.B. Cairns, L.-G. Nilsson and L. Nystedt (Mahwah, NJ: Erlbaum, 2000), 63-83.

²⁷ J.A.S. Kelso, **Dynamic Patterns: The Self-Organization of Brain and Behavior**, ch. 4.

²⁸ See: J.A.S. Kelso, G. Schöner, J.P. Scholz and H. Haken, 'Phase-locked modes, phase transitions and component oscillators in coordinated biological motion,' **Physica Scripta** 35 (1987): 79-87; and, G. Schöner and J.A.S. Kelso, 'Dynamic pattern generation in behavioral and neural systems,' **Science** 239 (1988): 1513-20. Reprinted in **Molecules to Models: Advances in Neuroscience**, eds. K.L. Kelner and D. E. Koshland, Jr (Washington, DC: AAS, 1989), 311-25.

²⁹ We remark, however, how helpful these techniques have been in establishing the presence of self-organization (phase transitions) in human brain and behavior, and for testing predicted effects, such as critical slowing down, fluctuation enhancement, switching time distributions, and so forth that are hallmarks of dynamic instability. Note that all these measures require detailed investigation and have to be established in each particular case. Note also that they are valid only **before** the transition and the associated breakdown of timescales occur. See: Kay, Kelso, Saltzman and Schöner, 'The space-time behavior of single and bimanual rhythmical movements: Data and a limit cycle model.'

³⁰ Of course, in experiments these times need to be operationally defined, similar say to the operations used to determine the onsets and offsets of other physiological measures such as EEG and EMG (see Kelso and Tognoli, 'Toward a complementary neuroscience: Metastable coordination dynamics of the brain,' for a start).



[2]

2 How the key coordination variable or order parameter of the coordination law (Equation 1) behaves over time. Shown is a family of trajectories of the relative phase ϕ over time (in arbitrary units) arising from a range of initial conditions sampled between 0 and 2π radians, in the multistable (a), monostable (b), and metastable regimes (c) of Equation 1. For the uncoupled case (d) the trajectories never converge indicating that the oscillations are completely independent of each other. Trajectories in the multistable regime (a) converge

either to an attractor located slightly above 0 rad. modulo 2π or to another attractor located slightly above π rad. modulo 2π . In the monostable regime (b), trajectories converge to an attractor located slightly above 0 rad. modulo 2π . In the trajectories of relative phase for the metastable regime (c. unwrapped to convey continuity), there is no longer any persisting convergence to the attractors, but rather a succession of periods of rapid drift (**escapes**) interspersed with periods inflecting toward, but not remaining on the horizontal (**dwells**). Note

dwells near 0 rad. modulo 2π in the metastable regime (for example, dwell at about 4π rad. annotated 1 in Figure 2c) and nearby π rad. modulo 2π (dwell at about 3π rad. annotated 2 in c.) are reminiscent of the transient obtained for certain initial conditions in the monostable regime (Figure 2b, annotation 3). The key point is that in the metastable regime the system's behavior is neither completely ordered (synchronized, compare Figure 2a, b) nor completely disordered (desynchronized, compare Figure 2d) but a subtle blend of both.

one for the elements to bind together and the other for the elements to behave independently. Such coexisting tendencies may be denoted as a complementary pair, $car \sim ca2$. Notice that the transition from a metastable regime to a mono- or multistable regime constitutes the *creation of functional information*.³¹ That is, the system moves from a place where there are no states to a place where the coordinated state is well-defined and vice-versa. Notice also that in the metastable regime near the saddle node bifurcation, information in the classical Shannonian sense (and presumably 'information processing') is at a maximum. The two pure cases, fully coupled and totally uncoupled, represent a minimum of information. They are what they are forever.

The k number: In Nature's self-organizing systems, the creation and stability of new forms always requires two or more force systems. The physical intuition is of a generalized Reynolds number. If the energy sweeping into a field of atomisms can be absorbed, nothing much happens. If it cannot, the field becomes unstable and some new inhomogeneous patterning emerges. The generalized Reynolds number is dimensionless and expresses a competition between a global, convective process and a local diffusive transport or propagative process. The resulting form or pattern is a collective, cooperative effect. Note again how the complementary pairs competition~cooperation and local~global come into play. Formally, the generalized Reynolds number (Re) can be written as follows:

$$Re = V(\text{convection})/V(\text{diffusion})$$

with unity ($Re_{\text{critical}} = 1$) reflecting the critical value at which the transition to new forms occur. With apologies for belaboring the fact, criticality conditions have to be worked out in each case.³²

Along the same lines of reasoning, a **k number** may be defined as follows:

$$k = \text{dwell time} / \text{escape time}$$

The dimensionless k-number appears to provide a measure of the *quality of metastability*. The basic math is trivial:

Limit

$$e \rightarrow 0; k = d/e \rightarrow \infty$$

In words, as the escape time (e) approaches zero, the dwell time (d) and hence k gets larger and larger. This means that there is a stronger and stronger tendency for the individual elements to

31 See: Kelso, 'The informational character of self-organized coordination dynamics'; Kelso, 'The complementary nature of coordination dynamics: Self-organization and the origins of agency'; and Kelso and Engström, **The Complementary Nature**.

32 For an interesting example, see: W.H. Warren, 'Perceiving affordances: Visual guidance of stairclimbing,' **Journal of Experimental Psychology: Human Perception and Performance** 10 (1984): 683-704.

bind together than to stay apart. Likewise,

Limit

$$e \rightarrow \infty; k = d/e \rightarrow 0$$

In words, as the escape time (e) gets larger and larger, the dwell time (d) and hence k gets smaller and smaller. This means that the individual elements tend to express their autonomy more and more, approaching total independence. In analogy to the generalized Reynolds number, a critical k number expresses when the tendency to coordinate overcomes the tendency to stay apart, and *vice-versa*. K might be expected to scale with the distance from the asymptotically stable locked state. But how? This will again depend on the details of the system. Were this process analogous to so-called Type-1 intermittency the distribution of dwell times should scale as the distance $^{-1/2}$ from the critical surface where the parameterized function (Equation 1) lifts off the origin. Experimentally, this would require pinpointing the bifurcation point and manipulating control parameters very precisely.³³ More generally, comparing k numbers, the ratio of dwell and escape times, across a range of levels of observation of the same and different systems may even reveal scale-free properties.³⁴

Metastable Coordination Dynamics of the Brain This brief introduction to measures of metastability once again highlights the complementary nature. Only together, as a complementary pair, do apparently contrasting phenomena, such as individual~collective, integration~segregation, local~global, cooperation~competition, attraction~repulsion, convergence~divergence, dwell~escape, and so forth and so on, exhaust the knowledge necessary for understanding. We are reminded once again of von Holst's classic analysis of coordination: both the 'magnet effect' and the 'maintenance tendency' are needed for a complete description of coordination in all its forms.³⁵ The metastable regime of the coordination law (Equation 1) shows how this is so: both tendencies arise as the result of the dynamic interplay between nonlinear coupling and individual intrinsic dynamics.

How might the brain make use of metastability?³⁶ As the Fingelkurts's remark, metastability is an entirely new conception of brain organization, not merely a blend of the old.³⁷ Individualist tendencies for the diverse regions of the brain to express their independence coexist with coordinative tendencies to couple and cooperate as a whole. As we have seen, in the metastable brain local segregative and global integrative processes coexist as a complementary pair, not as conflicting theories. Metastability, by reducing the strong hierarchical coupling between the parts of a complex system while allowing them to retain their individuality leads to a looser, more secure, more flexible form of functioning that promotes the

creation of information. Too much autonomy of the component parts means no chance of them coordinating and communicating together. On the other hand, too much interdependence and the system gets stuck, global flexibility is lost.

In comparison to theories of large-scale neural organization through linear phase-coupling,³⁸ the ability of metastable dynamics to coordinate or compute without attractors opens a large set of possibilities.³⁹ The classical view of phase-locked coordination prescribes that each recruited element loses its intrinsic behavior and obeys the dictates of the assembly. When such situations arise, from the functional point of view, individual areas cease to exert an influence for the duration of the synchronized state, and the pertinent spatial level of description becomes the synchronous assembly itself. However, it appears that phylogenesis also promoted specialized activity of local populations of neurons.⁴⁰ In theories of large-scale integration through phase synchronization, the expression of local activity can only exist when the area is not enslaved into an assembly, whereas in the metastable regime, the tendency for individual activity is continually preserved.⁴¹

33 Such experiments are nontrivial. Nevertheless, very clear hints are available in behavioral studies that have systematically detuned, in small steps, a two-frequency system coordinating near 2:1. G.C. DeGuzman and J.A.S. Kelso, 'Multifrequency behavioral patterns and the phase attractive circle map,' **Biological Cybernetics**, 64 (1991): 485-95; and, J.A.S. Kelso and G.C. DeGuzman, 'Order in time: How the cooperation between the hands informs the design of the brain,' in **Neural and Synergetic Computers**, ed. H. Haken (Berlin: Springer, 1988), 180-96.

34 For examples, see: V.A. Billock, G.C. DeGuzman and J.A.S. Kelso, 'Fractal time and 1/f spectra in dynamic images and human vision,' **Physica D** 148 (2001): 136-46; Y. Chen, M. Ding and J.A.S. Kelso, 'Long term memory processes (1/f a type) in human coordination,' **Physics Review Letters** 79 (1997): 4501-4; Y. Chen, M. Ding and J.A.S. Kelso, 'Long range dependence in human sensorimotor coordination,' in **Processes with Long-Range Correlations**, eds. G. Rangarajan and M. Ding (Berlin: Springer, 2003), 309-23; and V.M. Eguiluz, D.R. Chialvo, G.A. Cecchi, M. Baliki and V. Apkarian, 'Scale free brain functional networks,' **Physical Review Letters** 94 (2005).

35 E. Von Holst, 'The behavioral physiology of man and animals,' in **The collected papers of Erich von Holst**, ed. R. Martin (Coral Gables: University of Miami Press, 1973 [1938]). See also: M.T. Turvey and R.C. Schmidt, 'A low-dimensional nonlinear dynamic governing interlimb rhythmic coordination,' in **Interlimb coordination: Neural, dynamical and cognitive constraints**, eds. S. Swinnen, H. Heuer, J. Massion and P. Casaer (San Diego: Academic Press, 1994), 277-300.

36 For a fuller discussion of this question, the reader is referred to Kelso and Tognoli, 'Toward a complementary neuroscience: Metastable coordination dynamics of the brain.'

37 Fingelkurts and Fingelkurts, 'Making complexity simpler: multivariability and metastability in the brain.'

38 For example, in: R. Eckhorn, R. Bauer, W. Jordan, M. Borsch, W. Kruse, M. Munk and H.J. Reitboeck, 'Coherent oscillations: a mechanism of feature linking in the visual cortex. Multiple Electrode Correlation Analyses in the Cat,' **Biological Cybernetics** 60 (1988): 121-30; C.M. Gray, P. König, A.K. Engel and W. Singer, 'Oscillatory responses in cat visual cortex exhibit inter-columnar synchronization which reflects global stimulus properties,' **Nature** 338 (1989): 334-7; and, F.J. Varela, J-P. Lachaux, E. Rodriguez and J. Martinerie, 'The brainweb: Phase synchronization and large-scale integration,' **Nature Reviews Neuroscience** 2 (2001): 229-39

39 In fact, it can be proven that only dynamical systems whose basins of attraction are poised on the boundaries of elementary attractors are capable of universal computation. See: K.V. Velupillai, 'Variations on the theme of "conning" in mathematical economics,' **Journal of Economic Surveys** 21 (2007): 466-505.

40 For example, see: D.B. Chklovskii, T. Schikorski and C.F. Stevens, 'Wiring optimization in cortical circuits,' **Neuron** 34 (2002): 341-7; and S.O.E. Ebbesson, 'Evolution and ontogeny of neural circuits,' **Behavioral and Brain Sciences**, 7 (1984): 321-66.

As exemplified explicitly in the elementary coordination law (Equation 1) a delicate balance between integration (coordination between individual areas) and segregation (expression of individual behavior) is achieved in the metastable regime. Studies of interareal connectivity both at the anatomical and functional level⁴² support the notion that the region between complete integration and complete segregation is the most favorable for cognition: measures of complexity reach a maximum when there is a balance between segregative and integrative forces. Note, however, that such measures are based upon stationarity assumptions whereas metastability in coordination dynamics is a 'stationary transient'. Although the holding and releasing of the relative phase over time appears to be of a transient nature, it is actually quite stationary.

Metastable Mind What are the implications of metastable coordination dynamics for understanding the mind? Like nature and nurture, the contents of the mind and the dynamics of the mind are inextricably connected. Thoughts are not static: like the flow of a river, they emerge and disappear as patterns in a constantly shifting dynamic system.⁴³ Pretty though this metaphor is, science demands we go beyond it to seek description and explanation. As in other, more mature fields it is crucial to have a theory or at least a conceptual framework of what one is trying to understand. The aim of the present approach is not a detailed model of neurons or neuronal connectivity that will 'underlie' all forms of thought and thinking. Nor is this the forum to present a comprehensive account of the supporting neurophysiological and behavioral evidence. Rather, in the spirit of the person we honor here, the purpose is to stimulate insight into how mind, brain, and behavior might be connected in a unified way.

Figure 3 is intended to convey the gist of the story. On the left side of the middle panel, two areas of the brain (for the sake of simplicity) are shown to be active. This acknowledges a simple fact – or at least a dominant assumption in contemporary neuroscience: the contents of thoughts depend on the neural structures activated. Reciprocally, the neural structures activated influence – directly or indirectly – the contents of thoughts. Thus, if one is thinking about eating an apple, it seems likely that the neural structures concerned with the content of that thought – vision, smell, taste, and touch along with those associated with action, movement and its consequences are activated. If one is imagining producing a *pattern* of sensorimotor coordination, such as syncopating to a rhythmic stimulus, fMRI studies show that the same neural structures are active as would normally be engaged in the act of syncopation itself.⁴⁴ If one is expecting a reward as a result of an economic transaction, the so-called reward centers in the subcortical nuclei of the limbic system (for example the nucleus accumbens, ventral tegmental area) and associated pathways are activated.⁴⁵ If one perceives a new face or recognizes

an old one, structures in the fusiform gyrus and the inferotemporal visual cortex appear to be activated, and so forth.⁴⁶ Thoughts crop up from within, arising in neural structures associated with memory and emotion such as the hippocampus and amygdala, and they can be triggered from without by a familiar sound, touch, sight, or smell. Occasionally insightful thoughts arise, too. Though much remains to be learned about what exactly constitutes the contents of thought, thoughts appear to have neural correlates.⁴⁷ However, identifying thought-specific structures and circuitry using brain mapping, necessary though it may be, is not sufficient to tell us how *thinking* works. Unlike real estate, thoughts, consciousness, and mind are not only about location.

Active, dynamic processes like 'perceiving,' 'attending,' 'remembering,' and 'deciding' that are associated with the word thinking are not restricted to particular brain locations, but rather emerge as patterns of interaction among widely distributed neural ensembles, and in general between human beings and their environments. One of the great riddles of contemporary neuroscience is how the multiple, diverse and specialized areas of the brain are coordinated to give rise to thinking and coherent goal-directed behavior. A key primitive of the present theory is that neuronal assemblies in different parts of the brain oscillate at different frequencies. Such oscillatory activity is a prime example of self-organization in the brain. But oscillation, though necessary, is not sufficient. It is the fact that oscillations are coupled or 'bound' together into a coherent network when people attend to a stimulus, perceive, remember, decide, and act.⁴⁸ This is a dynamic, self-assembling process, parts of the brain engaging and disengaging in time, as in a proverbial country square dance in rural Connecticut. In the simplest case shown in the left column of Figure 3, oscillations in different brain regions can lock 'in-phase,' brain activities rising and falling together, or 'anti-phase,' one oscillatory brain activity reaching its peak as another hits its trough and vice-versa. In-phase and anti-phase are just two out of many possible multistable, phase

⁴¹ See also: Friston, 'Transients, metastability, and neuronal dynamics.'

⁴² Friston, 'Transients, metastability, and neuronal dynamics'; G. Tononi, O. Sporns and G.M. Edelman, 'Complexity and coherency: Integrating information in the brain,' **Trends in Cognitive Sciences** 2 (1998): 474-84.

⁴³ See: Kelso, **Dynamic Patterns: The Self-Organization of Brain and Behavior**.

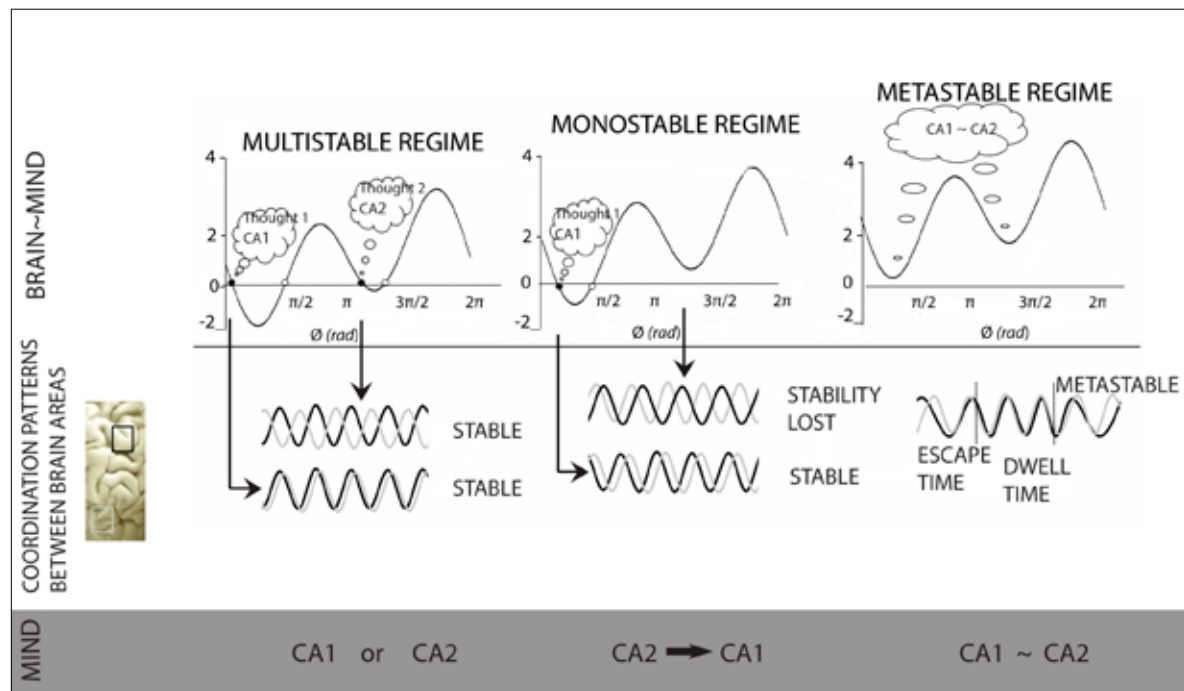
⁴⁴ See: O. Oullier, K.J. Jantzen, F.L. Steinberg and J.A.S. Kelso, 'Neural substrates of real and imagined sensorimotor coordination,' **Cerebral Cortex** 15 (2005): 975-85.

⁴⁵ For example: B. Knutson, C.M. Adams, G. Fong and D. Hommer, 'Anticipation of increasing monetary reward selectively recruits nucleus accumbens,' **Journal of Neuroscience** 21 (2001): RC159 (1-5).

⁴⁶ For example: J.V. Haxby, L.G. Ungerleider, B. Horwitz, J.M. Maisog, S.I. Rapoport and C.L. Grady, 'Face encoding and recognition in the human brain,' **Proceedings of the National Academy of Sciences** 93 (1996): 922-7.

⁴⁷ For a sobering analysis of some of the pitfalls in the methods and interpretation of brain imaging data, see: G.C. Van Orden and K.R. Paap, 'Functional neuroimages fail to discover pieces of mind in the parts of the brain,' **Philosophy of Science** 64 (1997): 585-94; and W.R. Uttal, **The New Phrenology** (Cambridge, MA: MIT press, 2003).

⁴⁸ For reviews, see: E. Başar, **Memory and Brain Dynamics: Oscillations Integrating Attention, Perception, Learning, and Memory**, (Boca Raton: CRC Press, 2004); Bressler and Kelso, 'Cortical coordination dynamics and cognition'; G. Buzsáki, **Rhythms of the Brain** (Oxford: Oxford University Press, 2006); Kelso, **Dynamic Patterns: The Self-Organization of Brain and Behavior**; Varela et al., 'The brainweb: Phase synchronization and large-scale integration'; and W. Singer, 'The brain – an orchestra without a conductor,' **Max Planck Research** 3 (2005):15-8.



[3]

3 Sketch of a dynamical law of thought and thinking (with homage to Boole's *An investigation of the laws of thought*, 1854). The middle panel represents synaptically coupled brain oscillations from two brain areas (for the sake of simplicity) whose activation is meaningful and specific to the content of 'thoughts.' Here 'thought' is used in a generic sense; the states could refer to patterns of perceiving, emoting, remembering, deciding, acting, etcetera. The top left panel shows the layout of the fixed points of the relative phase dynamics (Equation 1) in the multi- (here bi-)stable regime. Solid circles are stable and attracting; open circles are unstable and repelling (see also Figure 1). Two states are stable corresponding to particular phase relations between oscillatory groups of neurons, representing two

stable 'thought' patterns (ca1 and ca2) for exactly the same parameter values. Which one is realized depends on initial and boundary conditions. Many factors, developmental, social, cultural, learning, memory, and so forth may contribute to the process of stabilizing brain states. The top middle panel shows that the formerly stable pattern near anti-phase switches to near in-phase as a result of changing circumstances. Any ambiguity due to bistability has been removed, a 'decision' or 'selection' has been made and as a result, the system is monostable, stuck in one thought pattern. The switching mechanism is dynamic instability induced by changing control parameters (for instance, the coupling between the neural populations which may be altered by neuromodulators). Fluctuations (not explicitly

represented here) also play a key role in spontaneous switching. The top right panel shows that all states, both stable and unstable, have disappeared. This is the metastable regime. Now 'thoughts' no longer correspond to fixed-point, fully synchronized states of the coordination dynamics, but rather as coexisting tendencies or dispositions that have characteristic dwell times. The lowest panel called 'Mind' illustrates the classical dual nature of either/or, binary oppositions (ca1 or ca2), mind (and mindset) switching (ca2 to ca1 and vice-versa) and the mind and mindset of the complementary nature, where both 'thoughts' are held in the mind at the same time (ca1 ~ ca2). Even polarization ~ reconciliation may be considered a complementary pair.

synchronized states that can exist between multiple, different, specialized brain areas depending on their respective intrinsic properties and functional connectivity. More broadly, as Iberall intuited, the organism and its environment are embedded in a nested frame of rhythms ranging from rest~activity and sleep cycles to circadian and seasonal rhythms that both modify and are modified by behavior, development, and aging.

Coming back to the brain, different aspects of a moving scene, separate remembered parts of a significant experience, even different ideas that arise in a conversation may be bound together into coherent forms by synaptic coupling of (oscillatory) neural populations. The key proposal, conveyed in the top panel of Figure 3, is that 'thoughts' (figuratively shown as balloons) are 'coded' as relative phases between oscillating brain areas. Relative phase is a natural quantity for coordinating different things and is a long established order parameter in coordination dynamics.⁴⁹ Phase is also the means by which excitatory and inhibitory neurons communicate with each other in so-called central pattern generators.⁵⁰ If nature operates with ancient themes, as Ibby often reminded us, it is reasonable to propose that the same pattern generating principles typical of spinal circuitry are also exploited at the level of cortical circuitry.⁵¹ In coordination dynamics, phase relationships carry *functional information* with multiple attractors (the fixed points shown in left top part of Figure 3) setting alternatives for complementary aspects to enter the mind. The top left part of Figure 3 conveys the essential *bistable* nature of physical and social reality. Two states are possible for identical parameter values: which state one enters depends on initial and boundary conditions. Baldly put, bistability is the basis of polarization and the either/or. Note that this does not necessarily imply any judgment of good or bad. Polarization, for example, may be seen as the driving tension behind scientific progress in the sense of Thomas Kuhn,⁵² and bistability may be exploited for

49 An argument can be made that spatial patterns of amplitude in high-density EEG recordings of olfactory cortex also constitute an order parameter (for example, Freeman and Holmes, 'Metastability, instability, and state transition in neocortex'; Kelso and Tognoli, 'Toward a complementary neuroscience: Metastable coordination dynamics of the brain'). In coordination dynamics, following theories of self-organization (H. Haken, *Synergetics, an introduction: Non-equilibrium phase transitions and self-organization in physics, chemistry and biology* (Berlin: Springer, 1977); G. Nicolis and I. Prigogine, *Self-organization in nonequilibrium systems* (New York: Wiley, 1977) coordination variables or order parameters and control parameters may be established by studying dynamic instabilities or phase transitions (Kelso, 'Phase transitions: Foundations of behavior,' in *Synergetics of cognition*, ed. H. Haken (Berlin: Springer-Verlag, 1990), 249-68). The former change qualitatively at transitions and the latter – when systematically varied – lead the system through transitions. Order parameters and control parameters are thus co-implicative and complementary in the framework of coordination dynamics (Kelso, *Dynamic Patterns*). Recent empirical and theoretical research contacts Freeman's work in that it shows that phase transitions can also arise through the amplitudes of oscillation (C.G. Assisi, V.K. Jirsa and J.A.S. Kelso, 'Dynamics of multifrequency coordination using parametric driving: Theory and Experiment,' *Biological Cybernetics* 93 (2005): 6-21). Both routes are possible depending on the situation, for instance amplitude drops across the transition, the relative phase changes abruptly.

50 For example: S. Grillner, 'Neurobiological bases of rhythmic motor acts in vertebrates,' *Science* 228 (1985): 143-9.

51 See: Kelso, *Dynamic Patterns: The Self-Organization of Brain and Behavior*, Ch. 8; and Y. Ikegaya, G. Aaron, R. Cossart, D. Aronov, I. Lampl, D. Ferster and R. Yuste, 'Synfire chains and cortical songs: Temporal modules of cortical activity,' *Science* 304 (2004): 559-64.

52 T.S. Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1962).

solving ill-defined problems where the consideration of multiple interpretations of data is an advantage. Bistable, and in general multistable coordination dynamics confers many advantages on living things, in particular multifunctionality.⁵³

Why is it that some thoughts seem to persist longer than others? Coordination dynamics suggests that the persistence of a thought depends on the *stability* of the brain's relative phase dynamics. Some thoughts persist longer than others because the phase relations underlying them are more stable. In Figure 3 (top left), the negative slope through the ordinate near in-phase ('thought 1') is greater, hence more stable, than its anti-phase counterpart ('thought 2'). This proposition is supported by experiments and specific neurally-based modeling which shows that different patterns of spatiotemporal brain activity are differentially stable.⁵⁴ For example, applying transient perturbations to the Supplementary Motor Area (SMA) and lateral premotor cortex using Transcranial Magnetic stimulation induces transitions from anti-phase to in-phase coordination, but not vice-versa⁵⁵ Even more tellingly, recent fMRI work shows that increases in BOLD amplitude in a network of brain areas that includes pre-SMA, premotor cortex, cerebellum and insula increases linearly as pattern stability decreases.⁵⁶ Such evidence suggests that disruption of a *distributed* network of brain areas – in contrast to a discrete switch in a particular locus – results in the destabilization and eventual dismantling of a less stable coordination pattern in favor of a more stable one.

So what makes thoughts switch? When it comes to the nervous system, it is always tempting to ask, as does Abbott: 'Where are the switches in this thing?'⁵⁷ But merely because there is switching does not necessarily mean there are switches.⁵⁸ The middle column of Figure 3 offers a different mechanism: dynamic instability. Multistability and spontaneous switching in perception as in the alternating vase or faces in ambiguous Rubin figures, Necker cubes, the continuous wagon wheel illusion and so forth, continue to be a subject of much fascination in cognitive psychology and neuroscience.⁵⁹ The picture shown in Figure 3 (middle column) is based on considerable experimental evidence demonstrating that switching in both brain and behavior is a self-organized process that takes the form of a nonequilibrium phase transition.⁶⁰ Fluctuations play a key role, testing the stability of states and enabling the system to discover new states. In coordination dynamics, once the system settles into an attractor, a certain amount of noise or a perturbation is required to switch it to another attractor. Or, if internal or external conditions change when the system is near instability, a bifurcation or phase transition may occur, causing the system to switch from being multistable to monostable or vice-versa.⁶¹ Thinking in this view involves the active destabilization of one stable thought pattern into another.

A different view emerges from the flow of the relative phase dynamics in the

metastable regime (Figure 3, right). Instead of thoughts corresponding to rigid, phase synchronized states that must be destabilized if switching is to occur, metastability consists of a more subtle dwell and escape dynamic in which a thought is never quite stable and merely expresses a

⁵³ See, for example: J.A.S. Kelso, 'Behavioral and neural pattern generation: The concept of Neurobehavioral Dynamical System (NBDS),' in **Cardiorespiratory and Motor Coordination**, eds. H.P. Koepchen and T. Huopaniemi (Berlin: Springer-Verlag, 1991).

⁵⁴ See: K.J. Jantzen and J.A.S. Kelso, 'Neural coordination dynamics of human sensorimotor behavior: A Review,' in **Handbook of Brain Connectivity**, eds. V.K. Jirsa and R. MacIntosh (Heidelberg: Springer, 2007); V.K. Jirsa, A. Fuchs and J.A.S. Kelso, 'Connecting cortical and behavioral dynamics: Bimanual coordination,' **Neural Computation** 10 (1998): 2019-45; and A. Meyer-Lindenberg, U. Ziemann, G. Hajak, L. Cohen and K.F. Berman, 'Transitions between dynamical states of differing stability in the human brain,' **Proceedings of the National Academy of Sciences** 99 (2002): 10948-53.

⁵⁵ Ibid., A. Meyer-Lindenberg et al.

⁵⁶ Stable thoughts, like stable gaits it seems, correspond to minimum energy configurations among participating neural ensembles. Analogous to gaits, research shows that oxygen utilization (Blood Oxygen Level Dependent effect) increases as the pattern loses stability, suggesting that the demands on neural resources to sustain a given pattern stable also increase. Pattern stability, which can be precisely measured in terms of **variability** appears to be an (as yet unheralded) determiner of brain activity (number and intensity level of voxels, see Jantzen and Kelso, 'Neural coordination dynamics of human sensorimotor behavior: A Review,' Figures 3 and 4). See also: K.J. Jantzen, F.L. Steinberg and J.A.S. Kelso, 'Coordination dynamics of large scale neural circuitry underlying sensorimotor behavior,' **Journal of Cognitive Neuroscience** 21 (2009): 2420-33.

⁵⁷ L.F. Abbott, 'Where are the switches on this thing?' in **23 Problems in Systems Neuroscience**, eds. J.L. van Hemmen and T.J. Sejnowski (Oxford: Oxford University Press, 2006), 423-31. See also: K.A.C. Martin, 'Where are the switches on this thing? Asking the big questions in neuroscience,' **Nature** 440 (2006): 1113-4.

⁵⁸ J.A.S. Kelso, 'Phase transitions and critical behavior in human bimanual coordination,' **American Journal of Physiology: Regulatory, Integrative and Comparative** 15 (1984): R1000-R1004.

⁵⁹ For example: V.A. Billock and B.H. Tsou, 'Neural interactions between flicker-induced self-organized visual hallucinations and physical stimuli,' **Proceedings of the National Academy of Sciences** 104 (2007): 8490-5; R. van Rullen, L. Reddy and C. Koch, 'The continuous Wagon Wheel Illusion is associated with changes in EEG power around 13Hz,' **Journal of Neuroscience** 26 (2006): 502-7. For review, see: Kelso, **Dynamic Patterns: The Self-Organization of Brain and Behavior**, Ch. 7; and, articles in: **Ambiguity in Mind and Nature**, eds. P. Kruse and M. Stadler (Heidelberg: Springer-Verlag, 1995).

⁶⁰ For example: A. Daffertshofer, C.E. Peper and P.J. Beek, 'Spectral analysis of event-related encephalographic signals,' **Physics Letters A** 266 (2000): 290-302; Freeman and Holmes, 'Metastability, instability, and state transition in neocortex'; Fuchs et al., 'Phase transitions in the human brain: Spatial mode dynamics'; A. Fuchs, L. Deecke and J.A.S. Kelso, 'Phase transitions in human brain revealed by large SQuID arrays: Response to Daffertshofer, Peper and Beek,' **Physics Letters A** 266 (2000): 303-8; A. Fuchs, J.M. Mayville, D. Cheyne, H. Weinberg, L. Deecke and J.A.S. Kelso, 'Spatiotemporal analysis of neuromagnetic events underlying the emergence of coordinative instabilities,' **Neuroimage** 12 (2000): 71-84; Kelso, 'Phase transitions and critical behavior in human bimanual coordination'; J.A.S. Kelso, J.P. Scholz and G. Schöner, 'Nonequilibrium phase transitions in coordinated biological motion: Critical fluctuations,' **Physics Letters A** 118 (1986): 279-84; Kelso et al., 'Action-Perception as a pattern formation process'; J.A.S. Kelso, 'Coordination dynamics of human brain and behavior,' **Springer Proc. in Physics**, 69 (1992): 223-34; J.M. Mayville, S.L. Bressler, A. Fuchs and J.A.S. Kelso, 'Spatiotemporal reorganization of electrical activity in the human brain associated with a phase transition in rhythmic auditory-motor coordination,' **Experimental Brain Research** 127 (1999): 371-81; and G.V. Wallenstein, J.A.S. Kelso and S.L. Bressler, 'Phase transitions in spatiotemporal patterns of brain activity and behavior,' **Physica D** 84 (1995): 626-34.

⁶¹ For excellent examples of such modeling, see: T. Ditzinger and H. Haken, 'Oscillations in the perception of ambiguous patterns,' **Biological Cybernetics** 61 (1989): 279-87; and 'The impact of fluctuations on the recognition of ambiguous patterns,' **Biological Cybernetics** 63 (1990): 453-6.

joint *tendency* for neural areas to synchronize together and to oscillate independently. Fluid thinking, in this view, is when the brain's oscillations are neither completely synchronized nor desynchronized (see also Figure 2c). In the metastable regime, successive visits to the remnants of the fixed points are intrinsic to the time course of the system, and do not require any external source of input. Switching occurs, of course, but continuously and without the need for additive noise or changes in parameters. From the perspective of coordination dynamics, the time the system dwells in each remnant depends on a subtle blend of the asymmetry of the rhythmic elements (longer dwelling for smaller asymmetry) and the strength of the coupling (longer dwelling for larger values of a and b in Equation 1).

The metastable regime offers scientific grounds for Iberall's intuition of 'reverie': thoughts come and go fluidly as the oscillatory units of the brain express both an interactive integrative dynamic and an individualistic segregative dynamic. Metastable coordination dynamics also rationalizes William James beautiful metaphor of the stream of consciousness as the flight of a bird whose life journey consists of 'perchings' (phase gathering, integrative tendencies) and 'flights' (phase scattering, segregative tendencies).⁶² Both tendencies appear to be crucial: the former to summon and create thoughts; the latter to release individual brain areas to participate in other acts of cognition, emotion and action.

In some traditions, it is not the contents of thoughts that matter, but their 'stickiness'. In the metastable regime of the coordination dynamics, the 'stickiness' of thoughts depends on how close the neural system is to the fixed points of the relative phase dynamics. Sticky thoughts have long dwell times and a high probability density of near perfect phase synchrony between the brain's oscillations. Passing thoughts, as the name suggests, have short dwell times and low probability density. Stickiness means that the coupling interaction between neural populations is stronger than the tendency of these populations to express their individual autonomy and/or to disengage from one neural coalition to participate in others. Very sticky thoughts correspond to phase trapping between the brain's oscillations and may be pathological. Well-known manifestations of too much synchronization in the brain are diseases like Parkinson's disease and epilepsy. On the other hand, it appears that certain diseases such as schizophrenia appear to be characterized by a reduction in oscillatory brain activity and a relative absence of long-range phase synchrony.⁶³ Like order and chaos, it seems the boundary between health and disease is a fine one.

A few further remarks may be in order. One, hinted at earlier, is that environmental, intentional, attentional, emotional, learning, and memory processes are all capable of both stabilizing and destabilizing the coordination dynamics. A recently proposed dynamical mechanism is *parametric (de)stabilization* by func-

tional information.⁶⁴ The neural mechanisms of parametric stabilization by intention are beginning to be uncovered.⁶⁵ A full accounting of this work, though highly relevant, would take us too far afield. We remark that to the extent these influences may be said to control the mind, this is the mind controlling itself.

Second, certain views on meditation view the mind (pardon the pun) – with its beliefs, biases, and prejudices based on past experience and memory – as an obstacle to being truly aware, to seeing *what is*. Awareness is where the mind *stops* wandering and thinking is the pause between two thoughts, where the brain is not trapped in a coherent state. Here we may say that for thought not to interfere, there should be no 'binding' among brain areas; all the parts of the brain should be in a default state poised, as it were, to respond to any input. Metastability resolves, nay embraces, any paradox between 'content full' thought and 'content less' awareness: the flow of the dynamics allows both.

Third, notice in Figure 3 and throughout this discussion, that the linkage between events at different levels, from neural to psychological, is by virtue of shared pattern or coordination dynamics, not because any single level is any more or less fundamental than any other. Thus, psychological terms like 'stickiness,' or 'unhooking,' or 'trapping,' or even 'task difficulty' have explicit meaning in terms of meta- and multistable coordination dynamics. This amounts to transcendence if not translation.

Ending Thought is matter and thinking is matter in motion – coordinated motion. Thought arises as a low dimensional, coherent pattern in an extremely high-dimensional system called the human being coupled to its environment. The slightest fluctuation can trigger a thought. Context matters. The coordination dynamics of thinking is essentially nonlinear and contains multistability and switching – which may be debilitating when they lead to polarization. Coordination dynamics differs from other theories of self-organization, such as Iberall's homeokinetics⁶⁶ because it

⁶² W. James, **The Principles of Psychology**. Vol.1 (New York: Dover, 1890). My parenthetical inclusions.

⁶³ P.J. Uhlhaas and W. Singer, 'Neural synchrony in brain disorders: Relevance for cognitive dysfunctions and pathophysiology,' **Neuron** 52 (2006): 155-68.

⁶⁴ For example: P. Fink, J.A.S. Kelso, V.K. Jirsa and P. Foo, 'Local and global stabilization of coordination by sensory information,' **Experimental Brain Research** 134 (2000): 9-20; V.K. Jirsa, P. Fink, P. Foo and J.A.S. Kelso, 'Parametric stabilization of biological coordination: A theoretical model,' **Journal of Biological Physics** 26 (2000): 85-112; J.A.S. Kelso, P. Fink, C.R. DeLaplain and R.G. Carson, 'Haptic information stabilizes and destabilizes coordination dynamics,' **Proceedings of the Royal Society B**, 268 (2001): 1207-13. See also B.A. Kay and W.H. Warren, Jr, 'Coupling of posture and gait: Mode locking and parametric excitation,' **Biological Cybernetics** 85 (2001): 89-106.

⁶⁵ See: K.J. Jantzen, M. Bertollo, C. deLuca, S. Comani and J.A.S. Kelso, 'The neurophysiology of intentional switching among patterns of bimanual coordination,' **International Conference on Human Brain Mapping**, Chicago Ill. (June 2007); J.A.S. Kelso, J.P. Scholz and G. Schöner, 'Dynamics governs switching among patterns of coordination in biological movement,' **Physics Letters A** (1988); and J.P. Scholz and J.A.S. Kelso, 'Intentional switching between patterns of bimanual coordination is dependent on the intrinsic dynamics of the patterns,' **Journal of Motor Behavior**, 22 (1990): 98-124.

⁶⁶ A. Iberall and H. Soodak, 'Physical basis for complex systems – some propositions relating levels of organization,' **Collective Phenomena** 3 (1978): 9-24.

deals primarily in the currency of *functional information*: the two ‘forces’ that drive coordination dynamics deal fundamentally with *information exchange*. One force is the strength of coupling between the elements; this allows information to be distributed to all participating elements and is a key to integrative, collective action. The other is the ability of individual elements to express their autonomy, and thereby minimize the influence of others. Self-organization in the metastable regime is the interplay of both. This is the architecture of mind. Metastable mind.

*A modified version of the present paper was published in *Ecological Psychology*, 20 (2008): 180-208.

Author’s note:

‘Mind’ as used here is multifunctional: we pay attention, we see, we hear, we remember, we feel, we act, we experience, etcetera. These are activities that rely at least in part on the workings of a physical organ called the brain. Like structure and function, organism and environment, affordance and effectivity, mind and brain are complementary.

II

Epigenic Reconfigur- ations

Shaping the Environments that Shape Our Brains: A Long Term Perspective

Bruce Wexler

Introduction The most fundamental difference between the human brain and those of other mammals is the greater extent to which the development of its structure and function is influenced by sensory input. Brain cells require sensory input from the environment to maintain their vitality and functionality. This sensory input forges connections among cells that create functioning cell ensembles and neural functional systems. Psychological processes and cognitive operations like perception, memory, and thinking are properties of these ensembles and functional systems, not of individual cells. Changes in two parameter settings in pre- and postnatal neurodevelopment make this brain-environment interaction particularly powerful in human beings. One is a marked increase in the number of neurons in the human brain. The second is increased length of time after birth in humans, compared to even our closest primate cousins, during which interconnections among neurons are easily shaped by environmental input. These two changes in parameter settings are the result of Darwinian biological evolution and make it possible for environmental input to create more elaborate and powerful neural functional structures.

These contributions of biological evolution create a potential that is realized and amplified by another critical process: humans, and humans alone, shape and reshape the environments that shape their brains. This cultural evolution differs from Darwinian biological evolution in several important ways. Firstly, it creates more rapid, more incremental, and more widespread population variability. Second, cultural and biological evolution use very different processes to store the information that influences brain development, structure, and function. In biological evolution, information is stored in the largely stable base sequence of DNA molecules. In cultural evolution, the information is stored in the minds and behavior of adult members of society; in cultural artifacts such as books, architecture, and works of art; and in social institutions including laws, customs, and schools. In biological evolution the information is stored in identical and complete form in many individuals. In cultural evolution, the information is distributed in different and incomplete forms across many individuals and artifacts.

In this paper I will first review the scientific evidence demonstrating the processes and extent of environmental shaping of brain structure and function. This research has been conducted over the past 60 years by neuroscientists, psychologists and sociologists. It has provided new understanding of the centrality of neuroplasticity in human brain development, the power of cultural evolution that rests upon it, and the relationship between human beings and the environment. During childhood, developing individuals have limited ability to act on the environment but are profoundly affected by it. A homology is created between the external environment and internal structures because the brain shapes itself to the recurring features of the specific rearing environment in which it develops. By young adulthood, however, there is a fundamental shift in the relationship between the individual and the environment. The powerful neuroplastic processes in the develop-

ing brain are replaced by the less powerful ones of adulthood, and now established internal structures are self maintaining. Individuals are now able to act on the general environment and do so largely to make the environment match the internal structures established by the mix of elements in their rearing environment. Since their rearing experiences and associated internal structures are different from those of their parents' generation, they act to change the general environment from one that matched the internal structures of their elders to one that matches their own internal structures. These changes include new art forms and images, new music, new public structures, and new built environments. These actions on the environment by one generation create new rearing environments for the next. Each new generation thus differs from the one before, and when each gains the ability to alter the environment, it changes it to be consistent with its own internal structures and sensibilities. In the process, each generation creates a new rearing environment for the next, which leads to the development of a new generation with different internal structures and sensibilities which they in turn seek to impose on the environment.

The final section of the paper will offer more speculative thoughts about the transgenerational processes of cultural evolution during human prehistory. We know today that chimpanzees and orangutans have developed some simple tools from natural materials, these tools differ from one group to another, and their construction and use are passed down from one generation to the next. They have become features of the social environment and their use is seen, imitated and internalized by successive generations. But this is the most rudimentary cultural evolution and has not progressed to more substantial environmental modifications. Hominids preceding the appearance of *Homo sapiens* or human beings also used tools, and more actively fashioned them from natural materials than do chimpanzees. The archeological record provides evidence of the change toward more complex construction and greater utility in tool making over the course of hominid evolution. While many questions remain and new discoveries regularly refine the view of paleoanthropologists, several observations are particularly noteworthy. Tool making began approximately two million years ago. Initial innovations remained largely unchanged for hundreds of thousands of years. While some incremental variations are evident, even during the relatively slow changes during prehistory, there were periods of time and specific geographical locations when and where change was more rapid. While common tool making procedures were evident at geographically dispersed sites though out Africa and into Asia and Europe, there were also long periods in which older and newer technologies existed in different contemporaneous communities. While some technical advances are associated with new hominid species, there are instances of cross-species transfer of technology. In the last 30 to 50 thousand years there has been a marked acceleration in the rate of change and diversity of technologies. What, then,

are the reasons why the evolution of human material culture has been so rapid in comparison to the material culture of other primates, and why within human evolution have change in material culture and the built environment been so much more rapid relatively recently? The history of hominid evolution and new research on human brain development during childhood together shed light on these questions.

I A Contemporary Neural Systems View of Human Brain Function

There are 100 billion neurons in the human brain, each directly connected to over 1,000 other neurons. Learning simple associations between stimuli leads to altered responses in millions of cells distributed across wide expanses of cortical territory.¹ When people perform simple cognitive operations, neuronal activity changes in multiple brain areas.² When the same simple tasks are repeated within minutes or hours, there are different patterns of task-related regional activation changes associated with the task. This is true both with³ and without⁴ deliberate efforts to teach or learn the tasks. Most of the things we do in real life we have done before, so that the brain activations associated with them have been different at different times. As people get older, brain activation patterns associated with the same task changes, indicating that the same tasks are done by different combinations of brain areas at different ages.⁵ Furthermore, if the same component cognitive operation is performed as part of different overall cognitive functions, the pattern of regional brain activation associated with that component operation is different.⁶

These new observations with functional brain imaging are consistent with the notion of cerebral functional systems described earlier by the Russian neuropsychologist A.R. Luria.⁷ Luria noted that localized injuries rarely affected only one cognitive operation and usually affected multiple cognitive operations. Moreover, individual cognitive operations were affected by injuries in multiple different areas of the brain. Luria concluded that while groups of cells in a specific ana-

¹ For example: E.R. John, Y. Tang, A.B. Brill, R. Young and K. Ono, 'Double-labeled metabolic maps of memory,' *Science* 233 (1986): 1167-75.

² For example, M. D'Esposito, 'From cognitive to neural models of working memory,' *Philosophical Transactions of the Royal Society of London – Series B: Biological Sciences* 362 (2007): 761-72.

³ For example, R.A. Poldrack, V. Prabhakaran, C.A. Seger and J.D.E. Gabrieli, 'Striatal activation during acquisition of a cognitive skill,' *Neuropsychology* 13 (1999): 564-74.

⁴ For example: C. Kelly, J.J. Foxe and H. Garavan, 'Patterns of normal human brain plasticity after practice and their implications for neurorehabilitation,' *Archives of Physical Medicine and Rehabilitation* 87 (2006): S20-9; and, I. Loubinoux, C. Carel, F. Alary, et al., 'Within-session and between-session reproducibility of cerebral sensorimotor activation: a test-retest effect evidenced with functional magnetic resonance imaging,' *Journal of Cerebral Blood Flow and Metabolism* 21 (2001): 595-607.

⁵ For example: W.D. Gaillard, L. Hertz-Pannier, S.H. Mott, A.S. Barnett, D. LeBihan and W.H. Theodore, 'Functional anatomy of cognitive development: fMRI of verbal fluency in children and adults,' *Neurology* 54 (2000): 180; and G.T. Stebbins, M.C. Carrillo, J. Dorfman, et al., 'Aging effects on memory encoding in the frontal lobes,' *Psychology and Aging* 17 (2002): 44-55.

⁶ For example: K.J. Friston, C.J. Price, P. Fletcher, C. Moore, R.S.J. Frackowiak and R.J. Dolan, 'The trouble with cognitive subtraction,' *NeuroImage* 4 (1996): 97-104; and B.E. Wexler, 'Using fMRI to study the mind and brain,' in *Brain Energetics and Neuronal Activity*,

ed. R. Shulman and D. Rothman (West Sussex: John Wiley and Sons, 2004), 279-94.

⁷ A.R. Luria, *The Working Brain*, translated by B. Haugh (New York: Basic Books, 1973). See also, L.S. Vygotsky, *Mind in Society: The Development of Higher Psychological Processes* (Cambridge, MA: Harvard University Press, 1978).

tomic location might collectively have some elementary tissue function, such functions do not correspond to mental functions like perception, memory, or cognition. Such mental operations are instead properties of functional systems that perform the same function through different means or components in different circumstances or at different times. The functions are properties of the system, not of specific anatomic locations. Most contemporary views of the functional organization of the human brain are based on neural systems that integrate varying neural components that are often distributed throughout the brain.

This modern view contrasts with nineteenth-century concepts of phrenology and related twentieth-century concepts of modularity.⁸ Phrenology and modularity posit that specific cognitive operations are performed at circumscribed, localized anatomic sites, and that the function of these brain locations is the specific cognitive operation. In contrast, the twenty-first-century systems view is that ensembles of cells at different locations in the brain have different physiological characteristics, and that they are like different letters of an alphabet. Cognitive functions emerge from combinations of different local units just as words emerge from combinations of letters. In addition, there may be a limited number of localized units in the systems model that are also stand-alone modules for simple cognitive operations; operations that could have evolved prior to the primate, or even the mammalian line. Like the single letter words 'a' and 'I,' such modules could serve both as freestanding cognitive modules and as components of larger systems.

The dynamic systems view helps explain the striking fact that when one hemisphere of the brain must be surgically removed in very young infants, their subsequent cognitive development is largely normal and all cognitive operations are performed with the remaining hemisphere.⁹ Even when the left or language hemisphere is removed, near normal language function is supported by the right hemisphere. As in developmental neuroplasticity discussed more broadly, these reconfigurations of brain functional architecture are more easily understood from the perspective of systems/emergent property than from the perspectives of phrenology and modularity.

II Sensory Stimulation and Neuronal Viability and Growth

Sensory stimulation is literally a matter of life or death for cells in the nervous system, establishing the first level on necessity in the essential link between the mammalian brain and its environment. Information-processing structures along pathways from peripheral sensory receptors to cortical processing centers atrophy without sensory input. The number of ganglion cells in the retina that carry excitation from photoreceptor cells in the eye to the first relay station in the brain is decreased to 10 per cent of normal in chimpanzees reared in the dark; after dark-rearing, cats and rats have smaller than normal ganglion cells,¹⁰

and rod and cone photoreceptor cells in the eyes of chicks are morphologically abnormal after four weeks with opaque coverings of the eye.¹¹ The number and size of cells are reduced by 30 to 40 per cent in the lateral geniculate of cats and monkeys deprived of visual input during the initial weeks of life.¹² The effects continue into the visual cortex where the number, size, and density of connections among cells are decreased and the organization of cells is altered.¹³ Studies of olfactory deprivation have yielded a similar picture.¹⁴ The effects of sensory deprivation on structure can be decreased by the injection of nerve growth factor into the cerebral spinal fluid during the time of deprivation.¹⁵ Nerve growth factor is normally produced and released by cells stimulated

⁸ See: Wexler, 'Using fMRI to study the mind and brain' and B.E. Wexler, **Brain and Culture: Neurobiology, Ideology and Social Change** (Cambridge, MA: MIT Press, 2006).

⁹ J.A. Ogden, 'Phonological dyslexia and phonological dysgraphia following left and right hemispherectomy,' **Neuropsychologia** 34 (1996): 905-18; and R. Werth, 'Visual functions without the occipital lobe or after cerebral hemispherectomy in infancy,' **European Journal of Neuroscience** 24 (2006): 2932-44.

¹⁰ E. Rasch, H. Swift, A.H. Riesen, and K.L. Chow, 'Altered structure and composition of retinal cells in dark reared animal,' **Experimental Cell Research** 25 (1961): 348-63.

¹¹ H. Liang, D.P. Crewther, S.G. Crewther and A.M. Barila, 'A role for photoreceptor outer segments in the induction of deprivation myopia,' **Vision Research** 35 (1995): 1217-25.

¹² For example: D.H. Hubel, 'Deprivation and development,' in **Eye, Brain and Vision** (New York: Scientific American Library, 1988), 191-217; D.H. Hubel and T.N. Wiesel, 'The period of susceptibility to the physiological effects of unilateral eye closure in kittens,' **Journal of Physiology** 206 (1970): 419-36; T.N. Wiesel and D.H. Hubel, 'Effects of visual deprivation on morphology and physiology of cells in the cat's lateral geniculate body,' **Journal of Neurophysiology** 26 (1963): 978-93; C. Kupfer and P. Palmer, 'Lateral geniculate nucleus: histological and cytochemical changes following afferent denervation and visual deprivation,' **Experimental Neurology** 9 (1964): 400-9; S.M. Sherman, K.P. Hoffman and J. Stone, 'Loss of a specific cell type from dorsal lateral geniculate nucleus in visually deprived cats,' **Journal of Neurophysiology** 35 (1972): 532-41; S.M. Sherman and K.J. Sanderson, 'Binocular interaction on cells of the dorsal lateral geniculate nucleus of visually deprived cats,' **Brain Research** 37 (1972): 126-31; and M. Tigges and J. Tigges, 'Parvalbumin immunoreactivity in the lateral geniculate nucleus of rhesus monkeys raised under monocular and binocular deprivation conditions,' **Visual Neuroscience** 10 (1993): 1043-53.

¹³ For example: G.K. Aghajanian and F.E. Bloom, 'The formation of synaptic junctions in developing rat brain: a quantitative electron microscopic study,' **Brain Research** 6 (1967): 716-27; B.G. Cragg, 'What is the signal for chromatolysis?,' **Brain Research** 23 (1970): 1-21; E. Fiková, 'Changes of axosomatic synapses in the visual cortex of monocularly deprived rats,' **Journal of Neurobiology** 2 (1970): 61-71; A. Kumar and R. Schliebs, 'Postnatal laminar development of cholinergic receptors, protein kinase C and dihydropyridine-sensitive calcium antagonist binding in rat visual cortex. Effect of visual deprivation,' **International Journal of Developmental Neuroscience** 10 (1992): 491-504; Kumar and Schliebs, 'Postnatal ontogeny of GABA_A and benzodiazepine receptors in individual layers of rat visual cortex and the effect of visual deprivation,' **Neurochemistry International** 23 (1993): 99-106; P. Rakic, I. Suner and R.W. Williams, 'A novel cytoarchitectonic area induced experimentally within the primate visual cortex,' **Proceedings of the National Academy of Sciences of the United States of America** 88 (1991): 2083-7; and S. Robner, A. Kumar, W. Kues, V. Witzemann, and R. Schliebs, 'Differential laminar expression of AMPA receptor genes in the developing rat visual cortex using *in situ* hybridization histochemistry. Effect of visual deprivation,' **International Journal of Developmental Neuroscience** 11 (1993): 411-24.

¹⁴ For example: T.E. Benson, D.K. Ryugo and J.W. Hinds, 'Effects of sensory deprivation on the developing mouse olfactory system: a light and electron microscopic, morphometric analysis,' **Journal of Neuroscience** 4 (1984): 638-53; J. Najbauer and M. Leon, 'Olfactory experience modulated apoptosis in the developing olfactory bulb,' **Brain Research** 674 (1995): 245-51; and L.C. Skeen, B.R. Due and F.E. Douglas, 'Neonatal sensory deprivation reduces tufted cell number in mouse olfactory bulbs,' **Neuroscience Letters** 63 (1986): 5-10.

¹⁵ N. Berardi, A. Cattaneo, A. Cellerino, et al., 'Monoclonal antibodies to nerve growth factor (NGF) affects the postnatal development of the rat geniculocortical system,' **Journal of Physi-**

by sensory input, thus providing a concrete mediator of the association between neuronal activity and neuronal viability and growth.¹⁶

Effects of sensory deprivation on the development of brain functional organization build on these effects on cell viability and growth. Neurons at each stage of processing compete for connections with neurons at each subsequent stage, with neurons that fire more often gaining territory and following the principle that 'neurons that fire together wire together.' Hubel and Wiesel's Nobel-prize-winning studies of kittens and monkeys systematically elucidated these processes.¹⁷ Recording electrical activity from hundreds of cells in the area of the brain that receives visual information, they showed that in animals raised under normal conditions most cells respond to inputs from both eyes (approximately 85 per cent in the kitten, 65 per cent in the monkey). Many responded somewhat more frequently to input from one eye, and such eye preferences were divided evenly between the eyes. Similarly, half of the monocularly responsive cells responded exclusively to the right eye and half to the left. However, when an eye was sutured shut shortly after birth and then reopened 10 weeks later, 85 per cent or more of cells responded preferentially to the previously non-deprived eye, and few if any cells responded exclusively to the previously deprived eye. When present, responses to stimulation of the previously deprived eye were slow to start, decreased in amplitude and easily fatigued.

Hubel and Wiesel made two additional observations of particular relevance to cultural evolution. When visual input to the deprived eye is restored, the altered pattern of cortical cell sensitivities persists despite the fact that both eyes are now receiving unobstructed visual input. As long as neurons from the previously non-deprived eye remain active, they are able to maintain their abnormally acquired hegemony. However, if the previously non-deprived eye is occluded while the animal is still young enough, the abnormal response pattern can be normalized or reversed in favor of the previously deprived eye.¹⁸ The first point of particular interest is that socially generated activity can create unusual structures that alter the interaction with the environment so as to maintain themselves. In this case, when the eye was occluded, cortical structure changed so as to be unusually responsive to input from only one eye. When the occlusion was removed and input was available to both eyes, the brain still registered input almost exclusively from only one eye. The neural resources necessary to process input now available from the previously occluded eye had been appropriated by the active eye during the period of unilateral occlusion, and the active eye maintained the extra resources as long as it kept those resources actively engaged in processing input within the systems that had appropriated them. This situation could be reversed by occluding the previously open eye, demonstrating that the plastic potential remained, that the brain could be shaped or normalized by corrective intervention, but active intervention was necessary for the 'normal pattern' to reassert

itself even in a normal situation. The second conclusion of particular interest was that such active intervention to reverse the effects of the initial unilateral occlusion was only effective in young animals. After a certain stage in development, often referred to as the critical period, there is a higher degree of stability in established neural structures, in part because neurochemical mechanisms that support neuroplasticity are less powerful in older individuals.

In the next stage of their seminal work, Hubel and Wiesel demonstrated that the nature or content of the visual stimuli shapes the functional organization of the visual cortex even when the stimuli are viewed normally by both eyes. The dependence of the brain on sensory stimulation to maintain cell viability thus provides the opportunity for that stimulation to go beyond maintaining a predetermined functional structure and actually creating the functional structure. For example, some cells in the visual cortex respond selectively to moving objects, with each cell maximally sensitive to movement in a particular direction. Other cells respond selectively to lines (that is, object edges), with each having maximum sensitivity to lines of a particular orientation. Kittens raised in strobe light that prevents appreciation of movement have decreased numbers of motion-sensitive cells.¹⁹ Presumably cells that would have been specialized for movement detection became selectively responsive to some other aspect of visual information instead. Kittens raised in the dark except for exposure to stripes moving from left to right have a marked increase in the proportion of cells selectively responsive to left-to-right rather than right-to-left movement.²⁰ Kittens exposed to vertical black and white stripes for a few hours each day, but otherwise reared in darkness, have only cortical cells with vertical line orientation preferences.²¹ Kittens raised wearing goggles that allowed them to see only vertical lines in one eye and horizontal lines in the other have fewer than the normal number of cells that respond to oblique lines. Moreover, cells responsive to vertical lines are active only with stimulation of the eye that had been exposed to

ology-London 452 (1992): 293P; N. Berardi, L. Domenici, V. Parisi, T. Pizzorusso, A. Cellerino, and L. Maffei, 'Monocular deprivation effects in the rat visual cortex and lateral geniculate nucleus are prevented by nerve growth factor (NGF). I. Visual cortex,' **Proceedings of the Royal Society of London B** 251 (1993): 17-23; G. Carmignoto, R. Canella, P. Candeo, M.C. Comelli and L. Maffei, 'Effects of nerve growth factor on neuronal plasticity of the kitten visual cortex,' **Journal of Physiology-London** 464 (1993): 343-60; L. Domenici, A. Cellerino, and L. Maffei, 'Monocular deprivation effects in the rat visual cortex and lateral geniculate nucleus are prevented by nerve growth factor (NGF). II. Lateral geniculate nucleus,' **Proceedings of the Royal Society of London B** 251 (1993): 25-31; and T. Pizzorusso, M. Fagioli, M. Fabris, G. Ferrari and L. Maffei, 'Schwann cells transplanted in the lateral ventricles prevent the functional and anatomical effects of monocular deprivation in the rat,' **Proceedings of the National Academy of Sciences of the United States of America** 91 (1994): 2572-6.

¹⁶ L. Domenici, et al., 'Monocular deprivation effects in the rat visual cortex and lateral geniculate nucleus are prevented by nerve growth factor (NGF). II. Lateral geniculate nucleus.'

¹⁷ Hubel, 'Deprivation and development.'

¹⁸ Ibid.

¹⁹ M. Cynader, N. Berman and A. Hein, 'Cats reared in stroboscopic illumination: effects on receptive fields in visual cortex,' **Proceedings of the National Academy of Sciences of the United States of America** 70 (1973): 1353-4; and, M. Cynader and G. Chernenko, 'Abolition of direction selectivity in the visual cortex of the cat,' **Science** 193 (1976): 504-5.

²⁰ F. Tretter, M. Cynader and W. Singer, 'Modification of direction selectivity of neurons in the visual cortex of kittens,' **Brain Research** 84 (1975): 143-9.

²¹ C. Blakemore and G.F. Cooper, 'Development of the brain depends on visual experience,' **Nature** 228 (1970): 477-8.

vertical lines, and cells responsive to horizontal lines are active only with stimulation of the eye that had been exposed to horizontal lines.²²

The extent of this neuroplastic potential in the developing mammalian brain is remarkable. In adult rats that had an eye removed at birth, stimulation of their whiskers activated cells within the visual cortex;²³ neurons in what is normally a visual processing area came instead to respond to input from the whiskers when deprived of input from the eye. In a dramatic demonstration of plasticity, the optic nerve in one-day-old ferrets was rerouted to provide visual rather than auditory input to what is normally the auditory cortex. The auditory cortex developed a functional organization of ocular dominance columns highly similar to the normal visual cortex rather than its usual tonotopic structure, and the ferrets saw with what would normally have been the auditory regions of the brain.²⁴

These studies provide evidence that mammalian brains (and minds) develop concrete perceptual structures, capabilities, and sensitivities based on prominent features of the rearing environment, and then are more able and more likely to see those features in the world around them. Turning it around, mammals have limited ability to see even prominent features of a new environment if those features were absent from their rearing environment.

III Social Interactions as the Source of Early Environmental Stimulation

The class *Mammalia* is named on the basis of the presence of mammary glands. It is defined on the basis of nourishing young with milk and a series of physical features including a chain of small ear bones, four optic lobes in the brain, a particular mandibular structure, a muscular diaphragm separating the lungs and heart from the abdomen, only a left aortic arch, warm blood with red blood cells lacking nuclei, and viviparous reproduction. In studies of infant monkeys and wire mesh surrogate mothers, Harlow and Mears provided a radical correction to this definition, adding another central feature that in many ways is more important than all the others. Infant monkeys were separated from their mothers and raised with access to both a wire mesh and a cloth surrogate mother. The researchers provided milk to one-half of the monkeys via the wire mesh mother and to the other half via the cloth mother. They asked: 'Will the monkeys prefer the mother that provides the milk?' The answer was no. Both groups spent much more time on the cloth than the wire mesh mother. The differential was greater by only a small amount when the cloth mother was the source of milk. This preference for the cloth mother became greater over time in both groups, just the opposite of what would be expected from a classical conditioning model if the most important thing to the infants was getting milk. Harlow and Mears concluded that 'the disparity [in favor of selecting the cloth mother independent of which mother provides milk] is so great as to suggest that the primary function of nursing as an affectional variable is that of ensuring

frequent and intimate body contact of the infant with the mother.'²⁵ Their transformative insight was that instead of the provision of milk being the end goal of mother-infant interaction in and of itself, it is a means of ensuring contact between the mother and the infant because this contact is essential for the provision of sensory stimulation necessary for brain development, and for production of population variability through variability in that stimulation.

Real living mothers and other parenting figures vary in the ways they stimulate their infants and children. Naturally occurring differences in these parenting behaviors have lifelong and specific effects on the brains and behavior of their offspring, and changes in DNA structure that mediate these effects have been identified in studies of rats.²⁶ For example, mother rats differ in the amount of time they spend licking and grooming their pups, and in the ways they position themselves for nursing. Michael Meaney and colleagues found that adult rats that had been licked more as pups had decreased behavioral and hormonal responses to stress, and greater spatial learning abilities – a capacity in which areas of the hippocampus play an important role.²⁷ Examining the brains of the rats that had been licked more as pups, they found greater levels of two specific types of messenger RNA. One carries the information from the DNA to parts of the cells that synthesize the glucocorticoid receptors important in regulating stress responses. The other carries information necessary for building the NMDA receptors important in promoting neuroplasticity. Anatomic examination of the hippocampus revealed that offspring of high-licking mothers had longer neurons with more of the branches and interconnections so important in brain function (Figure 1). Moreover, examination of the DNA identified structural changes in the regions associated with stress response as a result of the degree of maternal licking. Shortly after birth, small chemical complexes called methyl groups cover much of the surface of DNA. The methyl groups limit access to the DNA and thereby limit activation or expression of genes. During the first weeks of life, sensory stimulation can lead to selective removal of methyl groups, making some genes more active. The effects of experience on methylation are greatest during the first three weeks of a rat's life, and changes induced by experience during this critical period usually remain relatively unchanged throughout the rat's adult life. Maternal licking initiates a series of neurochemical processes that selectively demethylate genes that produce the glucocorticoid receptors in the hippocampus and frontal lobes that regulate the stress response.

²² H.B. Hirsch and D. Spinelli, 'Visual experience modifies distribution of horizontally and vertically oriented receptive fields in cats,' *Science* 168 (1970): 869-71.

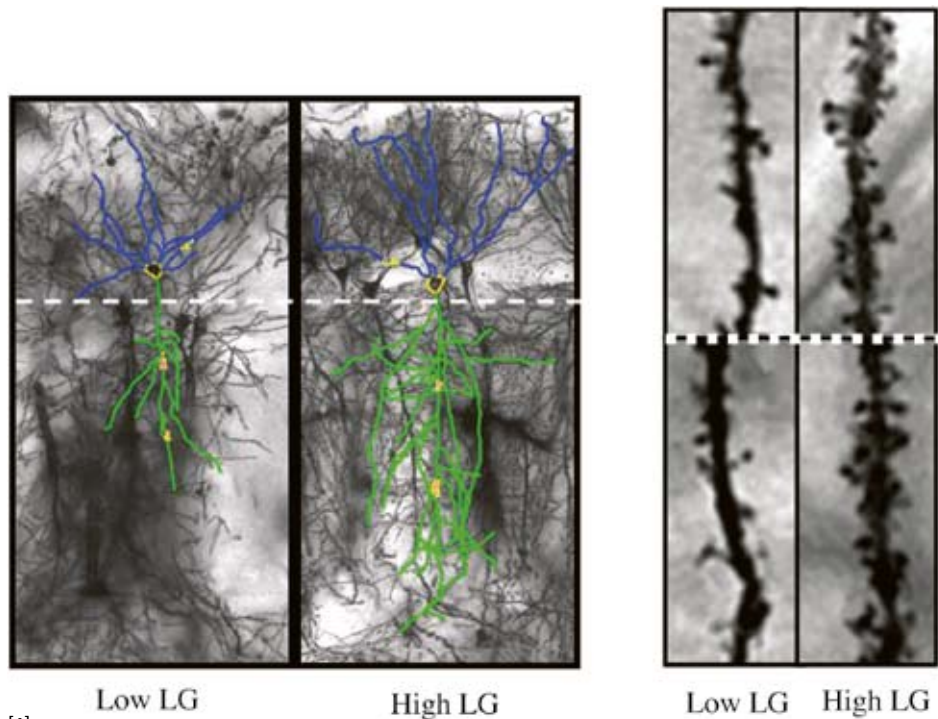
²³ J. Toldi, I. Rojik and O. Feher, 'Neonatal monocular enucleation-induced cross-modal effects observed in the cortex of adult rat,' *Neuroscience* 62 (1994): 105-14.

²⁴ J. Sharma, A. Angelucci and M. Sur, 'Induction of visual orientation modules in auditory cortex,' *Nature* 404 (2000): 841-7.

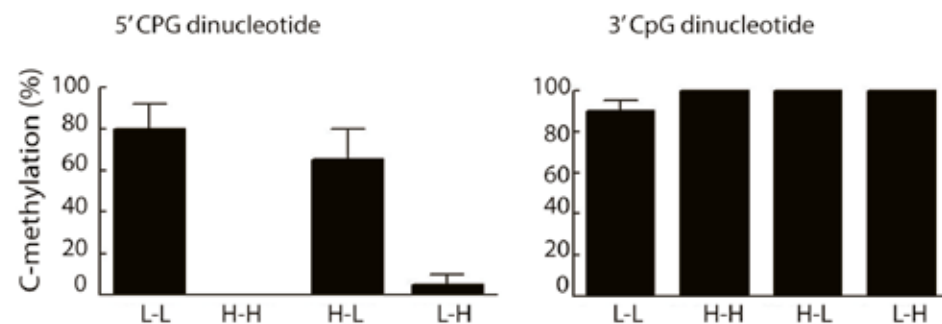
²⁵ H.F. Harlow and C. Mears, *The Human Model: Primate Perspectives* (Washington, DC: V. H. Winston and Sons, 1979), 108.

²⁶ I.C.G. Weaver, N. Cervoni, F.A. Champagne, et al., 'Epigenetic programming by maternal behavior,' *Nature Neuroscience* 7 (2004): 847-54; and, I.C.G. Weaver, J. Diorio, J.R. Seckl, M. Szyf and M.J. Meaney, 'Early environmental regulation of hippocampal glucocorticoid receptor gene expression: characterization of intracellular mediators and potential genomic sites,' *Annals of the New York Academy of Sciences* 1024 (2004): 182-212.

²⁷ Weaver, et al., 'Early environmental regulation of hippocampal glucocorticoid receptor gene expression: characterization of intracellular mediators and potential genomic sites.'



[1]



[2]

1 Apical (blue) and basal (green) dendritic branching in adult rats who received lower (left) or higher (right) amounts of licking and grooming as infants. Stained neurons are pyramidal cells from the hippocampus. The study found significantly more branching in the rats who had received more licking and grooming. This is also visible in the photographs of branching points along the axonal spine shown on the right.

Image Credit: Champagne et al., 'Maternal care and hippocampal plasticity: evidence for experience-dependent structural plasticity, altered synaptic functioning, and differential responsiveness to glucocorticoids and stress,'

Journal of Neuroscience 28 (2008).

2 Cross-fostering studies that maternal care and not maternal genes alter methylation and expression of the section of the genome that promotes expression of genes that code for the proteins that constitute neuro-receptors that regulate the stress response. The left side of the figure show low methylation (greater activity) in rats raised by high licking grooming mothers if their biological mothers were high (H-H) of low licking grooming (L-H) mothers, and high methylation (lower activity) in rats raised by low licking grooming mothers with either high (H-L) or low licking grooming (L-L) biological mothers. The absence of such

effects in another region of the DNA (right side of the figure) demonstrates specificity of the link between this aspect of maternal behavior and methylation of the part of the DNA associated with production of neuro-receptors regulating stress responsivity.

Image Credit: Weaver, et al., 'Epigenetic programming by maternal behavior,' and Weaver, et al., 'Early environmental regulation of hippocampal glucocorticoid receptor gene expression: characterization of intracellular mediators and potential genomic sites.' (See note 28).

In a further scientific tour de force, Meaney and colleagues did adoption studies to ensure that these observations were due to the differences in maternal behavior, and not to genes that high-licking mothers passed on to their offspring. To do this, they had pups born to low-licking mothers raised from birth by high-licking mothers, and vice-versa.²⁸ When these rats became adults, their stress responses and the methylation of their DNA (Figure 2) were both consistent with the type of mother that reared them and not with the type of their biological mother.

Two more findings from these important studies are also of relevance to cultural evolution. First, there were some advantages to having been raised by low-licking mothers; when given learning tests in high-stress environments, adult rats raised by low-licking mothers outperformed rats raised by high-licking mothers. The adaptive value of the population variability induced by cultural evolution is thus evident. Second, some of the persistent neurochemical and behavioral effects of maternal care of female infants affect the way the infant functions as a mother herself when she becomes an adult. Females that had been separated from their mothers when they were infants showed lower than normal gene expression in areas of the brain associated with maternal behaviors when they themselves became mothers.²⁹ They also licked and crouched over their pups less often than other mothers,³⁰ and their generally decreased ability to maintain attention and increased response to stress have been hypothesized to further compromise their maternal competence.³¹ Such intergenerational effects are potentially self-propagating and even self-amplifying. Moreover, since litter size³² and food availability³³ can influence the amount of licking and other behavioral interactions between mother and infant, a variety of environmental factors can influence maternal behaviors and their impact, across generations, on a range of individual and group behaviors. All this depends on the postnatal sensitivity of the mammalian brain to sensory stimulation, and the proximity of mammalian infants and mothers ensured by nursing.

IV The Human Rearing Environment Human rearing behaviors are more complex and varied than those of other mammals, and include massive social components and influences from extended families, communities, and nation-states. Influences beyond the family include schools, mass media, arts, laws, and customs. Human social and economic environments also affect the states of mind, time, and energy of the parents, thus affecting their interactions

28 Weaver, et al., 'Epigenetic programming by maternal behavior,' and Weaver, et al., 'Early environmental regulation of hippocampal glucocorticoid receptor gene expression: characterization of intracellular mediators and potential genomic sites.'

29 A.S. Fleming, G.W. Kraemer, A. Gonzalez, V. Loveca, S. Reesa and A. Meloc, 'Mothering begets mothering: the transmission of behavior and its neurobiology across generations,' **Pharmacology Biochemistry and Behavior** 73 (2002): 61-75.

30 A. Gonzalez, V. Lovic, G.R. Ward, P.E. Wainwright and A.S. Fleming, 'Intergenerational effects of complete maternal deprivation and replacement stimulation on maternal behavior and emotionality in female rats,' **Developmental Psychobiology** 38 (2001): 11-32.

31 Fleming, et al., 'Mothering begets mothering: the transmission of behavior and its neurobiology across generations.'

32 Ibid., and J.E. Jans and B. Woodside, 'Effects of litter age, litter size, and ambient temperature on the milk ejection reflex in lactating rats,' **Developmental Psychobiology** 20 (1987): 333-44.

33 D.M. Lyons, H. Afariana, A.F. Schatzberg, A. Sawyer-Glover and M.E. Moseley, 'Experience-dependent asymmetric variation in primate prefrontal morphology,' **Behavioural Brain Research** 136 (2002): 51-9.

with their offspring in a manner analogous to the effects of food supply on rat maternal behavior. And although beyond the scope of this paper to discuss, the huge role of language – spoken and written – in facilitating the influence of the human-made environment on the development of children must be noted, along with the fact that the latter is itself clearly a product of cultural evolution and it seems increasingly probable that the former is in large part as well.

Human infants can distinguish their mother's language from other languages at birth, based on stimulation received in utero.³⁴ They show a selective interest in looking at the human face within hours of birth, with the interest greatest for the full face as experienced in social interactions rather than for the face in profile. Within days they prefer their mother's face and voice to those of others.³⁵ Within the context of this powerful interest in social interaction, parents provide objects of play and structure interactions and activities. As Kenneth Kaye remarked, 'social interference in the object-directed activities of babies is such a common-place occurrence that few authors have remarked on its absolute uniqueness to our own species.'³⁶ In all these ways, the brains and minds of human infants and children develop closely linked to the minds and brains of their biobehaviorally mature caregivers. Through the small details and general rhythms of the child's experiences, the characteristics of the adults shape the stimulation that shapes the growing brains of the children. The child integrates input from progressively larger circles of direct interaction, beginning with primary caregivers and growing to include extended family members and then members of the community and society more broadly.

Some of the social input is actively shaped and provided by others, but much is just absorbed through constant imitation. Infants will stick out their tongues and move their heads in imitation of an adult within just two days of birth.³⁷ From infancy on, children learn how to do things simply by watching them done. They imitate the goals of action even by different means and imitate a parent's emotional response to new stimuli.³⁸ Mirror neurons fire when people (and monkeys) watch an act being done, and are then active when the individual performs the action previously observed.³⁹ Similarly, looking at someone else in pain activates the same regions of the brain that are active when the observer experiences pain him or herself.⁴⁰ The work of Hubel and Wiesel demonstrated that environmentally induced neuronal activity shaped the development of cerebral functional structures, following the principle that neurons that fire together wire together. In human development, parental and community interventions and nearly constant imitation of what is seen and heard produce intensive and repetitive firing of neuronal ensembles and circuits. This environment-induced neural activation shapes brain development to be consistent with the largely human-made rearing environment.

Psychologists were aware of the role of the social environment in shaping mental development well before neuroscience research added further support to their observations. They even described the processes in language remarkably similar to what would be suggested by the subsequent work of Hubel, Wiesel, Meaney, and others. Fenichel stated in 1926 that 'changes in the ego, in which characteristics which were previously perceived in an object [usually an important person] are acquired by the perceiver of them, have long since been familiar to psychoanalysis.'⁴¹ Freud, in 1933, described identification as 'the assimilation of one ego to another one, as a result of which the first ego behaves like the second in certain respects, imitates it and in a sense takes it up into itself.'⁴² Greenson stated in 1954 that 'identification with an object means that ... a transformation of the self has occurred whereby the self has become similar to the external object ... one can observe behavior, attitudes, feelings, posture, etc., which are now identical to those characteristics belonging to the external object,' and that at early stages of development 'perception implies transformation of the self.'⁴³ Reich, also in 1954, explained that 'the child simply imitates whatever attracts his attention momentarily in the object ... normally these passing identifications develop slowly into permanent ones, into real assimilation of the object's qualities.'⁴⁴ Writing from a different cultural

³⁴ J. Mehler, P. Jusczyk, G. Lambertz, N. Halsted, J. Bertoncini, and C. Amiel-Tison, 'A precursor of language acquisition in young infants,' **Cognition** 29 (1988): 143-78.

³⁵ G. Carpenter, 'Mother's face and the newborn,' **New Scientist** 21 (1974): 742-4; W.P. Fifer and C.M. Moon, 'The role of mother's voice in the organization of brain function in the newborn,' **Acta Paediatrica** 397(Suppl) (1994): 86-93; C.C. Goren, M. Sarty and P.Y.K. Wu, 'Visual following and pattern discrimination of face-like stimuli by newborn infants,' **Pediatrics** 56 (1975): 544-9; A. MacFarlane, 'What a baby knows,' **Human Nature** 1 (1978); Mehler, et al., 'A precursor of language acquisition in young infants'; M. Mills and E. Melhursh, 'Recognition of mother's voice in early infancy,' **Nature** 252 (1974): 123-4; and R. Spitz and K. Wolf, 'The smiling response: a contribution to the ontogenesis of social relations,' **Genetic Psychology Monographs** 34 (1946): 57-125.

³⁶ K. Kaye, 'Organism, apprentice, and person,' in **Social Interchange in Infancy: Affect, Cognition, and Communication**, ed. E. Tronick (Baltimore: University Park Press, 1982), 193.

³⁷ A.N. Meltzoff and M.K. Moore, 'Imitation of facial and manual gestures by human neonates,' **Science** 198 (1977): 74-8; and Meltzoff and Moore, 'Imitation in newborn infants: exploring the range of gestures imitated and the underlying mechanisms,' **Developmental Psychology** 25 (1989): 954-62.

³⁸ K. Kaye, **The Mental and Social Life of Babies: How Parents Create Persons** (Chicago: University of Chicago Press, 1982); M. Klinnet, R.N. Emde, P. Butterfield and J.J. Campos, 'Social referencing: the infant's use of emotional signals from a friendly adult with mother present,' **Developmental Psychology** 22 (1986): 427-32.

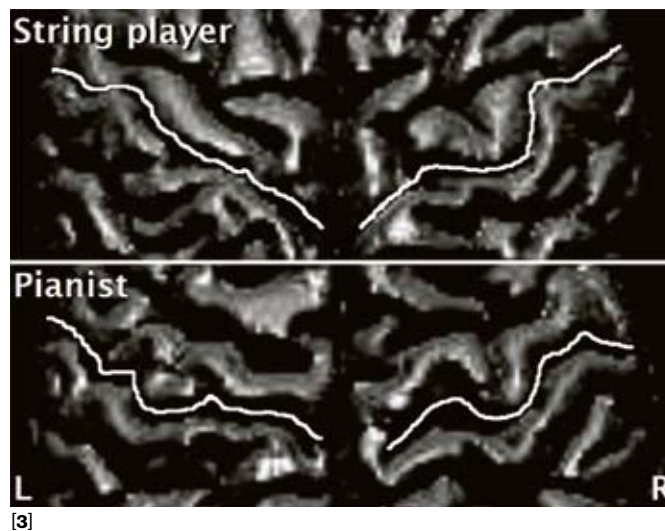
³⁹ M. Iacoboni, R.P. Woods, M. Brass, H. Bekkering, J.C. Mazziota and G. Rizzolatti, 'Cortical mechanisms of human imitation,' **Science** 286 (1999): 2526-8; G. Rizzolatti, L. Fadiga, V. Gallese and L. Fogassi, 'Premotor cortex and the recognition of motor actions,' **Cognitive Brain Research** 3 (1996): 131-41; and M.A. Umiltà, E. Kohler, V. Gallese, et al., 'I know what you are doing: a neurophysiological study,' **Neuron** 31 (2001): 155-65.

⁴⁰ X. Gu and S. Han, 'Attention and reality constraints on the neural processes of empathy for pain,' **NeuroImage** 36 (2007): 256-67; P.L. Jackson, A.N. Meltzoff and J. Decety, 'How do we perceive the pain of others? A window into the neural processes involved in empathy,' **NeuroImage** 24 (2005): 771-9; and T. Singer, B. Seymour, J. O'Doherty, H. Kaube, R.J. Dolan and C.D. Frith, 'Empathy for pain involves the affective but not sensory components of pain,' **Science** 303 (2004): 1157-62.

⁴¹ O. Fenichel, 'Identification,' in **Pivotal Papers on Identification**, ed. G. Pollock (Madison, CT: International Universities Press, 1993 [1926]), 57.

⁴² S. Freud, 'Excerpt from Lecture XXXI: The dissection of the psychical personality,' in **Pivotal Papers on Identification**, [1933], 47.

⁴³ R.R. Greenson, 'The struggle against identification,' in **Pivotal Papers on Identification**, [1954], 160-1.

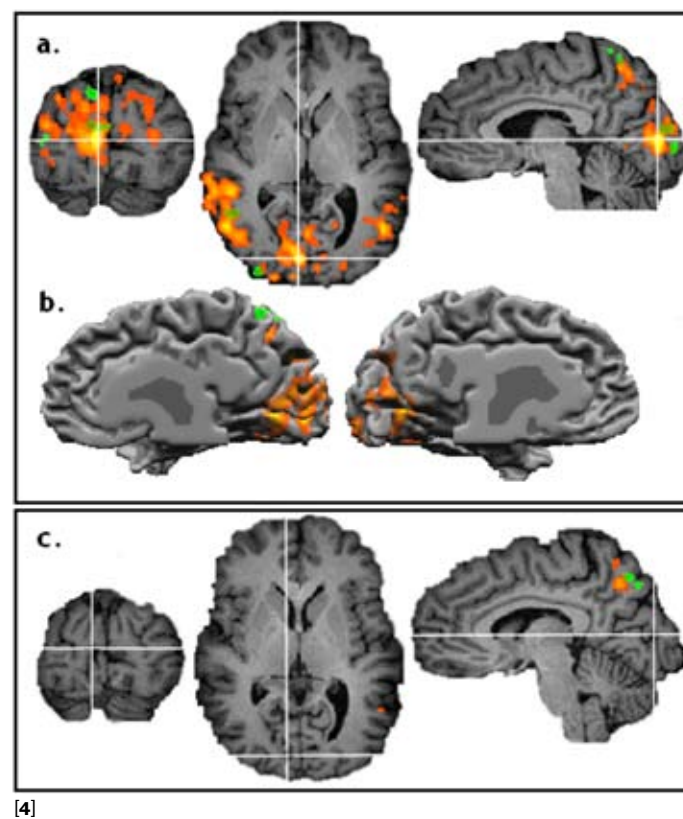


3 Expansion of sensori-motor cortex unilaterally (right side) in long time players of string instruments and bilaterally in long time piano players. These changes in brain structure result from many hours of music practice during childhood and are evident to the naked eye. Only the left sensori-motor cortex in string players is not affected by the practice since it controls the bowing (right) hand which makes many fewer and simpler movements than does

the left hand. Thus, the left sensori-motor cortex in the string players serves as a reference that demonstrates the increase in size of the other sensori-motor cortices.

Image Credit: M. Bangert and G. Schlaug, 'Specialization of the specialized in features of external human brain morphology,' **European Journal of Neuroscience** 24 (2006).

4 Areas of the cortex that usually respond to visual sensory input are shown here to respond



to auditory stimulation (white) and tactile stimulation (black) in individuals who were blind at birth or became so shortly after.

Image Credit: Weaver and A.A. Stevens, 'Attention and sensory interactions within the occipital cortex in the early blind: an fMRI study,' **Journal of Cognitive Neuroscience** 19 (2007).

and intellectual context, the Russian psychologist Lev Vygotsky described the process: 'In the early stages of development the complex psychological function *was shared between two persons*: the adult *triggered* the psychological process by naming the object or by pointing to it; the child *responded* to this signal and picked out the named object either by fixing it with his eye or by holding it with his hand. In the subsequent stages of development ... The function which hitherto was shared between two people now becomes a method of *internal organization of the psychological process*. From an external, socially organized attention develops the *child's voluntary attention*, which in this stage is an internal, self-regulating process.'

⁴⁵

V Brain-Imaging Demonstrations of Environment-Induced Brain Organization in Human Beings

Changes in brain structure and function resulting from unusual motor activity or sensory input during childhood have now been demonstrated in adult human beings with new brain-imaging methods. The lasting effects on the brain of practicing a musical instrument during childhood have been shown in multiple studies. As parents and children both know, regular practice of music during childhood is a socially and culturally created and induced activity on multiple levels, including construction of the instruments, writing of the music, creating the pedagogical methods, and inducing practice through a variety of parenting techniques. Intensive practice of string instruments leads to selective increase in volume of the right somatosensory and motor areas associated with the rapid, fine motor movements of the fingers of the left hand that provide intricate and fast moving sequences of pressure to the strings. The changes in the brain are greater in adults who practiced more hours and began practicing at younger ages.⁴⁶ Figure 3 shows the 'highly muscled' motor cortex in the right hemisphere of string players (the increase in volume is actually visible to the naked eye!) and bilaterally in piano players who practice with both hands.⁴⁷

Another set of studies looked at brain activations in areas of the brain usually responsive to visual and auditory stimulation in individuals who were blind or deaf at birth or shortly thereafter. Both these 'experiments of nature' and the findings are directly analogous to the earlier cited work of Hubel and Wiesel in animals. In early blind subjects, the area of the brain that is normally the site of early visual processing is activated instead by auditory and tactile stimulation (Figure 4).⁴⁸ It is also more active during language processing tasks than is the case in sighted people.⁴⁹ As in the animal studies, when the normal sensory input to an area was absent, other sensory input and

⁴⁴ A. Reich, 'Early identifications as archaic elements in the superego,' in **Pivotal Papers on Identification**, [1954], 180.

⁴⁵ Luria, **The Working Brain**, 265-8.

⁴⁶ G. Schlaug, 'The brain of musicians: a model for structural and functional adaptation,' **Annals of the New York Academy of Sciences** 930 (2001): 281-99.

⁴⁷ M. Bangert, and G. Schlaug, 'Specialization of the specialized in features of external human brain morphology,' **European Journal of Neuroscience** 24 (2006): 1832-4.

⁴⁸ K.E. Weaver and A.A. Stevens, 'Attention and sensory interactions within the occipital cortex in the early blind: an fMRI study,' **Journal of Cognitive Neuroscience** 19 (2007): 315-30.

⁴⁹ A. Amedi, N. Raz, P. Pianka, R. Malach and E. Zohary, 'Early "visual" cortex activation correlates with superior verbal memory performance in the blind,' **Nature Neuroscience** 6 (2003): 758-66.

cognitive operations moved into the territory. Moreover, among the blind individuals, memory performance was higher in the individuals who made more use of the 'visual' areas during the memory task.

The results of these new imaging studies in humans are what is expected based on the studies in animals, the increased plasticity of the human brain and the very active structuring by human adults of the rearing environment and developmental experiences of their offspring. The 1994 study by Toldi et al. showed that if one eye of a rat is removed at birth, stimulation of their whiskers when they are adults activates cells in what is usually the visual cortex. The demonstration of similar activation in humans who are blind from early life, then, is no surprise. The demonstration of changes in brain morphology as a result of practicing a musical instrument goes beyond the animal studies in that practicing music is clearly a socially constructed human activity, and it is impressive that the environmentally induced changes can be seen with the naked eye when data from multiple individuals is averaged together. These changes in the brain, however, are at a gross anatomic level and do not reveal more fine-grained changes in structure and function. The studies, however, are an important step in the process of science, testing assumptions and building bridges that link different sets of data. We do not yet have methods and data in people to enable us to demonstrate effects of parental actions on axonal branching in the hippocampus, as Meaney and colleagues have done in rats, but by linking the data and theory from animal studies to human beings with the above cited imaging studies, scientists complete an evidentiary loop and increase confidence in the application to human beings of principles based on the data from animals.

Long History of the Built Environment: Neurodevelopmental and Archeological Data Considered

Together The built environment has been such a prominent feature of most human societies for the past several centuries that it can be difficult to imagine a time when human activity had relatively little effect on the environment in which people lived. The shaping of the environment was a long process throughout human prehistory and history, with long periods of limited and other periods of marked increase in the impact of human activity. Moments or periods of faster change are of great interest to paleontologists. Some have seen marked discontinuities in the rate of change and sought to associate them with a specific genetic and biological change in the brain and cognition at that moment in evolution.⁵⁰ Others cite increasing evidence of more incremental change in material culture over several hundred thousand years, and emphasize the role of environmental factors in promoting and eliciting developments in technology and material culture.⁵¹ Differences in material culture of geographically separate contemporaneous communities of the same hominid species, more advanced technologies at

some earlier sites than were present at more recent sites, and the persistence or even re-emergence of stone age technologies in isolated communities in the modern period, further complicate the relationship between changing biology and hominid technologies.⁵² In most cases, however, paleoanthropologists have seen the changes in the built environment as the effect of change in brain and cognition through Darwinian evolution, change in the relationship between the population and its sources of food, or change in the climate. From our perspective, however, the increase in the built environment is both effect and cause. It can propel itself forward through changes in our brains and minds induced by the modifications in the environment. This understanding makes clear that at some time points in human evolution, the effects of biological or social changes have been greatly amplified by the interactions of brain development and the built environment. It also provides new clues to the nature of the profound biological and social changes that have altered the course of hominid and human evolution over the last two million years.

Discoveries continue to refine understanding of the evolution of hominids and their spread from Africa throughout the world, but different stages provide landmarks in this temporal sequence.⁵³ Over two million years ago the homo genus of hominids emerged in East Africa (*Homo habilis* and *Homo rudolfensis*), distinguished from the earlier bipedal hominids by a 40 per cent increase in brain size and the manufacture of tools. These tools are the earliest known items of material culture, and they created a rearing environment that included the objects themselves, the process of manufacture, and ways of hunting and eating that depended upon them. It is assumed that the ability to make the tools depended on the larger brains of these new hominids, but the nature of their critical neurobiological capacity is unknown. That the production required strength indicates that it was not something newborns could do and suggests some sort of learning. The use of specific types of stone depending on local availability suggests some flexibility in the process and abstract representation of the desired functionality. Abstraction, purpose and planning are equally apparent in instances of stone of better types for tool making be carried from distant sites to the sites of manufacture. Evidence of hammer stones and anvils indicates the non-singularity of the tools (six or so varieties of the manufactured tools themselves have been suggested by variation in shape and surface, and each assigned different names, but these may simply be the result of natural variation in materials rather than design or purpose). What is just as remarkable as the appearance of tools is the fact that there were so few in type and so constant in production. There was little change in the tool set, known as Oldowan, across time or space. They were fundamentally the same for over 700,000 years and at sites thousands of miles apart in Africa and Asia. Groups separated for long periods of time maintained the same or highly similar sets of tools. What change in the brain could be consistent with the creativity that made the tools in the first place, allow

⁵⁰ For example, R.G. Klein and B. Edgar, *The Dawn of Human Culture* (New York: John Wiley and Sons, 2002).

⁵¹ For example, S. McBrearty, 'Down with the revolution,' in *Rethinking the Human Revolution*, ed. P. Mellars, K. Boyle, O. Bar-Yosef and C. Stringer (Cambridge, MA: McDonald Institute for Archaeological Research, 2007).

⁵² K. Wong, 'The morning of the modern mind,' *Scientific American* (June 2005): 86-95.

⁵³ Klein and Edgar, *The Dawn of Human Culture*.

succeeding generations to reproduce the process, and so thoroughly conserve the particulars of production? It has been suggested that the initial tools were simply pieces of stone used to smash bones of scavenged prey to gain access to the marrow in imitation of what hyenas had been seen to do with their powerful jaws. When using stones in this way, some pieces of the stones may have chipped off yielding sharp edged flakes that could be used like the teeth of tigers to piece the skin and slice meat from dead prey. The newly acquired cognitive capacity would then have largely been the ability to imitate actions of animals and of older individuals in the community with the acquired capacity. The consistency in design and features of the tools would then have been the result of characteristics of the stone from which they were made and the simplicity of the manufacturing technique. The archeological evidence indicates that this early tool-making was a highly limited and contained process.

The next often noted innovation was the Achulean tool set associated with the appearance 1.8 million years ago of *Homo ergaster* and *Homo erectus*, the first hominids similar to modern humans (*Homo sapiens*) in body proportions and with a brain 50 per cent larger than that of *Homo habilis* but still only 60 per cent of the size of *Homo sapiens*. Tools were now shaped by systematically chipping the stone from both sides to create a symmetrical bifacial cutting edge. The entire stone was shaped into a recognizable and repeated tool form and the variation in tool form and function was increased and clearly intentional. Instead of being flakes struck off from a core, tools now became the core itself shaped by repetitive flaking. Here again, the tool set remained highly conserved for the next million years and across different communities extending into the Middle East, India, and Europe. Indeed, the eastern branch of *Homo erectus* lived in Asia from 1.8 million years ago until only 27,000 years ago without ever changing their tool set from Oldowan to Achulean.⁵⁴ Here again we are confronted by the same two-sided questions. What change in capacity and/or circumstance made the advance in tool manufacture possible? Why did this or these changes not then lead to further change over such a long ensuing period? How was the manufacturing practice conserved in the face of possible incremental drift over such a long period? On the one hand we have the adage, 'if it is not broken, don't fix it.' Apparently the available tools served the needs of the communities adequately. On the other hand, there is the problem of the telephone game – when a message is whispered from one person and then to another and another, the message gradually changes. How were the practices kept so constant over so many generations and widely distributed communities? On the third hand, we do know that when subsequent modifications were eventually made in tool manufacture they proved an asset to those communities and were themselves maintained. So while the Oldowan and Acheulean tool sets served the needs of their communities, there was room for improvement with practical rewards. Was the long period without change due to the absence of

motivation or of ability? Were there active processes to resist change and promote stability? Lastly, these observations offer a striking contrast to the much more rapid changes in all aspects of the built environment and human tool set over the most recent millennia. We will later consider the question of what the differences are between the change processes of *Homo ergaster* and *Homo sapiens*.

Approximately 500,000 years ago *Homo heidelbergensis* appeared with a brain 25 per cent larger than that of *Homo erectus* and with an arched brow ridge and brain case broadened in the front, sides and back to make a skull more similar in shape to that of *Homo sapiens*. *Homo heidelbergensis* further refined tool manufacture by introducing three-dimensional symmetry, finer chipping, and possibly wood or bone instruments in tool making. Multiple anatomic intermediates appeared during the next 300,000 years and fill the remaining evolutionary space between *Heidelbergensis* and *Homo neanderthalensis* and *Homo sapiens*, the two species that were to make much greater changes in tool production and initiate the radical human alteration of the environment. There is accumulating evidence that during the last 100,000 years of this period, from approximately 300,000 to 200,000 years ago, there were multiple hominid species and multiple communities of each in Africa, with increasingly stylization of tool sets from community to community.⁵⁵ With the possible notable exception of the projectile technologies that emerged sometime between 300,000 and 100,000 years ago,⁵⁶ however, variation and change were of limited extent. Prior to *Homo neanderthalensis* and *Homo sapiens*, then, we see anatomic changes including increase in brain size and development of a more modern brain shape with limited change in material culture or human alteration of the environment.

Homo neanderthalensis, originating in Africa and populating Europe, East Asia, and the Middle East 300,000 to 350,000 years ago until approximately 35,000 to 40,000 years ago, introduced new methods of tool production, a wider variety of tools, cared for their sick, buried their dead, collected earth pigments, and left an abundance of hearths suggesting regular use and control over fire. Tool production was more standardized in the details and was a multistep process that first prepared a base form that was then split or sliced to yield multiple nearly identical blades. The base forms were differentiated to produce different types of blades, and individual blades from the same base were further refined and differentiated for specific uses. Tools included scrapers thought to be used to prepare animal skins to be worn as clothing. Here then is evidence of a more significant change in the relationship between a hominid and its environment. The wide tool set implied a general view that the environment can be altered and increased the time and variety of ways in which individuals acted on the environment in a manner that would not have been possible without the tools they created. Greater variety itself in the available tools instantiated the concept of

⁵⁴ Ibid.

⁵⁵ S. McBrearty, 'Down with the revolution.'

⁵⁶ A.S. Brooks, J.E. Yellen, L. Nevell and G. Hartman, 'Projectile technologies of the African MSA: Implications for modern human origins,' in **Transitions Before THE Transition: Evolution and Stability in the Middle Paleolithic and Middle Stone Age**, ed. E. Hovers and S.L. Kuhn (New York: Springer, 2005).

change and innovation. Better weapons turned predators into prey. Fire turned night into day, cold into warm and raw food into cooked. Caring for the sick changed the social landscape and burying the dead further differentiated sections of the physical environment. Clothing changed the way individuals felt and acted in the face of environmental forces, perhaps creating a more active stance in relation to natural forces than hitherto possible. Earth pigments and clothes also changed the way individuals looked to one another and may have contributed to a sense of self.

Homo sapiens or anatomically modern humans appeared in Africa almost 200,000 years ago and apparently expanded to Europe as early as 90,000 years ago. Fossil remains from the earlier parts of this time span are limited, but archeological discoveries in the last decade indicate the existence of multiple independent *Homo sapiens* communities in which the sophistication of tool use moved beyond that of their hominid predecessors but varied bidirectionally over time and location.⁵⁷ It is unlikely that such variation among communities of *Homo sapiens* was related to genetic mutation and change in innate characteristics of brain or mind. In the Late Stone Age or Upper Paleolithic Period beginning approximately 50,000 years ago, change in technology and material culture more broadly accelerated. Upper Paleolithic sites reveal a greatly expanded tool set including bone, ivory and shell tools, fish hooks, and needles for tailoring clothes. Fire was used to alter the property of stones used for tools and to heat solidly constructed houses. Burial was ritualized and there was rich evidence of painting and sculpture. The Chauvet cave in France has 31,000-year-old wall paintings deemed beautiful and sophisticated by today's standards, an even earlier site in Germany yielded a 12-inch-tall figure with a human body and lion's head sculpted from ivory, and a 29,000-year-old site in Russia yielded 13,000 beads placed with the bodies of an adult and two children, with each bead estimated by modern simulations to have taken one to two hours to make. In contrast with previous periods and species, the material culture of *Homo sapiens* quickly evolved into much more distinct subcultures in different parts of Europe with distinctive regional styles. Here then is a qualitatively as well as quantitatively different relationship between a hominid species and the environment.

Homo neanderthalensis had a shorter, stouter body, heavier brow ridge, smaller chin, more sloping forehead, heavier bones, and larger brain than *Homo sapiens*. DNA studies indicate that the two species last had a common ancestor 500,000 to 700,000 years ago. They were contemporaneous products of two long divergent hominid lines. They each developed material cultures substantially more complex than the hominids that preceded them, but whatever biological changes may have supported these new behaviors were necessarily independently developed in the two species. The two species do, however, have one other important thing in

common in addition to their large brains. The upright posture of hominids is associated with a narrowing of the hips and, as a result, of the birth canal. This narrowing limits the maximum size of the head and brain of offspring. Both *Homo neanderthalensis* and *Homo sapiens* are able to have larger heads and brains than earlier bipedal hominids because brain growth continued in both after birth. Paleontologists have noted this and pointed out the associated biological cost of additional parental care required for offspring with still growing and less developed brains. As Klein and Edgar explain: 'The benefits of a larger brain are obvious, but there are also costs ... large brains and the constraints imposed on the birth canal by bipedalism vastly complicate birthing. A survey of other mammals suggests that ... the human gestation period should be perhaps three months longer. Restricting it to nine months increases the likelihood the fetus will make it out, but it also means that newborn human infants are more helpless than those of apes and other mammal species, and this imposes a further cost, mostly on mothers.'⁵⁸ They conclude that the benefits of a larger brain outweigh the costs of the relatively premature births. A more recent review reiterates this point: 'Our point of departure is the juxtaposition of developmental costs and adult benefits of encephalization. The evolution of a large brain size could entail delayed maturity to meet the needs of growing a brain. Likewise, it could bring about certain benefits, such as decreased mortality or increased reproductive rates among adults. Any organism could reap these benefits, provided they outweigh the development costs.'⁵⁹

What we now know about neuroplasticity and the importance of postnatal environmental shaping of the human brain structure and function casts this in a very different light; what has been widely understood as a cost of the narrowed birth canal is actually one of the factors that most powerfully propels the evolution of culture! Exposing the still maturing brain to environmental influences, including innate and environmentally induced variations in maternal behavior as described earlier in the paper, are a powerful force in cultural evolution of tool sets in the broadest sense.

The effort to understand the processes that have led to the increase in material culture and the prominence of the built environment is aided further by several additional paleontological and archeological observations. Some *Homo neanderthalensis* groups living in proximity to groups of *Homo sapiens* adopted a substantial number of Upper Pleistocene tools that had been developed by *Homo sapiens*. Features of *Homo neanderthalensis* that allowed them to make substantial advances in production of material culture limited their ability to make many of the advances made by *Homo sapiens*, but allowed them to copy and make use of advances made by *Homo sapiens* that they were not themselves able to make. This makes it clear that biological features necessary for the creation of aspects of material culture are not necessary for their use and even reproduction once they exist. On the other hand, there were anatomically modern hominids that looked the same as

⁵⁷ S. McBrearty, 'Down with the revolution.'

⁵⁸ Klein and Edgar, *The Dawn of Human Culture*, 145.

⁵⁹ N.L. Barrickman, M.L. Bastian, K. Isler and C.P. van Schaik, 'Life history costs and benefits of encephalization: A comparative test using data from long-term studies of primates in the wild,' *Journal of Human Evolution* 54 (2008): 568-590.

Homo sapiens in all aspects preserved in the fossil record, but that did not develop or copy and use the new tool sets of the Upper Paleolithic. This point is even more dramatically made by the existence of 'stone age' cultures of contemporary humans with the same genes carried out of Africa and shared by all *Homo sapiens*. This makes it clear that biological changes are not sufficient for the advances in material culture and the built environment.

Several environmental factors have been suggested to be instrumental in the punctuated moments of rapid change in the material culture. One is marked climate change. The interaction with biology in this case would be motivational, as captured in the adage 'necessity is the mother of invention.' Kline and Edgar find little support for this idea in the archeological record, pointing out both that periods of marked change do not seem to be accompanied by major changes in the natural environment and that documented periods of major change in the natural environment were not associated with changes in material culture or production techniques. So while such necessities may have been important in historically more recent inventions, and in innovations that enabled *Homo sapiens* to spread into climate zones too harsh for *Homo neanderthalensis*, these innovations are examples of a capacity already in place and operative rather than indicating factors responsible for the capability itself. It has also been suggested that hunting and gathering successes by early communities of *Homo neanderthalensis* and *Homo sapiens* depleted populations of easily killed and harvested game and thus created incentive for later communities to develop more advanced technologies with which to hunt more elusive and more dangerous prey.⁶⁰ This would constitute a significant change in the environment created by older generations (albeit many generations over thousands of years) that becomes a feature of rearing environments for the subsequent generations. Such a change would have a host of progressive effects on the culture, minds, and brains of subsequent generations.

Increasing population, increasing population density, and changing patterns of group life and social interaction have all also been suggested as environmental contributors to accelerated change in material culture. Although mechanisms of these putative influences have not been very fully elucidated, here also it is potentially valuable to approach them with knowledge of the roles of postnatal neuroplasticity and brain-environment interactions in the development of human children today. Most simply, increasing population density and larger groups of individuals interacting for longer periods of time, as has been suggested to have resulted from the use of communal hearths for warmth and cooking, would expose developing children to a larger variety of social sensory input. This could increase variation of brain functional organization in the population as a whole. More fine-grained models of the relationships among the number of different individuals with whom a young child interacts, and parameter settings of the forces of change and stability arising from the changes in neuroplasticity and

individual-environmental interactions across the lifespan described earlier in the paper, may shed more light on these processes. Population budding, the means by which *Homo sapiens* has thought to have expanded its geographic range, is also of relevance. Those who left an established community to form a new one may have been individuals on average with greater plasticity and later brain maturation. Moreover, relatively few older individuals may have been in the group, giving the younger adults freer rein in creating new features of their built environment. Cultural evolution may thus have been facilitated by the intracommunal dynamics of budding, resulting in greater innovation in new communities, and perhaps greater innovation the greater the distance of the community from the original community.

Differences between *Homo neanderthalensis* and *Homo sapiens* in the rate and extent of growth of the built environment may in part be due to differences between the two species in population density and plasticity and stability parameter settings. Postnatal brain development is fundamental to contemporary human capability, and as indicated above this seems to have been a feature of both *Homo neanderthalensis* and early *Homo sapiens*. It is possible that a longer period of high postnatal plasticity in *Homo sapiens* may have interacted with the larger community size to produce faster and greater cultural evolution than in Neanderthal communities. This hypothesis is consistent with the broader pelvis of Neanderthals that could allow the birth of more mature offspring. More direct support is provided by analysis of fossil teeth showing faster postnatal maturation of *Homo neanderthalensis* than *Homo sapiens*.⁶¹ Although evidence on this particular point is still being collected and analyzed and conclusion must be reserved, it is true that in contemporary primate species the rate of dental development is associated with other markers of biological development such as weaning and age of first reproduction.

But all these hominid alterations of the environment are small in comparison with the changes that took place with the rise of agriculture and animal husbandry approximately 10,000 years ago. Here again many processes are at play, including further increase in population density, increased leisure, role specialization and increasingly complex social organization. In many ways, however, the most fundamental change was in the relationship between people and the physical environment. Human actions for the first time directly changed the major features of the environment with which they interacted – the earth itself, the plants that grew upon it, and the animals that lived on it. Some farming communities moved every three or four years as fertility decreased in the land they tilled. Others, however, farmed in river valleys where the fertility of the land was renewed by soil nutrients carried by the river. In these communities, people developed a close physical relationship with a particular physical area, often changing the course of water flow and creating fields where there had been none.⁶² Large and stable communities developed, changes in

60 S. McBrearty, 'Down with the revolution.'

61 T.M. Smith, K. Harvati, A.J. Olejniczak, D.J. Reid, J. Hublin and E. Panagopoulou, 'Brief Communication: Dental Development and Enamel Thickness in the Lakonis Neanderthal Molar,' *American Journal of Physical Anthropology* 138 (2009): 112-118.

62 V.G. Childe, *Man Makes Himself* (Nottingham: Spokesman, 2003 [1936]).

the built environment and material culture were greater than elsewhere, and 'urban' spaces were built that regulated human interactions and themselves became the predominate features of the environment.⁶³ Writing and other powerful symbolic systems were developed that were external records of temporary and more lasting internal states, extended human memory more generally broke down the barrier between internal and external, and allowed manipulations of internal states by manipulations of humanly created external manifestations of those states, both individually and collectively. It is in these communities and processes that modern civilization was born.

The nature and significance of this physical relationship of the community to 'mother' earth herself is a striking parallel to the nature and significance of the physical relationship between mammalian offspring and their mothers as elucidated in the experimental work of Harlow, Mears and Meaney described earlier. Nursing of offspring was the basis of the name of the class mammalian, and its significance was initially seen as the necessary provision of food to infants that could not hunt or gather it themselves. The necessary and extended physical proximity of mother and infant created an opportunity for the mother to provide sensory stimulation that shaped the brains of the developing offspring. What may have first begun in evolutionary history as a physical relationship to provide nutrition to the growing body, and what was first understood in those terms by scientists, is now understood as the basis for providing sensory stimulation to nurture and shape a growing brain. In a parallel fashion, agriculture may have first developed as a way of more reliably and plentifully providing physical nurturance, and was first understood by scientists in this way. It came to ensure, however, a physical relationship between a community and the environment that allowed changes in the built environment to more and more powerfully shape the structure and function of the growing human brain.

Summary and Conclusions Functional properties of individual neurons in the human brain differ little from those of individual neurons in the brains of other primates. The large differences in function between the human brain and other primate brains result instead from the increased number of cells and interconnections among them, the extended period after birth during which the brain is highly susceptible to shaping by environmentally induced neuronal activity, and the fact that humans alone alter the environment that produces the neuronal activity that shapes the brains of their offspring. Together these factors constitute neuroplasticity and cultural evolution. Cultural evolution produces changes in human capabilities, desires and expectations much more rapidly and through very different mechanisms than does Darwinian biological evolution. It is a cross-generational and social process that shapes individual actions, and these actions then in turn contribute to the social and cross-generational influences that shape other individuals. Hominid alteration of the environment began two

million years ago. Alterations were very limited and highly conserved for hundreds of thousands of years, but noticeably greater in some periods and places than others. Over the past 40,000 or so years there has been a dramatic acceleration in human alterations of the environment and today most children are raised in predominantly human-made environments. Considering new research on neurodevelopment of modern human beings and the archeological record of hominid development together provides new perspectives on each.

Deleuze and Wexler: Thinking Brain, Body, and Affect in Social Context

John Protevi

Introduction The cognitive and affective sciences have benefitted in the last 20 years from a rethinking of the long-dominant computer model of the mind espoused by the standard approaches of computationalism and connectionism. The development of this alternative, often named the ‘embodied mind’ approach or the ‘4EA’ approach (embodied, embedded, enactive, extended, affective), has relied on a trio of classical twentieth-century phenomenologists for its philosophical framework: Husserl, Heidegger, and Merleau-Ponty.¹ In this essay I propose that the French thinker Gilles Deleuze can provide the conceptual framework that will enable us to thematize some unstated presuppositions of the 4EA School, as well as to sharpen, extend and/or radicalize some of their explicit presuppositions. I highlight three areas here: 1) an ontology of distributed and differential systems, using Deleuze’s notion of the virtual; 2) a thought of multiple subjectification practices rather than a thought of ‘the’ subject, even if it is seen as embodied and embedded; and 3) a rethinking of the notion of affect in order to thematize a notion of ‘political affect.’² I will develop this proposal with reference to Bruce Wexler’s *Brain and Culture*,³ a work that resonates superbly with the Deleuzean approach.

The standard approaches use a computer model for the brain-mind connection: brains, like computers, are physical symbol systems, and minds are the ‘software’ run on those computers. The difference is in the respective computer architectures. Computationalism sees cognition as the rule-bound manipulation of discrete symbols in a serial or Von Neumann architecture, which passes through a CPU (central processing unit). Connectionism, the second standard approach, is based upon another computer model, but it has a different, allegedly more biologically realistic architecture: parallel distributed processing. In connectionism’s ‘neural nets,’ learning is a change in network properties; that is, in the strength and number of connections.

The 4EA approach, although it agrees with connectionism that a model of the mind must have a realistic chance of being instantiated in brains like ours – a distributed neural architecture whereby neurodynamical processes are seen as integration or resolution of distributed/differential neural systems⁴ – differs from both computer models by defining cognition as the direction of action of an organism in its environment, rather than as a kind of information processing. Hence

¹ Hubert Dreyfus’s **What Computers Can’t Do** (Cambridge, MA: MIT Press, 1972; revised and reissued as **What Computers Still Can’t Do** in 1992) influenced the embodied mind school with its critique of computationalism and connectionism. Technically speaking, however, Dreyfus’s approach is better called Heideggerian than belonging to the embodied mind school. That is to say, he rejects the notion of ‘mind’ entirely, so that it being embodied is not an advance for him. The major works of the embodied mind school proper are: Francisco Varela, Evan Thompson and Eleanor Rosch, **The Embodied Mind** (Cambridge, MA: MIT Press, 1991); Andy Clark, **Being There** (Cambridge, MA: MIT Press, 1997); Shaun Gallagher, **How the Body Shapes the Mind** (New York: Oxford University Press, 2004); Alva Noë, **Action in Perception** (Cambridge, MA: MIT Press, 2005); Michael Wheeler, **Reconstructing the Cognitive World** (Cambridge, MA: MIT Press, 2005); and Evan Thompson, **Mind in Life** (Cambridge, MA: Harvard University Press, 2007).

² I develop these themes at length in John Protevi, **Political Affect: Connecting the Social and the Somatic** (Minneapolis: University of Minnesota Press, 2009).

³ Bruce Wexler, **Brain and Culture: Neurobiology, Ideology, and Social Change** (Cambridge, MA: MIT Press, 2006).

⁴ Ibid., 21.

one key difference is that the 4EA approach breaks with any unidirectional information processing model in which cognition is the middle slice in what Susan Hurley called the 'classical sandwich': sensory input/processing of representations/motor output.⁵ Similarly, the 4EA School rethinks the allegedly central role in cognition of 'representation,' in which a model of the world is built up inside the cognitive agent. Rather, adopting Rodney Brooks' slogan that 'the world is its own best model,' the 4EA thinkers will restrict representation to a few 'offline' problems, and see the vast majority of cognition as real-time interaction of a distributed and differential system composed of brain, body, and world.⁶

In sum, then, the 4EA School sees cognition as the direction of organismic action via the integration/resolution of differential fields immanent to extended/distributed/differential neuro-somatic-environmental systems.

An Ontology of Distributed/Differential Systems I claim that Deleuze's ontology can help us think the being of distributed and differential systems, as in, for example, the brain-body-world system of 4EA cognition; it also helps us think individuation in such systems as the integration of that distributed and differential system. A brief sketch of Deleuze's ontology follows; we will then show what I will call the 'radical relationality' of Wexler's work as resonant with Deleuze's outlook.

In *Difference and Repetition*,⁷ we find a tripartite ontological scheme, positing three interdependent registers: the virtual, intensive, and actual. Deleuze's basic notion is that in all realms of being intensive morphogenetic processes follow differential virtual multiplicities to produce localized and individuated actual substances with extensive properties and differentiated qualities. Simply put, the actualization of the virtual, that is, the production of the things of the world, proceeds by way of intensive processes. In a fuller picture of Deleuze's ontology, we see that the virtual field is composed of Ideas or multiplicities, which are sets of differential elements, differential relations, and singularities; what are related are precisely the intensive processes, thought in their abstraction as linked rates of change. Beneath the actual (any one state of a system), we find 'impersonal individuations' that produce system states and beneath these we find 'pre-individual singularities' (that is, the key elements in virtual fields, marking system thresholds that structure the intensive morphogenetic processes). We thus have to distinguish the intense 'impersonal' field of individuation and its processes from the virtual 'pre-individual' field of differential relations and singularities.

The abstraction of Deleuze's scheme is its strength, as an example will show. Deleuze himself often used Gilbert Simondon's theory of individuation as a very simple model for 'actualization.' For Simondon, crystallization is a paradigm of individuation: a supersaturated solution is 'metastable'; from that pre-individuated field, replete with gradients of density that are only implicit 'forms' or 'potential functions,' individual crystals precipitate out.⁸ The crucial difference is that crys-

tals form in homogenous solutions, while the Deleuzian virtual is composed of 'Ideas' or 'multiplicities' involving differential relations among heterogeneous components. These components are processes linked in such a way that their rates of change are connected with each other. A simple example is hurricane formation, where it is intuitively clear that there is no central command, but a self-organization of multiple processes of air and water movement propelled by temperature and pressure differences. All hurricanes form when intensive processes of wind and ocean currents reach singular points. These singular points, however, are not unique to any one hurricane, but are virtual in each actual hurricane, just as the boiling point of water is virtual in each actual pot of tea on the stove.

Deleuze's ontology has been proposed as compatible with and explanatory of the mode of being on distributed and differential systems, such as they are studied in dynamical systems theory.⁹ Dynamical systems theory shows the topological features of manifolds (the distribution of singularities) affecting a series of trajectories in a phase space. It thereby reveals the patterns (shown by attractors in the models), thresholds (bifurcators in the models), and the necessary intensity of triggers (events that move systems to a threshold activating a pattern) of material systems at many different spatial-organizational and temporal-processual scales. Dynamical systems theory enables us to think material systems in terms of their powers of immanent self-organization and creative transformation. Dynamical systems methods are widespread in neurodynamics, showing the brain as generating wave patterns out of a chaotic background.¹⁰ During any one living act (perception, imagination, memory, action) the brain functions via the 'collapse of chaos,' that is, the formation of a 'resonant cell assembly' or coherent wave pattern.¹¹

Making the link with Deleuze, we can see the embodied and embedded nervous system as a pre-individual virtual field: 1) a set of differential elements (reciprocally determined functions – in other words, neural function is networked: there is no such thing as the function of 'a' neuron;

⁵ Susan Hurley, *Consciousness in Action* (Cambridge, MA: Harvard University Press, 1998), 21.

⁶ See Wheeler, *Reconstructing the Cognitive World* for a treatment of 'action-oriented' representation. A radical anti-representationalist approach is found in Anthony Chemero, *Radical Embodied Cognitive Science* (Cambridge, MA: MIT Press, 2009).

⁷ Gilles Deleuze, *Difference and Repetition*, translated by Paul Patton (New York: Columbia University Press, 1994).

⁸ Gilbert Simondon, *L'individu et sa genèse physico-biologique* (Grenoble: Editions Jérôme Million, 1995).

⁹ The key works here are Brian Massumi, *A User's Guide to Capitalism and Schizophrenia: Deviations from Deleuze and Guattari* (Cambridge, MA: MIT Press, 1992), and Manuel DeLanda, *Intensive Science and Virtual Philosophy* (London: Continuum, 2002). See also Mark Bonta and John Protevi, *Deleuze and Geophilosophy* (Edinburgh: Edinburgh University Press, 2004).

¹⁰ J.A. Scott Kelso, *Dynamic Patterns: The Self-Organization of Brain and Behavior* (Cambridge, MA: MIT Press, 1995). See also, Francisco J. Varela, 'Resonant Cell Assemblies: A new approach to cognitive functions and neuronal synchrony,' *Biological Research* 28 (1995): 81-95.

¹¹ Francisco J. Varela, F.J. Lachaux, J.-P. Rodriguez and J. Martinerie, 'The Brainweb: Phase Synchronization and Large-Scale Integration,' *Nature Reviews: Neuroscience* 2: 229-239 (2001).

some argue the same for higher level cognitive processes, that is, that they emerge from global brain activity and hence cannot be understood in isolation); 2) with differential relations (linked rates of change of firing patterns); 3) marked by singularities (as critical points determining turning points between firing patterns). The dynamics of the system as it unrolls in time are intensive processes or impersonal individuations, as attractor layouts coalesce and disappear as singular thresholds are passed. Learning, then, is the development of a repertoire of virtual firing patterns as they relate to bodily interactions with the world. Any one decision is an actualization, a selection from the virtual repertoire, that is, the coalescing of a singular firing pattern; this is modeled by the fall into a particular basin of attraction from the attractor layout 'proposed' by system dynamics.

I will illustrate the resonance of Deleuze's work with that of the 4EA cognition school by reference to Wexler's *Brain and Culture*. First, an overview of Wexler's book. Wexler makes a series of interconnected points: our sociality and our brain structure/function have co-evolved, such that humans have evolved for a long period (though young adulthood) of intense socially mediated neuroplasticity.¹² In fact, the most socially sensitive plastic parts of the human brain are precisely the ones whose proportions relative to other brain structures distinguish humans compared to other primates (for example, frontal and parietal lobes, involved in decision making, impulse control, etcetera).¹³ However, this neuroplasticity is relatively reduced in adulthood. In a formula, children need sensorimotor and social stimulation to form neuropsychological structures, while adults look to shape their world in accordance with previously formed structures; these are linked and mutually reinforcing in that different cultures have different characteristic sensorimotor and social interaction patterns (for instance the 'comfort zone' for conversations – how close people stand to each other while talking – varies across cultures). It is important to emphasize that both children and adults work in a system of structuring structures: input produces a structure that shapes further input; once activated, these structuring structures are reinforced since consonance of input and structure produces pleasure and dissonance produces pain.¹⁴ The 'structuring structure' scheme is clear here in Wexler's summary of studies of prejudice: 'First, since these internal structures select and value sensory input that is consistent with them, they create an exaggerated sense of agreement between the internal and external worlds. Second, since internal structures shape perceptual experience to be consistent with the structures themselves, they limit further alteration of brain structure by environmental input.'¹⁵ The difference is that adults – or at least some adults, those in favored social positions – can act on the world according to this principle (or at least subconsciously select input conforming to previous structures), while children's actions in this regard are largely limited to adapting to what is the case.¹⁶ However, due to the complexity and change of current cultural conditions, what is the case for children often differs considerably from the experiential structures of adults.¹⁷ This difference in neuroplasticity and

experiential structures sheds light on generational conflict, bereavement and immigrant experience, and social conflict in multicultural situations.¹⁸

Turning from this summary of his points, we see that Wexler's opening chapter, a primer on neuroscience, shows the resonance with Deleuze clearly. Wexler emphasizes that higher-level cognitive function (thinking as well as sensorimotor perception/action) is an emergent process that occurs as the result of the integration of firing patterns in multiple brain structures; it cannot be located in individual neurons.¹⁹ This neuronal emergence is deepened by Wexler to a position that falls in line with the 4EA School, which locates cognitive functions as those of an organism in its environment, not simply as the result of brain activity alone. The following passage clearly shows Wexler's neuro-environmental emergentism: 'The specific patterns of all the intricate connections among neurons that constitute these functional systems are determined by sensory stimulation and other aspects of environmentally induced neural activity.'²⁰ Here it is clear that cognition is emergent not simply from multiple brain systems, but from a differentiated system in which brain, body, and world are linked in interactive loops. Indeed, the whole thrust of Wexler's position serves to 'minimize the boundary between the brain and its sensory environment, and establish a view of human beings as inextricably linked to their worlds by nearly incessant multimodal processing of sensory information.'²¹

Wexler's view of humans as embedded in their (largely social) environments has profound philosophical implications, as it entails that we must defeat any lingering tendencies to conceive of humans as individuated substances endowed with properties; human beings are individuated as singular patterns of somatic and social interactions. Character is not a set of properties of a substance but the tendency to partake in a pattern of social interaction. We can see the connection with Deleuze if we reformulate his ontology as what we can call an 'interactive process' ontology. From this perspective, it is the interaction of intensive individuation processes that forms the contours of the virtual field. At bottom, the actual as substance is an illusion; it is really just a process that is slow enough relative to our sensory processes that it makes practical sense to treat it as a substance.

If that is the case, then we human beings are not substances but processes, and those processes are not individuated by properties but as singular patterns of social, neural and somatic interaction. The embodied and the embedded aspects of our being intersect – we are bodies whose capacities form in social interaction. 'Singular patterns of social and somatic interaction' means that we are what we can do with others – our embodied capacities, which develop in the history of the social interactions we have had up to the present, intersect with the similarly constituted embodied

¹² Wexler, *Brain and Culture: Neurobiology, Ideology, and Social Change*, 16, 142.

¹³ Ibid., 31, 105.

¹⁴ Ibid., 155.

¹⁵ Ibid.

¹⁶ Ibid., 182.

¹⁷ Ibid., 6, 142.

¹⁸ Ibid., 144.

¹⁹ Ibid., 22.

²⁰ Ibid.

²¹ Ibid., 9.

capacities of the others we now encounter. The creative potential of these encounters is such that we do not know who we are, we do not know what human nature is, until we experiment with what we can do with others. This is not to endorse a naïve and outmoded social constructivism; but if plasticity is our nature, as Wexler argues, then that nature is certainly more open than programmed, or perhaps better it is programmed to be open – within limits and with certain universal patterns.

Let us continue. Wexler's treatment of human studies in his chapter on the effects of the social environment on experience-mediated neural structures stresses the mother-infant dyad.²² He is careful, and we have to be careful too, to avoid any 'fusion' images, which distorts individuation by seeing it as separation from a prior fusion, with all the anxiety about engulfment that entails. The dyad is a patterned interactive process, with the caregiver providing a scaffold, a supplement, which provides structure just beyond what the infant is capable of at any one moment, and within which the infant can develop its capacities for self-regulation.²³ In this way, self-regulation shifts from the parent-regulated dyad to the developing infant.²⁴ Wexler uses the term 'internalization' but we must recognize that this is not the internalization of external structure by a formless infant; rather, the infant has some capacity for self-identification, some crude and vague but active body schema or else it could not *relate* to others.²⁵ The important thing to keep in mind is that the structure the caregivers provide is a pattern of interaction; the infant does not internalize the properties of an independent substance. We come back to this formula: we are patterns of interaction. That is our being. We are not independent substances which 'relate' to other substances. Wexler writes in a key passage: 'the relationship between the individual and the environment is so extensive that it almost overstates the distinction between the two to speak of a relation at all.'²⁶

This is what I will call Wexler's 'radical relationality.' A formula to capture this position might be: 'relations' are primary, and the relata are only nodes of multiple relations. Radical relationality means that being human is composed of relations; we do not 'have' relations, but we are relations all the way down. Over time, we are the patterns of the processes of forming and reforming of relations. In light of his radical relationality, Wexler will imply that substantiality is an illusion: 'individuals often have an exaggerated sense of the independence of their thought processes from environmental input.'²⁷ This exaggerated sense of independence happens because of a substantializing illusion: "Thus, as we develop into unique individuals as a result of both our unique cumulative interactions with the environment and our unique hereditary characteristics, our uniqueness seems a property of us."²⁸ But that 'seeming' to possess 'properties' is an illusion, or better, the result of a bad ontology: we are not substances with properties, but singular patterns of interaction, singular ways of integrating and differentiating a multidimensional differential social-somatic field. This does not deny individuality, but sees it as an ongoing,

self-modulating process of individuation that is always in touch with a 'metastable' differential field.²⁹

Wexler's radical relationality comes out in his refreshingly open-minded discussion of psychoanalysis, in which he distinguishes an individualist and 'drive'-oriented theory from an interactional one.³⁰ The process of development via structuring structure is one of the main modes of our relationality. What must always be kept in mind to appreciate Wexler's radical relationality is that the target of 'internalization' is never the properties of a separate substance but the 'interpersonal or even multiperson processes that had not previously existed in any particular individual. That is, the qualities of the developing individual arise from interactive combinations of processes based on several individuals.'³¹ Radical relationality thus entails emergent inter-individuality, a notion we will see again in the discussion of affect. The important thing to focus upon here in relating Wexler's radical relationality and Deleuze's interactive process ontology is the notion of individuation as the process of singularizing a pattern of interactional processes. Individuation is the creation of a pattern by which one navigates, by differentiation and integration, a multidimensional differential social field. As Wexler puts it in another of his radically relational passages: 'What was first external and *interpersonal* becomes internal structure. Adolescence and young adulthood are occupied with the dual tasks of *integrating* internal structures derived from *multiple sources* into a functionally coherent whole and articulating a personal ideology that leads to a *niche in the general social matrix* that is consistent with the internal structures.'³² To repeat the key point: the goal of development is to incorporate a novel pattern of interaction, 'multiperson processes that had not previously existed in any particular individual.'³³ Wexler puts it like this: human development is a matter of 'the early shaping of the infant and child's psyche by the human-influenced environment, with the unique mixing of qualities from different adults and the internalization of historically influenced

²² Ibid., 2, 96-100.

²³ Ibid., 109.

²⁴ Ibid., 105.

²⁵ Gallagher, **How the Body Shapes the Mind**, 69-72, provides an excellent analysis of numerous studies on infant face recognition which can only be made sense of on the presupposition of a 'body schema.'

²⁶ Wexler, **Brain and Culture: Neurobiology, Ideology, and Social Change**, 39.

²⁷ Ibid., 39. I am aware that radical relationality seems to conflict with the 'object-oriented ontology' of Graham Harman and Levi Bryant, but I will have to defer a full discussion for the time being. As a placeholder, let me say that the singularity of individuated patterns allows a 'reserve' of plasticity such that the being of processes is not exhausted by their current relations. Relations go all the way down, but there is always room for new relations to form. Borrowing from biology, we can say that there is always a pool of 'unexpressed' or potential relations inherent in any one singular pattern of interaction. But these unexpressed relations are virtual, that is, only accessible ex post facto, looking back from the unrolling of intensive individuation processes.

²⁸ Ibid., 40.

²⁹ The term 'metastable' comes to Deleuze from Simondon, but its independent use in Kelso, **Dynamic Patterns**, provides evidence that Deleuze's ontology can inform our readings of dynamic systems research, and in particular, neurodynamics.

³⁰ Wexler, **Brain and Culture: Neurobiology, Ideology, and Social Change**, 123.

³¹ Ibid., 125-126.

³² Ibid., 136-137; emphases added.

³³ Ibid., 125.

interpersonal processes.³⁴ The crux of Wexler's book is this creative novelty produced by radical relationality, which in its synchronic emergence allows cultural variability and in its diachronic, dynamic aspect sets up generational interchange.

Population Thinking: The Multiplicity of Bodies Politic

Cognitive science, even that of thinkers allied with the 4EA approach, is still beholden to two unexamined presuppositions: first, that the unit of analysis is an abstract subject, 'the' subject, one that is supposedly not marked in its development by social practices, such as gendering, that influence affective cognition, and second, that culture is a repository of positive, problem-solving aids that enable 'the' subject. So the second way to use Deleuze to expand and deepen the 4EA School is to turn to population thinking to describe the development and distribution of cognitively and affectively important traits in a population as a remedy to this abstract adult subject.

To make the connection with Wexler, we note that Chapter 4, 'Self-Preservation and the Difficulty of Change in Adulthood,' is the turning point of his book. Wexler first discussed socially mediated neuroplasticity in infancy, childhood, and adolescence so that individuation is a process of singularizing a pattern of social interaction. He now turns to discuss adult processes that seek to conserve mature patterns by selective attention to, or active shaping of, the world. The first adult process alters the perception of the existing world, that is, it works on the present from the perspective of the past. The second changes the world to 'increase the likelihood that subsequent events will be consistent with pre-existing internal structures,'³⁵ that is, it works on the present to make the future conform to the past. Wexler puts the transition from childhood to adulthood as a change in the relation of learning and power of action: 'We learn the most when we are unable to act. By the time we are able to act on the world, our ability to learn has dramatically decreased.'³⁶

Wexler's take on our genetic endowment as the capacity for experientially mediated neuroplasticity resonates well with a school of biological thought, Developmental Systems Theory (DST), which also resonates with Deleuze. The DST thinkers demand that we think about the social environment in which capacities develop.³⁷ Most of our capacities are not genetically determined; genes are a developmental resource, but there are other resources, intra-organismic and extra-somatic, (for example, recurrent social practices), that need to be taken into account. And once we are in the social realm, the cat is out of the bag. There can no longer be an abstract subject, but populations of subjects, with varying distributions of capacities. And the practices that produce these capacities can be analyzed with political categories. Following Deleuze's bio-political orientation, we can call the socially embedded person the 'body politic.'

The relationality of bodies politic is shown when we consider that access to

training in affective and cognitive coping skills, and hence the development of those skills, is differentially distributed with regard to the categories of masculine and feminine. Feminized and masculinized bodies politic have different 'spheres of competence': a flat tire can appear as a mildly irritating challenge or as an insurmountable problem; a subway entrance as the enticing gateway to the city or as an anxiety-producing danger. Iris Marion Young's 'Throwing Like A Girl' is the classic piece in discussing the restricted body competence of the feminized body-subject.³⁸ Young's critique is aimed at Merleau-Ponty, in which the assured competence of the presumably neutral or non-gendered body subject hides a masculinist presupposition.³⁹

But this is still too simple. It does no good to replace a single abstract subject, 'the' body politic, with two abstractions, 'the' feminized and 'the' masculinized body politic. We need to think in terms of a range of gendering practices that are distributed in a society at various sites (family, school, church, media, playground, sports field ...) with variable goals, intensities, and efficacies. These multiply-situated gendering practices resonate or clash with each other and with myriad other socializing practices (racializing, 'class-ing,' 'religionizing,' 'nationalizing,' 'neighborhoodizing' ['that's the way we roll'] ...). In other words, we have to think a complex virtual field of these differential practices, a complex phase space for the production of bodies politic, with shifting attractor layouts as the subjectification practices – intensive morphogenetic or individuating processes, to use Deleuze's terminology – clash or resonate with each other.

But even this is still too simple, as these gendering practices also enter into complex feedback relations with the singular body makeup of the people involved; these corporeal constitutions are themselves regionalized slices of the virtual, modeled with a phase space of what that body can do, its own habitual yet variable patterns of attractor layouts. These complex dynamics cannot be analyzed into a relation of independent and dependent variables, no matter how powerful the regression analysis one attempts in order to isolate their effects. There is no one magic element that enables us to find the key to gender or other politically important categories.

Lacking a population perspective on the development of affective cognition capacities, the abstraction of the embodied-embedded school impoverishes its notion of 'cultural scaffolding' by relegating the cultural to a storehouse of heuristic aids for an abstract problem-solver who just happens to be endowed with certain affective cognition capacities qua the ability to interact successfully with the people and cultural resources to which it just happens to have access. But not

³⁴ Ibid., 128.

³⁵ Ibid., 143.

³⁶ Ibid.

³⁷ The key work here is Susan Oyama, *The Ontogeny of Information: Developmental Systems and Evolution* (Durham, NC: Duke University Press, 2000). See also the essays in Susan Oyama, Paul Griffiths and Russell Gray, *Cycles of Contingency* (Cambridge, MA: MIT Press, 2001).

³⁸ Iris Marion Young, *On Female Body Experience: 'Throwing Like a Girl' and Other Essays* (New York: Oxford University Press, 2005).

³⁹ See also, Judith Butler, 'Sexual Ideology and Phenomenological Description: A Feminist Critique of Merleau-Ponty's *Phenomenology of Perception*, in *The Thinking Muse: Feminism and Modern French Philosophy*, eds. Jeffner Allen and Iris Marion Young (Bloomington: Indiana University Press, 1989).

every subjectification practice is empowering. It is not just that sometimes one is denied access to an empowering practice. Some cultural practices positively harm individuals, instilling affective/cognitive traits that help keep them in subservient positions via an ‘internalization’ of a negative self-image and so on. This is not to discount raw coercion, but to call attention to its relative lack of importance in most social situations. As Deleuze says, following Spinoza and Wilhelm Reich, the real social mystery is: ‘Why do men fight for their servitude as stubbornly as though it were their salvation?’⁴⁰ The real bio-cognitive or ‘mind in life’ question has to be the level of selection. Let us say that a certain distribution of capacity X holds in population Y. Why do we think we have had individual-level selection for reproduction of that trait, that is, that each trait is adaptive for each subject? With group selection (in this case, selection for sets of subjectivizing practices that reliably yield a certain distribution of traits), then traits might be passed on that harm some individuals, but benefit the stability of the group in creating a dominant class that benefits from the disabling effects of those traits on the subordinate class.⁴¹

From this perspective, Wexler’s bio-neuro-cultural standpoint would be helped by more emphasis on population variability, in two ways. First, the neuropsychological conservatism Wexler notes in adulthood varies within a population, so that some adults remain in search of novel experiences. Now as Wexler notes, sometimes this novelty is just a variation on familiar themes.⁴² But can we design a culture such that what people are used to is the search for novelty? I admit that you cannot just value novelty for its own sake. You do have to have familiarity and repetition, if only as repose from novelty searching. And, some novel experiences simply shouldn’t be experimented with! So we do need some *normative standard*: we should search for novel ways of empowering people to search for novel means of empowering others. In other words, our challenge is to make empowerment a radiating, horizontal social process. It is not like we are going to run out of such challenges in this quest; there is more than enough injustice to fight; we can let the ones who reach utopia worry about being bored. Thus we can say that some adults seek to ‘conserve’ their inner neuropsychological structure by selecting friends who fight with them against unjust social structures and for positive social change. That is, they ‘conserve,’ in Wexler’s sense, the fight against ‘conservatism’ in the political sense. So what would be pleasant for them is not the conservation of an (unjust) social structure, but the change of that social structure, to which end they seek to conserve the fight against that structure.

Second, attention to population variability is needed to attend to disempowerment right here at home. It is not just immigrants who face disempowering dissonance between internal structures and external world. In any one society there are many native people who occupy ‘subject positions’ that are devalued by the larger culture. Even though it is a great advance to talk about socially-mediated neuroplasticity and the attendant notion of human ontology as the establishment

of patterns of social interaction, we have to talk about populations of subjects, many of whom suffer disempowering subjectification practices. The key here is to propose a level of analysis that would not be merely idiosyncratic, but that produces traits that would be reliably repeated and that would be open to political analysis. This is of course the major problem of feminism, race theory, queer theory, and other such analyses: Where to locate the analysis so that you avoid the Scylla of personal anecdote and the Charybdis of ignoring difference altogether. Can we isolate structured subjectification practices that reliably reproduce populations with gendered and racialized subjects?

Political Affect For our third point, we will develop the notion of ‘political affect.’ As a first approximation, we can say that for Deleuze affect is de-subjectified emotion. Although emotion as a subjective process is the standard understanding, let us follow the thread of radical relationality we have seen in Wexler in his treatment of emotion as ‘an interindividual process that alters the moment-to-moment functional organization and activation patterns of the brain in the individuals who are interacting.’⁴³ To appreciate the full radicality of this notion of emotion as an ‘interindividual process’ we must add that those neural changes have to be thought in relation to the modifications to the emergent functional unit of the couple or group in which the component individuals are interacting. The neural bases of this interindividual process are found in each person’s brain, but the unit we are analyzing is non-subjective, but relational, that is, inter-individual. To emphasize the interindividuality of such non-subjective emotion, Deleuze and Guattari will call it ‘affect.’

We should also note at the outset that this emergent neuro-somatic-social emotional process need not only be equilibrium-seeking; too often any mention of group processes is seen as equilibrium-seeking (negative feedback) as in ‘functionalist’ sociology. Rather, we are all familiar with interpersonal emotions that spin out of control in positive feedback loops (a mob rage, of course, but on the positive side of the ledger, falling in love cannot really be seen as equilibrium-seeking, even if a stable loving couple results, for that ‘stability’ can be a mutually reinforcing dynamic process of empowerment that never settles down to anything we can describe as an ‘equilibrium.’)

In a later discussion of ‘a form of internally driven prejudgment of what is perceived,’⁴⁴ we once again see Wexler’s radical relationality. Wexler cites studies of ‘emotional valence’ assigned to words and images in cross-racial contexts, and concludes ‘such prejudice demonstrates the effect of interpersonal modeling and sociocultural education on internal processes that alter the perception and valuation of stimuli.’⁴⁵ We must be careful not to limit the notion of ‘political affect’ to

⁴⁰ Gilles Deleuze and Félix Guattari, *Anti-Oedipus*, translated by Robert Hurley, Mark Seem, and Helen R. Lane (Minneapolis: University of Minnesota Press, 1977), 29.

⁴¹ For a general introduction to questions of group selection, see Elliott Sober and David Sloan Wilson, *Unto Others: The Evolution and Psychology of Unselfish Behavior* (Cambridge, MA: Harvard University Press, 1998).

⁴² Wexler, *Brain and Culture: Neurobiology, Ideology, and Social Change*, 17.

⁴³ *Ibid.*, 36.

⁴⁴ *Ibid.*, 152.

⁴⁵ *Ibid.*, 154.

that of 'prejudice,' since, as Wexler notes, prejudice is an example of a 'general process,' in which 'beliefs derive directly from sociocultural input, including the internal structures of important adults to whom the individual is exposed during childhood.'⁴⁶ But as we have seen above, the structures of these adults are not substances, but are radically relational in their turn. Adult structures, that is, adult patterns of interaction, are themselves individuations of a distributed and differential social field. The key point bears repeating. We do not internalize the structures of a single, substantial other. Rather, as we have seen, the target of internalization in Wexler's model is 'interpersonal or even multiperson processes that had not previously existed in any particular individual. That is, the qualities of the developing individual arise from interactive combinations of processes based on several individuals.'⁴⁷ Thus, Wexler's radical relationality implies that we are the patterns of the processes of forming and reforming relations.

With this preliminary, let us develop a Deleuzian notion of political affect. First, a negative distinction: although affect is felt, it is not equal to 'subjective feeling.' Rather, it can often precisely be 'de-subjectifying' or 'de-personalizing.' (That is, affect can be the move from the actual to the 'impersonal' intensive.) Just as for Deleuze and Guattari pleasure is the subjective appropriation of joy, subjective feeling is the subjective appropriation of physiological-emotional changes of the body, the recognition that 'I am feeling this way.'⁴⁸ Deleuze and Guattari's point about affect's extension beyond subjective feeling dovetails with extreme cases of rage and panic as triggering an evacuation of the subject as automatic responses take over; drastic episodes of rage and fear are de-subjectivizing. Thus the agent of an action undertaken in a rage or panic state is the embodied 'affect program' acting independently of the subject.⁴⁹ Here we see affect freed from subjective feeling. There can be no complaints about eliminating the 'first person' perspective in studying these episodes of political affect, because there is no 'first person' operative in these cases. Agency and subjectivity are split; affect extends beyond feeling; the body does something, is the agent for an action, in the absence of a subject. This affect and body agency beyond the subject can be key in a concrete problem of state violence. If political sovereignty entails a monopoly on legitimate violence, then the forces of order have to be able to act. But this is less easy than it sounds. So rages and reflexes and quick reactions are (always partial) solutions to this 'problem.'⁵⁰

Second, we have to appreciate the eco-social embeddedness of affect. Affect indicates that living bodies do not negotiate their worlds solely – or even for the most part – by representing the features of the world to themselves, but by feeling what they can and cannot do in a particular situation. Deleuze and Guattari follow Spinoza, defining affect as a body's ability to act and to be acted upon, what it can do and what it can undergo.⁵¹ Affect has two registers, 'passive' and 'active.' In the 'passive' register, it is being affected, that is, undergoing the somatic change

caused by encounter with an object; this aspect of affect can also be called 'affection' as the composition or mixture of bodies, or more precisely the change produced in the affected body by the action of the affecting body in an encounter. In the 'active' register, affect is the felt change in power of the body, the increase or decrease in perfection, felt as sadness or joy. There are multiple possibilities here. The encounter can 1) enhance the power of one of the bodies and decrease that of the other (in eating, or in enslavement), or it can 2) decrease both (in a mutually destructive encounter), or it can 3) increase both (in a mutually empowering encounter, what Deleuze and Guattari call a 'consistent' assemblage).

The primary contact with another being in the world is a feeling of what the encounter of the two bodies would be like; what the assemblage to be formed would be like (the mechanism for this felt imaginal encounter is what Antonio Damasio calls the 'as-if' loop producing a 'somatic marker').⁵² As you move into an assemblage, you are de-personalized or de-territorialized: you form new habits. Now in this de-personalization you have to maintain homeostatic viability constraints, but we must recognize the political as well as the biological sense of the term 'organism' for Deleuze and Guattari.⁵³ The organism is maintained not simply by homeostasis at the physiological level, but by its insertion into a social setting that establishes its affective structures, that is, the limits and potentials, the patterns, thresholds and triggers, of its affects qua power potentials. Affect is the feeling for variation in power; it is de-personalizing intensity as opening up access to the virtual, to the differential field, Idea, or multiplicity of the situation. As Brian Massumi puts it: 'Affect is *the virtual as point of view*, provided the visual metaphor is used guardedly.'⁵⁴ It is the feeling of change in the relation of bodies entering a new assemblage (you're always in an assemblage, that is, you are always an haecceity), and the feeling of how the present feeling might vary in relation to what might happen next in a variety of futures. Affect, then, is a resolution of a complex differential field, relating changes in the relations among changing bodies.

For Deleuze and Guattari, affect is inherently political: bodies are part of an eco-social matrix of other bodies, affecting them and being affected by them; affect is part of the basic constitution of bodies politic. Here we need the distinction between *pouvoir* and *puissance*. We will have to exaggerate differences for clarity, and need to remember that everyday French usage does not draw such clear distinctions. Nonetheless, we can say that *pouvoir* is transcendent power: it comes from

⁴⁶ Ibid., 152.

⁴⁷ Ibid., 125-6.

⁴⁸ Gilles Deleuze and Félix Guattari, **A Thousand Plateaus**, translated by Brian Massumi (Minneapolis: University of Minnesota Press, 1987), 155.

⁴⁹ Paul Griffiths, **What Emotions Really Are: The Problem of Psychological Categories** (Chicago: University of Chicago Press, 1997).

⁵⁰ John Protevi, 'Affect, Agency, and Responsibility: The Act of Killing in the Age of Cyborgs,' **Phenomenology and the Cognitive Sciences**, 7.2 (2008): 405-13.

⁵¹ Deleuze and Guattari, **A Thousand Plateaus**, 253-61.

⁵² Antonio Damasio, **Descartes' Error** (New York: Avon, 1994) and **The Feeling of What Happens** (New York: Harcourt, 1999).

⁵³ Protevi, **Political Affect**, 89-112.

⁵⁴ Brian Massumi, **Parables for the Virtual: Movement, Affect, Sensation** (Durham, NC: Duke University Press, 2002), 35. Italics in original.

above. It is hylomorphic, imposing form on the chaotic or passive material of the mob. In its most extreme manifestation, it is fascistic: it is expressed not simply as the desire to rule, but more insidiously as the longing for the strong leader to rescue us from the chaos into which our bodies politic have descended. *Puissance*, on the other hand, is immanent self-organization. It is the power of direct democracy, of people working together to generate the structures of their social life. The difference between *pouvoir* and *puissance* allows us to nuance the notion of joyous and sad affect with the notions of active and passive power.

Consider the paradigm case of fascist joy. The Nazis at the Nuremberg rallies were filled with joyous affect, but this joy of being swept up into an emergent body politic was passive. The Nazis were stratified; their joy was triggered by the presence of a transcendent figure manipulating symbols – flags and faces – and by the imposition of a rhythm or a forced entrainment – marches and salutes and songs. Upon leaving the rally, they had no autonomous power (*puissance*) to make mutually empowering connections. In fact, they could only feel sad at being isolated, removed from the thrilling presence of the leader. They had become members of a ‘society of the spectacle’ in that their relations with others were mediated by the third term of the spectacle the others had attended (the in-group) or had not attended (the out-group).⁵⁵

Political affect then includes an ethical standard: does the encounter produce active joyous affect? Does it increase the *puissance* of the bodies, that is, does it enable them to form new and mutually empowering encounters outside the original encounter?

Conclusion How can we put the virtual plus the thought of population of subjects plus political affect together in the context of Deleuze and cognitive science? A clue comes to us from Alva Noë’s notion of perceptual content as virtual.⁵⁶ This means that concrete perception happens as the resolution of a differential field, an Idea or multiplicity. The differential elements are movement and perceptual presence or appearance; the differential relations are those between these two elements; and the singularities thrown out in those relations as thresholds where qualitative perceptual change occurs (for instance, move too close to a pointillist painting and all you see are color dots, no longer forms).⁵⁷ I propose using Noë’s account as a model for the perception of ‘social affordances.’ When we make sense of a situation, we determine the potentials in this encounter for making assemblages. That is, we let de-personalizing affect arrive. This de-personalizing affect as ‘sense-making’ has different temporal scales: it is often an extended process of dynamic exchange/negotiation, but it can also arrive as a flash of insight, a feeling of what is possible. This feeling can be a definite reading of the situation (‘this stinks!’ or ‘this is for me!’), but it can also sometimes be just a vague feeling of good or bad possibilities (‘I don’t know, I can’t quite put my finger on it, but just maybe ...’). Neurologically, intensive sense-making happens

via Damasio’s somatic markers generated by ‘as-if loops,’ which tell us what it would feel like to live through such and such a scenario.

Now if we want to use Noë’s notion of ‘virtual’ to help us think affective cognition in its concrete political context, we cannot stick with his notion of perceptual content, which uses a physical / visual vocabulary of a differential relation between bodily ‘movement’ and sensory ‘appearance.’ Instead, in the sense-making of bodies politic the differential relation is that between moves in a social game and becomings or assemblage formations. The openings toward or potentials for a new becoming or a new assemblage vary as the members of the encounter make a ‘move’ in the social game, moves in which someone offers, commands, cajoles, persuades, pleads, and so on. The possible moves of a situation are the moves allowed by the social grammar and syntax (there is a syntax at work here in social situations: the order of moves is somewhat prescribed: some moves just cannot come after other moves). But of course such ‘grammar and syntax’ are not propositional rules, but embodied competences that are affects or feelings for the potential. But these possible moves are themselves taken up in relations of change: what Deleuze and Guattari call ‘de-territorialization’ (leading to what would be unexpected, because changing the allowable patterns of the game) and ‘re-territorialization’ (settling back into an old game, or setting forth the potentials of the new game).⁵⁸

To sum up, then, affective cognition unfolds in a social context between embodied subjects formed by that context. But ‘context’ is too static: there are multiple levels and time-scales involved. That is, in de-personalizing affective cognition, we see bodies in concrete situations act in real time with response capacities that have been generated over developmental time-scales as produced by multiple subjectivation practices in a distributed/differential social field. Thus a sense-making encounter, a de-personalizing case of affective cognition, is an emergent functional structure, a resolution of a dynamic differential field operating at multiple levels and different time-scales as those bodies navigate the potentials for the formation of new assemblages.

⁵⁵ Guy Debord, *The Society of the Spectacle*, translated by Donald Nicholson-Smith (New York: Zone Books, 1994).

⁵⁶ Noë, *Action in Perception*, 215.

⁵⁷ Daniel W. Smith, ‘Deleuze’s Theory of Sensation: Overcoming the Kantian Duality,’ in Paul Patton, ed., *Deleuze: A Critical Reader* (Oxford: Blackwell, 1996), 29–56.

⁵⁸ Massumi, *Parables for the Virtual*, 71–80.

From Spinoza to the Socialist Cortex: Steps Toward the Social Brain

Charles T. Wolfe

‘Subjectivation, événement ou cerveau, il me semble que c’est un peu la même chose.’¹

We have not yet left the Decade of the Brain proclaimed by George Bush *père*, which was supposed to be the 1990s but shows no signs of ending; however, something has changed, perhaps in keeping with communitarian stirrings that are felt in various places across the globe, in rejection of ‘methodological individualism.’ Consider the study of cognition. From its individualistic beginnings in seeking to model ‘agent intelligence,’ discover the neural correlates of consciousness or perhaps find ‘localized’ brain areas that would explain various mental functions, this field or rather cluster of fields has begun to take something of a ‘social’ turn in the past ten to twenty years, with the publication of books, anthologies, and journal issues called *Social Neuroscience*, *Social Brain* and such, picking up momentum in the past five years.² Topics such as imitation, empathy, ‘mind-reading,’ and even group cognition have come to the fore. Outside of the specifically ‘neuro-’ or ‘cognitive’ or ‘embodied’ arenas, there has been a fresh wave of reassessment of the pragmatists, notably John Dewey, for their ‘social theory of mind,’ and their overall theorization of mind as a set of practices within the world of action, augmenting ideas that in the 1960s were associated with the philosophy of the later Wittgenstein (meaning as use, forms of life, and so on); cognitivists and philosophers of perception have also sought to emancipate themselves from ‘behaviorism’ or other constraints by appealing to Heidegger-as-read-by-Hubert-Dreyfus (an avatar of the philosopher of *Geworfenheit*, the Black Forest, and the ‘authentic path’ of an ecological culture in which he suddenly becomes a cutting-edge theorist of skill, agency, and embedded cognition), and to ‘ecological’ thinking in the sense articulated by the psychologist of perception James J. Gibson.³ In short, from the study of cognition to very diverse corners of the philosophical landscape, the social dimension of mind, intellect, or action has come to the fore.

But I will be interested in a different locus of the social here: the *brain*. And differently from the newly emerged field of social neuroscience, the social brain I shall discuss here might also be called ‘The Spinozist Brain’ or, in a more mysterious turn of phrase, based on a longer formulation from a 1920s’ Bolshevik psychologist, Aaron Zalkind, ‘The Socialist Cortex.’ I shall clarify this expression later on, but for now would like to emphasize that the expression ‘social brain’ should be understood in specifically a Spinozist sense. Expressed in historical terms, I wish to reconstruct a tradition of

¹ Gilles Deleuze in conversation with Toni Negri in 1990 (originally in **Futur Antérieur**), in Gilles Deleuze, **Negotiations 1972-1990**, translated by M. Joughin (New York: Columbia University Press, 1995), 176.

² Dorothy Cheney, Robert Seyfarth and Barbara Smuts, ‘Social relationships and social cognition in nonhuman primates,’ **Science** 234:4782 (1986): 1361-6; Leslie Brothers, ‘The social brain: a project for integrating primate behaviour and neuropsychology in a new domain,’ **Concepts in Neuroscience** 1 (1990): 27-51; Robin Dunbar, ‘The social brain hypothesis,’ **Evolutionary Anthropology** 6 (1998): 178-90; and **Social Brain, Distributed Mind**, eds. Robin Dunbar, Clive Gamble and John Gowlett (Oxford: Oxford University Press, 2009).

³ James J. Gibson, **The Ecological Approach to Visual Perception** (Boston: Houghton Mifflin, 1979). See also: Michael Losonsky, **Enlightenment and Action** (Cambridge: Cambridge University Press, 2001), 8-9; Andy Clark, **Microcognition: philosophy, cognitive science and parallel distributed processing** (Cambridge, MA: MIT Press, 1989), 63-6, 132-5; and Michael Wheeler, **Reconstructing the Cognitive World** (Cambridge, MA: MIT Press, 2005), which argues that we don’t even need to normatively impose a ‘Heideggerian AI’ à la Dreyfus; it comes on its own.

thinking about the brain as social that is ultimately Spinozist in nature, via Marx, Lev Vygotsky and the contemporary philosopher Antonio Negri – the last two of whom explicitly refer to Spinoza's philosophy as a basis for their projects. One of the points I will make in light of this reconstruction is that the Marxist hostility to cognitive science might have to be reconsidered to some extent. (Marx himself uses the expression 'social brain'.⁴ Or, put differently, an incidental accomplishment of my reconstruction of this tradition should be to make it harder for politically motivated critiques of cognitive science and artificial intelligence to claim that theories of intellect and action that seek to involve the brain are necessarily individualistic, 'reactionary,' in the service of the military-industrial complex, and so forth.⁵ If anything, the danger will be from the side of the 'group mind,' as we shall see in closing.

I shall proceed in five steps: after a brief review of recent discussions of social cognition, I shall try to make explicit the Spinozist context for the social brain; next I shall summarize some key ideas of the 'Soviet school' (Vygotsky, Luria), then move from the 'socialist' to the 'avant-garde' brain (which are really two ways of describing the same thing, as we shall see); finally, I discuss the 'Italian' moment of the social brain, with Negri and Virno, including some reflections on tools and prostheses, and conclude with some considerations on the social brain and the group mind.

Varieties of Social Cognition Obviously not all 'social brains,' or rather their conceptualizations, are equal. Social epistemology, the emphasis on the primacy of emotions and the importance of 'common notions' are not all the same. The 'social' dimension that is being emphasized in the discussions of 'social intellect,'⁶ which culminated in the notion of 'Machiavellian intelligence' and its presence in the primate world, is that of the individual's capacity to interact successfully with social groups, to predict and manipulate behavior, to make and break promises, and so forth. The energetic demands of such a complex situation are ultimately presented as responsible for the large size of primates' brains, so that some evolutionary anthropologists and their collaborators in related fields took to calling the Machiavellian Intelligence hypothesis, the 'social brain hypothesis.'

The 'social' in 'social cognition' focuses notably on mirror neurons, which indicate the existence in the brain of a particular recognition or decoding of *action* and thus of the imitation of action,⁷ implying an understanding of other people's intentions, goals and desires. Mirror neurons, found in the ventral premotor cortex of macaque monkeys, are activated both when the monkey executes grasping actions (grasping a peanut, for example) and when it observes someone else (or another monkey) making grasping actions, or even the preparation of a motor act. Mirror neurons appear to distinguish between biological and nonbiological

actions, responding only to the observation of hand-object interactions and not to the same action if performed by a mechanical tool, such as a pair of pliers; more recent research has shown the presence of other mirror neurons which respond to the sound of known activity (such as the crunching of peanuts). Somewhat modifying the earlier research which stressed the difference between the goal-directed activity of intentional, biological agents and the activity of inanimate tools, recent work done with Japanese macaques in Atsushi Iriki's Lab for Symbolic Cognitive Development has indicated that training in tool use over several months produces changes in neural activity such that certain neurons now respond to a rake as if it were an extension of the hand. Indeed, that this training in tool use is successful at all is a major discovery and challenges received knowledge.⁸

Imitation had already been pinpointed in the late nineteenth century by the American psychologist James Mark Baldwin (of 'Baldwin effect' fame): 'By imitation the little animal picks up directly the example, instruction, mode of life, etc. of his private family circle and species.'⁹ Since the early 1990s Cacioppo and Berntson have used the term 'social neuroscience' to describe their work, but this has rather little to do with our interest in the social brain, as the focus seems to be chiefly on correlations between neural states and behavior.¹⁰ Closer in spirit to the tradition I shall be discussing is the study of the culturally and socially constructed nature of the brain, which more

⁴ Karl Marx, *Grundrisse: Foundations of the Critique of Political Economy* (Harmondsworth: Penguin, 1973), 694, 709.

⁵ The most eloquent version of this slightly paranoid critique (and the Rand Corporation, DARPA and others will keep such theorists busy for generations to come) is the long, anonymous text entitled 'L'hypothèse cybernétique,' in the post-Situationist journal *Tiqqun* 2 (2001): 40f.

⁶ Nicholas Humphrey, 'The social function of intellect' (1976), in *Machiavellian Intelligence: Social expertise and the evolution of intellect in monkeys, apes and humans*, eds. Richard Byrne and Andrew Whiten (Oxford: Clarendon Press, 1989); see also the sequel volume, *Machiavellian Intelligence II: Extensions and Evaluations*, eds. Alex Whiten and Richard Byrne (Cambridge: Cambridge University Press, 1997).

⁷ Vittorio Gallese, Christian Keysers and Giuseppe Rizzolatti, 'A unifying view of the basis of social cognition,' *Trends in Cognitive Sciences* 9 (2004): 396-403; Gallese and Alvin Goldman, 'Mirror neurons and the simulation theory of mind-reading,' *Trends in Cognitive Sciences* 12 (1998): 493-550; *On Imitation: From Neuroscience To Social Science*, 2 vols., eds. Susan Hurley and Nick Chater (Cambridge, MA: MIT Press, 2005). Note: *On Imitation*, vol. 1 of which contains several presentation papers by Rizzolatti et al.

⁸ Sarah-Jayne Blakemore, Joel Winston and Uta Frith, 'Social cognitive neuroscience: where are we heading?', *Trends in Cognitive Sciences* 5 (2004): 217; Gallese, Keysers and Rizzolatti, 'A unifying view of the basis of social cognition,' 397. Also see the useful summary of the research from Atsushi Iriki's RIKEN lab on macaque monkeys (but also on certain rodents that have also been trained to use tools) in Laura Spinney's 'Tools maketh the monkey,' *New Scientist* 2677 (8 October 2008): 42-5 and in the lab's report 'Using tools: the moment when mind, language, and humanity emerged,' *RIKEN Research Report* 4:5 (15 May 2009), online at <http://www.rikenresearch.riken.jp/eng/frontline/5850>.

⁹ James M. Baldwin, 'A new factor in evolution,' *American Naturalist* 30:354 (1986): 440, online at http://www.brocku.ca/MeadProject/Baldwin/Baldwin_1896_h.html; David Depew, 'Baldwin and his many effects,' in *Evolution and Learning: The Baldwin Effect Reconsidered*, eds. David Depew and Bruce Weber (Cambridge, MA: MIT Press, 2003), 7. I won't be able to discuss Baldwin in this paper but his views concerning language as a supplemental level beyond Darwinian evolution offer intriguing resonances with Vygotsky and Negri.

¹⁰ John T. Cacioppo and Gary Berntson, 'Analyses of the social brain through the lens of human brain imaging,' in *Key readings in social neuroscience*, eds. J.T. Cacioppo and G.G. Berntson (New York: Psychology Press, 2004), 1-17; and, John T. Cacioppo, Gary Berntson and Ralph Adolphs, *Essays in social neuroscience* (Cambridge, MA: MIT Press, 2004).

recently has focused on its necessarily ‘networked’ dimension – the ‘mind-like properties of social groups,’ in the words of Ed Hutchins, the chief theorist of ‘distributed cognition’; for an early, and broader statement of what we might call the cultural scaffolding of the mental, consider this passage from a 1962 paper by Clifford Geertz:

The accepted view that mental functioning is essentially an intracerebral process, which can only be secondarily assisted or amplified by the various artificial devices which that process has enabled man to invent, appears to be quite wrong; the human brain is thoroughly dependent upon cultural resources for its very operation; and those resources are, consequently, not adjuncts to, but constituents of, mental activity. In fact, thinking as an overt, public act, involving the purposeful manipulation of objective materials, is probably fundamental to human beings; and thinking as a covert, private act, and without recourse to such materials, a derived, though not useless, capability.¹¹

However, these different approaches that stress the role of culture, social institutions, and so forth in structuring the mind, still do not make ontological claims about the *brain* itself. Instead, we are interested in the social and *materialist* variant of the claim ‘the brain possesses an ontology too.’¹²

Under the influence of J.J. Gibson, in their influential paper ‘The Extended Mind’ (1998), Andy Clark and David Chalmers and in a different vein the ‘enactivist’ approach to cognition proposed by Francisco Varela and others, ‘ethological’ and ‘ecological’ approaches to the study of brain, body, and mind have become mainstream; they are simply part of the framework for understanding the behavior of an organism. But the environment that’s studied there still tends to be viewed in terms of stimulus and response (the red spot of paint that the little bird pecks at), and not in terms of the *symbolic world*, the historically, socially, and culturally determined world of representations, of role-playing, of recognition in which we actually live and act. In fact, symbolic practices are not a mere, external ‘cultural environment’ in which ‘brains’ lie floating. Instead, both these practices and the organ called ‘brain’ possess a fundamental plasticity, and we need to understand them together.

But rather than seek to broker agreement between various schools of thought, or retreat behind the safe posture of the intellectual historian relating the discovery of the ‘fact’ that our selves or minds, which turn out to be our brains, are socially produced and perhaps determined, I would, as indicated above, like to analyze a *tradition* out of which a unique concept, ‘the social brain,’ has emerged, from the post-Cartesian metaphysics of Spinoza to its neurological and Marxist reprisals in Vygotsky and Negri.

This will not, however, be a study in the history of Marxism – suffice it to say

that the concept of social brain appears in various passages in the works of the ‘autonomist’ Italian Marxist thinkers Toni Negri and Paolo Virno, where they use it synonymously with the even more mysterious expression ‘General Intellect,’ derived from the so-called ‘Fragment on Machines’ in Marx’s *Grundrisse*, his notebooks of the late 1850s which Negri ‘rediscovered’ as a source for another, heterodox Marxism in celebrated lectures given at the École Normale Supérieure in Paris in the late 1970s, at the invitation of Louis Althusser.¹³ The *Spinozist tradition of the social brain* runs concurrently from Spinoza to Marx and his reinterpretation by Negri, and from Spinoza to the neuropsychologists Lev Semyonovich Vygotsky and Alexander Romanovich Luria in Russia in the 1920s and 1930s. (They worked together notably at the Institute of Experimental Psychology in Moscow, starting in 1924, until Vygotsky’s untimely death from tuberculosis in 1934, at the age of 37.)¹⁴ The story could be extended to include both the ‘coevolution’ approach to brain and language proposed by Terrence Deacon and, in a more ‘American’ and ‘therapeutic’ vein, the type of ‘affective neuroscience’ proposed by Antonio Damasio. Indeed, claims about the embodied, embedded nature of cognition, or the ultimate ‘commonness’ of its contents, are inseparable from an affective component, as in Spinoza, and Vygotsky noticed this, authoring a manuscript on Spinoza’s theory of the emotions or ‘affects’ which was published posthumously; Spinoza’s *Ethics*, which he had received as a gift from his father at a young age, remained his favorite book throughout his life.¹⁵

¹¹ See, Edward Hutchins, *Cognition in the Wild* (Cambridge, MA: MIT Press, 1995); a recent example of ‘distributed cognition’ work is Morana Alač ‘Working with Brain Scans: Digital Images and Gestural Interaction in a fMRI Laboratory,’ *Social Studies of Science* 38 (2008): 483-508. After writing an earlier version of this paper I discovered: Michael Cole and James V. Wertsch, ‘Beyond the Individual-Social Antinomy in Discussions of Piaget and Vygotsky,’ *Human Development* 5 (1996): 250-6, which makes some connections here (notably between Vygotsky and the idea of ‘distributed cognition’), but does not mention the actual relation to the *brain*. Geertz’s quote is from ‘The Growth of Culture and the Evolution of Mind’ (1962), in *The Interpretation of Cultures* (New York: Basic Books, 1973), 76 (thanks to John Sutton for this reference).

¹² Thomas Metzinger and Vittorio Gallese, ‘The emergence of a shared action ontology. Building blocks for a theory,’ *Consciousness and Cognition* 4 (2003): 549.

¹³ Antonio Negri, *Marx Beyond Marx*, ed. J. Fleming, translated by H. Cleaver, M. Ryan and M. Viano (New York: Autonomedia, 1984). See also the prefaces by Yann Moulier and Matteo Mandarini to Negri, *The Politics of Subversion*, translated by J. Newell (Oxford: Polity/Blackwell, 1989) and *Autonomia: Post-Political Politics*, eds. Sylvère Lotringer and Christian Marazzi (New York: Semiotext(e), 2007 [1980]).

¹⁴ The only work I am aware of that makes a connection between the autonomist Marxist theory of the ‘social brain’ and Vygotsky’s landmark research at the intersection of social psychology, developmental psychology, linguistics and neuroscience is Virno’s ‘Multitude et principe d’individuation’; Virno was himself active in the former movement. See: Paolo Virno, ‘Multitude et principe d’individuation,’ *Multitudes* 7 (2001): 103-17 – also at the URL http://multitudes.samizdat.net/article.php3?id_article=65.

¹⁵ Lev S. Vygotsky, ‘Spinoza’s Theory of the Emotions in Light of Contemporary Psychoneurology,’ translated by E. Berg, *Soviet Studies in Philosophy* 10 (1972): 362-82; and for his biography, Jaan Valsiner and René van der Veer, *The Social Mind* (Cambridge: Cambridge University Press, 2000), 325f. On the idea that Spinoza anticipated contemporary ‘affective neuroscience’ (from Damasio to Gallese’s study of mirror neurons), see the short but useful commentary by Heidi Morrison Ravven, ‘Spinozistic Approaches to Evolutionary Naturalism: Spinoza’s Anticipation of Contemporary Affective Neuroscience,’ *Politics and the Life Sciences* 1 (2003): 70-4.

Networks and Common Notions: Some Spinozist Basics

Discussions of ‘person,’ ‘self,’ ‘experience,’ even when they bring in an embodied, material dimension, frequently appeal to a *first-person* concept of experience. This is usually opposed to a *third-person* view, typically presented as the point of view of the natural scientist with her measuring instruments. Many philosophers hold that we will *never know what it is like* to have someone else’s first-person experience. One trait shared by all the thinkers discussed here, from Spinoza to Negri, is that they do not hold this view. We might call this the difference between internalists and externalists. If the internalist holds that ‘states, or experiences ... owe their identity as particulars to the identity of the person whose states or experiences they are,’ the externalist holds that ‘no fact is only accessible to a single person,’¹⁶ and finds it merely a sign of laziness or potential mistakes that it is easier to consult oneself than to consult Nature. An unexpected ally of externalism is Bergson, who declares: ‘Why should I go, against all appearances, from my conscious self to my body, then from my body to other bodies, while in fact I am located from the outset in the material world in general, and gradually limit the center of action which will be called “my body,” thereby distinguishing it from all other bodies?’¹⁷ Or Dewey: ‘There is nothing in nature that *belongs* absolutely and exclusively to anything else; belonging is always a matter of reference and distributive assignment.’¹⁸ Spinoza, too, is an externalist.

In an important proposition of the *Ethics*, Spinoza declares that ‘the order and the connexion of ideas is the same as the order and the connexion of things.’¹⁹ Spinoza locates the individual within a world of relations; to be an individual is in fact nothing other than being a particular intersection in a giant universe of relations. This is what it is to be a finite *mode* of an infinite *substance*. One might think of a connectionist model, a neural net in which particular links are reinforced. Within this Spinozist universe of relations, any such intersection, whether it is a stone, a Fanta can, an animal, or me, strives to persevere in existence, as the finite mode it is; this striving is the *conatus*.²⁰ What this implies for Spinoza’s view of the ‘subject’ or ‘agent’ is that she will not be defined by her interiority, by private mental states, *a fortiori* private and foundational mental states. An individual is a certain quantum of striving, and thereby a certain relation between different points in the total causal network. And the difference between a live individual and a dead individual is simply that each is a different ‘ratio’ of motion and rest (*ratio motus et quietis*).²¹

Exactly as a contemporary practitioner of ‘social’ or ‘affective’ neuroscience might have it, the passions are not properties of an essential human nature, or an isolated individual, but rather of a relational spectrum between a plurality of individuals. Instead of Descartes’ *cogito ergo sum*, Spinoza says *homo cogitat*,²² ‘man thinks’: there is no foundational self, but always a process – a network. Body and

mind (and hence emotion and other forms of cognition; ideas and bodily states, etcetera) are interrelated as particular relations within this network: ‘The order of the actions and passions of our body coincides in nature with the order of the actions and passions of the mind.’²³ In this sense we should not overly emphasize a possible tension between a ‘rationalist’ tendency in Spinozism toward the second and third kinds of knowledge, and an ‘affective’ tendency.

Alexander Luria’s ‘monistic’ critique of psychology is explicitly Spinozist.²⁴ He thinks that both Feuerbachian materialism and psychoanalysis contribute to this monistic approach, unlike the ‘soul’-oriented tradition of philosophical psychology. (Vygotsky disagreed with this essay for inappropriately trying to synthesize Freudianism and Marxism without acknowledging their specific differences.) In Luria’s view, psychology was too dualistic – either too mechanistic, with no recognition of *activity*, or too vitalistic,²⁵ with no recognition of the causal (and thus deterministic) relations within which life, including mental life, takes place – and it has been this way at least since Descartes’ *Passions of the Soul*. Similarly, Vygotsky proposed a Spinozist ‘reform’ of psychology, arguing that: ‘Thinking is nothing other than a function of the brain. Mental life does not have an independent existence; following Spinoza’s definition, thinking is not a substance but

¹⁶ Respectively, P.F. Strawson, *Individuals* (London: Methuen, 1959), 97 and Fred Dretske, *Naturalizing the Mind* (Cambridge, MA.: MIT Press, 1995), 65.

¹⁷ Henri Bergson, *Matière et mémoire* (Paris: PUF, 1939 [1896]), 46-7. English: **Matter and Memory**, translated by N.M. Paul and W.S. Palmer (1910) (New York: Zone Books, 1988).

¹⁸ John Dewey, *Experience and Nature* (London: Allen & Unwin/Chicago: Open Court, 1929), 192.

¹⁹ Baruch Spinoza, *Ethics* (1676), in *Ethics/Treatise on the Emendation of the Intellect/Selected Letters*, translated by Samuel Shirley (Indianapolis: Hackett, 1992). See II, prop. 7.

²⁰ *Ibid.*, see III, prop. 6. This striving is frequently misread outside of Spinoza scholarship as being specifically ‘vital’ or ‘biological,’ including in Damasio’s version where it becomes a particular disposition of cerebral circuits such that an internal or external stimulus will induce them to seek out their well-being or survival.

See: Antonio Damasio, *Looking for Spinoza: Joy, Sorrow, and the Feeling Brain* (New York: Harcourt, 2003). For a rather touching expression of the ‘goalless drive’ quality of the *conatus*, see Boris Achour’s ‘Conatus’ video series, such as <http://borisachour.net/index.php?page=conatus-le-danseur>.

²¹ *Ibid.*, see IV, prop. 39, building on II, prop. 13, Scholium (the ‘little physics’ of the *Ethics*), especially lemmata 1, 7, scholium; **Short Treatise**, II, 14.

²² *Ibid.*, see II, axiom 2. For a nice summary, see Vittorio Morfino, ‘Ontologie de la relation et matérialisme de la contingence,’ *Actuel Marx* 18 (2003): § 5. ‘Spinoza: An Ontology of Relation?’, revised and shortened version of ‘Ontologie de la relation,’ in **Graduate Faculty Philosophy Journal**, New School for Social Research, 1 (2006): 103-27.

²³ *Ibid.*, III, prop. 2, scholium.

²⁴ Alexander Romanovich Luria, ‘Psychoanalysis as Monistic Psychology’ (1925), in *The Selected Writings of A.R. Luria*, ed. M. Cole (New York: M.E. Sharpe, 1978).

²⁵ In the yet unwritten history of vitalism (a project in which I am partly engaged), a study of Vygotsky’s and Bakhtin’s respective critiques of vitalism would make an interesting chapter. See the unknown text by Bakhtin on Driesch: Mikhail Bakhtin, ‘Contemporary Vitalism’ (1926), translation in *The crisis in modernism. Bergson and the vitalist controversy*, eds.

F. Burwick and P. Douglass (Cambridge: Cambridge University Press, 1992). It is possible that, despite the former’s invocation of a common cause between socialism and the cortex, both Vygotsky and Bakhtin (with Spinoza on their side) would not fully follow the Deleuzian-Negrian immanentist and vitalist gesture to make the brain itself a locus of resistance, since this would lead into contradictions: a) all humankind possesses such brains, yet; b) not all of humankind is either ‘avant-garde’ or ‘revolutionary’; I am responding here to an objection first put to me by Katja Diefenbach. However, one might reply that the brain is a tool ...

an attribute. A “psychic” [or “mental” – cw] phenomenon does not exist in itself but is rather ... a necessary moment in a complex psychophysical process.²⁶

The first Spinozist point was an *ontological* one, about the nature of the world as a total set of interconnections within which we find ourselves as embodied agents (a ‘relational’ claim familiar in a different form, perhaps, to readers of Michel Callon and Bruno Latour: what they call ‘actor network theory’). The second Spinozist point is the *non-independence of mind and brain* with regard to this world. What is missing so far is the ‘*self-sculpting*’ element, which falls under the heading of emotions or affects. Vygotsky adds in another text that:

Spinoza ... was a determinist and, in contrast to the Stoics, claimed that man has power over his affects, that the intellect may change the order and connection of the passions and bring them into accord with the order and connections that are given in the intellect. Spinoza expressed a correct genetic relationship. In the process of ontogenetic development the human emotions get connected with general sets both in what regards the individual’s self-consciousness and in what regards his knowledge of reality.²⁷

And he regularly emphasizes the *affective* dimension of communication (in stark contrast to what we would now think of as the information-theoretic approach to communication). This third point, acknowledging the ‘primacy’ of the affects, occurs in independent fashion in Vygotsky, in Negri, and in Damasio, each time with reference to Spinoza. For instance, it’s precisely inasmuch as we *belong* to a greater causal world that we are capable of effecting changes in ourselves and internalizing knowledge from the outside (this is also Spinoza’s doctrine of liberation as emendation). The British philosopher Derek Parfit expressed precisely this insight of Spinoza’s when he described the change that came over him once he began thinking about people, and the world as a whole, in reductionist terms:

Is the truth depressing? Some may find it so. But I find it liberating, and consoling. When I believed that my existence was such a further fact (like a soul or something existing separately from one’s experiences), I seemed imprisoned in myself. My life seemed like a glass tunnel, through which I was moving faster every year, and at the end of which there was darkness. When I changed my view, the walls of my glass tunnel disappeared. I now live in the open air. There is still a difference between my life and the lives of other people. But the difference is less. Other people are closer. I am less concerned about the rest of my own life, and more concerned about the lives of others.²⁸

Now, given these three points, if we add a fourth and last one, it will take us to the ‘social brain’: it is the ‘common notions’ we have which make our persons – and,

Negri will add quite consistently, our brains – *common*. Common notions are conceptions of things ‘which are common to all.’²⁹ There are common notions shared between bodies, and the more I ‘have’ or ‘know’ them, the more I have adequate knowledge of body, and more materialistically, the more my body has in common with other bodies, the more my mind is capable of perceiving things adequately.³⁰ The common notions allow us to step beyond the consideration of singular things and see (some of) the greater network-machine beyond us: we then see how finite modes are produced by an infinite substance. They are not to be confused with an aesthetic or sensory modality such as the *sensus communis*. Put differently, with reference to the affects: they are necessarily social, being about ‘otherness’ or ‘exteriority.’ For example, laughter and sobbing are distinctly human features activated by limbic structures; importantly, *they are the first two social valorizations that children make*, and they induce responses in others that are highly predictive of emotional states.³¹

Let’s move now from the Spinozist context to the *socialist cortex* (in the language, summarized, of one Bolshevik child psychologist in the 1930s, but also of Vygotsky himself, as we shall see). If this sounds like a leap from the quiet, cautious lifestyle of Bento Spinoza, one should bear in mind the explicit political ramifications of his metaphysics (to be precise, the two are on the same plane): Spinozism is *the*, or at least *a* key form of ‘absolute democracy,’ understood as a situation in which spontaneous practices that are generated by civil forms of interaction and cooperation are never taken as ‘fixed’ by the state. As Negri notably has done much to emphasize, Spinoza holds that all other forms of government are warped, constraints on human society, whereas democracy is its natural fulfillment.³²

The Socialist Cortex Given this Spinozist framework, the first real ‘pass’ toward the vision of the brain itself as social – of cerebral architecture as reflecting changes in the linguistic, social, and cultural environments – was made by Lev Vygotsky and his collaborator Alexander Luria in Russia in the 1920s and 1930s. Vygotsky died quite young but he managed to lay the foundations for a variety of fields of inquiry (he and Luria are the founders of neuropsychology, along with Kurt Goldstein,³³ and he is a first-rank figure in social psychology, linguistics, and developmental psychology). Among the unpublished manuscripts he left behind, one was on

²⁶ Lev S. Vygotsky, ‘The genesis of higher mental functions,’ quoted in Alexandre Métraux, ‘Die zerbrochene Psychophysik. Anmerkungen zu Lev Vygotskijs Spinoza-Rezeption,’ *Studia Spinozana* 8 (1992): 197 (my translation from the German).

²⁷ Lev S. Vygotsky, ‘On Psychological Systems,’ in *The Collected Works of L.S. Vygotsky*, vol. 3: *Problems of Theory and Method in Psychology*, eds. R.S. Rieber and J. Wollock, translated by R. van der Veer (New York: Plenum Press, 1997), 103.

²⁸ Derek Parfit, *Reasons and Persons* (Cambridge, MA: Oxford University Press, 1984), 281.

²⁹ Spinoza, *Ethics* II, prop. 38.

³⁰ *Ibid.*, prop. 39.

³¹ Terrence Deacon, *The Symbolic Species* (New York: W.W. Norton, 1997), 419.

³² On the role Spinoza played in the radical thought of Negri, Balibar and others, see the very detailed (but turgid) review essay: Céline Spector, ‘Le spinozisme politique aujourd’hui,’ *Esprit* 77 (May 2007): 27–45.

³³ René van der Veer, ‘Some Major Themes in Vygotsky’s Work,’ in *The Collected Works of L.S. Vygotsky*, vol. 3, 5.

Spinoza's Doctrine of the Emotions, in light of but also as the basis for a 'psychoneurology.' The context in which the ideas that concern us appear is in Vygotsky's work on the development of language in the child. It has powerful resonances with 'Baldwinian evolution,' an understanding of evolution that allows for behavioral adaptation to precede and condition major biological changes, so that when 'useful behavior spreads within a population and becomes important for subsistence, it will generate selection pressures on generic traits that support its propagation'³⁴ (particularly in the case of language: the acquisition of new traits by members of the population changes the social environment and hence sharply intensifies the selection pressures on members of subsequent generations to acquire language), or again, 'that successful learners will do better in evolutionary competition even though what is learned is not inherited,'³⁵ this is also referred to as the 'Baldwin Effect.'

It may not be surprising that the intellectual trajectory of the brilliant Soviet neuropsychologist intersects with another fan of Spinoza, the great social reformer of the early twentieth century, John Dewey. For Dewey, thought is necessarily symbolic and symbolism is necessarily social, hence *the mind is social*. Another way of putting this, or possibly a component of it, is to say that there are sources of experience outside the individual:

We live from birth to death in a world of persons and things which is in large measure what it is because of what has been done and transmitted from previous human activities. When this fact is ignored, experience is treated as if it were something which goes on exclusively inside an individual's body and mind. It ought not to be necessary to say that experience does not occur in a vacuum. There are sources outside an individual which give rise to experience.³⁶

Experience and action or behavior are primary for Dewey (as presumably for all pragmatists), and he believes behavior can be 'culturally' selected for in parallel to natural selection, a view which seems to be influenced by Baldwin: 'one form of life as a whole (is) selected at the expense of other forms... What difference in principle exists between this mediation of the acts of the individual by society and what is ordinarily called natural selection I am unable to see.'³⁷ However, Vygotsky found Dewey's Aristotelian extension of the 'tool' metaphor (language now becoming the tool of tools) too metaphorical, too broad.³⁸ Another difference between them has to do with the status of animals, which do not possess thought for Dewey, whereas Vygotsky integrates into his system a good deal of Wolfgang Köhler's work with apes, prefiguring the contemporary primate studies I mentioned above. But for present purposes these differences are irrelevant; what remains important is that they share an extreme emphasis on *activity*, that is, thought and the brain understood as action, as activity.

Vygotsky describes linguistic activity as necessarily intersubjective: learning a concept involves invoking it, linking it with the performance procedure and external information for which it stands. He calls this the 'outside-inside' principle, namely, that symbolic thought first represents external action, and only later becomes internal speech (that is, thought).³⁹ He argues that concepts and functions exist for the child first in the social or interpersonal sphere and only later are internalized as intrapsychic concepts. Contra Piaget in particular,⁴⁰ Vygotsky argues that we don't move from a solitary, 'autistic,' or 'egocentric' starting-point toward a gradual socialization, but rather from socialization toward individuality. In these different visions of child development, Piaget looks for universal laws of development, whereas Vygotsky always stresses the plurality of social environments as an irreducible factor in development. But the lessons to be learned go beyond child psychology: 'Thus the central tendency of the child's development is not a gradual socialization introduced from the outside, but a gradual individualization that emerges on the foundation of the child's internal socialization.'⁴¹

In the Spinozist terms outlined above, *we don't compose the network(s), they compose us*. So far, this is pretty well known – we've just restated the necessarily social character of *mind* or *intelligence*. Granted that the individual is social and cannot be defined without reference to social factors as primary as the relation of child to mother, what is new is something further, and tied to plasticity: there may even be evidence of consequences in our central nervous system derived from early social interaction. *Past experience is embodied in synaptic modifications*. The functional organization of the human brain can be said, in both the Vygotsky-Luria sense and in Deacon's sense, to reflect socially determined forms or types of activity. As Alexandre Métraux puts it, the origins of the

³⁴ Deacon, *The Symbolic Species*, 345.

³⁵ William Bechtel and Adele Abrahamsen, 'L'explication mécaniste et la controverse de l'inné et de l'acquis,' *Bulletin d'Histoire et d'Épistémologie des Sciences de la Vie* 1 (2005): 75-100; original English ms. available at URL: <http://mechanism.ucsd.edu/~bill/research/MechanisticExplanationandtheNatureNurtureControversy.pdf>.

³⁶ John Dewey, *Experience and Education* (New York: Macmillan, 1938; reprint, Collier Books, 1963), 39.

³⁷ John Dewey, *Early Works*, vol. 5, ed. J.A. Boydston (Carbondale: Southern Illinois Press, 1971), 50. Quoted by Depew, in Depew and Weber, *The Baldwin Effect Revisited*, 28, n. 3. Valsiner and van der Veer's ambitious book *The Social Mind* contains chapters on Baldwin, Dewey and Vygotsky (as well as George Herbert Mead, Pierre Janet and a variety of lesser-known figures chiefly from the history of social psychology).

³⁸ Lev S. Vygotsky, *Mind in Society*, edited and translated by M. Cole et al. (Cambridge, MA: Harvard University Press, 1978), 53; and, Vygotsky, *Collected Works*, vol. 3, 88.

³⁹ John A. Bargh, 'Bypassing the will: Toward demystifying the nonconscious control of social behavior,' in *The New Unconscious*, eds. R. Hassin, J.S. Uleman and J.A. Bargh (New York: Oxford University Press, 2005), 50; see Bruner's introduction to A.R. Luria, *The Role of Speech in the Regulation of Normal and Abnormal Behavior* (New York: Liveright/Oxford: Pergamon Press, 1961); and Merlin Donald, *A Mind So Rare: The Evolution of Human Consciousness* (New York: Norton, 2001), 250.

⁴⁰ Chapter 2 of *Thinking and Speech* (formerly translated as *Thought and Language*) is devoted to Piaget, as is chapter 6, in part. See also Michael Cole and James V. Wertsch, 'Beyond the Individual-Social Antinomy in Discussions of Piaget and Vygotsky,' *Human Development* 5 (1996): 250-6.

⁴¹ Lev S. Vygotsky, *Thinking and Speech* (ch. 7), in *The Collected Works of L.S. Vygotsky*, vol. 1: *Problems of General Psychology*, ed. R.S. Rieber and A.S. Carton, translated by N. Minick (New York: Plenum Press, 1987), 259.

higher psychological functions such as thinking, believing, wanting, etcetera are not to be sought in the brain or some hidden spiritual entity called ‘spirit’ or ‘mind,’ but in the activity of the members of a society.⁴² These higher functions, one can add, emerge out of ‘the dialectical interaction between specific biological structures (embodiment) and culture (situatedness) through a specific history of development (epigenesis).’⁴³ More dramatically put, as Luria does:

The fact that in the course of history man has developed new functions does not mean that each one relies on a new group of nerve cells ... The development of new ‘functional organs’ occurs through the development of new *functional systems*, which is a means for the unlimited development of cerebral activity. The human cerebral cortex, thanks to this principle, becomes an organ of civilization in which are hidden boundless possibilities.⁴⁴

He adds that ‘social history ties the knots that produce new correlations between certain zones of the cerebral cortex.’⁴⁵

Now we begin to see something new, namely what I referred to as ‘the socialist cortex’: the Bolshevik child psychologist Aaron Zalkind declared (as quoted by Vygotsky) that ‘the cortex is on a shared path with socialism, and socialism is on a shared path with the cortex.’⁴⁶ A kind of avant-gardism! And Vygotsky himself asserts that ‘history, changing the human type, depends on the cortex; the new socialist man will be created through the cortex; upbringing is in general an influence upon the cortex.’⁴⁷

If this were a longer study it would be useful at this point to look into the question of Vygotsky’s Marxism. He rejected most of the attempts in his day to link Marxism to psychology – including, as we saw, one by Luria – as being inadequate and misconceived; his claim that human mental functions are irreducibly *social* does not have to be seen as *per se* derived from Marxism, although he connects himself to this tradition in many other ways, but can also be connected to the French sociological tradition of Émile Durkheim, Lucien Lévy-Bruhl, and Maurice Halbwachs.⁴⁸ However, the claim that mind/brain must be understood as ‘the aggregate of internalized social functions,’ once relations have become functions for the individual,⁴⁹ is explicitly derived from Marx’s Sixth Thesis on Feuerbach: ‘Human essence in its reality is the sum of social relations.’⁵⁰ That is, Vygotsky is seeking to put cerebral flesh onto the Marxian ontological claim about relations.

The Avant-Garde Brain The new Socialist man will be created through the cortex ... Notice, however, that Vygotsky’s ‘socialist cortex’ stands or falls as a concept without Marxist theory. We would be more likely today to speak of plasticity, of the effect of various ecological dimensions on cerebral development,

including the role of maternal care in hippocampal plasticity in young rats⁵¹ and the effects of cortical microstimulation (a type of experimentation originally pioneered by Wilder Penfield in the 1930s, on epileptic patients) in ‘quantifying the relation between perception and neuronal activity’ and thereby, ‘inducing a phenomenal state’;⁵² more speculatively, instead of specifically calling the cortex the organ for socialism, we would point, following Terrence Deacon, to the manifestations in cortical architecture of our symbolic, linguistic, and even cultural life (a notion closely related to current debates on ‘niche construction’), or, following J.J. Gibson and Ed Hutchins, we would point to the ways in which perception is necessarily ‘scaffolded’ and cognition ‘distributed.’

We are a ‘symbolic species,’ in Terrence Deacon’s phrase, not because symbols float around in our bloodstream, but because ‘symbols have played a major role in shaping our cognitive capacities in

⁴² Métraux, ‘On Luria and the mind-body problem’ (unpublished ms.), § III.

⁴³ Jordan Zlatev, ‘The Epigenesis of Meaning in Human Beings, and Possibly in Robots,’ *Minds and Machines* 11 (2001): 190.

⁴⁴ Luria, ‘Vygotsky and the Problem of Functional Localization,’ in Luria, *Selected Writings*, 279. Luria is developing themes from Vygotsky’s ‘Psychology and the Theory of the Localization of Mental Functions,’ translated in Vygotsky, *Works*, vol. 3.

⁴⁵ Luria, ‘Vygotsky and the Problem of Functional Localization,’ in *Selected Writings of A.R. Luria*, 279.

⁴⁶ Aaron Zalkind, quoted in Vygotsky, *Pedagogija Podrotska*, vol. 1 (Moscow, 1929), 14, quoted in René van der Veer and Jaan Valsiner, *Understanding Vygotsky. A Quest for Synthesis* (London: Blackwell, 1991), 320.

⁴⁷ Vygotsky, *Pedagogija Podrotska*, quoted in Van der Veer and Valsiner, *Understanding Vygotsky*, 320.

⁴⁸ In particular Halbwachs’ *Cadres sociaux de la mémoire* (1925), which stressed the ‘reconstructive’ dimension of memory; see Alex Kozulin, *Vygotsky’s Psychology* (Cambridge, MA: Harvard University Press, 1990), 122–3. For a different view, which emphasizes the Marxist dimension more strongly see James Wertsch, *Vygotsky and the Social Formation of Mind* (Cambridge, MA: Harvard University Press, 1985), 8f., and Gavriela Eilam, ‘The Philosophical Foundations of Aleksandr R. Luria’s Neuropsychology,’ *Science in Context* 16 (2003): 551–77, § 2 (the paper is on Luria, but contains various remarks on Vygotsky). The most apt formulation is Métraux’s: Vygotsky’s ‘consistent Spinozist viewpoint’ is also a ‘consistent Marxist viewpoint’ (‘Die zerbrochene Psychophysik,’ 206). I find the latter reading more convincing (see the image of the cortex and socialism) but it is clear that Vygotsky, like Lukács, Althusser or Negri after him, has to invent a heterodox form of Marxism.

⁴⁹ Vygotsky, ‘The genesis of higher mental functions,’ in *The Concept of Activity in Soviet Psychology*, ed. James Wertsch (New York: M.E. Sharpe, 1981), 164.

⁵⁰ ‘Das menschliches Wesen ... in seiner Wirklichkeit ist das Ensemble der gesellschaftlichen Verhältnisse.’

⁵¹ D.L. Champagne, R.C. Bagot, F. van Hasselt, G. Ramakers, et al., ‘Maternal care and hippocampal plasticity: Evidence for experience-dependent structural plasticity, altered synaptic functioning, and differential responsiveness to glucocorticoids and stress,’ *Journal of Neuroscience* 28 (2008): 6037–45; and, L.A. Smit-Rigter, D.L. Champagne and J.A. van Hooft, ‘Lifelong Impact of Variations in Maternal Care on Dendritic Structure and Function of Cortical Layer 2/3 Pyramidal Neurons in Rat Offspring,’ *PLoS ONE* 4 (2009): e5167.

⁵² Respectively, Ranulfo Romo, Adrián Hernández et al., ‘Somatosensory Discrimination Based on Cortical Microstimulation,’ *Nature* 392:6674 (1998): 387–90; and John Bickle and Ralph Ellis, ‘Phenomenology and Cortical Microstimulation,’ in *Phenomenology and the Philosophy of Mind*, eds. D. Woodruff Smith and A. Thomasson (Oxford: Oxford University Press, 2005), 159. The experiments on macaque monkeys showed that a range of cognitive processes could be initiated and consummated on the basis of artificial stimuli delivered to specific columns of the somatosensory cortex. For more discussion of the implications of this research see my essay ‘Un matérialisme désincarné: la théorie de l’identité cerveau-esprit,’ *Matière première* 1 (2006): *Nature et naturalisations*, 77–100.

ways that are complementary to their special functional demands';⁵³ 'language has given rise to a brain which is strongly biased to employ the one mode of associative learning that is most critical to it,'⁵⁴ namely, 'the most extensive modification to take place in human brain evolution, the expansion of the cerebral cortex, specifically the prefrontal cortex, reflects the evolutionary adaptation to this intensive working memory processing demand imposed by symbol learning.'⁵⁵ Hence there is a 'co-evolution' of language and the brain. We have learned since at least Walter Benjamin to recognize the *historicity of perception*; Luria recognized this through his experiments on visual illusions during trips to Uzbekistan in the 1930s; different subject groups, depending on their degree of Westernization, had a more or less high chance of seeing the illusions: 'the more the subjects had dealt with abstract aspects of everyday practice, the less their vision was natural,' with visual-motor recollection playing a key role – *and this recollection being, not a biological invariant* but a process 'determined' by sociohistorical processes.⁵⁶

We might say, 'The cortex is the locus of avant-gardism.' Think of Deleuze's phrase: 'Creating new circuits in art means creating them in the brain' (*Créer de nouveaux circuits s'entend du cerveau en même temps que de l'art*).⁵⁷ Indeed, there is an entire aesthetic dimension of our construct which I have not discussed here, the first instance of which is Deleuze's determination of the brain in its plasticity (for instance with reference to Antonioni, in the cinema books). Much like in Benjamin, this is the double-barreled idea that a *new kind of brain* is required to grasp new spatiotemporal, perceptual, chromatic, affective arrangements, such as the modern city, the neorealist city, etcetera, and conversely, these arrangements *give rise to* a new kind of brain. It is a very unique understanding of neural plasticity. Interestingly, Deleuze's approach to the brain also has the advantage of bypassing the usual *linguistic* theories of the mind, or of getting one stuck in debates over the status of representations. And one recalls the vehemence with which Deleuze rejects attempts to apply linguistics to cinema: when he invokes a 'cerebral' dimension in his discussions of perception, image, time, and so forth, it is not in order to reduce the 'artistic' dimension to a manageable set of quantities or even processes to be studied by a nefarious neurophilosopher (even one with additional firepower from CAT and fMRI scans); it is a way of opening onto the openness of perception without immediately sealing it off into linguistic categories.⁵⁸

Indeed, one dimension of the tradition of the 'social brain' that is currently popular is 'neuroaesthetics,' not in the sense of finding neural correlates of aesthetic experience (promoted by scientists such as Semir Zeki or Jean-Pierre Changeux), but in Warren Neidich's sense that stresses neural plasticity in relation to the aesthetic environment. Much as one can say: 'You don't see with your retina, you see with your cortex' (Christof Koch), one can add: 'Avant-gardism and its reliance on the plasticity of perception happens in and through the cortex.' From

Mriganka Sur's 'rewired ferrets' to the recently studied young rats whose hippocampus develops differently depending on what kind of maternal care they receive, and onto the Benjaminian realization of the historical conditioning of our forms of perception, we are all avant-gardists in a sense; the same sense in which, according to Deacon, 'prefrontal overdevelopment has made us all *idiots savants* of language and symbolic learning.'⁵⁹

The idea is that the brain itself, less in its 'static,' anatomical being than in its 'dynamic,' physiological being – *in actu*, then – displays features that reflect its embeddedness in or belonging to the social world. The externalist-Spinozist point to be derived here is that we can only have knowledge about the inner states of others, and indeed, of our own, thanks to the overall structure of symbolic activity (à la Deacon) which externally exhibits the existence of such states, and further, creates the structure in which such states emerge. Most people don't realize that Vygotsky and Luria *meant the brain itself* when speaking about these dynamic, self-transformative features; they usually describe these as belonging to *mind* or *intellect*. But Vygotsky and Luria were materialists! (Both in the Marxist sense as seen above with respect to the embeddedness of the person in the world of networks – 'relations' – and in the more naturalistic sense that they believed intellectual processes could be explainable in terms of, or at least in a causally integrated relation to, cerebral processes.) The brain for them is no longer just an 'organ' mediating between mind and society, through language – not just a 'physiological abstraction, an organ cut out from the totality of the skull, the face, the body as a whole,' as Feuerbach put it.⁶⁰ Extending from the social mind to the social brain is a major step *toward*, or *for* materialism. However, neither neurally correlated social cognition nor even Machiavellian primates seem to display anything like the activity of the 'socialist cortex,' our shorthand for the transformative dimension of the plastic, socially plastic brain. For this we need not only Spinozist affects (along with his reduction of the universe to relations between portions of motion and rest), but a theory of transformation. Behind Vygotsky and Negri, there is also Marx.

⁵³ Terrence Deacon, 'Multilevel selection in a complex adaptive system: the problem of language origins,' in Depew and Weber, **Evolution and Learning. The Baldwin Effect Reconsidered**, 95.

⁵⁴ Deacon, **The Symbolic Species**, 336.

⁵⁵ Deacon, 'Multilevel selection in a complex adaptive system,' 100.

⁵⁶ Métraux (ms.), § III; Luria, 'Towards the Problem of the Historical Nature of Psychological Processes,' **International Journal of Psychology** 6 (1971): 269.

⁵⁷ Deleuze, **Negotiations, 60/Pourparlers 1972-1990** (Paris: Éditions de Minuit, 1990), 86, and the almost visionary discussion of the brain, art and color in Gilles Deleuze, **Cinéma 2 : L'image-temps** (Paris: Minuit, 1985), 266, n. 20 (along with chapter 8 as a whole, which comprises a section entitled 'Donne-moi un cerveau,' 'Give me a brain').

⁵⁸ This Deleuzian approach to the brain is sometimes associated with Francisco Varela's notion of autopoiesis (emphasizing the self-organizing nature of life and mind – autopoietic systems essentially produce **themselves as individuals** whereas 'allopoietic' systems are, like regular machines, defined by an external output), but this model lacks any recognition of the **social**. Specifically on Deleuze's 'neuroaesthetic,' see John Rajchman's excellent discussion in **The Deleuze Connections** (Cambridge, MA: MIT Press, 2000), 136-8.

⁵⁹ Deacon, **The Symbolic Species**, 413, 416.

⁶⁰ Ludwig Feuerbach, 'On the Dualism of Soul and Flesh' (Wider den Dualismus von Leib und Seele) (1846), in **Anthropologischer Materialismus. Ausgewählte Schriften I**, ed. A. Schmidt (Frankfurt: Europäische Verlagsanstalt, 1985), 177. Compare Bergson's image of the brain as the 'bureau téléphonique central,' as a mere 'intermediary' between sensations and motions' (**Matière et mémoire**, 26, 198) ... which Vygotsky finds too dualistic! (Vygotsky, **Collected Works**, 125). See overall chapter 3 of Bergson's book and Deleuze, **Cinéma 2**, 274.

General Intellect As I mentioned at the outset, the notion of social brain appears in Marx's *Grundrisse*, notebooks VI–VII, a text known as the 'Fragment on Machines' which has had particular influence on the Italian autonomist tradition of Marxism. There, Marx speaks of the 'general productive forces of the social brain.'⁶¹ The idea is that humanity's increasing use of automation and of developing networks of communication and transportation has brought about a kind of metaphysical shift in who and what we are, seen here from the angle of labor:

The production process has ceased to be a labour process in the sense of a process dominated by labour as its governing unity. Labour appears rather as a conscious organ, scattered among the individual living workers at various points of the mechanical system; subsumed under the total process of the machinery itself, as itself only a link of the system, whose unity exists not in the living workers, but rather in the living (active) machinery, which confronts his individual, insignificant doings as a mighty organism.⁶²

Later on in the text, Marx returns to this almost Laplacian level of contemplation and now uses the expression 'general intellect' (in English in the original; the provenance of this expression is unknown):

Nature builds no machines, no locomotives, railways, electric telegraphs, self-acting mules etc. These are products of human industry; natural material transformed into organs of the human will over nature, or of human participation in nature. They are *organs of the human brain, created by the human hand*; the power of knowledge, objectified. The development of fixed capital indicates to what degree social knowledge has become a *direct force of production*, and to what degree, hence, the conditions of the process of social life itself have come under the control of the general intellect and been transformed in accordance with it.⁶³

What Marx is saying is that the real 'operator' or 'agent' of transformation, indeed the sole remaining actor in this process, is the social brain; it has become the productive force itself. In the words of Paolo Virno: 'Rather than an allusion to the overcoming of the existent, the "Fragment" is a sociologist's toolbox and the last chapter of a natural history of society.'⁶⁴ That is, it is meant as a description of empirical reality.⁶⁵ The actor is neither the machines by themselves nor the old-fashioned humanist 'autonomous rational animal,' but rather the 'General Intellect,' which resides both in humans and in intelligent machines. Comparisons have been made between this idea of 'General Intellect' and Teilhard de Chardin's 'noosphere' (roughly, a vision of an ultimate stage of development of the universe in which increasing complexity but also technological interrelation and interde-

pendence produce a kind of 'pure mind,' total intelligence, total reflexivity, as the final outgrowth of a process that began with basic forms of matter, moving toward atoms and molecules, organisms and ultimately the human mind itself),⁶⁶ and indeed there is something uncomfortably spiritualistic about the idea, as if intellect were more real than a piece of flesh or silicone. This may indeed be a Hegelian residue in Marx, a residue of *Geist*, and is also probably why General Intellect and its twin concept, 'immaterial labor,' have been the targets of so much hostile criticism from the part of more orthodox Marxists, who feel as if Grandpa gave away the store, so to speak.

If I am emphasizing the term 'social *brain*' here, it's precisely to show that it's part of the real ('wet' rather than 'dry') natural world, not a virtual, strictly informational network. Further, just because the brain is irreducibly social does not mean that it is an 'empire within an empire' or 'kingdom within a kingdom' (in Spinoza's famous phrase from the Preface to Book III of the *Ethics*, in which he rejects the idea that we are somehow apart from the rest of Nature, an *imperium in imperio*). I refer back to the Spinozist ontology of relations and find support in this also from Negri's recurring invocations of 'ontology' as a political necessity.⁶⁷

The Spinozist brain, the social brain cannot be extracted or abstracted from this universe of relations (recall Vygotsky's arguments against Piaget's 'egocentric' perspective). As such, it cannot or should not be confused with either of two major positions or attitudes within twentieth-century European thought:

- With the phenomenological outlook (according to which 'Man thinks, not the brain,' in Erwin Straus' words),⁶⁸ or with Varela's enactivist model, which is rich and full of possibilities but hardly sociopolitical ones; Varela is our Piaget, in a sense: a new idealist, a new metaphysically grounded solipsist for whom the Self is self-positing, self-grounding rather than constituted in and through relation, or challenges of the 'outside,' whether this is construed as a Darwinian environment or a Spinozist causal universe.⁶⁹ If we were not speaking of the brain we could be phenomenologists of

⁶¹ Marx, *Grundrisse*, 694.

⁶² Ibid. 693.

⁶³ Ibid. 706, emphasis in original.

⁶⁴ Virno, 'Multitude et principe d'individuation,' section on 'Marx, Simondon, Vygotski'; Marx, *Grundrisse*, 709.

⁶⁵ Paolo Virno, 'General Intellect,' *Lessico Postfordista* (Milan: Feltrinelli, 2001).

For English (translation by A. Bove) see *Historical Materialism. Research in Critical Marxist Theory* 3 (2007): 3-8.

⁶⁶ Charlie Gere, 'Brains-in-vats, giant brains and world brains: the brain as metaphor in digital culture,' *Studies in History and Philosophy of Biological and Biomedical Sciences* 2 (2004): 351-66.

⁶⁷ On the meaning of 'ontology' in Negri see my essays: 'Materialism and Temporality. Antonio Negri's "Constitutive" Ontology,' in *The Philosophy of Antonio Negri 2: Revolution in Theory*, eds. T.S. Murphy and A.-K. Mustapha (London: Pluto Press, 2007), 196-218; and, 'Antonio Negri's ontology of Empire and Multitude,' *Ideas in History* 1 (forthcoming).

⁶⁸ Erwin Straus, *Du sens des sens* (Grenoble: J. Millon, 1989 [1935]) (a translation of *Vom Sinn der Sinne: Ein Beitrag zur Grundlegung der Psychologie*), 183.

⁶⁹ Hence it is understandable that Luria was critical of Kurt Goldstein, another (brilliant) forerunner of Varela's, whose theory of organism makes it very much a solitary, creative, and anomalous entity within the broader world of animate nature. (I discuss the concept of organism further in 'La catégorie d'"organisme" dans la philosophie de la biologie,' *Multitudes* 16 (2004): 27-40; reprinted in *Multitudes. Une anthologie*, ed. Yann Moulier-Boutang (Paris: Éditions Amsterdam, 2007), 80-89; and in 'Do organisms have an ontological status?', *History*

the social world; but as I have emphasized, we are in materialist territory here.

• With the classic distinction between natural sciences and human sciences, *Naturwissenschaften* and *Geisteswissenschaften*, which its very name seeks to overcome: this distinction is crucial for thinkers like Husserl, Heidegger, and Sartre,⁷⁰ but also the Frankfurt School. No distinction here between the brute, inanimate world of nature, animals, and machines on the one hand and a free, spiritual world of self-interpreting *Dasein* on the other. Suffice it to recall here the charming formula Negri proposed for understanding Deleuze-Guattari's *Mille plateaux*: that it was the last great work of the *Geisteswissenschaften*, but where *Geist* was replaced by the brain.⁷¹

Scaffolding, Tools and Prostheses I have said that the social brain is not wedded to a concept of 'privacy' or 'interiority,' the way the Cartesian cogito, but also the phenomenological self (or body, in its embodied variant) are. It is an *externalist, relational* concept. In a sense, the novelty of the social brain appears most striking in regard to a kind of garden-variety, hermeneutical self. If we recall that Vygotsky's concepts are born out of a reflection on linguistic development, and that the 'affective' dimension that both Vygotsky, Negri, and Virno draw out of Spinoza is 'always already' social – such that the general intellect itself is permeated with the 'linguistic cooperation of a multitude of living subjects'⁷² – we can see a bit better why the distinction between the natural and the 'hermeneutical' is of little use here. Ontologically there is no hard and fast border between the natural and the artificial, and thus between a world of amoebas and cane toads on the one hand, and a world of Byrons, Hölderlins or Mandelstams on the other. The potential of an agent is inseparable from what Negri calls the 'set of prostheses,'⁷³ essentially the possible set of 'scaffolding,' networks and technological extensions of our perception, cognition, and action. The idea of 'scaffolding,' which has been associated with Andy Clark in recent discussions of cognition (and Clark takes the idea from J.J. Gibson's work in the 1960s), is that we are inseparable from the 'looping interactions' between our brains, our bodies, and 'complex cultural and technological environments.'⁷⁴ In other words, our brains have the talent for making use of the environment, 'piggy-backing on reliable environmental properties,'⁷⁵ which is in fact a far more economical and *swift* action procedure than processing representations of objects. Scaffolding is one of the vehicles humans employ, so that language, culture, and institutions *empower* cognitions.⁷⁶

On this view, the brain is not a central planner but possesses a 'scaffolding' that is inseparable from the external world.⁷⁷ Indeed, the biological functioning of our brains themselves 'has always involved [using] nonbiological props and scaffolds,'⁷⁸ with direct consequences for brain architecture itself: 'A youngster growing up in a medieval village in twelfth-century France would literally have different neural

connections than a twenty-first-century American adolescent who has spent serious time with computer games.'⁷⁹ There is no longer a real separation between body and extension, brain and tool. Vygotsky speaks of 'psychological tools' that alter the flow of mental functions by use, such as the knot in the handkerchief: 'When a human being ties a knot in her handkerchief as a reminder, she is, in essence, constructing the process of memorizing by forcing an external object to remind her of something; she transforms remembering into an external activity.'⁸⁰ But the concept of tool

and Philosophy of the Life Sciences 32 (2010): 195-232). See, for example, A.R. Luria, 'L.S. Vygotski and the Problem of Functional Localization,' *Soviet Psychology* 3 (1967): 53-7, reprinted in *Selected Writings of A.R. Luria*, 277. After all, Luria, referring to himself and Vygotsky, spoke approvingly of 'Pavlovian psychophysiology' as having 'provided a materialist underpinning to our study of the mind' in *The Making of Mind: A Personal Account of Soviet Psychology*, ed. and translated by M. and S. Cole (Cambridge, MA: Harvard University Press, 1979), 41.

70 Jean-Paul Sartre, 'Matérialisme et révolution' (originally in *Les temps modernes* of 1946), in *Situations philosophiques* (Paris: Gallimard, 1990). In this famous work, Sartre describes materialism as an irrationalism, which removes man from the sphere of free, *verstehtes* action and forces him into a world of biological, then physical conditioning. Reason is then 'captive, manœuvrée par des chaînes de causes aveugles' (*Situations philosophiques*, 86). Man as empire within an empire indeed! One might speak of 'knee-jerk humanism' here ...

71 Antonio Negri, 'On *A Thousand Plateaus*,' translated by C.T. Wolfe. *Graduate Faculty Philosophy Journal* 1 (1995): 93-109.

72 Paolo Virno, 'Les anges et le general intellect. L'individuation chez Duns Scot et Gilbert Simondon,' *Multitudes* 18 (2004), also at the URL <http://multitudes.samizdat.net/Les-anges-et-le-general-intellect>.

73 Antonio Negri, 'Alma Venus. Prolegomena to the Common,' translated by P. Dailey and C. Costantini, in *The Renewal of Materialism*, ed. C.T. Wolfe, (*Graduate Faculty Philosophy Journal* 22:1, New York: New School for Social Research, 2000), § 16b. These texts are also republished in Negri, *Time for Revolution*, translated by M. Mandarini (London: Continuum, 2005).

74 Andy Clark, *Natural-Born Cyborgs: Minds, Technologies and the Future of Human Intelligence* (Oxford: Oxford University Press, 2002), 11, 43. Clark intersects here with a good deal of recent cultural/literary/media theory (when it concerns itself with the relation between fiction, embodiment, and technological forms) – see in particular Donna Haraway, 'A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century,' in *Simians, Cyborgs and Women: The Reinvention of Nature* (New York: Routledge, 1991), 149-181; and N. Katherine Hayles' *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago: University of Chicago Press, 1999), and 'The Life Cycle of Cyborgs: Writing the Posthuman,' in *A Question of Identity: Women, Science and Literature*, ed. M. Benjamin (New Brunswick: Rutgers University Press, 1993). Clark is unique, however, in that he speaks from *within* cognitive science – which also entails that there is no utopian dimension to his theory. Clark is not calling for a new hybridity or seeking to usher it into being.

75 Andy Clark, *Being There. Putting Brain, Body and World Back Together Again* (Cambridge, MA: MIT Press, 1997), 45.

76 *Ibid.*, 21, 87.

77 On scaffolding, see Clark, *Being There*; for an original discussion of plasticity-remapping- 'cultured brain' see Warren Neidich, *Blow-Up: Photography, Cinema and the Brain* (New York: Distributed Art Publishers, 2003); some brief discussion in my essay 'De-ontologizing the Brain: from the fictional self to the social brain,' *CTheory* 1 30:1 (Winter 2007), at the URL <http://www.ctheory.net/articles.aspx?id=572>. Neidich's idea has its own potential for being restated as a new form of what phenomenologists call 'self-affection,' just as Marxist-operaist General Intellect has a potential to be restated as Pure Mind: ultimate idealism.

78 Clark, *Natural-Born Cyborgs*, 86.

79 N. Katherine Hayles, 'Flesh and Metal: Reconfiguring the Mindbody in Virtual Environments,' *Configurations* 10 (2002): 300

80 Vygotsky, *Mind in Society*, 51; and Lev S. Vygotsky 'The instrumental method in psychology' (1930), presentation at Krupskaya Academy for Communist Education, in *Collected Works*, vol. 3.

is still too instrumental, that is, too *external*. Indeed, in his day Vygotsky was attacked by Party psychologists for ‘virtualizing’ the concept of tool or that of labor, and allowing for ‘mental’ factors such as culture to be determinations, rather than strict economic factors.⁸¹ Given the degree of ‘openness’ of the central nervous system, and on the ‘personal’ level, our ability to identify with *non-biological* extensions of our body (as has been shown in great detail in experiments by V.S. Ramachandran, Atsushi Iriki, and others, from diverse perspectives), the ‘artificialist’ perspective, in which body and prosthesis, indeed, body and tool, *merge*, is not so far off. What Negri speaks of in Spinozist terms as a kind of commonness implies that there is no longer a separation between brain and tool as two distinct entities.⁸² In Negri’s terms: ‘The tool ... has entirely changed. We no longer need tools in order to transform nature ... or to establish a relation with the historical world ... we only need language. Language is the tool. Better yet, the brain is the tool, inasmuch as it is common.’⁸³

The brain is ‘common’ inasmuch as it is constituted by and inseparable from the network of relations to which we belong. What Spinoza’s common notions, Marx’s General Intellect and the Vygotskian ‘socialist cortex’ indicate is precisely this commonness, as opposed to the ‘classic’ idea of thinking as a solitary, contemplative activity (I turn to some potential pitfalls of this commonness below). Negri puts it strongly:

The metaphysics of individuality (and/or of personhood) constitutes a dreadful mystification of the multitude of bodies. *There is no possibility for a body to be alone*. It cannot even be imagined. When man is defined as individual, when he is considered as an autonomous source of rights and property, he is made alone. But one’s ownness does not exist outside of the relation with an other. The metaphysics of individuality, when confronted with the body, negates the multitude that constitutes the body in order to negate the multitude of bodies.⁸⁴

The ‘social’ in the ‘social brain’ means that we cannot achieve the privacy of a Cartesian or Husserlian meditator, contemplating the world, but also that we can never be truly cut off from it; the ‘brain’ in the same expression means that we are not just dealing with a formal property of an arrangement of thoughts or otherwise construed mental states, but with an embodied, biological, natural agent.

Envoi To sum up. First, there is no absolute ontological separation between an individual agent and her brain, and the total network of affects, objects, and structures around her. ‘Subjectification, event or brain – aren’t these much the same thing?’⁸⁵ Second, individuation is an effect of power, both in the Vygotskian sense that ‘I’ am a product of socialization, and not the other way round, and in

the Spinozist sense that the more ‘extensions’ I have – a notebook, a computer, a pen, a knot in my handkerchief, a friend’s telephone number, a Party membership card, and so forth – the greater my power of acting will be. As Althusser said somewhat whimsically, recalling an earlier era: ‘A Communist is never alone.’⁸⁶ Not just in a trivial sense of ‘greater influence,’ but because (recall the idea of common notions) I will have more ideas of more bodies. Does the individual disappear in the nets of this reticulated network? No, for the above reason (connection is an increase in power), and also because what Félix Guattari called the ‘production of subjectivity’ is only possible *because* of the presence of common components in the world of brains: it is not like a popularity contest where I am pushed to ‘connect’ with ever more people! Third, the social brain concept presented here is definitely not reducible to the individual’s manifestations of a social world around her, since on the contrary (*pace* Vygotsky, Deacon, and others) cerebral architecture reflects, however minutely, forms of social, linguistic, cultural organization. Does the group then have a ‘group mind’?⁸⁷ A unified, constrained, ‘transsubjective reality’?⁸⁸ The foregoing discussion does not nec-

⁸¹ A.A. Talankin, speaking at the First All-Union Congress on Psychotechnics and the Psychophysiology of Labor, Leningrad, 1931. He also attacks Vygotsky on the related charge of importing ‘Western’ concepts from Freud and Gestalt theory into Soviet psychology. See Van der Veer and Valsiner, **Understanding Vygotsky. A Quest for Synthesis**, 377.

⁸² Antonio Negri, **Kairos. Alma Venus. Multitude**, translated by J. Revel (Paris: Calmann-Lévy, 2001), § 16bis, 84.

⁸³ Negri, ‘Alma Venus,’ § 16b. One can see resonances here with the work of Donna Haraway (with the focus on the category of prosthesis and the primacy of artificiality). And in works such as **Empire**, Hardt and Negri speak favorably of our posthuman, inseparably simian, human and cyborg nature (a viewpoint which is again fully Spinozistic), but they also distance themselves from ‘hybridity [as] an empty gesture’ perhaps on political grounds. Michael Hardt and Antonio Negri, **Empire** (Cambridge, MA: Harvard University Press, 2000), 216.

⁸⁴ Antonio Negri, ‘Towards an Ontological Definition of the Multitude,’ originally published in French in **Multitudes** 9 (May-June 2002). Emphasis my own.
– in English at the URL: http://multitudes.samizdat.net/article.php3?id_article=269.

⁸⁵ Deleuze in conversation with Toni Negri in 1990 (originally in **Futur Antérieur**), in Deleuze, **Negotiations**, 176.

⁸⁶ To be precise, in his reflections on the critique of the personality cult, Althusser wrote: ‘In the beginning, we were few, and John Lewis is right: we were “speaking in the desert,” or what some thought was the desert. But one should be careful of this kind of deserts, or rather know how to trust them. Actually, “we” were never alone. Communists are never alone’ (Louis Althusser, ‘Note sur “la critique du culte de la personnalité,”’ in **Réponse à John Lewis** (Paris: Maspero, 1973), 78). And at the end of his life, in his autobiography, he reprised the theme: ‘I was quite solitary or alone as a philosopher, and yet I wrote in the **Reply to John Lewis**, “a Communist is never alone”’ (**L’avenir dure longtemps** (Paris: Livre de Poche, 1994), ch. 14, 196), (translation mine). Thanks to Yoshihiko Ichida for the reference.

⁸⁷ Compare the recent discussion of ‘group minds’ in Philip Pettit, ‘Groups with minds of their own,’ in **Socializing Metaphysics**, ed. F. Schmitt (Oxford: Rowan and Littlefield, 2003), 167–194; and Rob Wilson, ‘Collective memory, group minds, and the extended mind thesis,’ **Cognitive Processes** 4 (2005), 227–36. For a helpful discussion of the pros and cons of the notion of group cognition see Georg Theiner and Timothy O’Connor, ‘The Emergence of Group Cognition,’ in **Emergence in Science and Philosophy**, eds. A. Corradini and T. O’Connor (New York: Routledge, forthcoming 2010).

⁸⁸ At a meeting a few years back I was intrigued by Margarita Gluzberg’s visual and theoretical performance ‘How to get beyond the market ...’ which proposed a kind of group mind achievable through aesthetic/hallucinatory means. However, this was quickly denounced as ‘dangerously close to Fascism’ by a loyal Frankfurt School theoretician, Diederich Diederichsen. So we might then ask, is the social brain fascist? Clearly, if we are speaking in a Spinozist context, the answer is No: one of Spinoza’s chief concerns is to overcome a condition in which the ‘multitude’ is manipulated by political fear. He is the preeminent thinker of ‘absolute democracy,’ as indicated above. As to our biological characteristics in and of themselves, unfortunately it is harder to make

essarily entail that – and indeed, that the brains of a young rat, a young child, an American teenager and a Russian chess master respectively reflect various epigenetic, environmental traits does not at all imply that a club, a sect, or a mob needs to be described as possessing a ‘mind.’

I have simply tried to show that there is a way of thinking about the brain that retains a sociopolitical dimension while at the same time dealing with naturalistically specifiable features of development; a genuinely *materialist* perspective. From the social dimension of mind – materialized through ethological and single-neuron studies, ontologically founded with the doctrine of common notions and of being as relation – through the fundamental plasticity of the brain and the remodeling by language and culture of the functional architecture of the cortex: this is the Spinozist tradition of the social brain.

* Thanks to Deborah Hauptmann and Warren Neidich for their invitation; to Katja Diefenbach, Luc Faucher, John Protevi, and Georg Theiner for useful suggestions.

them bear some innately emancipatory role, albeit perhaps a potential one. Margarita Gluzberg, ‘How to get beyond the market – Transsubjective Reality in the **Salvia Divinorum** Forest,’ presentation at Neuroaesthetics Conference, Goldsmiths College, London, 2005; transcription at the URL: <http://www.artbrain.org/how-to-get-beyond-the-market-%e2%80%93-transsubjective-reality-in-the-salvia-divinorum-forest-let-the-crowds-in/>.

Other Minds, Other Brains, Other Worlds

Patrick Healy

Introduction The phenomenon of meaning and embodiment points to the lack of a dialectical grasp of embodiment and world in theories of the cognitive or neo-Darwinian functionalism, in relation to the creative and open field of relations which living, intelligible structures exhibit and generate. It is the problem of the genesis of such intelligibility which demands a turn away from traditional accounts of mind, and perception. This paper will address this problem by two means:

First, the way in which the work of Merleau-Ponty in its analysis of the structure of behavior identifies the different requirements of what he calls the various kinds of order that are given for analysis, in the human, the biological and ultimately the historical. His trenchant critique of behaviorism, and the analysis of human speech, points to the limitations of linguistics and the wider field of relations which are demonstrated in understanding the action of human expression. By looking at the basic anthropological situation Merleau-Ponty delivers a different understanding of structure and the problem of the intelligibility of world and the human ecology than the traditional mechanistic or dualist accounts in a version of radical materialist explanation, that have been the dominant solutions of the mind-body problem in the psychological sciences.

The work of Merleau-Ponty points to the wider ontological claims of understanding the individual event for the biological order, and the human immersion within the environment of meaning which cannot be contained in any operational or functional algorithm. Expression does not mirror an already given order, but shapes and creates even as it is situated in the complex field of relations which are meaning-laden, and that require unforeseen creative solutions that is genuine learning. The dynamic and immersive order of human signifying and awareness cannot be reduced to the sum of its parts. The 'excess' in perception and meaning points to the deeper problem of how living structures are maintained and innovated.

Secondly, this paper points to the question of the genesis of orders as relational and examines the way in which the living dynamic of speech, the public enactment that constitutes the human way of being opens up a different reading of nature and meaning in the Ancients.

The relation of learning, and logos, is argued as crucial also within the defining of human order in Plato and Aristotle. Thus, the second part of the paper returns to the question of speech and philosophy which finds a way to grasping the interweaving of existence and meaning as the Socratic turn to the question and answer that arises in the individual human event. The evidence from the *Phaedo* is re-examined and also the rejection of the explanatory accounts based on physiology and empiricism which Plato gives in his intellectual biography of Socrates. The paper points to the neglected evidence within pre-Socratic and literary sources for the complex debates on mind and world that remain pertinent even in our most contemporary concerns.

Mental activity in Merleau-Ponty There is a passage in Plato's *Theaetetus* in which the exchange turns on how one defines 'thought,' 189-90:

Socrates: 'And do you define thought as I do?'

Theaetetus: 'How do you define it?'

Socrates: 'As the talk which the soul has with itself about any subjects which it considers. But the soul ... when it thinks, is merely conversing with itself, asking itself questions and answering; answering, affirming and denying. When it has arrived at a decision slowly, or, with a sudden bound, and is at last agreed, and is not in doubt, we call that its opinion; and I define forming an opinion as talking, and opinion as talk which has been held, not with someone else, nor yet aloud, but in silence with oneself.'¹ At Sophist 264a we find a similar definition of thought: 'the conversation of the soul with oneself.'²

What is the activity of talking to oneself, in relation to language, the other, thinking? Is it an open practice? Is there any need to refer it to either processes that go on in its activity, or to events that take place in some outside, *partes ex partes* that lend it weight, depth, meaning?

There is the anthropological definition in Aristotle, of the living being having language; language or discourse. There is no word which is stand alone for word in Greek because there is the word 'logos,' and we are obliged to translate; it can be translated as much by discourse, reason, principle of intelligibility, and is interchangeable with these terms, and of course it is the word for word. Talking depends on logos. Speech is the vital human activity.

In some way this talking is taken as a definition of the difference between the human and animal, Aristotle will speak of *zoon echon logon* – living beings that have language. This *zoe* is not *bios*, it is animal vitality that has logos as activity, and eventually for Aristotle logic guides all propositional assertions that come out of speaking. Assertion is that something is said of something 'as' something.³ For Aristotle the 'said' can evoke conviction. Something is said, it lets something be seen, thus there is a cognition, and ultimately a re-cognition, *noein* – thinking. The *zoe* is determinable as *nous*, mind, when it is understood how logos lets the thinking and the perception appear. Logos alone is not only reason. One translation, so decisive for later logic thus fails, or, is lost in an indecidability of meaning; all unity of sensation and experience is a vital order belonging only in expression as the living being that speaks, speaking carries out perception and thinking, in Aristotle perception is aesthesis. Utterance reveals, it is not tied only to signifying; without this activity of speaking/showing there would be no human existence. Every addressing is an addressing of something as something, this is the relation of saying and showing in *phainesthai*, from which we have access to phenomena, access because we are capable of *dianoia*, the capacity to perceive in a unified way, which is what drives the discussion in the *Theaetetus*, namely how does our striv-

ing for knowledge open up the relation to being, and grasp the multiple ways of knowing in the intricate relationality in which the ontological as anthropological is immersed, so that we grasp truth as essentially human.⁴

Talking is the searching murmur, the obscure enactment of ontic difference. It moves in difference, and remains open simply through its own activity. This suggests it is self-founding, and by the same token self un-raveling: in an extreme version it is *causa sui*, self creating, and self destructing. It just is a rhythm in time. I am folding myself in silence, or as Merleau-Ponty will say, creating a hollow. There are many features which can be pointed to, in speech itself, dia-logos, through the logos, thus the act of dialogue. The ambiguity of talking is, however, for Merleau-Ponty a good ambiguity.⁵

This behavior, speaking, can also be anonymous, the I that is speaking and accompanying representations in the Kantian sense may also be a medium, a behavioral weigh-station of process, labial and plastic, not a guaranteeing 'observation point.'

In my talking I now speak, even report the talking of someone else, and ask what does 'else' mean? I stop over that word for a moment, it is said in 'or, else,' does it point out something that shows what is in openness? In saying you might want to think something 'else,' it is never determined. Something is always left undetermined. This is the idea of the phrase of La Bruyère discussed by Merleau-Ponty: 'Of all the possible expressions which might render our thought, there is only one which is best. One does not always come upon it in writing or talking, it is nevertheless true that it exists.'⁶ This, as we will ultimately see, is very close to the search for the architectonic in the 'idea' proposed by Socrates, and accounted for in Plato's *Phaedo*. Kant in the *Critique of Pure Reason* draws attention to this search in its crucial meaning, where he argues Plato sees an origin from ideas not just where human reason shows true causality, and where ideas become efficient causes (of actions and their objects), that is the moral sphere, but also in regard to nature; the regular arrangement of the world edifice, and presumably, Kant adds, of the whole natural order which shows distinctly that they are possible only according to ideas. Ideas in the highest understanding are the original causes of things, and only the whole of the combination of things in the universe is exclusively and fully adequate to that idea. The task is to rise from contemplating what

¹ I refer readers to **Plato: Complete Works**, ed. John M. Cooper (Indianapolis/Cambridge, MA: Hackett Publishing Company, 1997), 210.

² *Ibid.*, 288.

³ Here I refer the reader to the extensive discussion in **Heidegger's Platon: Sophistes**, Vittorio Klostermann, 1992, especially Chapter Three, section 26.

⁴ Heidegger also extensively situates the problem of 'excess' in perception in his lectures on *Theaetetus*, this topic has been recently discussed in a 2009 doctoral work, Megan Halteman Zwart, **What Simple Description can Never Grasp – Heidegger and the Plato of Myth**, Notre Dame, Indiana, December, 2009.

⁵ Clara Da Silva-Charrak, **Merleau-Ponty, le corps et le sens** (Paris: Presses Universitaires de France, 2005). In particular the discussion on pages 119-141, on the word, Saussure and the problem of expression.

⁶ This is cited in the abandoned work by Merleau-Ponty, and edited later by Claude Lefort and translated by John O'Neill, **The Prose of the World** (London: Heinemann, 1974), originally published in French as **La Prose du monde** (Paris: Gallimard, 1969). In this paper I draw on the English translation. The reference to La Bruyère, can be found on page 49.

is physical in the world order to an awareness of 'this order's architectonic connection according to purpose.' Here purpose is also 'ends' in the sense of *Zwecke*.⁷

We insist on the economy of speech, and at the same time insist that we do not reduce everything to simply a combinatorial game, where nothing new could eventuate. There is a kind of idolatry here: we believe that with a small number of means we can deliver every conceivable signification. When the child grows up it will as an adult deliver algorithms, and even practice science. Such science will make the attachment of things and meanings clear. The symbols created constitute conventionalism. Thus if relations for the algorithm must apply to another form, all that is required is new symbols and definitions. Then thinking only needs to discover what it has placed in thoughts. When we search then we find that all this talk points to something. We say something, and really are pointing to a state of affairs, sometimes only coming into view, which our speaking lets us recognize.

It would be an inconceivable shock to think that language speaks us, we have never had a thought we simply recombine what is there, and this on the pattern of processes which are physically reducible, even the I that is talking is simply an instantiation of a myriad and complex pattern, or if you like, a momentary penetration in being, that then exits its own action, for another action and so on until it is finally defunct.

This I is not thinking it is being thought, by the brain, and spoken by language, and belongs only to the eruption of forces that bend and curve into shape and appear. Expression now takes from the thinking what we can stand over, make intelligible. It is such an account that Merleau-Ponty's work *The Structure of Behavior* seeks to interrogate. The philosophy of expression and his consideration of structure and language have implications for all attempts to piece together the functional organization of the human nervous system. Seeing things and what lets something be seen is analyzed by Merleau-Ponty in a detailed rebuttal of methodological behaviorism. Because, as he argues, for example, nerve functioning is not punctually localizable; a kinetic melody is completely present at its beginning and the movements in which it is progressively realized can be foreseen only in terms of the whole; Merleau-Ponty takes it that this points to form. Organic structure is not just one of those structures that physics encounters, 'it is a structure in principle,' the concrete given is a kind of resistance to the approximate laws of physics, it is the opaqueness of the fact, shock of the unexpected, or the experience of the inexpressible quality.

Within the organism there is no submission to the general law sought for physical explanation, a law in a physical system gives at least the probable value of the present state in terms of the immediately preceding state, which of course means

that an exhaustive analysis of the de facto structures is inconceivable since the physical and chemical actions into which we decompose a function can themselves be produced only in a stable context, which means the laws explain a given structure, only by presupposing another structure. If one wants to maintain a biological category as constitutive of the organism and speak of vitalism then vital actions must be taken as having autochthonous meaning. The individual asserted as a 'specific capacity of reaction' is an ultimate category, or, irreducible model, *Urbild*, of biological knowledge. The partial phenomena, which physicochemical analysis intercepts in the living organism, are bound together by means of an original relationship. They all participate in a single structure of behavior and express the organism's manner of modifying the physical world and of bringing about the appearance in the world: 'of a milieu in its own image.'⁸ Thus, for Merleau-Ponty it is no longer the question of the reciprocal determination of the physicist who ideally derives each of them from the other, that is, the partial phenomena, which physicochemical analysis intercepts. Even with quantum a-causality in the image of the physical world, the positing of the organism that modifies its milieu according to internal norms of its activity is 'individual' in a sense which is not that of modern physics.

The argument is taken further, one must also distinguish the organism from the systems of modern physics because in physics the unities of indivisible behavior remain opaque givens, while in biology they become the means of a 'new type of intellection'; the particularities of an individual organism are more and more closely connected with the capacity for action; the structure of the body in man is the expression of character. The unity of physical systems is a unity of correlation, that of organism a unity of significations. Correlation by laws of physics leaves a residue in the phenomena of life which is accessible to another kind of coordination: coordination of meaning. 'The same reasons which make a completely deductive physics chimerical render a completely explanatory biology chimerical.' The apprehension of structures – the supremely cognitive capacity – is a kind of knowing that is irreducible to the comprehension of laws.⁹

The question of correlation in meaning and access is crucial. The unity of the biological is an ideal. A total molecular analysis would dissolve the structure of the functions of the organism into an undivided mass of banal physical and chemical reactions. 'Life is not therefore the sum of these reactions. In order to make a living organism reappear, starting from these reactions, one must trace lines of cleavage in them, choose points of view from which certain ensembles receive a common signification and appear, as for example phenomena of assimilation or as components of functions of reproduction, events are distinguished in the becoming, one must detach certain partitive phenomena from their real context and subsume them under an idea that is not con-

⁷ Immanuel Kant, *Critique of Pure Reason*, translated by Werner S. Pluhar (Indianapolis/Cambridge, MA: Hackett Publishing Company, 1996), 363.

⁸ Merleau-Ponty, in this regard, approaches close to Heidegger's discussion of *Umwelt*. See the recent work of Brett Buchanan, *Onto-Ethologies: The Animal Environments of Uexküll, Heidegger, Merleau-Ponty, and Deleuze* (New York: SUNY Press, 2008), 115-46.

⁹ I have discussed this in greater detail in *Images of Knowledge* (Amsterdam: Sun Publishers, 2005).

tained but expressed in them – ‘The meaning of the organism is its being’ – and the organism that biological analysis is concerned with is an ideal unity.¹⁰

Explanation cannot be coextensive with description, however full the taxonomy. The local states that are understood in terms of the organism’s preferred activity cannot be explained as in a present state by an immediately preceding state, and that then of the local state in terms of the total state. Such a double determination is impossible. Merleau-Ponty will further suggest that the gestures and attitudes of the phenomenal body must have therefore a proper structure, an immanent signification; from the beginning the phenomenal body must be a center of actions that radiate over a ‘milieu’; it must be a certain silhouette in the physical and moral sense, it must be a certain type of behavior. It is this immediate apprehension of structure that is the condition of possibility of all judgments of recognition – even what is expressed in emotion is also a judgment on this account – as well as all association of ideas. There are nuclei of signification that contain animal essences such as walking toward a goal, jumping over or going around an obstacle, eating bait, unities that reflexology cannot engender from elementary reactions, ‘and which are therefore like an a priori of biological science.’

The process of recognition is dialectical and not mechanical. There can be no simple de-composing into elements that have a one to one correspondence. In recognizing behavior as having a meaning, Merleau Ponty adds that in recognizing its dependence upon the vital significance of situations, biological science is prohibited from conceiving of it as a thing in-itself (*en soi*) which would exist, *partes ex partes*, in the nervous system or in the body, rather it sees in behavior an embodied dialectic that radiates over a milieu immanent to it. In bringing perception closer to action, the question to be put is: ‘Is action only still understood as vital action?’ It is a question that Merleau-Ponty puts to Bergson, as it were, the question of how objects of nature are constituted for us, and if it is to such objects that human actions are first addressed.

Returning to speech, how to account for that, how to move away from the Kantian declaration of experience, in the a priori and a posteriori, the first a world of external objects, that of inner states, and all other specifications of experience, linguistic consciousness or consciousness of other persons; a variety of a posteriori contents? Thus a word is only a sonorous phenomenon, a moment of externality, and that meaning and word is a conceptualized contiguity, the act of speaking a ‘banal conceptual operation accompanied by a phonation mechanism which is contingent with regard to it.’¹¹ The child recognizes faces, is drawn to the face and to sound. The relation of consciousness cannot be simply external, since it is not merely defined by representations, by the possession of certain representations human action cannot be treated as another solution to the problems which instinct resolves. Consciousness is a network of significative intentions that are

sometimes clear to themselves and sometimes not. How, for the child, does an indecomposable significance emerge in the moment of experience, ‘a face, a sound: a face smiling, a sound saying something’?

The sonorous phenomena are already integrated into a structure, expression-expressed; the face, even if it is touching one’s own face or that of another, the structure, alter ego emerges. There is no distinction between a priori and empirical context in this apprehension. How do speech and other persons emerge from the sensory phenomenon of the multiple given? Are the possession of a representation and the exercise of a judgment coextensive with consciousness? Briefly Merleau-Ponty will say, no.

If one abandons the multiple given as source of specifications, one will be obliged to abandon mental activity as the principle of all coordination. If one refuses to separate the relation from the different concrete structures that appear in experience, it is no longer possible to found all relation on the activity of the ‘epistemological subject’: consciousness is divided into different types of acts of consciousness as the perceived world is fragmented into discontinuous ‘regions.’ Consciousness is a network of significative intentions that are sometimes clear to them and sometimes on the contrary are lived rather than known. Confusion can still be the basis of human intentions. Somebody, something, is given to the child in advance of representations: ‘There is a sort of blind recognition of the object desired by the desire and of the good by the will.’¹²

Felt movements are linked by a practical intention that animates them, makes of them ‘a directed melody,’ and it becomes impossible to distinguish the goals and the means as separable elements. Consciousness recognizes the correspondence as such, that is, such a tactile or motor is given in the visual and inter-sensory organization of space, not in the activity of localizing reflexes or engendering visual space from tactile space. Thinking of speaking again, there is in this action no longer a simple cleaving to milieu, it is elevated to the status of spectacle, and taken possession of in the means of knowledge is a proposition and judgment, which seeks to confirm the real. Merleau-Ponty draws from Sassure, and remarks that language needs to be approached as the means of differentiation in the verbal chain and be seen as a methodical means of differentiating signs from one another, and thus constructing a linguistic universe of which we later say that it expresses a world of thought, only of course when it is precise enough to crystallize a significative intention and thus be capable of such construction. But like the visual field, the field of language ends in vagueness.

In possessing language as a principle of distinction, one is not working with a known quantity, as it were, of vocabulary. It, language, permits us to have at our disposal a certain number of signs, and in fact, ‘language never says anything’; it invents a series of gestures, which between them

¹⁰ Maurice Merleau-Ponty, *The Structure of Behavior*, translated by Alden Fisher (Boston: Beacon Press, 1963), 152 and following.

¹¹ Ibid., 171.

¹² This whole argument needs to be supplemented by the extensive lecture course notes of Merleau-Ponty 1949-52, published by Cynara, Paris, 1988, which has the most extensive treatment of the child’s acquisition of language.

present differences clear enough for the conduct of language, to the degree that it repeats itself, recovers and affirms itself and purveys to us the palpable flow and contour of a universe of meaning. This event of language is always subject to the twin demands of expressivity and uniformity. Speech makes every artificial language irregular, as human thinking makes every artificial intelligence irregular and full of exceptions. What we discover is the concrete universality of language, which can be different from itself without openly denying itself. Signification and sign belong ultimately to the perceptual order, and linguistics, Merleau-Ponty notes, has not always realized to what extent its own findings remove us from positivism. The expressive power derives from a part in a system, and in coexistence with other signs. None of this is ever fully given, as it would never be possible to have complete expression.

Thus what defines man is not his capacity to create a second nature, economic, social, or cultural – beyond biological nature, it is rather the capacity of going beyond created structures in order to create others.

This power of choosing and varying points of view permits man to create instruments, not under the pressure of a *de facto* situation, but for a virtual use and especially in order to fabricate others. The meaning of human work therefore is the recognition, beyond the present milieu, of a world of things visible for each 'I', under a plurality of aspects, the taking possession of an indefinite time and space, and one could easily show that the signification of speech or that of suicide and the revolutionary act is the same.¹³

There is a fundamental ambiguity then in the human dialectic, use objects and cultural objects would not be what they are if the activity which brings about their appearance did not also have as its aim to reject them and surpass them: this is also an essence for mind, which is not construed as specific difference added to vital or psychological being, which would leave intact a sphere of self-enclosed instincts in the human.

The talk about talk, and mind and instincts, and the network of consciousness raises the dialectic of the real and the problem of the unity of world. The question of whether there is a given architecture of such vital and human orders, that is isomorphic with the access to what is called mental states, or the brain, and in what way the relation between a natural history of mind, and the unity that belongs to the posits needed to understand the world is as can be seen in the next section: the questions that remained fundamental in the autobiography of Socrates, and still remain of such significance to current discussion in the philosophy of mind, consciousness research, the discussions on eliminative materialism. We cannot go to the Phrontisterion without a transition, and again it relates to the problem of

how logos and *eidos*, the various intepenetrabilities of reason, speech, even philosophy are interwoven.

I am talking to myself, but cannot say where that is taking place. The words seem to be in the head, if they were heard from outside then it is either others talking or I am delusional. What way could I find out the unspoken, unheard word, that is going on, as much on the surface of the skin as any imputed 'inside' that I see which has already run away? What am I going to say next? I don't know. That is not what I was thinking; it came, as an eruption into the open of the question. The hollow always wants meaning. Where did it start that need for meaning?

If we would call it a species of behavior, what would that tell? The behavior is: I am talking to myself. Is it just an epiphenomenon, the result of other processes, which I cannot investigate except by a non-first-person stance? It can only be made intelligible by giving it a structure, taking the fact of it being behavior as the mark of mental. The process of such talking is not that of public speech, it cannot only belong to the public realm, and gains its intelligibility through structures to which it belongs, it cannot just be private or it would have ceased to mean. It has to do with language. To speak of activity seems to burden the statement. The initial puzzle is when I say I am talking to myself, one asks, who is talking to whom, or, more grammatically, to who is one talking when talking, or who is speaking with whom. None of the ways of asking this is easy. I speak with myself, run things over in my mind, puzzle, find words and say something. Must communication always lead to 'rhetoric,' and thus betray the truth for thinking in the false address of others by philosophy?

The Socratic description allows for sudden leaps, it eventuates in propositional utterance, in stating opinion, something is affirmed or denied. One holds an opinion, not with someone else but with oneself. How can such a propositional account be founded, grounded? Who then is the self that the 'I' is said to be addressing, since this doubling is required to understand the locution, which then must ask: is this addressed 'self' out of the I that is speaking, separate, or is it an 'other'? What world, what other, what mind is in play? It would be instructive to return to Plato and therefore Socrates.

Socratic Reflections Of the three most significant surviving ancient sources for our knowledge of Socrates: the *Dialogues of Plato*, Xenophon's *Memorabilia*, and *The Clouds* of Aristophanes, all point to the significance for Socrates' intellectual development of his early study in physics, or, inquiry into nature.¹⁴ The comedy of Aristophanes has Socrates in the 'think-tank' (Phrontisterion) where the main studies taking place are mapping, providing an explanation of

¹³ Merleau-Ponty, *The Prose of the World*, 175. Freedom of language is the open which contains the possibility of non-possibility, and is the event that can only be owned within the human truth, which is always in concealment.

¹⁴ For convenience I have used the following; for Plato: *Plato Complete Works*, ed. Cooper, and for passages from the *Phaedo*, the G.M.A. Grube translation at pages, 49-101. For *The Clouds* of Aristophanes see: *Aristophanes Clouds, Wasps, Peace* ed. and translated by Jeffrey Henderson, the Loeb series volume (Cambridge, MA: Harvard University Press, 1998). For the *Memorabilia* see: *Xenophon IV: Memorabilia, Oeconomicus, Symposium, Apology*, the Loeb series (Cambridge, MA: Harvard University Press, 1923).

meteorological phenomenon, and engaging in 'rhythm-analysis,' of poetry; what we would call cartography, natural history, and literary criticism. However, it is the issue of 'natural inquiry,' the study of meteorological phenomena, that is the most laden with implications, and the main activity of the 'Thinkery.' Aristophanes has unerringly pinpointed what the most fatal aspect of contemporary natural investigation could deliver, and the dark ending of the play confirms: sophistic intellectualism leads to civic violence and destruction of all 'natural' relations.

Strepsiades, the farmer, who had married above his station, and is desperately seeking a way to avoid paying his debts – which the social ambitions of his wife and son have caused to mount – has gone to the Phrontisterion in the hope he might learn from its teaching, and the reputation of the school for rhetoric, how to 'make the weaker argument the stronger': the deep 'principle' of sophistry: if such an egregious intellectual opportunism can be said to have a principle. However much Strepsiades is shown in character as a buffoon, or how mixed the Athenian audience was that attended the play, it seems that the in-jokes and the broad farce can rely on an easy and immediate identification of the hypocrisy of the newly imported sophist educators to Athens. Even if there is a subtle impossibility in lumping Socrates among their number – that he is deliberately unrecognizable, to underscore the main comic target in mind – or, that one can argue his obvious failure to succeed, makes a mockery of the whole enterprise of teaching: nevertheless, on the most straightforward reading, Aristophanes underscores the sophistic connection of Socrates by comparing him to the teacher Prodicus, who was among the first generation of Sophists to come to Athens.¹⁵ Consistent with the practice of these first 'professional educators,' the fees charged to Strepsiades are enormous. As Karl Kraus knew, effective satire requires mimetic contiguity to succeed best.

In the play, the exchanges between those inspired personifications Good Argument and Bad Argument capture the main aims of sophistry, which as Plato amply demonstrates, in the Sophist is very difficult to define, and refute. Sophistry is as slippery as an eel and capable of lyre-bird mimetic skill when it comes to seeming to be 'philosophy.' That Good Argument and Bad Argument, in their quasi-allegorical personification, reverse the order of things, leaves one with a strange vagueness, and this too is part of the Aristophanic joke: the sophists are the real purveyors of an 'inverted' world, and at the same time one as nebulous, and changeable as the personified goddesses, the Clouds.

The later image, in the tradition, of the figure of Socrates is ultimately deconstructed from the one created for stage by Aristophanes and indicates the principal version of his life that Plato had to overcome, disassemble, and reinvent; for the Athenian followers of the next century, when he was writing.

The rascally depiction of Socrates, produced by Aristophanes, has Socrates and his students engaged in mumbo-jumbo and flamboyant quackery within an esoteric setting; which fuels a principal charge of the satire against so-called 'intellectual' life; in the cloistral setting of the Phrontisterion: the main feature of the inmates is pallor and a continuous predilection for confidence trickstering. The Phrontisterion is the asylum of the Hochstapler. Socrates is the reigning genius.

The Aristophanic portrayal is anything but flattering. The twister and huckster character, Socrates, has defrauded a man of his cloak in order to sell it to feed the pale inmates of his Athenian 'ration(s)-ality shop.' His arrogant students are liggers of the revealed mysteries; and are inevitably indiscrete, superior, and rude by turns. The deliberate playing up of mystery, metaphor, and solemn language, even in the spoken rhythms, is an ingenious comic device, and scores another hit against the sophists for humbuggery: a pun which the play would happily support.

Strepsiades is brought into the presence of Socrates, while gawking around stupidly at the instruments and paraphernalia of the research institute. He is the slack-jawed country bumpkin, and by the same tokens the 'cute hoor' on the make. These instruments may include mystifying elements of the newfangled science that uses visual means to communicate cosmological information, although they serve apparently an intensely practical purpose here.¹⁶ The brain trust is fully equipped, and the image will have a long descent, ending up as Swift's Academy in *Gulliver's Travels*.

Socrates makes the first of his physical claims – he is hanging suspended in a basket in order to better understand the nature of meteorological phenomenon:

Socrates: 'I tread the air and scrutinize the sun.'

Strepsiades: 'So you look down on the gods from a basket? Why do you not do it from the ground, if that's what you are doing?'

Socrates: 'Why, for accurate discoveries about meteorological phenomena I had to suspend my mind, to commingle my rarefied thought with its kindred air.'

The text here at l. 229-30 is directly similar to the statements of Diogenes of Apollonia whose fragments as given in Diels-Kranz, reads, in B4: 'Further the following are also major signs. Human beings and other animals are kept alive by the air they breathe. This (air) is both soul and intelligence for them... And if this departs they die and their intelligence lapses'; and he adds in B5 to that claim: 'And it seems to me that the thing that possesses intelligence is what people call air, it controls everything and governs everyone. This thing seems to me to be a god, to extend everywhere, to dispose of everything, and to be present in everything.'¹⁷

¹⁵ Gábor Betheg, 'Le problème des représentations visuelles dans la cosmologie présocratique: pour une histoire de la modélisation,' in *Qu'est-ce que la philosophie présocratique*, eds. A. Laks and C. Louguet (Villeneuve d'Ascq: Presses Universitaires du Septentrion, 2002), 382-415.

¹⁶ The reference to Prodicus, which refers to Prodicus of Ceos, frequently mentioned in the works of Plato, is found here at *Clouds*, l.360.

¹⁷ I have used the 7th edition of Hermann Diels, *Die Fragmente der Vorsokratiker*, ed. Walther Kranz, published in three volumes (Hildesheim: Weidmannsche Verlagsbuchhandlung,

Strepsiades is suitably awed by the dangling sophist. The interest in, *ta meteora*, meteorological phenomena, is crucial for the identification of Socrates with the sophists, and also atomists, in their concerns with the natural sciences. In his first exposure to the introduction of rationality and consciousness via method in argument, he will be left baffled by what Nietzsche once referred to as the Apollonian logical schematism of Socrates. The bantering mockery of Aristophanes shows that Socrates forgets from one section to the next that he contradicts things he has said earlier. The exchange is rapid and preposterous. Despite being depicted as a nitwit, Strepsiades seems informed on some essentials of the 'Thinkery': Strepsiades: 'Now teach me one of your two Arguments, the one that repays no debts. Whatever fee you charge, I'll swear to you by the gods to pay in cash.' Socrates: 'What do you mean you will swear by the gods? Firstly gods are not legal tender here.... Would you like to know the truth about matters divine, what they really are?'

Socrates here initiates Strepsiades in a parody of the mystery cults, and then explains that the Clouds are goddesses, whose shape shifting can reveal the characters of those on earth. Strepsiades tries to raise a stuttering objection, dismissed out of hand by Socrates, in a further parody of the famed Socratic eristic – there is no dialogue, questions are dismissed instantly. The abusiveness and violence seeps in everywhere and is another main point of what Aristophanes is holding up to ridicule, the competitive aggression of intellectuals who pretend to be caring of the welfare of the other:

Strepsiades: 'Come now, by Earth, doesn't Olympian Zeus count as a god with you people.'

Socrates: 'What do you mean Zeus? Stop babbling. Zeus does not even exist.'

Strepsiades: 'What are you talking about? Then who makes it rain? Answer me that one, first of all.'

Socrates: 'These do, of course! And I'll teach you how with overwhelming proofs. Now then: where have you ever yet seen rain without Clouds. Though according to you, Zeus should make rain himself on a clear day, when the Clouds are out of town.'

The Clouds, as goddesses, had come on stage, and announced their ever-shifting capacities, which is clearly not remote from the skills of sophistry that Bad Argument displays over Good Argument in the play. Crucially, Socrates is given the phrase that denies the traditional pantheon, and commits him to reductive materialism: *oud esti Zeus*, 'There is no Zeus.' (*Clouds*, 367) and to Strepsiades objection that the disequilibrium of forces operate laws of motion by the power of Zeus, Socrates replies 'Oh, no. It's an atmospheric vortex.'

The reference to *dinos*, vortex, eddy – basic in atomist thinking – in ordinary daily speak meant also goblet, the object said to be outside the 'Thinkery' which was there in the place of a statue of Hermes – bespeaks not just the attack of the

poet on the philosophers, as engaged in subtle deceptions, but constitutes a very knowing pointer by Aristophanes to the natural philosophers, most especially Anaxagoras, whom he knows to have been in the circle of Pericles and who is most likely to be as David Sider has maintained the originator of the vortex theory, and whose works probably antedates Empedocles and his more detailed description of vortex action.¹⁸

One can equally see that another source for this is Xenophanes, whose direct refutation of the traditional designation of St Elmo's fire and the Dioscuri is closely connected to his 'meteorological' studies. The best example being his rejection of the rainbow Iris as divine, or, the kind of being as given in Homer and Hesiod, insisting rather it is in fact a colored cloud. It was from natural phenomenon that explanations were to be sought B 28, B 30, and his explanation of the Dioscuri, St Elmo's fires, are not, as Patricia Curd once remarked: 'cheering communications from the gods to frightened or lonely sailors' – rather, they are little clouds glimmering because of their motion.¹⁹

The radical revision does not necessarily commit one to atheism in the modern sense. In some way the divine, a god in Xenophanes, is just a removed, immutable, thinking, 'mind which knows everything,' *noou phreni panta kradainei*, which does not require prayers and worship; is remote from humans, does not interfere in affairs and cannot be known better through revelation.

It is in that sense that the divine is an 'other mind' which knows and has awareness without enquiry. Gods do not need to study or learn. Mortals project their images of gods out of delusion and deficient sense of what their own enquiry can attain. The limitation of human understanding also is stressed, and it requires experiment and openness. One can also find the same claim in the earliest fragment given to Alcmaeon: gods know, humans with regard to knowledge are essentially limited.²⁰ The limits-of-reason problem also is sounded in Heraclitus, where confusion reigns between sleeping and waking in awareness because mortals do not understand that logos is intrinsic to a knowable and intelligible world, and requires a certain kind of soul, dry and fiery, to grasp this inner intelligibility.²¹ One can also argue that in Parmenides even the message of the goddess is subject to critical revision – in other words philosophical examination.²²

This comedy of Aristophanes from about 423 BC, however notorious its lampooning of Socrates, lays out the kind of connections that would be directly contributory to the later charges of impiety

1954). In further notes abbreviated following convention, to DK, and reference. The work of Ioannis Kalogerakos *Seele und Unsterblichkeit*, Teubner, Stuttgart and Leipzig, 1996, contains superb secondary bibliographies for Pythagorean and Orphic material, and inter alia the main pre-Socratic thinkers. Some of Kalogerakos can be supplemented from articles in the Stanford Encyclopaedia of Philosophy, which has recently added to articles on pre-Socratic philosophy in its entries.

18 For the most detailed discussion of Anaxagoras and the theory of vortex, see David Sider, *The Fragments of Anaxagoras* (Sankt Augustin: Academia Verlag, 2nd edition, 2005). Notes on Fragment 12 can be found at page 133.

19 Patricia Curd, 'The Presocratics as Philosophers,' in Laks and Louquet, *Qu'est-ce que la philosophie présocratique*, 115-38, especially page 127.

20 DK, sub. Alcmaeon, 210-6.

21 *Heraclitea*, ed. and translated by Serge Mouraviev (Sankt Augustin: Academia Verlag, 1999). Especially the 2002 volume *Recensio: Fragmenta* III.3.A, 160-74.

22 For Parmenides see Patricia Curd, *The Legacy of Parmenides* (Princeton: Princeton University Press, 1998).

brought against Socrates by Meletus that led to his condemnation to death. From Plato's *Apology* we know that Meletus directly conflates Socratic teaching with that of Anaxagoras – repudiated by Socrates.²³

The outrageous satire nevertheless reflects fairly accurately contemporary scientific discussion, while it canonizes an absurdist view of theoretical and intellectual activity that has had a curiously enduring hold, not just as the expression of mythology (that is hatred of reason, a condition first identified by Socrates in the *Phaedo*), but as a standard attacks on intellectual life pursued as the phrase has it 'for its own sake.'

Aristophanes' knowing and mocking distortions of the life of Socrates is the earliest evidence we have that Socrates is linked much more closely to the concerns of pre-Socratic philosophy than has often been acknowledged. In the revived debates in the first half of the fifth century the main source for such theories was to be found in Empedocles, and in the Sicilian School of Medicine, and similarly can be traced directly to Anaximenes. By the mid-fifth century it had been revived, according to Burnet, by Diogenes of Apollonia, whose teaching is almost identical to that attributed by Aristophanes to Socrates in *The Clouds*, although the significance of Diogenes has been recently reconsidered by David Sedley.²⁴ Against this one might insist on setting the detailed rebuttal of Theophrastus in *De Sensibus*, which indicates not just the renewed interest in philosophical predecessors but the need to counter arguments that would make the research program of the Lyceum redundant.

In a certain way it would be better to see Socrates as directly filiated with Anaximenes and Anaxagoras, and to abandon the late-eighteenth-century division within ancient philosophy between Socratic and pre-Socratic. This doxographical chain would square directly with the view of Diogenes Laertius in establishing a historical context that 'the succession passes from Thales to Anaximander, Anaximenes, Anaxagoras, Archelaus and Socrates, who introduced ethics.' Further, Diogenes Laertius claims that Archelaus was the pupil of Anaxagoras and the 'master of Socrates,' and Archelaus was the first person to import the study of 'natural philosophy' from Ionia to Athens, and he was called the Natural Philosopher, because natural philosophy terminated with him, as Socrates introduced ethical philosophy.²⁵

Mario Montuori, in an analysis similar to, but not dependent on, those of Leo Strauss, has argued most extensively for the significance of Aristophanes. The various questions that arise from reading the satire, comedy, is whether it really announces within a decade of the presumed activity of Socrates in Athens, the claims of natural enquiry – used here and further instead of 'science' – required a commitment to atheism, the repudiation of the gods and thus a teaching that inevitably corrupted youth. The reading of *The Clouds*, however one wants to take its evidential status in respect to the later sources, Xenophon, Plato, or even later

Aristotle, can hardly leave much doubt about the view that about 25 years before the trial of Socrates, as Montuori states: 'Aristophanes had formulated in precise terms a denunciation which corresponds perfectly on all counts with the later judicial indictment.'

Indeed, Plato literally, in the *Apology*, draws an exact rebuttal point for point to the Aristophanic portrait, which argues for its tenacity and significance, requiring Plato to create a counter-imago, one that at the same time concealed 'that dangerously subversive spirit' which characterized the moral, political and religious aspects of Socrates' conversation – the most notable feature of which, as Hegel was the first to argue, is the 'interiorization' of knowledge, the exteriorization of dialectic as the restless need for enquiry. With its ironic play this undermined the traditional belief in the gods, pointing instead to a human wisdom which is essentially 'political,' that addresses how life in the city is lived as a way of being for individuals and the degree of awareness they have when giving an account of this, so, Euthypro must give an account of piety, Hippias of the beautiful, Charmides of what is wisdom, etcetera. None of the interlocutors know themselves, and knowing oneself is, anyway, an ongoing search, which applies from the individual to the social, the polis. Montuori – following Hegel – suggests that Socrates has transferred the 'divine,' to *theion*, into the intimacy of the individual soul, *psyche*.²⁶ The point-for-point rebuttal of Aristophanes and the interiorization of the divine are both moot in the 'Theages' dialogue, which increasingly looks as if it could be accepted into the Platonic corpus.

This is the move to the ethical suggested in the Diogenes Laertius account cited above. However, the very metaphor of innerness signals a complex situation for understanding the Socratic move as so described, and for the radical individualizing which makes of Socrates a thoroughly existential figure (this is the view of Patočka). He is the supreme dissident who conducts critique as the morality of individual finitude. The dialogues of Alcibiades and Euthydemus argue for an account of Socratic wisdom that is directly political.²⁷

One needs to proceed with great caution. The problematic is not one of trying to establish the 'out-thereness' of the world, and the 'in-thereness' of consciousness. There is no cogito that alone escapes doubt and leaves the rest of the phenomena to skeptical questioning, nor indeed is there a precise sense of location for consciousness, nor any clear etiology for mental states, or priority for different kinds of awareness. As the conclusion of this paper hopes to demonstrate, we need to

²³ *Apology*, 26, d-e, see **Plato Complete Works**, 25.

²⁴ David Sedley, **Creationism and its critics in Antiquity** (Berkeley: University of California Press, 2007). See chapter 3, 75-92. Also see John Burnet, **Plato's Phaedo** (Oxford: Clarendon Press, 1911). For a detailed analysis of Theophrastus and his rebuttal of Diogenes, the best account is Han Baltussen, **Theophrastus Against the Presocratics and Plato** (Leiden: Brill, 2000), 178-85. Here Baltussen considers the text of Theophrastus *De Sensibus*, and his report and criticism on the theory of Diogenes. The principle objection, and danger, being that: 'Thinking with air leads to the unacceptable situation that remembering and thinking would be possible in all parts of the body' (184).

²⁵ Diogenes Laertius, **The Lives of the Philosophers**, the extracts are conveniently gathered in **Socrates, a Source book**, compiled by John Ferguson (Open University, Macmillan, 1970).

²⁶ I have drawn freely here on Mario Montuori, **Socrates** (Amsterdam: J.C. Gieben Publisher, 1988).

²⁷ I have consulted the Italian translation in the bilingual edition edited by Giuseppe Girgenti and Martin Cajthaml: Jan Patočka, **Socrate** (Milan: Rusconi Libri, 1999).

rethink our talk of the ‘mental’ in general and the kind of ontic division that sorts out world and mind in an over spatialized metaphor, or in an indefensible substance ontology.

In the *Memorabilia* of Xenophon, Socrates is engaged, according to Xenophon, in ‘*historia peri phuseos*’ and ‘*peri phuseos*’ historian, inquiry about nature. Leo Strauss rates Xenophon as a very significant Socratic source, against earlier views that he had embroidered a quilt, much of it from secondhand patchwork. Xenophon, even given his gentlemanly hesitations, is in some sense also the first hagiographer, giving the tradition its first Saint Socrates. Cicero echoes the Xenophontic direction, maintaining that Socrates had challenged the ‘meterologia,’ and that Socrates is the first philosopher to bring philosophy down from the heavens and to put it in the city, and households, and enquire about the good and the bad in a life – ‘*Socrates autem primus philosophiam devocavit e caelo et in urbibus conlocavit et in domus etiam introduxit et coegit de vita et moribus rebusque bonis et malis quaerere*.’²⁸

In this account Socrates is a distinct rupture with the earlier philosophers, and this squares with the view of Aristotle who eliminates Socrates’ interest in natural enquiry, in favor of ethical preoccupation. This involved Socrates in constant speech. The decree of Diopieithes of 433–432 BC shows what was at stake for the Athenians, ‘not believing in the gods will be taken as a crime against the state, as also those who teach doctrines with regard to the heavenly bodies.’²⁹ The connection between astronomy and atheism is also stressed by Plato at *Laws* XII, 967. This may go toward understanding the *invenio* of the Platonic Socrates as a form of defense for Plato and his students in post-Socratic Athens. Xenophon is at pains to point to the piety of Socrates.

In Aristophanes it is clear that the enquiry into nature is set against the charge of impiety and ‘corruption of youth’ which flows from *asebeia*, an undimmed thesis that is so prominent in Aristophanes. If one takes it that Socrates is embattled against the radical materialists, if you like, such as found in the atomists, where chance and accident rule, then the primary commitment of Socrates is to a naturalized form of theology in which the intelligibility of the cosmos must require an argument from design. For Sedley this points to not only the significance of Xenophon as a source, but to the beginning of the argument from Design.³⁰ However, Socrates does not just take the up-in-the-airness of the astronomical, the very target of *The Clouds*, and bring it to Earth, thus ‘naturalizing’ it, he also takes the divine inward and sets the direction for what is in essence a denial of the public myths of the pantheon. It is this aspect of the Socratic that is clearly of such significance for later thinkers such as Plotinus with his remarkable phrase *panta eiso* – everything is within.³¹ The divine, to *theion* is accessible as such, and via the existential play of sign and voice, which is the *daimonion* of Socrates. This certainly is the report of Xenophon.

Turning to Plato’s *Phaedo*, and thus the portrait of Socrates waiting for his death in the prison, we have Plato’s account, and also the fullest source for the early intellectual development of Socrates, an aspect of his character which has often been downplayed, namely his formation and direct intellectual inheritance in Athens. It was the great achievement of Patočka in his study on Socrates to emphasize the education of Socrates in Athens and to point to his lively and studious interest in the work of earlier philosophers, especially Anaxagoras. Given that Socrates has vivid and frequent contact with Alcibiades, and therefore with the circle of Pericles, it is no surprise that he knows of the work of Anaxagoras, who was also directly connected with Pericles. Even if Plato’s later reference to the buying of a book of Anaxagoras for a drachma seems slightly scathing. The figure of Anaxagoras, who was to be exiled from Athens for ‘impiety,’ also prefigures the eventual fate of Socrates.

The picture of Socrates given by Plato, in which an intellectual autobiography as related by Socrates, therefore seems credible even if the historical details cannot ultimately be verified. One of the most remarkable features of the description that Socrates gives of his early studies, his youthful preoccupations, is his reference to the brain as a source of ‘what we think with.’

The question of the brain as the source of thinking and the provenance of this idea, which was not taken up by Aristotle in his studies, although mentioned by Theophrastus in *De Sensibus*, 25, was lost to philosophical discussion, until the scientific researches of Descartes.³² Socrates replies to Cebes, confirming that the problem he has raised requires deep and serious thought, and that it requires a thorough investigation into the causes of generation and destruction. Socrates offers to give an account of his experience in these matters if Cebes consents to listen, which he does graciously. Socrates proceeds to inform Cebes that when he was a young man he was very keen on the ‘wisdom’ that they call natural science. Clearly the translation of *peri physeos* as natural enquiry or science is fraught with the later meaning of the term, especially science. The most significant reading of the Greek *physis* is found in Heidegger and turns away from the reification of nature which the Latin translation of Cicero as *natura* imports, thinking of phenomena as substance like enduring things, or, *res*.

Heidegger’s reading of *physis* in his 1939 text sees rather the relation of *physis* to genesis, the being/nature relation, and not the being of nature, as objective genitive. Heidegger probes Aristotle’s *Physics* B1 to claim a route to understand the pre-metaphysical capture of *physis*, and thus point to the antecedent earlier Greek conception. The search for cause is the founding of relation-

²⁸ Tusculan v, 4, 10–11. For a discussion of this passage from Cicero Tusculanum, and Xenophon, see; Romeyer Dherbey and Jean-Baptiste. Gourinat, *Socrate et Les Socratiques* (Paris: Vrin, 2001).

²⁹ For this see ‘La Cosmologie de Socrate dans les Mémoires de Xénophon,’ in *Socrate et les Socratiques*, 97–119.

³⁰ Sedley, *Creationism and its critics in Antiquity*.

³¹ Walter Burkert, *Kleine Schriften VIII*, ‘Towards Plato and Paul: The Inner Human Being’ (Göttingen: Vandenhoeck & Ruprecht, 2008), 167–85.

³² Baltussen, *Theophrastus Against the Presocratics and Plato*.

ality as the way of Being.³³ A significant claim advanced by Burnet is that the source for the idea announced by Socrates derives from Alcmaeon of Croton, and not only the idea of the brain as the seat of thought, but further the empirical procedure indicated in the form of efficient causality rejected later by Socrates. Nothing remains more puzzling than the meaning of 'enquiry into nature' in which Socrates is engaged. How, we might ask does he explain to Cebes what this has entailed and why has he abandoned it, if he has?

Part of the difficulty in assigning meaning to what Socrates is saying is the very material he has inherited, on one side the physiological reflection of Alcmaeon and on the other the theory of Anaxagoras. Socrates is speaking to Pythagoreans, and it may be that he took the view about the brain to be Pythagorean teaching, if he also thought of Alcmaeon as a Pythagorean – which Aristotle denies, but which is asserted by Diogenes Laertius.

Theophrastus gives credit to Alcmaeon for distinguishing between the understanding and sense perception, and as being the first to argue that the brain is the central organ of sensation and thought. It is plausible to think that Theophrastus is reporting views from the lost work on Alcmaeon of Aristotle, whom he serves faithfully in his doxographical constructions. Alcmaeon of Croton is of direct significance in many ways. With him we have, according to the tradition, a possible direct pupil of Pythagoras, the first known Greek *physiologos* to conduct empirical enquiry, and the first to raise the question of the limits of knowledge. The fragments published in Diels-Kranz, along with the *testimonia* remain disputed, including his dates. Part of this confusion stems from the desire to secure a founder for, the originator of x, a compulsion which is so much part of the Greek historical imagination, and is a consistent feature of Herodotus's writing. If Alcmaeon is the first then this is a claim that requires secure dating, whether he is early fifth or mid-century, if the latter then the conventional view of Aristophanes is well informed, if earlier, then he is the 'original' and a major pre-Socratic, if neglected, figure.

Another significant claim made about Alcmaeon would suggest that he had theorized the problem of the endurance of the soul that he had discovered through dissection of the channels – *poroi* – linking the optic nerves to the brain, and indeed the senses to the brain, and while advancing empirical research also indicated the limits of human understanding. Further, he did not create a rigid ontic differentiation between animals and human 'awareness.' There is *testimonia* that suggests his influence on Plato's conception of the immortality of the soul, a lost separate treatment by Aristotle, for whom the empirical theory was of direct value, and direct influence on the Hippocratic corpus text about epilepsy, 'On the Sacred Disease': which further complicates the picture, as the Hippocratic writings that are assignable to the fifth century are often anonymous. Again context is lacking for the fragments, and there is the usual difficulty of interpretation.

What is the semantic range of the terms being used by Socrates within Greek usage of this date? Let us say the middle of the fifth century. What, one might ask, counts for 'mental,' consciousness, brain states in pre-Socratic and Socratic philosophy? How is intelligence identified and what is the source for the enquiry about the structural and intelligible in nature and its consequences for understanding the microcosmos of the individual human? The closest summary on Alcmaeon of Crotona is found in Theophrastus *On the Senses* 25–26, which is the single richest source for pre-Platonic and Aristotelian accounts of ancient theories of the senses and mental life. The complexity can be indicated by the following brief observations, which have recently been studied and summarized in the work of Robert Zaborowski, *Sur le sentiment chez les Présocratiques*, published by Stakroos in 2008. Of the three terms that have most to do with the affective states among the pre-Socratics, *phren*, *noos*, *thumos*, we find even in their earlier Homeric use that there was a blurring of meaning, and they along with other usages, such as *kardia* and *psuche*, became impossible to distinguish. There is, what Zaborowski calls, *un flottement sémantique*.

- For *thumos*, the range of lexical meanings offered has been immense, from soul, spirit as the principle of life, feeling and thought, especially strong feelings and passion, desire, inclination, to, mind, temper, will, courage, or very specifically the seat of anger, even the heart as the place of emotion, joy or grief.
- *Phren* is taken as the midriff, or heart as the seat of passions, or mind as the seat of mental faculties, perceptions and thought, with a sense also of will and purpose, in Xenophon for example as thought, mind activity, in Heraclitus as wisdom intelligence, in Democritus as thought, and in Empedocles as mind/consciousness. The locution 'a thinking heart' is possible.
- *Noos* is understood as mind, as employed in perceiving and thinking, sense, wit, and more widely as employed in feeling, deciding, as in an act of mind, as a faculty of thinking, intellect, a way of judging, feeling; it includes the distinctions of a spirited intelligence, even as a cosmic principle.

Of course one could return to each term and in specific authors find different nuance and emphasis, thus, *thumos*, which as a noun has the meaning of releasing with fury, or also burning, creating smoke, offering a sacrifice, can also be rendered an energy that is intellectual.

In the specific context of Plato, for example, as used in Cratylus 419 e 1–2, the definition offered for *thumos* is that it refers to impulse. The sense is one of boiling over, of impetuosity, and *thumos* becomes of great significance for Plato in his understanding of the tripartite division of the soul, since it is the *thumoeides* that plays a central role in the distribution of psychic and affective forces, and the balance between which is a large analogy for the kind of harmony and balance of the city in the Republic. It could also mean a kind of irascible, irritable energy that is the nervous life itself. *Phren*, presents equally complex associations, as the word seems to be linked with the

idea of doing, accomplishing, there is even one etymological suggestion that it is related to the Sanskrit *baharati*, with its sense of self-moving.

The meaning of *noos* remains even more puzzling; with one scholar renouncing etymological and linguistic speculation still plumbing for the sense in the derivation from a root meaning of 'to sniff,' of smell then being the most direct analogue of mind.

Returning to the passage in the *Phaedo*, it is of clear import to Aristotle later and of course to his most zealous pupil Theophrastus. It indicates in *nuce* how one can take *peri phuseos* in the broadest sense, for the early Socrates, namely the knowledge of the causes of things, why it comes to be, why it perishes, why it exists. The definition tallies well with the later research program of Aristotle. But from the text of Plato it is the problem of genesis and destruction that is prior for Socrates, and this cannot be pressed into the later causal account of Aristotle. Socrates admits to wavering in the search 'I was often changing my mind in the investigation,' and speculating on several different kinds of sources of questions: Are living things nurtured when heat and cold produce a kind of putrefaction as some say, or, do we think without blood, or is it air, or fire, or none of these? This line of enquiry also raises the question: Does the brain provide the senses of hearing and sight and smell, from which comes memory and opinion? Is it then from the brain supported senses that memory and opinion are formed and do they stabilize and become knowledge?

The investigation he conducted convinced Socrates that he had no aptitude for such research, not because of intellectual incompetence but of what we could designate as the blindness to commonsense phenomenism that had been a secure kind of awareness before he undertook the questioning which had now eventuated. It is the first blindness that Socrates mentions. 'The investigation made me quite blind to the things which I and others thought was clearly known before, so that I unlearned what I thought I knew before, about many other things.' The example he cites about growing, and one person being taller than another challenges the relationality of the phenomenal itself, because as he says to Cebes he now so far from knowing the cause of anything, that he cannot he will not allow himself say when one is added to one either the one to which it is added, or the one that is added, becomes two.

The example is well calculated in a Pythagorean discussion, where the nature of number was ascribed as real, that everything which existed had a number, and the notion of one, which was both odd and even, and capable of generation to the dyad, remained a significant doctrine of the group. The line of thinking is best seen in *Philolaus*. Socrates claims to be confused about basic mathematical operations, addition, and then division, since previously the cause of becoming two was addition, and now he sees it as division. In addition the number became two by coming close together, and in division by separation.

Despite his confusion he rejects the older account of causes, and found from listening to a reading from a book of Anaxagoras: 'And I heard someone reading, as he said from a book of Anaxagoras, and saying that it is Mind that directs and is the cause of everything.' Socrates states he was delighted to have thought he found in Anaxagoras the teacher he needed to understand the cause of things, and it seemed to him good that Mind should be the cause of everything, and such a hegemonic Mind would direct everything for the best, and one could know what was the best way for a thing to be, and therefore how it came to be or perish, to be acted upon or to act. The work of Anaxagoras held the promise of explaining the necessity of whether the earth was flat or round, and showing that this was necessary and therefore the best possible way to be. Such a causal account would lead to completely being able to say what was best for everything, one could from Anaxagoras 'go on to explain the common good for all.' Socrates eagerly acquired his books – plural – 'and read them as quickly as I could in order to know the best and the worst as soon as possible.'

But his hopes were dashed he says, and instead found that the explanation offered was physical, air, water, and earth, which was like saying he thought that all the actions of Socrates are due to mind (lower case), and this leads to a kind of deflationary causal account that Socrates is sitting here (in prison) because his body consists of bones and sinews, the bones are hard and separated by joints, that the sinews are such as to relax and contract, they surround the bones along with the flesh, which holds them together, then that the bones are hanging in the sockets and the relaxation and contraction of the sinews enables him to bend his limbs and that then is the cause why his limbs are bent. If Socrates has overcome his methodological confusion, he has been literally led down a blind alley – the problem of reductive materialism is faced, and he admits to Cebes that he had to follow another track of investigation.

The second theme of blindness is sounded. Relying on the senses alone could be fatal, because people trying to watch an eclipse of the sun ruin their eyes, unless they watch it in water or some such material. Socrates thought his soul would be blinded if 'I looked at things with my eyes and tried to grasp them with each of the senses.' The second blindness is an important modification on the theme of the first blindness, namely the turning away from the security of common sense phenomenism, just the way the world seems to us, to the requirement for a causal explanation that would point to a fundamental intelligibility of world, and thus even of human conduct, a task which leads to a reductionist materialism as Socrates understands in the work of Anaxagoras. This second blindness, where the very instruments of the senses are not adequate to the task in hand, or at least must be deployed in an indirect way, point Socrates to a further turn, one which Cebes finds perplexing. The cause with which Socrates concerns himself is the assumption of the existence of the Beautiful, 'itself by itself,' of a Good and a Great, 'if you grant me these and agree that they

exist, I hope to show you the cause as a result, and to find the soul to be immortal.’

The upshot of the turn is not to create a stern division between the Mind of Anaxagoras as understood by Socrates, nor elide the distinction between mind and *psuche* which Socrates effectively founds in his reflection, rather in conjunction with both the earlier and later parts of the dialogue one has instead a mesh of arguments that are required by a dialogue that is a treatise ‘On the Soul,’ and in which the problem of emergence and genesis, cosmology and radical individuation – an inner divine – leads to new forms of hypothesis to be adequate as an account for the relation between assertion, propositional structure and reason or discourse. Other strategies lead to skepticism, or absurdity. Socrates’ ‘second turn and second sailing’ is the only rational solution to explain the anthropocentric cosmology he initiates. Fundamentally it the question of the being of emergence.

The problem which first preoccupies Socrates is the problem of genesis and destruction. The criticism of Anaxagoras is the failure to actually show how intelligent causation would be demonstrated by what is best, that is to say can one argue there is no better way to construct the world. Anaxagoras’ proposed Nous, which is a most subtle physical thing, need not be necessarily individual, and further that there could be different Minds whose cognitive power results in other worlds, but which on Anaxagoras account in B 4 – quoted by Simplicius: ‘These things being so one must believe there are many things in all the things that are brought together, and seeds of all things, which have every kind of forms, color and tastes... And that their earth bears many things of all kinds ... must be like this one, points to the issue raised by Socrates, why then is this best’ (Sider and Sedley translate the construction *ten gen autoisi* as possessive dative).³⁴

As argued earlier, the problem also arises in Diogenes of Apollonia, again in fragments preserved by Simplicius: which assume the underlying principle of the universe to be intelligent, and this can be inferred from the arrangement of things. The *kai moi dokei to ten noesin erxon einai ho aer kaloumenos*, ‘that seems to me that the thing that has intelligence is what people call air ...’ The significance of this is also that in breathing in and with the air circulating around the heart and the diaphragm, then the heart can be the seat of *noesis*, and not nous as mind = brain, etcetera. The possession of a smaller brain for Aristotle is obviously not a sign of less intelligence, as in his work on the soul no real consideration of the brain is found. Indeed, the nub of the problem is just that that shows intelligence to be intelligent. Socrates moves an otherwise circular discussion by a brilliant hypothesis whose circularity is not vicious; it is the Good, the Beautiful that gives one the answer to the intelligence of intelligence, and it is the same Good to which the soul ultimately belongs and toward which even when separated it ceaselessly moves. The formulation which must be accepted *ex hypothesi* by the interlocutors of Socrates goes to answering the question of why in jail Socrates, while on death row, is still willing to listen and learn.

Designing the Lifeworld Selfhood and Architecture from a Critical Neuroscience Perspective

Lukas Ebensperger, Suparna Choudhury and Jan Slaby

Γνώθι Σεαυτόν
(Gnōthi Seauton, Know Thyself)

The famous inscription on the temple of Apollo in Delphi could be read as one of the central slogans chiseled onto the edifice, or library, of Western philosophy. However, on a less obvious level one can also read it as the tacit stipulation that usually is implicit in the experience of architecture in general (be it sacral or secular), made explicit: ‘Know Thyself, you, that walks down this hallway.’ Architecture as that which materially envelops us, that which holds us and constitutes the stable artificial sphere around us, reflects our liveliness, and hence confronts us with our mortality.¹ In this sense we can interpret architecture as an object in the ontological sense of being an *objectum*: that which materially opposes us, us as beings that are subjects – plastic, mimetic beings that are *sub-jected* to the structures imposed by architecture.² It might be exactly this ontological friction that unlocks the potential needed to confront the dunning call: ‘Know Thyself!’ It might be this friction that can lead us to a thorough scrutinizing of ontology itself – and in our case more specifically – to challenge the strict subject-object ontology as tacitly proposed and implicitly imposed by current discourses that prioritize biologicistic- and neuronally-reductionist descriptions concerning the question of ‘who and what we are.’

One emerging voice cementing the view that selfhood is equal to ‘brainhood’ can be found in the field of neuroarchitecture. Henceforth, when we use the label ‘neuroarchitecture,’ we are alluding to the field of research and the body of conceptions that have evolved around the ANFA (Academy of Neuroscience for Architecture); an organization whose self-proclaimed goal is to bridge architecture and neuroscience. Indeed it is the general construct of ideas surrounding the ANFA that will – in the following – serve as an exemplification of the outreach of the neuroscience hype into other fields of theory and practice. The last section will be concerned with a critique of neuroarchitecture’s underlying assumptions and the reificatory tendencies that, despite good intentions, are prominent in its approach. The critique will be voiced from a Critical Neuroscience framework that will be presented in the following. It is the ontological assumptions of mind in contemporary cognitive neuroscience that Critical Neuroscience attempts to grapple with, through a close analysis of the futuristic discourse of promise and progress within and around the field. On the one hand, Critical Neuroscience takes issue with the unquestioning enthusiasm for the ‘neuro’ prefix

¹ One of the key phenomena marking modernity is that durability and rigor are being replaced by fluidity on many levels, the architectonic level being one of them, and that the ensuing liquefaction and acceleration – and the often described ‘homelessness’ – bring about widespread and menacing effects on our modern ways of being and our selfhood. All historical and archeological artifacts confront us with history and thus with our fugacity. Architecture, in its function as possible shelter, as home, as sacral and secular envelope, however, constitutes a peculiar intersection of rites and practices, aesthetics, politics, science, religion, and economy.

² These brief reflections are very loosely related to Žižek’s remarks on the ontological difference in the first chapter of his ‘Parallax View.’ Slavoj Žižek, **The Parallax View** (Cambridge, MA: MIT Press, 2006). Žižek emphasises the reversal of the classical view that the subject is active while the object is passive. While he takes this reversal as a starting point to develop his theory revolving around the parallax view, this same reversal is pivotal for our argumentation as it is used to demonstrate the molding power objecting materiality has on our ductile sub-jected layouts of subjectivity.

in neighboring and even distal disciplines,³ challenging the transformative power and in some cases the basic function of the neurologization of concepts and practices hitherto dealt with by the humanities, social sciences, and through practices that did not take shape around knowledge of the brain.⁴ The reflexive approach of Critical Neuroscience is grounded not only in philosophical analysis but also in empirical investigation through ethnography of laboratories, of narratives within academic literature and of interactions with policy and commercial enterprises, as well as metascientific analysis of the limitations and potentials of available tools of neuroscience research, such as brain imaging technologies.⁵ With particular relevance to this essay, Critical Neuroscience, with its interest in formulations of personhood and self-understanding, also analyzes ways in which new advancements in, and relentless commentary about, the neurosciences can lead to the incorporation of neuroscientific claims and language into laypeople's notions of selfhood. What are the assumptions about the mind/brain that are absorbed through the readiness for self-objectification in such cases? What is at stake when authoritative (albeit tentative and changing) 'facts' about behavior from neuroscience with their alleged 'hard' scientific validity⁶ are taken up not only in everyday understanding of ourselves, our predicaments, and in our processes of decision making but also for the purposes of shaping normative questions in social and health policies and clinical diagnoses.⁷ Such 'ontological impacts' of neuroscience, their routes and formulations, are the object of scrutiny in Critical Neuroscience.⁸ It seems clear, for example, that neuroscience participates in the constitution of new 'kinds' of people, in creating discursive spaces in which it is possible to create and sustain categories of persons,⁹ and which have consequences for the practices that follow. A more concise elaboration on this creation of categories of persons via neuroarchitecture will follow after some preliminary observations concerned with the general experience of architecture.

Returning to the inscription on the temple and its alternative reading: 'Know Thyself,' a preliminary compliance to this stipulation (what 'kind' of knowledge is in demand?) is already given: the answer might possibly be itself structured by or negotiated within architecture.¹⁰ In other words: a sensible experience of architecture confronts us with more detailed questions than 'just' our mortality and existence as a whole: Who and what are you (or do you have to be, and to have), that you design, craft, garnish, and live in buildings and houses? Who are you to call this or that a 'home'? What kind of being are you, using tools and science and engineering, forming globalized-artificial-urban spaces, shopping malls, parking lots, and so forth, and to what ends? All of these are questions emerging out of the experience of architecture and are best addressed in comfortable architectural structures. As Bruno Latour put it: 'Tell me what your position on space is, and I'll tell you who you are: I suspect such a touchstone is equally discriminating for philosophers, architects, art historians, and others.'¹¹

A partial answer to the questions above, as proposed already, might be revealed in the 'architecture' of actual architectural implementations themselves.¹² The patterns, the materials – the design and its constraints, its execution and ever changing employments – cultural in the broadest sense, economic, aesthetic, politic, etcetera – these are preliminary and very tangible responses, responses we inhabit. In this sense we can distinguish two basic characteristics of architecture. First, a rather narrow one: that which our habitats in themselves reveal; and second, one that is more ample: that which such architectures point us to.

The first, narrow one is everything within reach, our immediate surroundings. The materiality of the habitat itself and its self-referential functionality indicate 'what we are.' We are technicians, craftsmen, assemblers, sedentary and cultured, there is necessity and taste, style and history. In other words, we are beings that use tools and create, that need an artificial habitat, that nest and arrange and build sepulchres, that plan, project, abstract, draw, read, gather, and design our environment. It is, as it were, the 'stony' externalized memory of our human predicament, and we constantly hit upon it.

Architectural structures furthermore are toeholds in the sense that they disclose their own juncture-nature. That is to say – architectures always point to a totality of implied social, technological, historical, cultural, political, and so forth ramifications and mutual influences, parameters and requirements beyond themselves. A contemporary house, neatly arranged, connected to the transportation system, sanitation, and the power network (infrastructures) constitutes an entanglement of construction, transportation, and material technologies; at the same time it accrues and is altered in reciprocity to the needs of the socioculturally and historically contingent forms of

3 Neurocultures: Glimpses into an Expanding Universe, eds. Franciso Ortega and Fernando Vidal (Berlin: Peter Lang, forthcoming 2010).

4 Critical Neuroscience: Between Laboratory and Lifeworld, eds. Suparna Choudhury and Jan Slaby (Oxford: Wiley-Blackwell, forthcoming 2011).

5 Suparna Choudhury, Jan Slaby and Saskia Kati Nagel, 'Critical Neuroscience – Linking Neuroscience and Society through Critical Practice,' **BioSocieties** 1 (2009): 61-77.

6 Deena Skolnick Weisberg, Frank C. Keil, Joshua Goodstein, Elizabeth Rawson and Jeremy R. Gray, 'The Seductive Allure of Neuroscience Explanations,' **Journal of Cognitive Neuroscience** 3 (2008): 470-7.

7 Emily Martin, 'Identity, Identification, and the Brain' (presented at the Workshop 'Neurocultures,' Max Planck Institute for the History of Science, Berlin, Germany, 21-22 February 2009); Francisco Ortega 'The Cerebral Subject and the Challenge of Neurodiversity,'

BioSocieties 4 (2009): 425-45; Suparna Choudhury and Moritz Merten, 'Rebelling against the brain: Public engagement with the 'neurological adolescent,' (under review); Scott Vrecko, 'Folk neurology and the remaking of identity,' **Molecular Interventions** 6 (2006): 300-3.

8 Jan Slaby, 'Steps Towards a Critical Neuroscience,' forthcoming 2010.

9 Ian Hacking, **The Social Construction of What?** (Cambridge, MA: Harvard University Press, 1999).

10 Recurring to the *archi-tekton* and architecture as the leading-craft: that which is to be disclosed is possibly self-knowledge (note that there is no specification on the ontological or anthropological status of 'self' implied yet). The interesting point here then is that architecture brings into being certain aspects of ourselves. It can be read as the material formulation of an answer to self-knowledge. 'Who understands architecture and space, understands himself, or at least the location from which to start.'

11 Bruno Latour, 'Spheres and Networks: two ways to reinterpret globalization' (lecture held at Harvard University Graduate School of Design, Cambridge, MA, USA, 17 February 2009), **Harvard Design Magazine** 30 (Spring/Summer 2009): 142.

12 This reduplication of the term 'architecture' is intended to show how 'architecture' as a metaphor is used when we refer to the structure, drawing, make-up, and constitution of something.

socialization that it accommodates. It is embedded in a set of constraints and effects, requirements and impositions via production, marketing, engineering, craftsmanship, capital, and so on. A house then can be seen as implying and necessitating for instance oil-refineries, complex physical and chemical conversions executed in specialized laboratories whose outcomes are distributed and sold via global systems of carriage-of-freights and institutions of knowledge – which themselves are maintained and perpetuated by people that live in neatly arranged houses or apartments. It contains, and is contained in conglomerations of economic, technoscientific, sociopolitic and historical meshwork as it responds to certain conceptions of subjectivity, family, socialization, and cultural standards, and at the same time it is that which tunes and possibly fortifies these same conceptions. Such a neatly arranged house implies certain values and alleviates certain ways of interaction. It is in this sense that it points to the entirety of discourses and practices that pervade our existences.

The negotiation of space is, in line with the above quotation from Bruno Latour, undoubtedly one of the central and defining loci in philosophy, science, art, and architecture – and one that is very rich in terms of its consequences. Latour shares this *spatial-turn* with Peter Sloterdijk.¹³ While Latour's attention is focused on expounding the problematic division between culture and nature – and the consequent exclusion of things from politics, Sloterdijk, elaborating on the well-known quotation of Heidegger: 'The fundamental event of modernity is the conquest of the world as picture,'¹⁴ develops a theory of globalization based on the metaphor of the sphere. 'It was the early European metaphysicians, mathematicians, and cosmologists who forced their new, fatalistic definition on the mortals: they would be creatures that inhabited and administered a sphere. Globalization begins as a geometricization of the immeasurable.'¹⁵

The conception, or, rather than the merely abstract conception, the *experience* of spatiality and the way we inhabit and interact *with* and *in* this spatiality are fundamentally shaping and shaped by our ontologies. This is exactly one way to describe the criticism that Heidegger voiced against the mathematical-geometrical-metaphysics of modern science.¹⁶ Modern science, so the deliberation goes, imposes a geometrical idealization of space prior to all experience of it (by imposing, it poses us 'into' this geometrical idealization and provides a framework for our possible experiences of space). Therefore, the ontological status of all things is changed: things are and can only appear as things if they are material, extended, measurable, and ultimately controllable objects. Space then is not the location of a thing *qua* its nature, but its position relative to a coordinate system.¹⁷ The criticism proceeds stating that idealized geometry was institutionalized in the ever growing premises of Science to be *the* coordinate system in which all things organic or inorganic appear. Simultaneously, a reinforced subject-philosophy is

instantiated. External things object necessarily *sub-jected* subjectivity. Returning to the topic of focus: the only place left – for the 'mind,' being itself conceived as a thing – is now internal: eventually inside the skull, among neuronal patterns, but to that outlook we will return later. With this abstraction of space and the institutionalization of geometrical space, the approach to what can be called 'world' is completely altered. 'This zone is no longer a castle or a vegetative grotto, a hearth or cult commune, dancing in a circle, but a logical and cosmological construction form of timeless validity.'¹⁸

The impositions of the geometric-mathematical predetermination of ontology, as pointed out by Heidegger, can be summarized as follows: all matters and things of nature are a priori equal. Linear movement becomes the standard form of motion in nature. As already mentioned, the 'natural' site of a thing is reduced to its position relative to other positions, in short: location becomes an *external property*, projected onto and defined via a system of coordinates. With the transmutation of movement, force is altered, too: from being an internal property of a thing, movement and force become both external to things. With this the whole definition of nature and environment is changed. Environment and nature are now the interrelation of relative positions of bodies *in* external time and space. Consequently the experiment – that is, projection, computation, and measurement – becomes the only valid manner to approach nature predefined in this way since the being of beings is reduced to their calculability, which means: controllability and manageability. The geometrico-mathematical predetermination of ontology defines that a thing is that which is tangible by experiments. This obviously technoscientific outlook on nature imposes a similarly reifying and objectifying outlook on humans. It is especially interesting that 'Science' – while classically being believed to be neutral and objective – and drawing the ongoing fortification of its authority in ethical, social, political, and anthropological discourses precisely from this supposed objectivity and impartiality – is a practice that axiomatically imposes an outright

¹³ Latour, 'Spheres and Networks: two ways to reinterpret globalization.'

¹⁴ Martin Heidegger, **Off the Beaten Track**, translated by Julian Young and Kenneth Haynes (Cambridge: Cambridge University Press, 2002), 71.

¹⁵ See: Peter Sloterdijk, 'Geometry in the colossal: the project of metaphysical globalization,' translated by Samuel A. Butler, **Environment and Planning D: Society and Space** 27 (2009): 29.

¹⁶ See: Martin Heidegger, 'Die Frage nach dem Ding, zu Kants Lehre von den transzendentalen Grundsätzen,' **What Is a Thing?**, translated by William B. Barton, Jr and Vera Deutsch (Chicago: Henry Regnery Company, 1976). Here a thorough analysis of spatiality and the scientific-technological framework of Cartesianism, rooting in Galileian and Newtonian geometrico-mathematical ontology, is undertaken, and in which the ontological shift between the ancient Aristotelian ontology of thing-ness, **objectum**, time and space and so on, and modern scientific ontology is outlined to demonstrate the profundity of such an ontological transmutation.

¹⁷ Descartes himself is unsurprisingly the most prominent philosophical example for the effects such a space-conception implies. His *res-extensa res-cogitans* differentiation is resulting directly from the onto-geometrical assumptions implicit in Galileian physics (see, for example, Charles Taylor, **Sources of the Self – The Making of Modern Identity** (Cambridge: Cambridge University Press, 1989); Heidegger, **What Is a Thing?** and **Being and Time. A Translation of Sein and Zeit**, translated by Joan Stambaugh (Albany: State University of New York Press, 1996), especially §19-24.)

¹⁸ Sloterdijk, 'Geometry in the colossal: the project of metaphysical globalization,' 31.

¹⁹ It is Newton who in 'Philosophiae naturalis principia mathematica' explicitly states the way in which his physics is designed: as an **in-mente-concipere**, an abstract idealization, conceived in the mind and projected onto the totality of the world. The **accuracy** of this technoscientific

idealization at the very root of its ontology.¹⁹ The obsessive empiricism of modern science results precisely from the need to constantly reaffirm and validate this initially predetermined hypothesis.²⁰

The ideal of phenomenology on the other hand is to develop the notions of space and time directly from *experience* – without any predetermination by geometry, science or even philosophy – according to its slogan: *Zu den Sachen selbst!* ('To the things themselves').²¹ Here experiential existential-space serves as the point of departure. It is the pre-scientifically experienced lifeworld that holds primacy. Space as the location of our everyday practices and handling of artifacts, as the place we are immersed in prior to the insertion of a reflective distance – and not as the externalized system of relations in which things appear as *res extensae* – is central. Things appear foremost in their meaningfulness and practicality, they importantly *are* possibility-spaces and reveal affordances. We constantly negotiate our existential space in dialogue with our surroundings and our social environment. In this sense the space we live in, in which we experience architecture and habitat, is an entanglement with our existential orientations, the givens of history and the ongoing interplay between our design intervention and the influence design has on our actions and our possibility-spaces. To repeat Latour's assertion once more: 'Tell me what your position on space is, and I'll tell you who you are.'²²

But let us return from the 'depths' of ontology to the matter at hand: the experience of architecture in existential-space, (neuro)architecture and the connection to the formulation and formatting of modern selfhood.

The central role of architecture as one of the main venues of modernity and of its ruptures, as well as one of modernity's most prominent and successful metaphors²³ is widely recognized, and its intimate linkage to questions concerning modern self-interpretation has been discussed by many authors.²⁴ The ongoing quest for a satisfactory formulation of selfhood on the other hand, still remains at the core of every existentially relevant philosophy. Such a formulation of selfhood would entail a certain degree of clarity concerning its own underlying ontological presumptions, clarity toward its inevitable formatting via historically contingent discourses and narratives on various levels. It is important to keep in mind that the concept of selfhood in question here is not at all restricted to the theoretical discussion of an abstracted 'self.' On the contrary, if the notion of selfhood is used in the following it is always meant to encompass the practical scope of our existences as well. Selfhood as envisioned here means the self with life and limb, socially, historically, and spatially embedded. The notion presented is that humans *are* essentially self-interpreting beings, to be human means to be an *ens hermeneuticum*.²⁵ This is to say that a hermeneutic praxis at an existential level is central for our self-understanding and our self-fashioning, one might – in the context of this essay – say: via existential interpretation we quite literally *design* (as in the

latin *designare*: diagnose, designate, destine, determine) our being as possible 'selves.' We reflexively instantiate, within certain bounds of freedom and certain shades of accomplishment, interpretations and narratives about ourselves and selfhood in general. This existential design never starts with an empty drawing board, nor is it initiated in a vacuum. All on the contrary, we are not absolutely free in our design. There's the whole material and intellectual environment – in short, the world we're thrown into – that inescapably moulds our existence. Our self-interpretation, far from solipsist 'purity,' is partially given – sketched by culture, language and architectures in the broadest sense. The notion of an existential hermeneutic praxis as proposed here is in a beneficial and enriching way never neutral, a-historic, or objective. Architecture – like the shell of a crustacean – envelopes us and makes up our world. It is the 'location' of origin of the hermeneutic praxis, the departure point of the interpretation. To penetrate this location a sensible experience of the spaces we inhabit – in which we base and take our stand – the things we interact with, but also the whole of discourses that surround us (that are bound and materialized in these same things and

outlook is beyond any doubt; its truth on the other hand is that of a functional adequacy: the applicability and application reveals and brings into being Science's 'truth.' It is technology and engineering that – not only by providing ever more complex epistemological prostheses for Science – play a major role in 'making' scientific results real. See: Isaac Newton, **Philosophiae naturalis principia mathematica** (Boston: Adamant Media Corporation, 2004).

²⁰ Edmund Husserl, in 'Die Krisis der europäischen Wissenschaft' in a very similar vein explicated Science's a priori essence as being the eternal interplay between a hypothesis and its validations. The eternal hypothesis is the initial imposition of the geometrico-mathematical ontology itself, which regardless of the given phenomena constantly presupposes a 'nature' according to idealized space – this presupposition constantly needs reaffirmation. One could go on to hypothesize that every regional hypothesis formulated within this ontology, every experiment and validation of specialized sciences, is such an affirmation. See: Edmund Husserl, **Crisis of European Sciences and Transcendental Phenomenology**, translated by David Carr (Evanston: Northwestern University Press, 1970).

²¹ Edmund Husserl, **Logische Untersuchungen** (The Hague: Husserlianna XIX/1, 1984), § 2, 10. This sentence, which Husserl expressed the **Logische Untersuchungen**, has become the signature slogan of phenomenology. Interestingly, however, it stems from a remark that Husserl more or less made only in passing. On this, see Jean Grodin, 'Die Wiederweckung der Seinsfrage auf dem Weg einer phänomenologisch-hermeneutischen Destruktion (§§ 1-8),' in **Klassiker Auslegen: Sein und Zeit**, ed. Thomas Rentsch (Berlin: Akademie Verlag, 2001), 1-27.

²² Latour, 'Spheres and Networks: two ways to reinterpret globalization,' 142.

²³ Allusions and metaphors recurring to architecture range from Heidegger's famous **Die Sprache ist das Haus des Seins** ('Language is the house of Being') to talk about literary 'architectures' in literature departments. See: 'Letter on Humanism' [1927] to 'The Task of Thinking' [1964], in **Martin Heidegger: Basic Writings: from Being and Time**, ed. David Farrell Krell, translated by Frank A. Capuzzi and Glenn J. Gray (New York: Harper and Row, 1977). Of special interest is – for obvious reasons – the scientifically effective, epistemological metaphor of cognitive architectures (there's an endless body of literature in A.I., neuroinformatics, robotics as well as neuro-bio-psychology dealing with different cognitive architectures). Another, and arguably by far the most influential, pattern of thought inspired by an architectural metaphor to epistemology is obviously that of constructivism.

²⁴ For example: Georg Simmel, Walter Benjamin, Pierre Bourdieu, Marcel Mauss, Siegfried Kracauer, Ernst Bloch, Norbert Elias, Michel Foucault.

²⁵ This notion is obviously borrowed from Charles Taylor's 'Self-interpreting Animals' as described particularly in the second chapter, see: Charles Taylor, **Human Agency and Language** (Cambridge: Cambridge University Press, 1985). As well as Martin Heidegger's existential hermeneutics, as implemented in **Being and Time** and proposed in concise form in the earlier so-called Natorp Report, see Richard Rojcewicz, **Phenomenological Interpretations of Aristotle: Initiation into Phenomenological Research** (Bloomington: Indiana University Press, 2001).

habitats) is necessary. The experiential-existential space in question here is the surrounding world which we always already find to be fraught with meanings, projects, and possibility-spaces²⁶ – both practical as well as conceptual. A place endowed with desires, intuitions, thoughts, memories of past experiences, and projections into the future. It is a whole clew of significances and possibilities on practical, social, emotional, and conceptual levels. As such this ‘location’ can also be marked by an emptiness experienced in the absence of significance and meaning, a barren space, eldritch and obtrusive, devoid of tenor and use. Moods, memories, connotations alter the experience of spaces thoroughly – as is well known. A parlor can transform into a cage, a tent into a palace.

It is precisely the aim not to lapse into the a priori geometrico-mathematical ontology for a description of spaces, which leads to and fortifies the reification of subjectivity.²⁷ Instead we always already are thoroughly infused with prejudices and opinions as well as with certain ontological assumptions absorbed and inherited via language, via education and knowledge, via technologies and the Others with which we share our lifeworld. We are constantly confronted with (in the broadest sense) culturally pre-formulated, historically contingent, offers of identities given through, for example, peers and family, the experience of art, the media, labor relations, science, religion, philosophy, history, language, and so on. One might say that we constantly encounter instructions on how to autopoetically design ourselves, on what we could be, could do, could have, should have.

These pre-formulated identities populate our existential-space and seal our identities, very similarly to the *sealing of the lifeworld*, as observed by Husserl. The sealing of the lifeworld explicates how technologies, by constantly extending *their* application to us, seal, that is shrink or condense, the possibility-spaces encountered in our lifeworlds, in so far as they ‘make’ us use them. In so doing they prevent us from using or conceiving possible alternatives. They funnel *our* possibilities into *their* usage. As our existential-space becomes more and more sealed by technologies (via engineering, design, and architecture), so is the space for our possible self-interpretations. Along with this structural identity-forging through architecture, modern selfhood is constantly (explicitly and tacitly) being sealed by alternating and competing discourses surrounding modern selfhood itself.²⁸ Architecture – our houses, the transport-network, urban and public spaces,²⁹ national parks, and so on, as the materialization of sociopolitical, economic powers and requirements that are mutually enmeshed with technology, science, and aesthetics – shape, regulate, and thereby partially seal the way we conceive our being and our inter-being with others. As such, architecture formats the basic space for our self-understanding. That is to say: architecture shapes our existential-space, out of which we formulate our self-understanding.³⁰

There is a special emphasis on the notion of experience in this account, that

might, if anything, be cautiously related to Benjamin’s well known conceptualization of Baudelaire’s *flâneur*, and the concept of *Mimetic Ability*.³¹ ‘Only that which looks at us, we see. We only are capable of that ... which we aren’t able to help with.’³² One point of interest for the experience of architecture and existential-space as described above is that also in this description the urban-architectural experience is beyond or prior to the grasp of the reificatory division of subject and object. The experience is that of an – at least temporary – indistinguishability between architecture and self in classical subject-object, active-passive terms. Architecture is presented as a protagonist, an actor that accosts and interacts in the literal sense of the word. In surrendering oneself to (or filling) a ‘sphere,’ a room, a city, one merges with it. The things around us are incessant remainders: what environs us – pervades us. And it is the interplay between a ‘*flâneuresque*’ strolling and the

26 These elaborations are loosely based on Heidegger’s account, for example, of things and their ready-to-handness, as elaborated for instance in § 22 of **Being and Time**. The possibility spaces alluded to above imply as their horizon a spatiotemporal meshwork; meaning not only that certain places are ritually bound to certain dates, but rather that space and time are inextricably interwoven – we never experience pure space. We experience, so to say, the temporality of space and the spatiality of time – in one.

27 Here the very literal reification of subjectivity as **res cogitans** is meant. The seemingly apodictic cogito can only have a place in this ontology as a ‘thing.’ As such it is to be studied and treated as a thing as well.

28 One of which is the ongoing naturalization and brainification of our selves, as thoroughly challenged by the Critical Neuroscience Project. See: Slaby, ‘Steps Towards a Critical Neuroscience’; and Choudhury, Slaby and Nagel, ‘Critical Neuroscience: Linking Neuroscience and Society through Critical Practice.’

29 An original description of urban space within the age of globalization can be found in Peter Sloterdijk, ‘Foam City – about Urban Spatial Multitudes,’ translated by Antonio Petrov, **New Geographies Journal** 0 (2009): 136-43. Sloterdijk’s leitmotif-metaphor: spheres are spaces artificially created by humans around them, in urban settings they condense to a foam. In this urban foam the single bubbles or spheres (his intuition is that every man is an island) are bridged via communication. In that sense our lifeworlds are adjacent spheres in a foam, there is always at least one side or sphere wall that borders on another sphere.

30 Latour, ‘Spheres and Networks: two ways to reinterpret globalization,’ 140. Latour echoes his colleague Sloterdijk’s question to Heidegger: ‘When you say **Dasein** is thrown **into** the world, **where** is it thrown? ... **Dasein** has no clothes, no habitat, no biology, no hormones, no atmosphere around it ...’ This observation underlines and makes evident the pivotal role design and architecture, building materials and engineering, in short, all the practices revolving around **Dasein**’s habitat have for its being-in-the-world, because it is architecture and design that mostly makes up this world.

31 Both are principal topics of Walter Benjamin in the greater framework of his ‘Arcades Project,’ see: **The Arcades Project**, ed. Rolf Tiedemann, translated by Howard Eiland and Kevin McLaughlin (Cambridge, MA: Harvard University Press, 1999). An exegesis of Benjamin’s complex universe would by far exceed the limits of this article. The *flâneur* is only consulted here as a fingerpost toward one of the most prominent explicitly urban lifeforms. His strolling and the Mimetic Ability are revealing ways to experience our habitats. The *flâneur* is both historically informed and embedded, yet phenomenologically very open and close to the phenomena he encounters on his strolls. Tiny details open up whole worlds as he flows along with the crowd. As for the Mimetic Ability, which Benjamin described, for example, in the ‘The Mummerehlen’ essay, one aspect is especially worth mentioning here: the becoming-akin-to-things of children and artists. Like clouds, so the poetic description, children merge into the books they read, into the toys they play with; while artists fuse with and disappear in their oeuvre. The mimetic experience serves as one possible example on how we very fundamentally are shaped by and merge with the ‘material’ shells of our existence. See Walter Benjamin, **Berlin Childhood around 1900**, translated by Howard Eiland (Cambridge, MA: Harvard University Press, 2006).

32 **Walter Benjamin: Selected Writings, Volume 2: 1927-1934**, ed. Howard Eiland, translated by Rodney Livingstone and others (Cambridge, MA: Harvard University Press, 2005), 265.

rather constrained experience of architecture as an *objecting* structure that reveals the interface-nature of architecture as the interface between Technology, Science and Aesthetics and the molding of Selfhood. By crafting our surroundings we craft ourselves. This conviction is shared by what has emerged as the 'field' of neuroarchitecture with which the ensuing section will be concerned.

*When our brains are happy a certain endorphin gets released, so we need to design homes in order to release that neuro-transmitter.*³³ John Zeisel

The argument for the collaboration between architecture and cognitive neuroscience – as put forward by one of the most prominent spokesmen of neuroarchitecture³⁴ – can roughly be outlined as follows: since the brain remains plastic during the whole lifespan, and the brain is the organ that regulates our behavior – the environment obviously has an impact on the structure of our brain and hence on our behavior. Therefore: if we want to improve conditions – have healthy brains as well as appropriate behavior – architecture and design should be informed by: the already existing corpus of neuroscientific literature,³⁵ the coming breakthroughs in brain research,³⁶ and especially by research designed with a specific focus on the brain-architecture interaction.³⁷

Interestingly, there already exists a rich body of work from environment-behavior studies, the evidence-based design paradigm and psychology³⁸ with many successful examples on how to improve, for example, care structures for Alzheimer patients, neonatal intensive-care units or on how to reduce crime rates in inner cities (by incorporating trees into city planning, for instance). Esther M. Steinberg³⁹ skillfully and suggestively depicts a broad array of historical and contemporary examples on how wellbeing and health is linked to the design of places. Mostly, however, this work happens *without* recurrence to the brain. And so the question is: *Why* this recent focus on the brain?

One of the most emphatically cited studies⁴⁰ in the ANFA-neuroarchitecture context is actually not a neuroscientific study at all, but a behavioral priming study performed at the Carlson School of Marketing at the University of Minnesota. The outcome of the study showed a significant influence of ceiling height as a priming factor for consumer's responses. The results indicate that higher ceilings (*if* the subjects are *aware* of the higher ceiling) are more likely to yield relational processing, while lower ceilings are more likely to yield item-specific processing. The hypothetical conclusion states that: as lower ceilings activate confinement-related concepts and higher ceilings freedom-related ones, these 'purely' spatial primes can influence the very type of cognitive processing that consumers employ. An instrument to tune behavior, for instance in a supermarket, or as already in use: in airplanes, where the illusion of higher ceilings is used to reduce feelings of constriction and anxiety. This study might be very beneficial far beyond the field

of marketing and points to the high potential of lifeworld- and concept-engineering, by priming, to which we already always are *sub-jected* in our everyday lives. There resides, however, in every potential also a danger. In 'Anarchists and the fine art of torture,'⁴¹ the story of French anarchist Alphonse Laurencic is related, who – in order to fight Franco – installed torture cells inspired by the space-bending art of, for example, surrealists like Dalí. Uncannily curved walls, beds and doors with weird angles, dizzying light effects – an altogether 'lovecraftian' set up – to distress and torture its occupants. The problem is the ubiquitous danger of misuse and exploitation of such psychotechnologies. And while all of the intentions of the neuroarchitects are thoroughly humanistic in their outlook, aimed at the general improvement of environments so that they meet the 'natural' and 'cultural' needs of their users, the questions: *Why neuroscience?* *Why the brain?* are still open.

The brain-centeredness of neuroarchitecture's prospect is rooted in more than just the intelligible fascination with this promising field and the applicability of its results. Neuroarchitecture, especially in John P. Eberhard's vision, embraces a very specific idea of man, which it derives from a pop-neuroscientific perspective; as well as an overly optimistic appraisal of future neuroscientific

³³ Quoted from Vaughan Bell, **Building on brain clichés**, available online at http://www.mind-hacks.com/blog/2007/09/building_on_brain_cl.html. In this short article the author voices obvious points of critique regarding ought-right scientific errors in Zeisel as well as in other related neuroarchitecture enthusiasts' accounts on how brain and habitat supposedly are linked in a very simplistic way. For example, the above quoted direct identification of a specific mental state with the occurrence of a neurotransmitter.

³⁴ The two architects John Zeisel and John P. Eberhard (founder of the ANFA, Academy of Neuroscience for Architecture, to be found at: www.anfarch.org), Esther M. Steinberg and Salk-Institute Neuroscientist and Geneticist, famous for the discovery of adult neurogenesis, Fred Gage.

³⁵ As proposed by Esther M. Steinberg and Matthew A. Wilson: 'A rich neuroscience literature exists that can be mined by architects who wish to optimize the design of built space.' Esther M. Steinberg and Matthew A. Wilson, 'Neuroscience and Architecture: Seeking Common Ground,' **Cell** 127 (2006): 242.

³⁶ 'If we expand the horizon for neuroscience, it would eventually result in a new knowledge base for architecture.' John P. Eberhard, 'Applying Neuroscience to Architecture,' **Neuron** 62 (2009): 753.

³⁷ Eberhard explicitly calls upon neuroscience PhD Students to engage in the investigation of neuroarchitecture and proposes more than 70 hypotheses that could be studied in 'Brain Landscapes.' See, John P. Eberhard, **Brain Landscape – The Coexistence of Neuroscience and Architecture** (New York: Oxford University Press, 2009). As he puts it: 'New sources of funding are likely to emerge for the support of interdisciplinary science in the next few years. Professors and research directors in neuroscience who read this essay are invited to explore this new horizon. By encouraging their students and graduate assistants to move into this new field, architecture would have a greater potential to improve the lives of generations to come.' Eberhard, 'Applying Neuroscience to Architecture,' 756.

³⁸ For some of the topics and problems surrounding the relation between architecture and psychology see, Christian Jarett, 'Is there a psychologist in the building?,' **The Psychologist** 19 (2006): 592-4. Also, see Chapter 7 in John Zeisel, **Inquiry by design – Environment/Behavior/Neuroscience in Architecture, Interiors, Landscape, and Planning** (New York: W.W. Norton & Co., 2006).

³⁹ See Esther M. Steinberg, **Healing Spaces** (Cambridge, MA: The Belknap Press of Harvard University Press, 2009).

⁴⁰ Joan Meyers-Levy, Rui (Juliet) Zhu, 'Influence of Ceiling Height: The Effect of Priming on the Type of Processing That People Use,' **Journal of Consumers Research** 34 (2007): 174-86.

⁴¹ Giles Tremlet, 'Anarchists and the fine art of torture,' **The Guardian**, 27 January 2003. Available online at <http://www.guardian.co.uk/world/2003/jan/27/spain.arts>.

insights. Neuroarchitecture thereby adopts a simplistic representational theory of mind, together with an uncritical definition of humans as path seekers and problem solvers. The danger then is precisely that, by putting into place neuroscientifically informed architectures, the 'architecture' of a neuroscientific outlook on personhood and selfhood (that is, brainhood), is instantiated and reflexively institutionalized. It is precisely because human beings have a certain hermeneutic freedom and the possibility to implement self-interpretations that an uncritical and insensible absorbing of information – especially from psychology and the neurosciences, but equally from anthropology and philosophy – can lead to the actual coming into effect of preformatted conceptions concerning 'who and what we are'; a self-fulfilling prophecy.⁴² What is to be criticized about neuroarchitecture is not its intentions concerning buildings, but its idea about men: the human as the path seeker, problem solver, as an animal with mental representations, a navigator in an environment. Such a self-interpretation is not primordial, but derived from the exigencies modern lives put on us. The anthropological assumptions implicit in – at least the popular neuroscience approaches strained in neuroarchitecture – are impositions emerging out of our technomorphic lifeworlds, they substantiate the unfounded claim that neuroscience has a privileged access to 'human nature.'

Eberhard's trust in neuroscientific progress goes to such lengths as to hypothesize that neuroscience will solve the so-called 'hard problem' of *qualia*, which itself already presupposes a conception of the human mind that is problematically Cartesian. He suggests that 'the key to understanding how our brains enable our minds to experience architectural settings is consciousness.'⁴³ He goes on to propose that once powerful new neuroscientific knowledge is at hand: 'We may produce some clarity that eventually enables us to incorporate human experiences of architectural settings directly into the neural networks of designers. This would be a multifaceted design process, built on a foundation of new knowledge and resulting in a much richer and more satisfactory context for our lives.'⁴⁴ Another strand pouring into this neuro-optimistic stance is that neuroarchitects see a general kinship between designers, architects, and (neuro)scientists. As John Zeisel puts it: 'Just as designers and researchers – both involved with forms of inquiry – have a natural urge to solve problems, the brain 'has circuits that ... want to work on problems.'⁴⁵ There is a certain affinity between researchers and architects, especially certain schools of architecture, in the way they design, abstract, and envision their respective projects, create hypotheses and react to the outcomes of their work. Still, such broad structural parallels could, if looked for, be found all-around. Is it that brain research is closer to hard facts than soft psychology? Zeisel's answer in allusion to Eberhard is: 'If we want to understand *how* people behave, the E-B [Environment Behavior] paradigm is sufficient. If we want to understand *why* people behave in certain ways when they interact with their environment, E/B/N [Environment-Behaviour-Neuroscience] is useful.'⁴⁶

The underlying expectation is that cognitive neuroscience will fully be able to explain mental processes, emotions, moods, behavior, and consciousness, and that knowledge can and will be fruitfully implemented in architecture.

Neuroarchitecture – as it is at the moment – can on the one hand be seen as a paradigmatic example of how popular neuroscience and the general neuro-hype incorporate and implement naïve and simple ideas about the self and the brain into popular (and architects') self-understanding. It shows how the promissory character of neuroscience yields disproportionate hopes far beyond the boundaries of the discipline itself.⁴⁷ On the other hand, it can be taken as a pointer in the direction that neuroscience – despite its self-conception – is not about to prove successful in scientifically investigating personhood, via naturalizing subjectivity, but is foremost a supplier of instrumental knowledge for engineers. Not only are the expectations and hopes projected onto and served by neuroscience impudent with regards to the actual results yielded by it; but the prospect of a 'neuro-Feng-Shui' that implements the objectified naturalistic approach to a supposedly fixed and stable 'human nature' is in substantial contrast to the hermeneutic approach presented here. Neuroarchitecture very innocently equals 'selfhood' with 'brainhood' and thereby fortifies biologicistic and reificatory discourses. As Sternberg puts it at the very end of her book: 'It is really in ourselves, in our emotions and in our memories, that we can each find our healing space. For the most powerful of healing places is in the brain and in the mind.'⁴⁸ The 'short circuit' in this deduction is blatant: Why should we ourselves, 'our minds' be *inside* the head and brain?

It is in response to such Cartesian excrescences of the mathematico-geometrical ontology, which ignore the primacy of experience and assume ontological hegemony, that the above descriptions of existential-space were developed. Self-interpretation as self-design is an endeavor carried out in hands-on world-making as well as in reflexive contemplation. The tabula rasa assumption, on which modern science foots, instead fortifies a reification of subjectivity. Architecture and design, as that which structures our technomorphic lifeworlds, can seal certain ways of interaction and enable others. As that which envelopes and outlasts us, it confronts us with our selfhood, while at the same time affecting our self-interpretations. As such a meshwork it can both enable an

⁴² Possible alternatives could be, for example, philosophically contemplative or 'meditative' practices. Albeit it would seem likely to consult Eastern philosophies for that purpose, the example offered here will be Ancius Boethius's **The Consolation of Philosophy**, in which he, while imprisoned and awaiting his death sentence, finds peace and comfort in a fictional dialogue with 'Lady Philosophy.' This only to show that for instance freedom and wellbeing – although they can certainly be primed positively or negatively by spaces – as existential concepts, are even more so subject to our hermeneutic design. Via a sensible existential experience it might be possible to see through some of the sealings, forgings, and effects that space, things, and discourses have on our existential orientations. See Ancius Boethius, **The Consolation of Philosophy**, translated by Richard H. Green (Mineola, NY: Dover Publications, 2002).

⁴³ Eberhard, 'Applying Neuroscience to Architecture,' 753.

⁴⁴ Ibid.

⁴⁵ Zeisel, **Inquiry by design**, 152.

⁴⁶ Ibid., 144.

⁴⁷ For a detailed critique see Slaby, 'Steps Towards a Critical Neuroscience'; and Choudhury, Slaby and Nagel, 'Critical Neuroscience – Linking Neuroscience and Society through Critical Practice.'

⁴⁸ Steinberg, **Healing Spaces**, 296.

enriching friction that can lead to a thorough questioning of ontology and on the other hand fortify and implement certain discourses and ontological assumptions, and thereby inscribe them into our self-understanding. As such – a sensible experience of architecture and a translucent view on one's own existential-space is indispensable if we want to be masters in our own home.

III

Adminis- tering Attention

Disposition

Keller Easterling

Spaces are rarely considered to possess disposition. A building, landscape or an interior might be described in terms of its appearance, geometrical composition or visual pattern. Spaces are considered to be objects or volumes, not actors with agency or temperament that might even be evaluated for, for instance, a quotient of aggression, submission, or exclusivity immanent in their arrangement.

Disposition is a familiar but nuanced word best understood by using it. Acquiring that understanding is similar to the way that disposition itself operates. Consequently, the word flourishes in common parlance and usually describes an unfolding understanding of temperament, relative position, or tendency in either beings or objects. Francois Jullien has given the example of a round ball and an inclined plane as a situation possessing disposition – the potentials of a situation as they are associated with factors including geometry and position among many other things. Sugar is soluble in water. A student is recalcitrant. A barbiturate induces rest. A subatomic particle spins in a particular way. A dog is aggressive. All of these are dispositions, tendencies, propensities, or properties that are interacting with other factors. The latent potential is expressed as a quotient of action that exists without the need for the actual movement or event. Disposition locates activity, not in movement, but in relationship or relative position. The physical objects in spatial arrangements and infrastructure, static as they may seem to be, possess agency. While from some perspectives this verges on the oxymoronic or supernatural, some of the most familiar practical encounters with physical material and organization are typically handled with dispositional expressions. Disposition, as the unfolding relationship between potentials, resists science and codification in favor of art or practice.

A discourse on disposition from several different disciplines, including philosophy, theater, organization, art, aesthetics, and sociotechnical networks, may contribute faculties and techniques useful in shaping the noosphere. This volume treats the noosphere as a mental as well as an urban space, or as a domain of reciprocating influences between the two. It posits that neurophysiological architecture and urban architecture project and make each other interdependently. The means to alter noopolitics can be found in interior virtual territory as well as exterior physical territory. For instance, ideation and habit of mind project scripts onto the urban sphere, and the interactions between these scripts and urban infrastructures gradually author the city. Altering perceptions, attentions, and habits of mind in this relationship may be as powerful as altering the geometric and volumetric space of the city. Any of these adjustments can re-center attentions, unseat powers, or redistribute economies. The discourse on disposition is bound up in this mode of change, and it is helpful because it tracks not only the stated content or intention of an urban design but also its spin – the English on the persuasion that causes the design to travel through culture. Yet, going further, the interplay between mental and urban strata of the noosphere is also a reflection of

organizational character that remains unexpressed or undeclared but *immanent* in the organization. Here, a discourse on disposition lends an essential understanding of, not only the affect of persuasion, but also the activity and potential latent in relative positions and arrangements (for example, the shape of the ball and its position on the plane). Neurophysiological structures of the brain or organizations of infrastructure networks possess latent activities, protocols, and time-released powers – propensities that also reciprocally influence one another.

In conceptions of form that are limited to outline, volume, geometry, or some other direct form of declaration, these powerful dispositional strata remain invisible and underexploited. They are verbs and tendencies that escape nominative designations or documented events. A contemplation on disposition stretches disciplinary habits of mind to consider a common art for shaping the object as well as the way it plays – an art with enhanced faculties for *conditioning* material and immaterial parameters with active forms, aesthetic practices, and political trajectories, which may even be located at a remove in space and time. Further tutoring an expanded political repertoire, these *active forms* are capable of embodying discrepancies and slippery, undeclared forms of power.¹

Knowing How and Knowing That For many disciplines, form is object, name, fixed signification, vessel, or template. Yet form is commonly used as both a noun and a verb to describe not only the shape, structure, outline, or appearance, but also the act of creating these attributes. Social forms describe those activities by which a cultural practice takes shape, becomes formalized or recognizable. For the poet or artist, similarly, form may refer to shape or arrangement or a reusable vessel of creative output as well as a process of formalizing. For designers, authorship of form as an object reliant on profile, shape, and geometry is a crucial, fundamental skill. If asked to create something called active form, designers would naturally rely on what they are best trained to create – formal objects themed, choreographed, or dressed to represent action. For instance, geometry is used to name or fix an arrangement or to create a placeholder for a process that cannot be named or fixed. A single enclosure is meant to represent, for example, relativity or embryology. An architect embracing Deleuze and Guattari might make an homage to *Le Pli* with a folded building or represent the *diagram* (something that cannot be represented because it is evolving) with choreographed, serialized geometric patterns. In grasping for apprehension of an evolving spatial field with changing components, the architect designs the *field* in its entirety with a fixed architectural pattern. The more complex or agitated these tracings, the more ‘active’ the form is meant to be. A more simple-minded confusion (made more powerful by being simple-minded) arises when action or activity is confused with movement or kineticism as in a building that appears to be moving or a space composed of or populated by moving objects.

For architecture and urbanism as for many schools of thought, the distinction between understanding form as object and form as action is something like the philosopher Gilbert Ryle’s distinction between ‘knowing that’ and ‘knowing how.’ Ryle was keen to point out the ‘ghosts in the machine’ or the phantoms harboring in false logics of Cartesian dualism that would separate mind and body. He relished the outlying or nonconforming evidence that challenged familiar constructs and quite frequently found it by coaxing meaning from everyday speech. Ryle’s work within ordinary language philosophy harvested these non-conforming phenomena and made them available as meta-critical tools for renovating other logical tangles and fallacies in thinking. For Ryle, ‘knowing that’ versus ‘knowing how’ – training the mind to know the answer over training the mind to rehearse actions – was essential to a critique of the mind-body split. Intelligence is often measured in terms of the amount of knowledge that can be acquired, identified or named. If one *knows how* to tell a joke or do gymnastics one can only satisfy the ‘intellectualist myth’ that knowing how is intelligent only if one knows the proper way to do it and in doing it is doing it right. Yet, as Ryle points out, a skill is not a logical proof that can be correctly or incorrectly reasoned. He argues for an intelligence or way of knowing in *knowing how*. He writes, ‘A soldier does not become a shrewd general merely by endorsing the strategic principles of Clausewitz; he must also be competent to apply them. Knowing how to apply maxims cannot be reduced to or derived from, the acceptance of those or any other maxims.’ ‘Knowing how’ is, for Ryle, ‘dispositional.’²

For instance, Ryle dwells on the performance of a clown as an unfolding encounter. The clown’s antics are not mirroring or manifesting as an event that represents a thought process about being funny. ‘The clown’s skills represent ‘... a disposition, or a complex of dispositions, and a disposition is a factor of the wrong logical type to be seen or unseen, recorded or unrecorded.’³ The clown does not possess the correct answer to the question: ‘What is funny?’ His knowledge and experience unfold in relation to the situation, from encounter to encounter, circumstance to circumstance. He modulates his fluid, plastic expressions in relation to the reactions of the audience. He has well-rehearsed knowledge of how to do a pratfall, exaggerate his facial expressions, modulate his voice, or introduce any other gag in his bag of tricks in improvisation according to the audience’s reaction. What is funny is contingent on a set of possible pathways and choices. ‘We can now come back to consider dispositional statements, namely statements to the effect that a mentioned thing, beast or person, has a certain capacity, tendency or propensity, or is subject to a certain liability.’⁴

Ryle emphasizes the latency of dispositional action, and significantly considers dispositional qualities in both human and non-human subjects. Disposition remains as a potential or tendency until activated, but it is present even in the absence of an event. Sometimes such an action cannot be recorded, not because it is a ‘ghostly happening, but because it is not a happening at all.’ He used

¹ **Dispositions and Causal Powers**, eds. Max Kistler and Bruno Gnassounou (London: Ashgate Publishing, 2007).

² Gilbert Ryle, **The Concept of Mind** (Chicago: University of Chicago Press, 1949), 27-32.

³ *Ibid.*, 33.

⁴ *Ibid.*, 123.

the example of a glass that was brittle, an attribute that was not in evidence unless the glass was shattered. He writes that to ‘possess a dispositional property is not to be in a particular state, or to undergo a particular change; it is to be bound or liable to be in a particular state, or to undergo a particular change, when a particular condition is realized.’⁵ It is a ‘hypothetical proposition’ about the glass different from an event or ‘episode.’⁶ The disposition cannot be proven as a definite ‘occurrence’ or what we might consider to be a definitive and singular piece of evidence. A person has the capacity or tendency to sing or smoke. The dog can swim. Rubber has a tendency to lose its elasticity. ‘My being a habitual smoker does not entail that I am at this or that moment smoking; it is my permanent proneness to smoke when I am not eating, sleeping, lecturing or attending funerals, and have not quite recently been smoking.’⁷

Ryle emphasizes that disposition, by its very nature, is not absolute but serial and indeterminate or gleaned from multiple observations of activity. Dispositional attributes, sometimes remain as a fuzzy imponderable within customary logics and epistemes because they do not constitute an event but must rather be observed over time as a potentiality, capacity, ability, or tendency. Ryle refutes those theories that associate disposition with occult agencies or causes, that is, things existing, or processes taking place, in ‘a sort of limbo world.’⁸ As a continuum of values dispositional expressions cannot be controlled, only inflected, conditioned or tutored. To know about the disposition of a person, for instance, is to know about their likely behaviors and practices in the world. Ryle cites Jane Austen’s various vantage points on the pride possessed by one of her characters.⁹ There may be rules about how an organization is to behave, but the disposition of the organization is an indication of how that organization dealt with the rules over time – how it absorbed or deflected the active forms moving within it. To know about the disposition of a material may be to know about its tendencies to be elastic or brittle. As it evolves from observing activities, disposition does not describe a constant, but rather a changing set of actions from which to assess agency. A temperamental disposition, for instance, describes, not an absolute, but an inclination toward a particular demeanor. Disposition requires more than a single encounter. For instance, only multiple deformations of a balloon would signal a disposition to plastic behavior in that material. A function in calculus describes the behavior of a number of values, which if mapped tend to form a curve with variable amplitude. The expression describes the disposition of those values to form a curve. Being able to locate one point, one episode, one value would not be sufficient.

To disregard ‘knowing how’ in favor of ‘knowing that’ is to discount evidence of dispositional activity as unknowable, simply because it is seen to be indeterminate or impossible to formalize. Disposition is composed of a cocktail of successive

active forms, indeterminate in its totality, but explicitly derived as it emerges. Knowing that – unresponsive to naming and declaration – involves its own explicit techniques for shaping serial activity. It does not answer to, nor is it the result of a reasoned executive intellectual order. To discard these dispositions as occult or to misinterpret them as echoes or a representation would be to discard much of what we practice in everyday life. With highly developed discourses to treat object, content, outline, and nominative, culture remains under-rehearsed in making action, medium, relation, or infinitive as material. Whatever Ryle’s particular arguments regarding the concept of mind, the notion of disposition travels and informs other organizations. In pointing out the ways in which some actions elude various quarantines of language and difference between naming and doing, Ryle raises further questions about what constitutes action or latent action and exposes ghosts that haunt the discussion of action and space.

With regard to spatial phenomenon, to limit design to the making of discrete objects on discrete sites that can be named and assessed with geometry is very similar to denying the ability to ‘know how’ in favor of ‘knowing that’ – to denying the dispositional phenomenon, or *active forms*, that shape most of the space in the world.

Active forms do not require an event or a movement. They are active even when they are static because that activity may be latent, serial, and indeterminate. Active forms might be manifest in movement, but they might describe agency, practices, or capacities that are not bound by a single event. For instance, active forms describe the way that some alteration performs within a group, multiplies across a field, reconditions a population, or generates a network. Moreover, the forms that alter physical space may not be themselves physical. Often working together with form as object, active forms are conceived as agency or contagion within a spatial field, and the extent of their contact may be out of control. The designer of active forms is designing the delta or the means by which the organization changes – not the field in its entirety but the way it is inflected. The designer of active forms designs not only the shape or profile of the game piece, but rather a repertoire for how the game piece can be played. So while perhaps intensely involved with material and geometry, active forms are inclusive of but not limited to enclosure and may move beyond the conventional architectural site. Active forms are not at odds with, but rather propel and expand the power of form as object. As they may ride larger organizations, they are instrumental to additional modes of authorship with time-released powers and cascading effects.

As Ryle noted in his discussion of a clown’s performance, the transposition from the nominative to the active that requires so much ideation and analysis in some schools of thought like design is a completely ordinary or practical matter in some other disciplines like theater. Working up to their elbows in the construction of dispositional action, those in the theater come very close to

⁵ Ibid., 43.

⁶ Ibid., 89, 116.

⁷ Ibid., 43. ⁸ Ibid., 119-20.

⁹ Ibid., 42-4.

handling action as an essential raw material while being completely uninterested in its codification. An actor adheres to an explicit script, but the scripted words are considered only to be traces or artifacts that provide hints of an underlying action. An actor constructs a scene as a string of sequenced actions. Often it is that action that is the meaning or information that is conveyed. The script is not merely ossified form, but it has shaded meaning as it is enacted. Actors rarely deal with nominative or descriptive expressions – states of being or mood. One cannot play ‘being a mother’ for instance. In theater this is usually a bad performance because its self-reflexivity lessens the possibility of listening to and interacting with other performers. It is an expression in the nominative rather than the infinitive – what is known in the theater as ‘indicating’ – a form of over-articulation that is akin to the ‘single track’ about which Ryle writes. Theatrical techniques often privilege infinitive expressions. The director asks the actor: ‘What are you doing?’ It is generally agreed that leading with action or letting a vivid action carry the words rather than the other way around is a relatively durable technique. Again the action that is leading the performance is not necessarily movement, gestures, blocking, or choreography. It is the driving intent expressed as an active verb.¹⁰ An actor knows that stillness and silence are incredibly powerful actions. An actor would play not ‘being a mother’ but rather ‘smothering a child.’ Uncertainty, or the inability to fix meaning, does not paralyze but rather catalyzes the process. The words of the textual script together with the movement constitute an action that is the real carrier of information – the consequence, change, or event. The repertoire constructed for a role is explicit while remaining flexible enough to be, again quite practically, reactive and improvisational.

Information Theater as a discipline for crafting action similarly attracts Bruno Latour in an analysis of those evolving qualities of social and technical networks that are central to noopolitical territory. Latour was among a group of scholars and researchers who theorized interactions between social and technical, or sociotechnical, networks, everything from communications media to electrical networks and other infrastructure. The work has correspondences to not only philosophical and sociological but also spatial and political considerations of disposition. For Ryle, locating dispositional activity in inanimate, static objects as well as animate beings demonstrates the ways that disposition delivers indeterminacy to some of the familiar habits of knowing and logics of reasoning. Like Ryle, Latour works on the shape of action (human and non-human, social and technical), to question some suppositions in studies of social networks.

Action, form, actor, actant, script, and information are words that refract between disciplinary and general usages. Both Latour and Ryle note oscillating glimpses of reciprocal formatting between formal uses and common parlance. For instance, an actor is a participant in a group. In a discussion of urbanism or infrastructure, as in many studies of sociotechnical networks, both the social and technical sides

of the networks are considered to be active and intertwined. Similarly, the word script, used in the theater, is also used in social studies to describe the instructions and practices that attend and inflect social networks and their technologies. As in theater, a script has no binding meaning, it is only one layer of many layers of signals.

It is not by accident that this expression, like that of ‘person’, comes from the stage... To use the word ‘actor’ means that it’s never clear who and what is acting when we act since an actor on stage is never alone in acting. Play-acting puts us immediately into a thick imbroglio where the question of who is carrying out the action has become unfathomable.¹¹

Latour considers the special attributes of action as a carrier of meaning – the difference between the declaration associated with the nominative and the multiple valences associated with the infinitive. He considers action as a source of uncertainty. While there is ‘something social that carries out the acting,’ that structure that can be named does not substitute for the action that is never ‘transparent.’ He variously describes action as a ‘surprise,’ or ‘mediation.’¹² Action, he writes is ‘dislocated.’ It is ‘borrowed, distributed, suggested, influence dominated betrayed, translated.’¹³ It is an ‘under-determination.’ Action is not under the full control of consciousness; Latour considers that ‘action should rather be felt as a node, a knot, and a conglomerate of many surprising sets of agencies that have to be slowly disentangled. It is this venerable source of uncertainty that we wish to render vivid again in the odd expression of actor-network.’¹⁴

For Latour, things, whether they are human or non-human, have agency; they are actively ‘doing something.’¹⁵ One of Latour’s first speculations about *actants* considered a door and the technology of a hinge and/or door closer. While it might seem an elementary example, the door demonstrates the ways in which there remains a mental obstruction to considering objects as active. The door is not active because it moves. It is technology fashioned by humans and even sometimes imbued with anthropomorphic qualities and while it is not human it is not divorced from the human. Nothing then can be merely an object, according to Latour. It is a thing that not only induces relational action from humans, but also is itself an actant. With dizzying oscillations and complications, more things are actors, and this ‘concatenation’ of actors and actants reciprocally format each other. This relationship alone renders most technologies active. Similarly, in a discussion of infrastructure, the most static roadways or the cable lying at the bottom of the ocean are actants – members of an active organization.

¹⁰ Sharing a sensibility with theater, Ryle, for instance, makes a distinction between active verbs or ‘performance verbs’ and verbs like ‘know,’ ‘possess’ and ‘aspire.’ One would not say, for instance: ‘He is now engaged in possessing a bicycle.’ Ryle, *The Concept of Mind*, 116, 130.

¹¹ Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network Theory* (Oxford: Oxford University Press, 2005), 46.

¹² Ibid., 45.

¹³ Ibid., 46.

¹⁴ Ibid., 44.

¹⁵ Ibid., 46.

The storing and releasing of crafted action or active forms as crucial to understanding a social network as it is crucial to understanding infrastructure or theater. For Latour, social forms are not something to be taxonomized and fixed, but rather catalyzed in an ‘infra-language.’ Forms are carriers, something against which to measure differences or societal valences. Form, he writes, is ‘simply something which allows something else to be transported from one site to another. Form then becomes one of the most important types of translations. Such a displacement from ideal to material can be extended to *information*. To provide a piece of information is the action of putting something into a form.’¹⁶

Rather than maintain social science in a ‘steady state,’ Latour sets about to renovate and ‘[redefine] sociology not as the “science of the social,” but as the tracing of associations.’¹⁷ His recent versions of this actor-network theory (ANT) in *Reassembling the Social*, for instance, constitute his own ‘critical sociology.’¹⁸ Concerned that human actors or non-human actants in the study of social networks might simply become ‘placeholders’ that reinforce existing assumptions, Latour calls attention to an unfolding trajectory of activities that is harder to fix. To study social networks is to continually ‘follow the actors.’¹⁹

Agency Resonant with both Ryle and Latour, Gregory Bateson’s manipulation of active forms is especially insightful at this juncture. Ryle describes disposition as a latent or inherent property of both materials and intentions, Latour retools social science techniques to account for the ever-unfolding dispositional nature of sociotechnical networks. Bateson, perhaps most overtly landing in the noopolitical territory, posited the cybernetic model as a means to create equilibrium amid violent tensions in the mind, the group and the larger political scene. As a cyberneticist his position is sympathetic to that of Latour in that he expresses form as information – not a vessel to fix meaning but rather a flow of meanings. Bateson characterized information as a cybernetic instrument, a universal unit or elementary particle. ‘Information is a difference that makes a difference,’ Bateson famously wrote.²⁰ Objects as well as actions are not anthropomorphized as little selves that possess mood and intentionality, but the degree to which they ‘make a difference’ in the world, they constitute influence, components of intention, *information* for the cybernetician. Setting aside some holistic conclusions and codifications, information shapes morphology and organization in biological or machinic, human or non-human systems. Assessing any group, whether be it electronic circuits, nations, tribes from New Guinea, or Alcoholics Anonymous meetings with this cybernetic epistemology, Bateson could also transpose sociological assessments of tension and violence to organizations of inanimate objects. Where Ryle describes disposition as inherent properties (glass that is brittle, for instance), Bateson can naturally extend an understanding of disposition to include behaviors inherent in groups. For the architect of the city, Bateson’s simple tools foster an understanding of stability, tension, violence,

aggression, interdependence, or competition that are literally immanent in urban organizations. In this way, Bateson’s agile travel through many noopolitical strata assesses something like the political agency, temperament, or disposition of an organization.

For instance, Bateson wrote about a number of binary patterns in behavior whether between individuals or groups as in ‘Republican–Democrat, political Right–Left, sex differentiation, god and the devil, and so on.’ He noted that people attempt to ‘impose a binary pattern upon phenomena which are not dual in nature – youth versus age, labor versus capital, mind versus matter.’ So ingrained were these binary habits for formation and group behavior that its proponents could envision no other. Bateson was interested in ternary systems as an alternative to binaries. He suggested that the proponents of binary relationships ‘lack the organizational devices for handling triangular systems; the inception of a “third party” is always regarded, for example, as a threat to political organization.’ He was especially interested in how and why these binaries generated divisive situations or schismogenesis.²¹

Bateson offered models of three types of binary relationships in groups: symmetrical, complementary, and reciprocal. In symmetrical relationships both sides of the binary compete for the same dominant position. They mirror each other, and their mimicry may escalate toward ‘extreme rivalry and ultimately to hostility and the breakdown of the whole system.’²² Some of these binaries he characterized as complementary motifs: ‘dominance–submission, succoring–dependence and exhibitionism–spectatorship.’²³ In complementary behavior, one party provides the necessary ingredient of the other. While that ingredient might be reinforcing and stabilizing in some instances, it often leads to hostility and schismogenesis if ‘submissiveness promotes further assertiveness which in turn will promote further submissiveness.’²⁴ In reciprocal relationships the various groups that occasionally form binaries oscillate between symmetrical and complementary relationships.

¹⁶ Ibid., 39, 223.

¹⁷ Ibid., 5, 8–9, 10–11. For instance, Latour departs from colleague Wiebe Bijker’s work because ‘the social is kept stable all along and accounts for the shape of technological change.’ See: Bijker, Wiebe E. *Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change*, Inside Technology. Cambridge, Mass.: MIT Press, 1995; or Bijker, Wiebe E., Thomas Parke Hughes, and T. J. Pinch. *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. Cambridge, Mass.: MIT Press, 1987.

¹⁸ Ibid. Latour, however has both critiqued and extended the sociological work. He departs from Durkheimian practices and steps away from, for instance, Irving Goffman’s work or Pierre Bourdieu’s critical sociology. Goffman and Bourdieu both use the word disposition in a way most pertinent to social studies. Bourdieu, who was also transposing his work to an active realm of practice, used the word disposition to describe a repeatedly structured set of cultural activities or *habitus*. Latour perhaps extends this work by suggesting that sociology might overcome its own *habitus* to further consider practices. He even departs from a branch of sociotechnical studies, arguing that they enshrine social forms as structured patterns or habits or reified some structures of social ‘science,’ when these were the very constructs he wished to renovate with considerations of both humans and things, actors and non-human actants in networks.

¹⁹ Ibid., 39.

²⁰ Gregory Bateson, *Steps to an Ecology of Mind* (Chicago: University of Chicago Press, 2000), 21, 272, 315, 381, 462.

²¹ Ibid., 95.

²² Ibid., 68.

²³ Ibid., 95.

²⁴ Ibid., 68.

There is an understanding that dominance might be shared or that one group might be submissive in some encounters and dominant in others. Reciprocal relationships distribute power over time and allow for trading roles in a way that stabilizes the relationship.

For the purposes of this discussion, Bateson linked information flow in organizations to dispositions of productivity, stability, violence, and collapse. In the competitive or destructive states, the flow of information collapses, whereas in the more balanced postures information is more easily exchanged. Bateson considered the stabilizing effects of breaking binaries with ternary systems that further increased the possibility of exchange. While it makes little sense to devise a system of codifying disposition merely in terms of numbers (such as monadic, binary, or ternary systems), Bateson offers an understanding of the disposition of an organization in terms of interdependence between an organization and its receptivity to extrinsic information or its ability to juggle multiple logics. Propensities toward aggression or its relief are significant markers in the craft of conditioning political disposition.

While cybernetic preoccupations facilitate an understanding of the interdependence between organization, logic, or morphology and receptivity to information, that understanding extends beyond Bateson's primary analysis to address even more elaborate political dispositions. Again, an understanding of disposition is also frequently rediscovered in the familiar. Many network topologies (for instance linear, hub and spoke, serial, parallel, hierarchical, rhizomic) are implicitly understood to possess disposition (patency, redundancy, hierarchy, recursivity, resilience, aggression, submission, exclusion, collusion, or duplicity). Culture understands the unfolding behaviors and power relationships of these networks in terms of their geometry, logic, and arrangement. The same fluency reverberates between digital, biological and spatial networks. For instance the power relationships between a hierarchical or nonhierarchical structure are familiar, as is an understanding of the resilience of a serial versus a parallel network arrangement.

Discrepancy As they are stored in the active strata of communication, dispositions can escape the expectations of the nominative, and yet the discrepancy between those expectations lends special powers of discrepancy. The indeterminacy of dispositional expressions that Ryle and Latour identified supported their critique of fixed declarations of language or social 'science.' Attempting to name active form results in the hilarious mismatch between a label that intends to fix meaning and a form capable of eluding that label because it is generated by entirely different means. In the case of a Levittown house, for instance, the active form was not itself physical, but rather a protocol for building. A set of sequenced moves concerning financing, foundation building, framing, plumbing, electrifying, roofing, or cladding were applied sequentially to create a field of homes. The object for sale was identified as a 'colonial-style' house, yet if the buyer or the

architectural reformer identified the form as an objectified enclosure, they were sure to be either disappointed or misdirected. The confusion is not the result of a misrepresentation, but something closer to a more profound miscue on the order of Ryle's 'category mistake.' Indeed, rhetorical labels that did not match the economic and political engines that fueled their dispositional trajectory have accompanied most infrastructures, wars, cities, and other spatial programs. The inadvertent as well as the deliberate divergence of label and active form offer powerful political opportunities.

Erving Goffman's contemplation of disposition explores this power of discrepancy. Like Ryle and Latour, sociologist Goffman was intrigued by both theatrical and social performance. He used the term disposition rather casually to describe the entire performance – the spoken words, gestures, postures, and the facial expression – that constitute an individual's presentation of self. Goffman marveled that while these myriad subtexts outnumbered, often even overwhelmed, the stated text, yet they were often not 'systematically examined.' He simply admitted into evidence not only the language that is decipherable with customary techniques, but also the glyphs and gestures that reside in an active realm of practices. In doing so, his groundbreaking work could step into an enormous field of material that often constitutes a large measure of communication. Goffman, like Ryle, found in the performance of language a trajectory of activities and agencies that cannot be named but rather operate with dispositional logics.

Everyone knows that when individuals in the presence of others respond to events, their glances, looks and postural shifts carry all kinds of implication and meaning. When in these settings words are spoken, then tone of voice, manner of uptake, restarts, and the variously positioned pauses similarly qualify. As does manner of listening. Every adult is wonderfully accomplished in producing all of these effects, and wonderfully perceptive in catching their significance when performed by accessible others. Everywhere and constantly this gestural resource is employed, yet rarely itself is systematically examined.²⁵

Since Goffman observed that meaning and intent coalesce from the multiple, and often contradictory, scripts presented, discrepancy is often the subject and material of his work. For Goffman, it is often the disconnect between the supposed text of an individual's presentation and what they are actually doing or enacting that is the material, and it is unusual material. Despite both expectations of and self-congratulations for sincerity, discrepancy is ironically at the heart of communication. What Goffman has in his hands, the material of his study, is often contradiction, caprice, and disguise. From the active forms he studies, where meaning is quite difficult to determine, it is the fluidity and slippery passage of meaning that is the material.

Like Latour, Goffman directly refers to the craft of theatrical performance as a model when he writes:

A character staged in a theater is not in some ways real, nor does it have the same kind of real consequences as does the thoroughly contrived character performed by a confidence man; but the successful staging of either of these types of false figures involves use of real techniques – the same techniques by which everyday persons sustain their real social situations.²⁶

The notion of performance is relevant not only because it is similar to the play-acting involved with myriad gestures of self construction and presentation, but also because of the essential ‘dislocation’ that Latour suggests is involved in the transposition from nominative to infinitive. In theater, actions, intentions, and motives are stored not only in words and voice but in the body, in sound, gesture, attitude. Action is the material that is used to make things and create meaning. The spoken text is not fixed and meaning as expressed in action may be the opposite of the stated meaning. The actor is saying, ‘I am pleased to meet you,’ while gently placing a teacup in the saucer. Despite the stated meaning, the character may actually be expelling someone from society. Despite the apparent civility, the real event may be quite violent. In the scene where the actor is saying to another character, ‘I don’t love you’ they may be actually tearing away at a wall that separates them from the other character. Indeed, just as actors have recipes and tricks for fooling their body and voice into being another body and voice, they become quite good at creating these cocktails of opposing intentions – playing actions that are entirely different from outward movements, text, and gestures.

While it is no great revelation to note that individuals, organizations, or governments are duplicitous, most disciplines train in techniques of reconciliation and verification of evidence, symptoms, and circumstances using their own disciplinary standards, laws, and tests for what constitutes information. Most business organizations maintain an isomorphism that eschews contradiction of its rules and general principles. A training in literary theory or sociology might involve learning techniques for determining signification or codifying cultural forms, just as a training in design reifies knowledge of a canon of buildings and their geometries. Training in the arts often encourages the discovery of an authentic self. One does not ordinarily train in discrepancy or trickery, because this is treated as another ghost, or as a form of magic. It is the supernatural of forthright communication, the wispy smoke that passes between the supposedly solid field of signifiers. Training to be a hustler or a con man is dispositional. These skills are ‘picked up’ by those sensitive to active forms and in the process of enacting them. Active form and disposition are handled in craft, and the form of tutelage is itself dispositional.

In *The Politics of Aesthetics*, Jacques Rancière develops an understanding of aesthetics that ‘does not refer to a theory of sensibility, taste, and pleasure for art amateurs.’ Like all the thinkers considered here, he considers the forms of art in terms of active or dispositional logics. Aesthetics cannot be codified as a set of guides or rules that culture carefully tends and maintains. He focuses on ‘aesthetic practices’ that both ‘depict’ and enact, that articulate ‘ways of doing and making.’ Aesthetics exists not as a form but as a changing regime of forms that are full of meaning but not determinate meaning. Rancière describes the ways in which forms are ‘distributed’ into various strata of the sensible.²⁷ Significantly, he does not discuss the aesthetics of politics, but the politics of aesthetics – the politics surrounding the reception of a work of art. He describes, for instance, not the pageant of goose-stepping soldiers in a Zeppelin field, nor the aestheticizing of resistance as fervid disappointment. Rather, he writes about the way art is used to generate political activity. For instance, his early study *The Nights of Labor* delivered eccentric evidence to some enshrined political theory by uncovering the way that workers involved in the revolution of 1830 used the desire for art to fuel their fight. Like the discrepancies and dislocations of active forms, the art itself did not take revolution as its subject or content, but was rather an instrument for enacting politics. Similarly, Flaubert’s *Madame Bovary*, in its reception, relayed to its audience a liberating disposition despite Flaubert’s conservative politics. ‘When *Madame Bovary* was published, or *Sentimental Education*, these works were immediately perceived as “democracy in literature” despite Flaubert’s aristocratic situation and political conformism. His very refusal to entrust literature with any message whatsoever was considered to be evidence of democratic equality.’²⁸ Rancière is describing the way an aesthetic regime might marshal political power in even more unpredictable ways. He writes: ‘At the heart of what I call the aesthetic regime of art is the loss of any determinate relationship between a work and its audience, between its sensible presence and an effect that will be its natural end.’

With active, dispositional forms, the ostensible content, text, or objective form is less relevant than the trajectory of that content (since content and disposition may be discrepant). Objective form that presents shape and contour can be attributed to and controlled by an author, and this is at least part of its seduction. Active form, on the other hand, takes pleasure in its ability to create cascading effects and alterations. It does not wish to maintain a particular contour, but rather to maintain a behavior within an organization or a network. Names may be used, designations may be made, but they may not matter. In addition, other scripts and intentions may be loaded into the organization without being identified. The content of rumor and gossip is less relevant than the way it behaves. By way of illustration, during the US presidential election of 2008, the rumor that Obama was Muslim was effective precisely because it was so far from the truth. The rumor could be kept alive even longer and repeated twice as much – first to spread the falsehood and then to

²⁶ Erving Goffman, *The Presentation of Self in Everyday Life* (New York: Anchor Book/Doubleday, 1959), 254-5.

²⁷ Jacques Rancière, *The Politics of Aesthetics* (London: Continuum, 2004), 13-14.

²⁸ *Ibid.*, 14.

refute it. The hoax claiming that climate change was itself a hoax, was effective for similar reasons. The bounce of the rumor or hoax may be instrumental in ways that are dislocated from content. Design is often a kind of hoax. Fiction lubricates many of the most powerful and transformative enterprises in the world – whether the construction of buildings or nations.

Dissensus Expectations of proper forthright techniques and territories for political activism supply some of its most significant constraints. Using proxies and obfuscation for protection, power frequently escapes because it is rarely forthright and survives on fluid intentions. The architecture of global relations is not, of course, arranged as a series of symmetrical face-offs or head-to-head battlegrounds. There is ample evidence of overlapping networks of influence and allegiance. Moreover, it may be a mistake to disregard caprice – the subterfuge, hoax, and hyperbole that actually rules the world. The complex logics of duplicity may be more instructive than the straightforward structure of righteousness. Indeed, the notion that there is a proper forthright realm of political negotiation usually acts as the perfect camouflage for parallel political activity. Finding the loophole to absolute logics or zero sum games, power wanders away from the bulls-eye or wriggles out to take shelter in another ruse. It may even come costumed as resistance. Goliath finds a way to pose as David, or multiple forces, assembling and shape-shifting, replace the fantasy Goliath of monolithic capital or corporate culture with even more insidious moving targets. Dissent is then left shaking its fist at an effigy while power mimics or confounds with some other disguise. Activism that shows up at the barricade, the border crossing, and the battleground with familiar political scripts sometimes finds that the real fight or the stealthier forms of violence are happening elsewhere. The opponent of dissent becomes an even more mystical or vaporous force (for example, Capital, Empire, or Neoliberalism). The attempt to name and defy a dispositional force is all the more misdirected. As Jacques Rancière said, ‘I would rather talk about dissensus than resistance ...’²⁹

The weather-changing, medium-changing, compounding capacities of dispositional activism make it among the most powerful tools of dissensus as distinct from resistance. While some political traditions call for inversions and revolutions or some other annihilation of the preceding system, a lateral dispositional shift might be just as radical, but never permanent. These adjustments can be politically powerful in that they can disappear and be discrepant, but they can also serve as the foundational medium that decides what survives. Active forms are meta-agents that can create a sea change capable of disarming a fight, and they are part of the ongoing reconditioning or revolutionizing of a spatiopolitical climate.

Disposition is a word used in common parlance to condition the declarations and events that supposedly constitute forms of knowledge proper. When the art of creating nominative, objective form is in the foreground, dispositional expressions frequently stand to the side as inadmissible evidence or the means to a nuanced, ineffable shading of affect. Yet dispositional techniques extend form-making into another, central and potent territory. They provide the means by which forms find new time-released capacities, and infrastructural territories that are the medium of power and polity. As Ryle, Latour, Bateson, Goffman, and Rancière explore this active register, they rehearse disposition as expressed in ordinary language, unfolding scripts of social networks, group architecture, discrepant presentations of self, and relational aesthetics. As it is bound up in the reciprocal influence of mind and unfolding activity, their work nourishes a contemplation of noopolitical power by offering some new techniques of adjustment and dissensus. An understanding of dispositional active forms catalyzes knowledge of language, social studies, geometry, organization, or aesthetics and sets it spinning in the world over time. Dispositional techniques help to script not only what the form is, but also what it is doing and how it will play.

Loose Coexistence: Technologies of Attention in the Age of the Post-Metropolis

Elie During

New Technologies of Information and Communication (NTIC) have recently begun to double as technologies of attention, and to determine what could be called a new *attentional regime*. Yet this phenomenon cannot be attributed solely to the fact that the diffusion of temporal objects plays a direct influence on the user-consumers' psyche. The process through which flows of consciousness tend to be synchronized points, at a deeper level, to the spatiotemporal reorganization of the very conditions of attention. Seen through this lens, the sly marketing strategies or simply cynical motivations of the tycoons of the cultural industry are not the main issue. Their ruthless arrogance is only the epiphenomenon of a movement, the leadership of which they lost a long time ago, that marks a profound change in capitalism as a system. Such a change is indeed inseparable from the transformations affecting urban life, or from what is often referred to as the 'post-metropolis.' Our goal in the following is to show that such a change is directly connected to the manner in which configurations of coexistence emerge and are formalized – configurations that, it is argued, are at once more fundamental and more concrete than the amiable discourses praising 'togetherness' or 'communal living.'

Distraction How can we deal with this issue without being too naïve about the emphatic praise of technological innovation? How can we circumvent ideological pitfalls in order to tackle the underlying aesthetic conditions of coexistence that, being at the heart of the mutations we have just mentioned, shape the ways we feel and think? On this matter, it would be tempting to merely extrapolate a few empirical features borrowed from a spontaneous phenomenology of the alienated or destructured consciousness. For instance, one could emphasize the worrying multiplication of symptoms pointing to a syndrome of generalized attention deficit, mainly among young people: the difficulty to concentrate or sustain continuous attention to keep up with the linear trajectory of a narrative, a demonstration, or any succession of discursive ideas, etcetera. 'Distraction' seems to be the moniker that sums up all the evils associated as a whole with new technologies in audio-visual broadcast, the latest improvements in chat and SMS communication, as well as the waves of multiple flows going through computer screens, cell phones, MP3 players and other forms of 'personal digital assistants.' We are suffering from a new form of 'mass distraction,' or so it would seem. The cause of this *mal d'époque* does not reduce to an external chaos distracting our minds from much more important and necessary chores: it corresponds to a structural transformation, a new regime of attention (and inattention) that is all the more adapted to our technological environment since it is, essentially, induced by it through the massive use of new cognitive prosthetics.

On the whole, there is obviously no objection to this type of diagnostic. It should primarily concern experts in management as they are facing the perverse effects of real-time technology on their employees' productivity. There is no point arguing that the time and effort required to read *Othello* comes nowhere near the level of natural disposition that results from the intensive use of a

cell phone or a video game, or even data mining via Google. However, to simply state the obvious, namely that the time required for reflection and research is incommensurable with the sustained flow of performance and *just in time* logic, does not bring us very far. What is really at stake is to find out which type of skills, which potentials for creativity may lie in this new attention regime and, by the same token, what we can attempt to gain by either reversing some of its vectors or playing them out against one another. YouTube, Facebook, and the innumerable blogs and RSS flows are indeed our new *pharmakon*: in the poison lies the remedy, and it all becomes a question of *composition*. Such is indeed Bernard Stiegler's main purpose in prescribing a 'pharmacology of attention' adjusted to our times.¹

Granted, the task of composition and, therefore, of critical evaluation, implies that one goes beyond the most obvious effects and after-effects of the industries of distraction in order to uncover the *uses* that makes them so effective. Still, behind the uses of technology, there lie *forms of life*, or to speak more accurately, forms of coexistence, namely modes of circulation and connection that determine the most generic spatiotemporal conditions of individual lives. For NTIC users are far from being 'no-life' zombies, glued to their screens and cut from the surrounding world: most of them do go about cities followed by waves of flows. Needless to say, the spatiotemporal conditions of these innumerable networks include the space of flows woven by the proliferation of communicational prostheses. Among those, one must now include geolocalization tools such as GPS, as well as all kinds of pervasive objects scattered around the urban environment. The gift of ubiquity appears as a dream come true as innumerable interfaces (info stations and boards, wi-fi outlets, webcams, and so forth) locally implement spatially separate and yet simultaneously unfolding processes.

Space of Flows and Simultaneity This notion of ubiquity requires closer inspection. We cannot be content with such global designations as the 'space' of networks – an expression that often lends support to lamentations about the universal 'enframing' and 'mobilization' of conscience achieved by modern technology. As a matter of fact, the space of networks – or flows – is less unified than what some candidly catastrophist theories would like us to believe.² Some of its most peculiar effects are the result of the disparities between individuals, as well as of differences in places within the same territory, differences in mobility, access to networks or connecting speed. These disparities must in turn be considered in relation to the conjugated phenomena of spatial hyper-concentration and dispersion, or else to hybridations that, from a temporal perspective, take place between imposed time and chosen time.³ To sum things up, distraction always builds over *viscosity*, which involves the notion of a differential. Far from the metaphor of the digital ether, flows are halfway between liquid gas and solid matter, which means that they would not exist without the differentials in mobil-

ity and access, concentration and dispersion, constraint and freedom that make up the spatiotemporal framework of our lives.⁴ We believe it is through this angle that we ought to assess the impact of the current artistic practices that are developing around so-called 'locative media' – or, if one prefers, localized or localizing media.⁵ We can only hope that the artists who are taking up these new technologies will open up new paths for critical reflection, while laying the ground for a creative reappropriation of geolocalization and real-time techniques. Yet the meaning of these very practices – which will only be examined in the concluding section – cannot be considered apart from the diversity of the material usages that complicate the forms of coexistence attached to the contemporary post-metropolis. For in so far as it involves genuine *practices* of simultaneity, coexistence has now become an issue of both spatial and *temporal* interconnectedness. As such, it cannot be reduced, as Virilio imagined, following in Kant's footsteps,⁶ to the optical blinding of instantaneous communication or action at a distance. In other words, the space of coexistence cannot be identified with mere instantaneous space viewed as a transversal slicing of the universe at 'instant t': it cannot be considered apart from the manner in which heterogeneous durations and rhythms connect at the local level.⁷ Even geographers, who were believed to be chiefly concerned with spatial notions, are now more inclined to think in terms of timespace.⁸

¹ Bernard Stiegler, **Taking Care of Youth and the Generations** (Stanford: Stanford University Press, 2010).

² I am referring here to some of Paul Virilio's most extravagant statements concerning 'real time,' 'ubiquity,' and 'instantaneity.' I have tried to dispel certain confusions surrounding these notions in 'The Compression of the World,' **Art Press** 354 (2009): 39-41.

³ On these issues, see **24/7: Time and Temporality in the Network Society**, eds. Robert Hassan and Ronal E. Purser (Stanford: Stanford University Press, 2007). On urban spacetime and its relation with new technologies, see also **Cybercities**, ed. Stephen Graham (New York: Routledge, 2004).

⁴ The paradigm of percolation introduced by Michel Serres can be used as a guide, see Michel Serres and Bruno Latour, **Conversations on Science, Culture, and Time**, translated by R. Lapidus (Ann Arbor: The University of Michigan Press, 1995) 58. Cf. Serge Galam, 'Le portable et les autres,' in **Mobilités.net: Villes, transports, technologies face aux nouvelles mobilités**, eds. Daniel Kaplan and Hubert Lafont (Paris: LGDJ, 2004), 348.

⁵ For examples, one may visit the following website: 'We Make Money Not Art' (<http://www.we-make-money-not-art.com/>), under 'locative.'

⁶ The theme of coexistence or community is the nerve of 'the third analogy of experience' as presented in the analytics of principles in Kant's **Critique of Pure Reason**: although the analysis is conducted along the lines of the temporal form (which explains the emphasis placed on the notion of simultaneity), coexistence ends up being defined through the concept of reciprocal action, which provides – in accordance with the framework of Newtonian physics – a first metaphysical characterization of physical **space** as the locus of 'community' or instantaneous interaction.

⁷ This, by the way, is exactly what is at stake in Bergson's confrontation with relativity. See Henri Bergson, **Durée et Simultanéité** (Paris: Presses Universitaires de France, 2009 [1922]), translated as **Duration and Simultaneity** (1965). Note that video art deals with the same issue according to its own means when it provides montages of movements or fluxes that are the spatial expression of so many **local durations** (what physicians would call 'proper times.'). Some of Mark Lewis' work – such as **Airport** (2003) or **Downtown Tilt** (2005), featuring barely perceptible movements – result in the subtle composition of spacetimes interlocking with each another in the way animal **Umwelts** are described by ethnologist Jakob von Uexküll. If the relative nature of simultaneity (see below) prevents us from gathering these local durations in a single, encompassing space, the only way to go is through local connections operating from point to point.

⁸ See Doreen Massey, 'Space-Time, "Science" and the Relationship between Physical Geography and Human Geography,' **Transactions of the Institute of British Geographers** 3

As for attention, here is the idea that guides us: the attentional apparatus encapsulated by the concept of distraction is better determined, and also more capable of initiating, critical operations when considered in relation to the spatiotemporal configuration manifested by the embedding of NTIC-connected activities within the real environment where everyone finds their bearings. Remarkably enough, most of the time, attention scatters without dislocating. This amazing property of consciousness cannot be explained by merely referring to the 'plasticity' of the human mind. Without denying the effects of maladaptation or relative deconstruction induced by attention technologies, it is important to understand what is being created there by circumscribing more closely their operational potential. When it comes to technologies of simultaneity or action at a distance, there is no doubt that the reason why attention manages split ('split attention') in an effort to follow, in parallel or alternation, a plethora of sources of stimuli or data through fast oscillations of consciousness, is because it is capable of *setting up its own dispersion* on various levels by distributing itself in embedded space-time sequences. When it comes to a new regime of attention, what is at stake is not so much the dizziness or vertigo that may accompany sensorial hyperstimulation or informational saturation, as this higher-level skill that enables us to articulate various spatiotemporal frameworks of experience – these frameworks being themselves inseparable from the actual relations that make them up. 'Split' or 'distributed' attention is split or distributed among distinct planes of composition which it actively sustains, rather than between bursting fluxes of impressions received in a state of shock or sheer passivity. Only in cases of extreme perceptual disorganization can the sensorial input be compared to parallel, disconnected series of external stimuli.

Distraction as a Skill: Dispersed Attention, Diffuse Attention

In this respect, we need to keep in mind that Walter Benjamin's use of the notion of 'distraction' already pointed to something utterly different from the mechanical after-effect of an intensification of nervous life induced by the new urban environment. Turning back to his analyses will allow us to clarify certain points about attention, while assessing how remote we are – nearly a century – from the early stages of the issue.

Like Simmel, Kracauer and a few others, Benjamin believed in the themes of *shock* and *fragmentation*, two recurrent perspectives on city life. With the Berlin of the 1920s in mind, Kracauer writes that the city is 'the locus of a life that has been sucked dry of its substance, that is empty like a white metal tin and that lacks inner connection [*Statt des innerlichen Zusammengangs*] and is instead made of isolated events that assemble in a kaleidoscopic manner in a series of ever renewed images.'⁹

He further writes: 'Whoever lives in Berlin long enough ends up not knowing

where he is truly from. His existence is no longer shaped like a line but like a juxtaposition of dots.'¹⁰ Referring to Baudelaire's image of the *flâneur* built around 'his frequent contact with enormous cities' and 'the junction of their innumerable connections,'¹¹ Benjamin similarly refers to a perpetually titillated consciousness, 'one that has to be alert as a screen against stimuli,' forced as it is to be 'on the watch' at all times in order to avoid blows, 'to parry the shocks.'¹² Perhaps the man who avoids blows is most often prone to the discontinuous exercise of automatic activity, soliciting a new regime for memory. Benjamin has explored this aspect of the 'shock experience,' drawing from Bergson and Proust. What concerns us here is the fact that sensorial hyperstimulation and the ensuing state of shock usually translate into a form of psychic depression doubled with spatiotemporal disorientation.

Already Simmel insisted on the direct correlation between hyperesthesia and 'lassitude,' resulting, in this case, in the dulling of sensitive skills. Neurasthenia, a typical theme of the era, naturally comes to mind, and so does the state of catatonia to which hyperstimulation might lead in some subjects. Yet, this phenomenon appears in its ordinary state through the crisis of the forms of spatiotemporal coordination. The superposition of traditional frames of reference (those of the 'city in the process of its disappearance'¹³) with new frames, the simultaneous presence of the horse-drawn carriage, streetcar, and automobile, make the simple act of crossing a street already difficult.¹⁴ This is an obvious instance of the phenomenon of viscosity: the coexistence of heterogeneous speeds within the same traffic space commands caution at any time. The flexibility and mobility of lifestyles is the source of new tensions, as the multiplication of urban rhythms and spacetimes requires increased coordination, synchronization, exactness, and punctuality.¹⁵ Thus, uniform and universal 'clock time' – the time of clocks distributed all over the city space – becomes the symbol of a generalized rationalization of human conducts adjusted to the demands of mechanized production. This rationalizing process is all the more intrusive as it takes place at

(1999). See also **Timespace: Geographies of Temporality**, eds. John May and Nigel Thrift (London: Routledge, 2001). On this issue, there exists a specific connection between recent conceptual shifts in geography and the reflection conducted by some philosophers of science on the physical notion of spacetime: see Milic Capek, 'Time-Space Rather than Space-Time,' in **The New Aspects of Time: Its Continuity and Novelities** (Dordrecht: Kluwer Academics Pub., 1991).

⁹ 'Ein Film,' originally published in **Frankfurter Zeitung**, 4 February 1925, reproduced in Siegfried Kracauer, **Kleine Schriften zum Film, 1921-1927** (Frankfurt: Suhrkamp Verlag, 2004), quoted by Stéphane Füzesséry and Philippe Simay (eds.) in **Le Choc des métropoles** (Paris: Editions de l'éclat, 2008), 14.

¹⁰ 'Wiederholung,' quoted in *ibid.*, 37.

¹¹ Charles Baudelaire, 'To Arsène Houssaye,' in **The Prose Poems**, translated by R. Lloyd (Oxford: Oxford University Press, 1991), 30.

¹² 'Une conscience perpétuellement aux aguets,' Benjamin writes, describing 'l'homme qui pare aux chocs.' The quotes are from 'A propos de quelques motifs baudelairiens,' in Walter Benjamin, **Écrits français** (Paris: Gallimard, 1991, coll. 'Folio'), 317, and 'On some motifs in Baudelaire,' in **Illuminations**, translated by H. Zohn (New York: Harcourt Brace, 1968), 163.

¹³ Walter Benjamin, 'Notes sur les **Tableaux parisiens** de Baudelaire,' in **Écrits français**, 305.

¹⁴ Füzesséry and Simay, **Le Choc des métropoles**, 33.

¹⁵ Cf. Georg Simmel, **Die Großstädte und das Geistesleben** (Frankfurt: Suhrkamp Verlag, 2006), translated as 'The Metropolis and Mental Life' in **On The Sociology of Georg Simmel**, ed. K. Wolff (Glencoe, IL: The Free Press, 1950), 412-13.

the very moment when the spacetime of functions and uses looks more fragmented than ever by the multiplied functions and possibilities of interaction offered by a metropolis that apparently never sleeps. In this respect at least, it is obvious that we are no longer living in the same world: the temporality of 'network space' is that of a generalized *asynchronicity* (however coordinated or connected) that has definitely shattered the rigid frameworks of universal and linear time.¹⁶

What makes Benjamin's writings especially topical, however, is the following: beyond the automated response triggered in the hyperstimulated urban subject, 'parrying the shocks' can also take a positive and potentially emancipating turn, provided that one can see in it a capacity to develop new perceptive skills. This is how one ought to consider the themes of distraction and fantasy, as well as the figures of the *blasé* and the *flâneur* which echo – or maybe act as a counterpoint to – the both explosive and cruel nature of urban experience in the context of the modern metropolis. Benjamin suggests that such 'urban skills'¹⁷ can translate as a 'truly political expertise.'¹⁸ In this perspective, the incapacity of the urban wanderer to pay attention to solicitations from the outside expresses a power for *indifference*. 'If you head towards the train station through Friedrichstrasse, you can see the powerful locomotive of an express train that is overhanging above... Is it a hit among the crowd? No, no one notices it. Coffee shops, shop windows, women, self-serve buffets, newspaper headlines, neon signs, policemen, omnibuses, music-hall pictures, beggars – all these impressions at human eye's level – are too strong stimuli for the passers-by to apprehend properly this form popping up in the distance.'¹⁹ Sociologist Isaac Joseph reminds us that, overall, passers-by are rarely faced with the 'otherness' of others. This is no reason, however, for overemphasizing the idea of atomized individuals lost in anonymous crowds, locked up in their own thoughts as if in a bubble. The truth is that passers-by deal with 'anybody' (*tout un chacun*), whether it is a mere silhouette or a 'mobile unity' in movement (*unité véhiculaire*) offered to a non-focused attention, capable of obliterating sequences of sensations that are of neither concern nor interest.²⁰

Such a filtering or screening of the perceptual field, maintaining in a state of indifferentiation whole slices of the urban environment,²¹ is utterly ambivalent. Thanks to the works of experimental psychology, it has been known since the end of the nineteenth-century that focused attention, conceived as active conduct, results in a reduction in the perceptual field. John Dewey, among others, rightly insisted on this point: the intensification of perception on a specific point in perceived space presupposes the *anesthesia* of peripheral zones,²² so much so that any process involving attention also involves an element of distraction. Conversely, any distraction can engender an increase in attention, provided that it is coupled with shock. Therein lies the dialectic nature of the filmic image. As Benjamin

writes: 'The shock effect of the film ... like all shocks, should be cushioned by heightened presence of mind.'²³

While Kracauer still links distraction to the simulacrum of the entertainment industry (a real *Zerstreuungsfabrik*, or entertainment factory²⁴), it is quite clear that Benjamin holds a radically different view on its meaning. Distraction no longer consists merely of a way to become immunized from the traumatizing effect of shock. It also serves as an 'apprenticeship,' or a 'training' for 'reception in a state of distraction.'²⁵ With cinema as its corollary, and contemporary with experiments by Haussmann or Moholy-Nagy, it appears not only as an essential prerequisite for acquiring and owning skills in general,²⁶ but more importantly as a reflexive skill of a specific genre. There is, in this respect, a true homology between the spatiotemporal experience freed by cinema and the spatiotemporal experience of the city and its architecture: 'Only film commands optical approaches to the essence of the city, such as conducting the motorist into the new centre.'²⁷ So says Benjamin who, we know, dreamt of a movie based on the map of Paris.²⁸ Yet what really sets cinema apart from other forms of art is not the fact that it conjures up the 'dynamite of tenths of seconds' in order to 'blow up' the 'carceral setting' of modern life along with its offices, stations, factories, and furnished efficiencies; it is not chiefly its capacity to deconstruct the gloomy functional organization of modern life and denounce its violence through the surgical scrutiny of

¹⁶ Cf. Mike Crang, 'Speed = Distance / Time: Chronotopographies of Action' in Hassan and Purser, **24/7: Time and Temporality in the Network Society**, 51.

¹⁷ Füzeséry and Simay, **Le Choc des métropoles**, 39.

¹⁸ Ibid., 50.

¹⁹ 'Lokomotive über der Friedrichstraße,' originally published in **Frankfurter Zeitung**, 28 January 1933, quoted from Siegfried Kracauer, **Straßen in Berlin und anderswo** (Frankfurt: Suhrkamp Verlag, 2009), 43.

²⁰ Isaac Joseph, **L'Athlète moral et l'enquêteur modeste** (Paris: Economica, 2007), 311-2.

²¹ Cf. what Simmel says about the 'blasé attitude' and the 'blunting of discrimination,' the 'discoloration' or 'hollowing out' of experience it involves (in 'The Metropolis and Mental Life,' 413-5).

²² Cf. Jonathan Crary, **Suspensions of Perception: Attention, Spectacle, and Modern Culture** (Cambridge, MA: MIT Press, 2001), 24.

²³ Walter Benjamin, 'The work of art in the age of mechanical reproduction,' in **Illuminations**, 238.

²⁴ See 'Cult of Distraction,' in Siegfried Kracauer, **The Mass Ornament: Weimar Essays**, translated and edited by Thomas Y. Levin (Cambridge, MA: Harvard University Press, 1995), 323-8.

²⁵ Benjamin, 'The work of art in the age of mechanical reproduction,' 240.

²⁶ 'The distracted person, too, can form habits. More, the ability to master certain tasks in a state of distraction proves that their solution has become a matter of habit. Distraction as provided by art presents a covert control of the extent to which new tasks have become soluble by apperception.' (Ibid.)

²⁷ Walter Benjamin, **One-Way Street and Other Writings**, translated by E. Jephcott and K. Shorter (London: Verso, 1985), 298. Quoted by Graeme Gilloch in 'Urban Optics: Film, Phantasmagoria and the City in Benjamin and Kracauer,' **New Formations**, special issue on Siegfried Kracauer, 61 (2007), 118.

²⁸ 'Couldn't an exciting film be made from the map of Paris? From the unfolding of its various aspects in temporal succession? From the compression of a centuries-long movement of streets, boulevards, arcades, and squares into the space of half an hour? And does the flâneur do anything different?' Walter Benjamin, **The Arcades Project**, translated by H. Eiland and K. McLaughlin (Cambridge, MA: 1999), 83.

close-ups and slow motions, the critical montage of debris and fragments. The proper function of cinema is not to double the optical dazzle of urban life either; it is not to provide, on the glimmering surface of the screen, the optical hit-and-run that will act as a compensatory *ersatz* for the shock or vertigo experienced in the streets of the metropolis.²⁹ What makes cinema so special is that its distracting factors concurrently call for heightened attention, a form of vigilance that brings about the likelihood of a new *disposition* and indeed of a new *taste* for anything urban.

Thus, editing procedures such as montage, superimposition, and cross sections (*querschnitt*)³⁰ that have become staples in the film industry, translate in their own way the emergence of a new *perception apparatus* capable of integrating and surpassing the traumatic dimension of the shock, as well as the threat of disruption borne by the swirl of sensations which, whether as signs or, even more often, as mere signals, end up saturating the visual and auditory fields of urban subjects.³¹ Still, what this city/cinema homology operates, by capturing the alert reverie that is typical of the *flâneur*, eventually amounts to a *depsychologization* of the very concept of distraction, which thus becomes available as a genuine operator for perception. The experimental approach to 'reception in distraction' results in reversing the common relation between attention and distraction. As Graeme Gilloch writes:

Distraction refers not to the inability to concentrate, to mere inattention *per se*, but rather involves attention directed elsewhere, a concern with the peripheral, marginal, and neglected. Conceived in this way, distraction signals an openness to contingency and happenstance, a penchant for the diffuse and dispersed. It is a form of accomplishment rather than a failing. Distraction, like losing oneself in a city, is a skill to be learned and honed, it requires that time spent on the 'training ground'.³²

In other terms, distraction does not merely stand for the element of anesthesia necessary for any effort to focus; it now signals a lateral opening of the perceptual field that is capable of embracing singularities as such. Distraction is no longer basic inattention; it is not the absent, scattered, or disseminated attention of a mind unable to concentrate. It is the diffused or floating attention of a mind that actually refuses to focus, so as to make itself receptive to the occurrences happening on the surface of the most familiar urban weave; and to let emerge, through an almost tactile apprehension of the glittering visual space,³³ happenings that jut out from the cover of perceptive habits. It is thus reasonable to hope that the man of the metropolis, 'spiritually homeless' as Kracauer phrased it, can again be *moved* by things in a lateral and peripheral relationship with an enveloping environment.³⁴

Post-Metropolis and Distributed Attention In the context of the contemporary *post*-metropolis however, the problems raised by Benjamin require that we turn to a third definition of distraction – or distracted attention. Cities have indeed changed; they might already be things of the past. For one thing, the very idea of an urban *form* becomes problematic in a way unfathomable to Kracauer or Benjamin. The erosion of urban space, both concentrated and spread out on larger and larger territories; the tendentious blurring of traditional distinctions between centers and peripheries; the multiplication and densification of networks that support its activity; all these factors make it more and more difficult, even from a theoretical standpoint, to assign a *form* to the city. If it has now become impossible to 'read' a city, it is due to a radical turn that goes beyond the dizzying experience of the passer-by submerged by the continuous flow of Potsdamerplatz. The issue here is that of urban form as such, a form that no cross section can totalize and represent as a simultaneous whole, to the extent that 'instantaneity' – despite all the fuss about telepresence and ubiquity – only survives as a simulacrum. The emergence of this 'nonplace urban realm,' as Melvin Webber had it, is one of the reasons why Benjamin's project of a film based on the Paris map is, more than ever, relevant. To a certain extent, Bruno Latour carried out this idea with *Paris ville invisible*. This book, an illustrated meditation on the idea of the network-city made of a collage of texts and images (photographs, maps, diagrams), can be read as Latour's updated version of *The Arcades Project*.³⁵

²⁹ Posters, signs and billboards: fashioned for the 'mercantile gaze,' the city, Benjamin writes, 'hits us between the eyes with things as a car, growing to gigantic proportions, careens at us out of a film screen.' 'One-Way Street,' in **One-Way Street and Other Writings**, 85.

³⁰ See what Kracauer says about 'cross sections' (*querschnitt*) in Walter Ruttmann's symphonic depiction of Berlin: **From Caligari to Hitler** (Princeton: Princeton University Press, 2004), 182-5.

³¹ See **Berlin, Symphony of a Great City** by Walter Ruttmann (1927) and **Man with a Movie Camera** by Dziga Vertov (1929). Should one search for the figuration of contemporary city or post-metropolis, they would need to turn to films or TV series the topic of which is not the city *per se*: from **Taxi Driver** to **Lost in Translation**, from **Collateral** and **The Wire** to **24**. On this last example, see my article '24 ou l'art du contrôle,' **Trafic** 68 (2008), republished in **Faux Raccords: la coexistence des images** (Arles: Actes Sud, 2010).

³² Gilloch, 'Urban Optics: Film, Phantasmagoria and the City in Benjamin and Kracauer,' 129. See Graeme Gilloch, **Walter Benjamin: Critical Constellations**, (Cambridge: Polity, 2002), 189-93.

³³ Benjamin speaks of a 'tactile appropriation' in 'The work of art in the age of mechanical reproduction,' in **Illuminations**, 240.

³⁴ Further development of such issues can be found in Deleuze's evocation of the 'brain-city' (*ville-cerveau*), in relation to the transformations in cinematic imagery induced by digital media. See 'Letter to Serge Daney,' in **Negociations** (New York: Columbia University Press, 1995), 76-8. The projection of city lights in motion onto the car's windshield in **Taxi Driver** is an allegory of the switch from the aesthetics of shock to what could be called an aesthetics of hypnosis or free-floating attention. See Dork Zabunyan, 'The Image beyond the Shock Wave,' **Art Press** 354 (2009), 43-6.

³⁵ Bruno Latour and Emile Hermant, **Paris ville invisible** (Paris/Le Plessis-Robinson: Les Empêcheurs de penser en rond, 1998). English translation available on <http://www.bruno-latour.fr/virtual/index.html>. Latour's metaphor of the urban 'plasma' is strangely reminiscent of Benjamin's description of Baudelairean Paris as 'a submerged city, more submarine than subterranean,' see Walter Benjamin, **Reflections**, translated by E. Jephcott (New York: Harcourt Brace, 1978), 157. But Latour's point is precisely that we should not expect too much from such blanket metaphors: there are only **local** projections of the city, which themselves function as new mediations in the network. Every panoptic view is, in the end, an 'oligoptic.'

The perspective upon which such questions are based can no longer be that of a Baudelairian wanderer or his Berlin-born avatar. We have moved away from the aesthetics of shock. To begin with, the urban man is no longer a pedestrian. In that respect, most derivative practices – in the sense of the situationist *dérive* – envisioned during the twentieth century still retain in them, whether they want to or not, something of the first experience of the urban shock: they offer creative – if somewhat anachronistic – counter responses to a type of urban experience that is not fundamentally different from Baudelaire's. What situationists, like surrealists before them, mostly lacked, and what still represents a challenge to some of their contemporary counterparts (such as Stalker or Hendrik Sturm), is the automobile. Let's hypothesize: given that the topology and dynamics of the city are deeply configured by circulation networks, an artistic experiment adjusted to the dimensions of the contemporary metropolis, to its spread and tendential dispersion (*urban sprawl*, *città diffusa*, *Zwischenstadt*, etcetera), is bound to focus, sooner or later, on the urban flows and trajectories themselves. It then becomes necessary to go beyond a certain speed limit, which does not mean, of course, that one is doomed neither to ride incredibly long routes, nor to move around simply by car. The point is rather that even the walking tours favored by most contemporary artists-wanderers will bear meaning so far as they are likely to introduce a difference within the 'speed space' of the city. Such a speed space, by the way, does not reduce to the trajectories traced by physical bodies (pedestrians, cars, goods); it also includes all kinds of digital flows. This is why the use of digital prostheses will most often suffice when it comes to capturing an experience of urban space (*ubicity* as we sometimes read) that is no longer separable from the intensive use of information and communication technologies. Portative or 'pervasive' devices, combining real-time information and geolocalization, actively participate in the reconfigurations of urban form, in addition to the morphological transformations that affect territories, as well as to the circulation network and the physical conveyers (automobile, public transportation) that ensure the mobility of people and goods. These technologies are of course technologies of control, but it is mainly as attention technologies that they are of interest to us. As such, they set up a *contrapuntal* perception of the city, drawing from all possibilities of spatiotemporal short circuits, shortcuts, and compressions engendered by electromagnetic transmission. On this issue, prophets of ubiquity proceeded too fast: blinding themselves with the mirage of real time and telepresence, they never were in a position to perceive distraction in any other way than as a giddy consciousness bombarded with signals transmitted at infinite speed. This is why they are of no real help today in the fine tuning necessary to solve the various issues surrounding noo-technologies.

The third form of attention to which we alluded above is that of dissociated attention, or to speak more accurately, *distributed* attention.³⁶ Distributed atten-

tion is neither scattered attention nor diffused attention. It better suits the new figure of the *flâneur* emerging from the context of ubiquitous technologies. We have already pointed out its formal characteristics: attention is distributed along several tracks, several levels as it were, that work as many planes of organization of spatiotemporal experience. If we had to single out one cinematic technique that seems well adjusted to this new attention regime, we would need to turn to cross-cut editing rather than to the cross-section image favored by Ruttmann or Vertov. This being said, distributed attention seems to accomplish what cinema can itself barely emulate on its own without resorting to artificial means, namely the *simultaneous* capture of several shots and apparently incompatible – or at least disjointed – frames of reference. Split-screens exhibiting simultaneous sequences in parallel can only provide an awkward and, ultimately, too literal illustration of attention's propensity to distribute itself in order to operate, in the same way neuronal networks are said to, through 'parallel processing.'

Dissociation, or bisociation, as Arthur Koestler put it,³⁷ might be the origin of all creative process. Bergson, in a way, anticipated this concept in his article 'Intellectual Effort,'³⁸ in which he stressed how global restructurations were solicited by the intensive circulation among heterogeneous planes of consciousness, and how they each time solicited a specific degree of tension of the mind. The study of risk management techniques, at the level of structures such as the 'control and command' unit of an underground railway system reveals, through a different angle, the values of distributed attention. Isaac Joseph's analysis is quite enlightening: in the absence of any hierarchical chain of command or centralized structure, the working team's goal is to coordinate localized perspectives overlapping each other. It is 'a complex and irregular process in which the agents' attention constantly oscillates, as a pedestrian walking, between "focused attention" and "distributed attention".'³⁹ No rigorously appointed stations, but polyvalent skills and scattered working areas functioning as knots connected to a number of different networks. No 'just in time,' but the alternation of moments of heightened vigilance and moments of sleep – that is, wait and active reserve. Focused attention, the intensive use of monitoring screens and communication tools needed for the conduct of some urgent tasks, share the same background of mobile co-presence: a field of virtual visibility, of evenly hovering or suspended attention. To be on the watch is to pay lateral attention to what is happening on the side of a main activity – in the fringes, to use one of William James' gimmicks. As a matter of fact, improvised cooperative chains often operate along weak lines or links, building marginal or peripheral bridges between moving poles. The way the

³⁶ Although fascinated with the McLuhanian concept of the 'global village,' Glenn Gould was fully aware of the experimental potential to be found in new distance technologies. The pianist's reflections on divided attention and the notion of environmental music constitute both a precious resource and an antidote to catastrophism. They are indebted to his cumulative experience in media (radio, telephone) and (peri-urban) car driving. See for this matter my article, 'La coupe, l'écran, la trame: dispositifs et musique d'environnement selon Glenn Gould,' *Cahiers de médiologie* 18 (2004). Cf. Stiegler, *Taking Care of Youth and the Generations*, chapter 5, §25.

³⁷ See Arthur Koestler, *The Act of Creation* (London: Hutchinson Press, 1964).

³⁸ See Henri Bergson, *Mind-Energy*, translated by H.W. Carr (New York: Henry Holt & Co., 1920), 186-230.

³⁹ Joseph, *L'Athlète moral et l'enquêteur modeste*, 377.

group apprehends itself as a collective has to do with a global vigilance that the English term 'awareness' captures more accurately than the French *attention*.

What is required is a form of 'parallel thinking and perception' by which one may at any time distinguish between and operate on several planes of simultaneous activity.⁴⁰ There is no doubt that such a non-hierarchical management of activity corresponds to the specific regime of governance that Agamben, in the footsteps of Foucault, identifies as a 'control' regime distinct from that of 'disciplinary' societies.⁴¹ The question is to know whether the skills developed in this context can be moved to new terrains in a creative way.

Urban Form In order to better lay the groundwork for this program, let us review the terms in which we have formulated the issue of coexistence so far. This issue, as we conceive of it, originates at the crossroads of three distinct yet intricately woven lines. Our discussion needs to cover: 1) the general issue of urban form as such; 2) the massive phenomenon of the diffusion of telecommunication technologies adjusted to the forms of contemporary mobility; and 3) a new attention regime, that of distributed attention, itself inseparable from a group of procedures typical of 'societies of control.'

How do these lines communicate within the same problematic framework? The answer appears more clearly once we move deeper into the abstract level and ponder for a while on the concept that underlies all the above issues, namely, that of simultaneity. In this regard, we can turn toward Henri Lefebvre and his explanation that the urban form is that of a determined *spatiotemporal unity*. The problem is quite simple: What is it that makes us think of Paris, Los Angeles, Shanghai or Tehran as so many individualized cities? What does it take for a city to be identified as an individual, apart from the linguistic, political, or administrative uses that give it a place in our system of representations? If urban form is definitely a matter of spatiotemporal unity, how is this unity to be regarded? What makes it possible to identify the process of spatiotemporal unification – if not the spacetime – that is specific to a given city? The answer that Lefebvre provides is quite straightforward: Whatever the case may be, the essence of urban form is simultaneity.⁴² This statement needs to be understood in the most general sense, to the extent that the urban realm defines a form of experience in itself, involving the simultaneity of events, perceptions and elements of a concrete whole in the 'real.'⁴³ From a social perspective though, simultaneity also means 'gathering.' There should be no reluctance to give back to the term its generic meaning as 'crowd gathering' or 'demonstration.' It is not by mere chance that cities have become the cradle of revolutions – or more recently, 'flashmobs.'

Viewing urban form as a form of simultaneity allows us to view the issue of urban sprawl and the diffused city along new lines. We briefly alluded earlier to the fact

that the paradox of contemporary cities lies in the double tendency to intensification and dispersion, to densification and scattering of relations of simultaneity between the events that punctuate the lives of numerous individuals. On the one hand, urban life is synonymous with an increase in the opportunities to meet and congregate. On the other it is synonymous with dispersion: division at work, segregation between social groups, and material or spiritual separations of all kinds make up its weave. What is remarkable is that far from objecting to the idea of simultaneity, the contradiction that often gets pointed out between these two tendencies has now become an operating condition of urban form. Indeed, 'these dispersions,' as Lefebvre explains, 'can only be conceived or appreciated by reference to the form of simultaneity. Without this form, dispersion and separation are purely and simply glimpsed, accepted, confirmed as facts.'⁴⁴

It is indeed through this constitutive tension that urban form can start to identify determined *contents*, thus ceasing to appear to be the generalization of some global empirical fact, a sociological or morphological feature arbitrarily selected as 'significant' (for instance, the city as a place where power and industrial production are concentrated). Lefebvre's reading of Hegel is correct: true content does not stand to form in an external relationship; the former is not submitted to the latter the way the specific is to the general. Form is indeed the very movement through which the dispersion of contents contradicts the formal unification operated within the scheme of simultaneity.⁴⁵ Thus the challenge of the urban amounts to coming to grips with a *dispersed unification or totalization*. This is the reason why it calls upon philosophical reflection as much as sociological field work. Concentrated, and therefore constantly distracted: such are the characteristics of the contemporary metropolis or post-metropolis, reflecting on its own scale the distributed attention of consciousness.

This being said, it is still possible to view this process from a strictly morphological perspective. The erosion of the urban fiber as seen in the phenomenon of sprawl is a good example of the double movement of concentration and spreading encapsulated in the issue of dispersed unification. Nevertheless, it only points to one of its possible dimensions. The same could be said of the acceleration of exchanges and flows, the corollary of which is, as we know, the creation of enclaves, ghettos and other types of gated communities. Lieven De Cauter's critical response to the theme of the 'generic city' elaborated by Koolhaas takes account of this dialectic in its own fashion:⁴⁶ as the city spreads its uniformed network in all directions, alveoli and capsules multiply so as to

⁴⁰ Ibid., 383.

⁴¹ This is most clearly illustrated in a series such as **24**, in which multiple decision-making and action protocols are staged and in which leading roles are given to the telecommunication and geolocalization tools and equipment. Cf. '**24** ou l'art du contrôle.'

⁴² Henri Lefebvre, **Writings on Cities**, edited and translated by E. Kofman and E. Lebas (Cambridge: Blackwell, 1996), 138. See Henri Lefebvre, **The Urban Revolution**, translated by R. Bononno (Minneapolis: University of Minnesota Press, 2003), 118-19; **The Production of Space**, translated by D. Nicholson-Smith (Cambridge: Blackwell, 1991), 101.

⁴³ Ibid., 138.

⁴⁴ Ibid.

⁴⁵ 'Movement in its emergence reveals a hidden movement, the dialectical (conflictual) movement of urban content and urban form: the problematic. The form in which this problematic is inscribed raises questions which are a part of it' (Ibid., revised translation).

⁴⁶ Lieven De Cauter, **The Capsular Civilization** (Rotterdam: NAI Publishers, 2005).

recreate, at the local level, artificial and controlled atmospheres that clash with liberal ideology and its sanctified celebration of the universal circulation of flows. Behind all these examples and analyses there lies, however, a core issue, of which the specific spatial practices just mentioned are only local projections. We need to reconsider the principle guiding these practices, so as to resist the temptation of viewing them as governed by some totalizing abstraction such as 'social space.'⁴⁷ For it is an illusion to think of social space as a sort of common framework or universal container.⁴⁸ The truth is that there is no absolute space left, instead there is a seemingly infinite set of moving reference frames. Reflection on urban form is now at the same stage physics was at a century ago after Einstein, in a decisive gesture, decided not to refer movements to an all-embracing motionless ether and, instead, to resort to the laws of spatio-temporal perspective that make it possible to shift from one system of reference to another.⁴⁹

Conclusion: The Prospects of 'Locative Media' It is not necessary to know much about physics to acknowledge that distance communication technologies and their electromagnetic infrastructure play an active part in the minute redefinition of the conditions of lived simultaneity. Their role in this regard is indeed fundamental, owing to the gap introduced in our general worldview by what one may call the locality principle, that is, the principle exemplified by the local – one step at a time – propagation of signals traveling in space at a necessarily *finite* speed (indicated by the symbol c in the fundamental equations of electromagnetism). Granted, the Einsteinian concept of 'relativity of simultaneity,' according to which two events that are simultaneous in a given spatiotemporal perspective cease to be so in another, has no sort of direct impact at the scale where human actions come into play. For all practical purposes, 'real time' as we know it provides an acceptable equivalent for instantaneous communication. It all seems as if distance technologies achieved instant communication, thus preserving the deeply ingrained intuition of absolute simultaneity. Things are quite different, however, from the conceptual point of view required by the task of developing a global representation of the space of flows to which cities eventually amount. The principle of locality indeed forces us to renounce the classical image of a spacetime that would somewhat be obtained by piling slices of the universe on top of each other, each slice being cut at a particular instant within the universal flow. There is no means to unify space at once by magically sidestepping distances: there is no such thing at instantaneous action or connection at a distance. Reality is more complex, connections always take place one step at a time. What distinguishes the relativist spacetime from Galilean or Newtonian spacetimes is the fact that it integrates within the very unity of its form the inevitable breaks in simultaneity, desynchronizations and phase shifts induced by the coupling of locality (finite speeds) and relativity (systems of reference in relative motion).

As for distributed attention, relayed as it is by new technologies of simultaneity, it will become more capable to liberate new powers if it is actively cultivated as a *pragmatic* of distance connections. It is a matter of becoming more sensitive to the singularities emerging in the fringes or the interstices of the spacetimes within which we circulate and which we occupy, either simultaneously or alternatively, wavering quickly between the two. Rather than rejoicing over the exhilarating prospects of real time and instantaneity, rather than feeding on the illusion of a panoptic standpoint that would encompass at once the extended diversity of the processes and durations of the world or the city, we should look everywhere for the *jump cuts* that may give us a concrete grasp on the fragmenting totality, or fragmented totalization that makes the urban form: compression and dilatation of time and space, interference or congestion effects, delays, latencies, and falling in and out of rhythm due to differentials in speed ...⁵⁰ In this regard, the practices claiming an artistic appropriation of 'locative media' point to new directions, although they seem to be largely dominated by the ideology of instantaneity – even when they indulge in the celebration of local, embodied co-existence. Let us conclude with a few remarks on this rapidly developing trend among media artists.

Any digitalized information system is referred to as *locative media*, as long as it is registered at the local level within a physical space. Tagged with geographic coordinates, such a system may be traced in real time. The art of locative (digital and contextualized) media can then be defined in two ways: on the one hand it is an art of interlocality; on the other it is an art of the interface. Let us begin with interlocality. The use of geolocalization and tracing technologies by some groups of artists is all the more interesting, as its focus is not the concept of communication (or community) as a whole, but connection itself. Working on connections implies finding opportunities to link – rather than oppose – the local and the global, the practice of places and the formalization of space, the construction of situations, and the representation of urban form as a totality. As far as interface is concerned, the idea is to install distance communication technologies within a given context and, by the same token, to critically engage with the multilayered nature of spacetime, focusing on the superposition of 'real' space, the space of immediate co-presence, and of a virtual space that is the locus of interlocality and connection. In the end, the issue is to manage to link not only the local and the global, but also the real and the virtual, with a view to the process of urban form as such. This could be the common agenda for the very heterogeneous and unevenly

⁴⁷ Social space, if we insist on resorting to this term, is nothing like an Euclidian, homogeneous and isotope space. Not only is it layered, laminated, 'reminiscent of flaky *mille-feuille* pastry,' as Lefebvre writes (in *The Production of Space*, 86), but it appears to be composed of several spaces interpenetrating one another. 'We are confronted not by **one** social space but by many – indeed, with an unlimited multiplicity of social spaces, the uncountable set of which we refer to generically as "social space".' (Ibid., revised translation).

⁴⁸ Ibid., 93-4.

⁴⁹ These are Lorentz's famous 'transformation equations.' Cf. Bruno Latour, 'A Relativistic Account of Einstein's Relativity,' *Social Studies of Science* 1 (1988): 3-44. About the new perspectives laid out by a relativist conception of urban spacetime, see 'The Compression of the World' and the more developed 'Invention du local, épuisement des lieux,' in *Airs de Paris*, eds. Christine Macel and Valérie Guillaume (Paris: Éditions du Centre Georges Pompidou, 2007).

⁵⁰ Cf. Crang, in Hassan and Purser, **24/7: Time and Temporality in the Network Society**, 49.

valid practices commonly coined ‘locative media,’ which include anything from technologically assisted, city-wide board games involving trackable *dérives*, to practices of spatial indexing and annotation, the streaming of performances on multiple screens or stages, or the cartography or mapping of territories, circulation and networks of all kinds (technical, social, relational, and so forth). The *pragmatic* stance that distinguishes these practices is apparent in the way they try to explore new possibilities for inserting individual and collective action within the urban fabric, by tuning distracted minds – fields of distributed attention – to the laminated or sheared spacetime of the city.

Two examples will suffice to understand what is at stake. They also illustrate, in their own way, two opposite orientations of ‘locative media.’ *Real Time Rome*, a project developed at MIT, aims at making tangible the pulse of urban life by combining multiple data received simultaneously and in real time from all over the city. The synchronous happening of a myriad of technical operations – if not the synchronization of the streams of consciousness themselves – can be traced in the spatiotemporal densification of the cell phones connections that punctuate a public event such as the soccer World Cup or a Madonna concert.⁵¹ The value of this project does not lie so much in its rather frightening portrayal of the celebratory synchronization of consciousnesses, as in the *tota simul* reading it provides of the frenetic quality of distance contact. This frenetic quality brings us back to a plethora of local operations rather than to the scheduled organization of Spectacle. Yet, in the diagrams designed by the *Real Time Rome* collective, the seemingly ‘instantaneous’ connections take the shape of a warm plasma evolving before our eyes in real time, providing a spatiotemporal portrait of the city. Totally different in nature, *iSee*,⁵² conducted by the Institute of Applied Autonomy, aims to localize on a Manhattan map all surveillance cameras to be found on the urban grid. The goal is not so much to create a paranoid map of control, but rather to encourage original circulation patterns by allowing users of the *iSee* interface to map paths of ‘least surveillance’ and move along them. These paths, by a smart use of the blind spots in the surveillance apparatus – the areas of the territory that are not ‘covered’ – strive to connect any spot in the city to any other while trying to come across the least number of surveillance cameras possible. Such a practice of constrained detour, which we assume operates in real time, can hardly be held for an avatar of the situationist *dérive*. Its explicit goal is to heighten the wanderer’s attention, to call for his or her increased vigilance, and to suggest, at the same time, ways to circumvent the principles of good management one is expected to apply to spacetime capital. There is no doubt, indeed, that whoever follows such furtive itineraries and consequently takes their time will end up developing tactical skills that may count as modes of resistance against the power of ‘control society.’ Yet the principal value of this project is to have revealed, in a particularly efficient way, the porous nature of control spacetime by resorting to its zones of

relative disconnection. Given that surveillance space is full of vacuoles and blind spots, it is likely that time itself might eventually expand and allow for counter-rhythms generated by new circulation patterns within the very matrix of control.

Exploring disconnections, breaks in simultaneity, dislocated durations: such are some of the challenges facing today’s experimenters of urban form. There is no denying that the examples we have just briefly discussed do not do much justice to the more general issue of coexistence within the urban form – a coexistence we might describe as ‘loose.’ If anything, they point out, still with much hesitation, paths toward the creative implementation of technological systems of distributed attention. Nevertheless, the orientation to take is clear. Strategies have become less frontal and less straightforward in their critical approach than those favored by hacker artists who wish to grip the engine. But they have already moved away from a festive approach to a ubiquity that more or less perpetuates the ordinary regime of distraction and entertainment.

Translated for this volume by Jean Xavier Brager.

* The paper was originally published as: ‘Technologies de l’attention et esthétique de la coexistence dans la post-métropole,’ in *Technologies de contrôle dans la mondialisation*, eds. P.-A. Chardel and G. Rockhill (Paris: Kimé, 2009).

⁵¹ See <http://senseable.mit.edu/realtimerome/>.

⁵² See <http://www.appliedautonomy.com/isee.html>.

ScreenSpaces

Can Architecture Save You from Facebook Fatigue?

Andreas Angelidakis

Are you suffering from Facebook fatigue? Do you scroll through Facebook more than three times a day? Do you find it hard to concentrate at work while contacts instant message you and collaborators e-mail you and friends tag you and so forth? These conditions would not be a prerequisite for you reading this text, though they somewhat describe the contemporary situation. It is a situation where our typewriters have also become our phones, mailboxes, libraries, sound systems, televisions, and even our public spaces, the places where we socialize, meet people, exchange ideas, and sometimes even have sex. All this is a lot to ask from a single piece of hardware, but even more to ask from a person trying to do their 'job' while all this is going on. And if this is a snapshot of contemporary life, where exactly does architecture fit in the picture? Is a media-friendly architecture enough to respond to this situation, or is it time for a major paradigm shift? If the needs and habits of the contemporary citizen are changing, should architecture change to accommodate them or should it come to the rescue of our attention deficit society? Finding an answer to something like that is obviously impossible, since life just happens, but it's interesting to see in how many ways the question can be posed.

OffScreen One of the ways that the contemporary citizen has changed over the last few decades is that their attention span has diminished. Internet users are so used to clicking away from non-catchy information that does not grab their fleeting attention; it is only logical to assume that the way they view their screens is also the way they view their off-screen environments. Of course, away from their screens and into a 'real space,' they cannot click away so easily, but the question is would they if they could? And should architecture do something about this?

At the conference organized at the Delft School of Design (DSD), which was the first step in the development of this volume, I tried to answer sections of this question via examples from my own practice, but transferring a lecture onto a piece of text is like describing the experience of a building you visited with plan and section drawings, which is to say the information might still be there but it's really not the same thing.

A building usually contains life, or it contains light, smells and maybe sounds. These imprint themselves onto your subconscious and you remember them, even if at that moment you were paying no attention. The drawings of a building contain none of the above information, though they are alive, indeed infested with the architects' ambitions, his/her thoughts on how the building will be perceived, the hopes and anxieties, the speculations on how the real building will turn out. On the other hand, when we read a drawing of a building, we often remember spaces we have already visited, or imagine the spaces we see on the paper as buildings we have been to, so it's not a clear plate, everything is layered with our previous information. Being 'there' and imagining the 'there' are two different conditions. Today, we experience the second condition more often than

the first: We talk to people via phone, Skype and instant messengers, we look at buildings in magazines and on blogs, we meet people online. We are not there, but neither are we here. Our screens have become the portal for experiencing life in the second degree.

What makes architects different in this, is that their brains are full of experiencing buildings in their second degree, design-stage versions of reality, as drawings, models, and various other representations. Quite often their struggle consists of making the actual building as similar as possible to the imagined building, making reality resemble their screens.

TripleSpace In the situation of a person sitting in front of a screen, looking at drawings of a building, we have three spaces to pass through before we enter that building for real. The first space is somewhere inside the skull of the person sitting in front of the computer. That space is imaginary, distorted by memories, subconscious information, needs, frustrations, neurons exploding left and right. That is the space we inhabit more than any other space, and it is a space we never leave, it is a window to all other spaces, it is our mental space. Everything we see is through this space. The second space is the place where our screen is located. No matter how nerdy and attached to our computer we are, the space where the sitting-in-front-of-the-screen takes place matters, the hardware we are using matters too, even the software matters. That space, the space between the citizen and the screen, extends all the way to the surface of that screen. One could argue that that space ends inside the graphic interface of the operating system, or maybe it even extends to the software you are using to view whatever it is you are viewing. All the hardware and the software you are using is part of your room, it affects everything that comes on to your screen, it is part of the distance your gaze needs to travel from your eyes to the space that exists inside the computer representation, the space where a lot of your social life takes place nowadays, the third space.

Let's say you are an architect, working on a design for a house. The third space in question is that house, represented in the drawings on your screen; it is a space you are imagining or in the process of devising. To get to that house we have to pass through the other two spaces, the mental space and the room space. Through these three different spaces we experience the building inside the screen. In these three spaces stuff will distract us from the experience of that house, one might argue that they will make our experience of that house richer, since it is filtered by so much other stuff. As you imagine yourself walking down corridors in your imagined house, memories of last nights' dinner pop up, a window blinks at the bottom of your screen – somebody wants to talk to you, maybe the little red light on your handheld device says 'you have a new message' and while all this is going on you are also listening to the rain fall outside your window, and maybe even to

music. Can you really take so much information, and still say you are inside the building-drawing-house?

ScreenDisorder So this text could never be the same as the lecture at the DSD, though it might attempt to shed light on similar issues. If you read this text closely, some information will stay with you, but if you sort of scan it diagonally, you will miss a lot of stuff. If you had been in the room at Delft, even nodding off half asleep, something from the lecture would have stayed with you if only subconsciously, because all you ever remember from lectures is what you saw and not so much what you heard.

A couple of years ago I was at a conferences and had the chance to hear researcher Linda Stone talk about her concept of Continuous Partial Attention and how contemporary life is so full of distractions that we have lost the ability to fully concentrate on anything (www.lindastone.net). I really paid attention to that lecture because it seemed to ring so many bells, she spoke about conditions I had described many times but had never heard it so clearly stated, and somehow it all made sense.

Even if you are not an architect, even when you are not working, you tend to be in front of a screen, which invariably contains your job, your friends, your library, but also your phone, your television and even your newspaper. How to even try to write a text amid all this chaos? Visiting a building is of course different than writing a text, or even reading one. You don't need to pay too much attention, because all your senses are working together. You can be thinking of your mother or talking on the phone to your boyfriend and still you will remember what it was like to visit that building. Or you will remember what that building felt like while you were thinking of your mother and talking to your boyfriend. On top of all that, the building you are walking through might remind you of other places you've been to or seen in movies, so the experience of walking through can never be a virgin experience. As Baudrillard has said over and over, there is no more real, all is simulation. I guess reality is never one-dimensional.

ScreenBuildings Somewhere at this point in the presentation at DSD, I showed a project from 1997, and maybe it fits this part of the discussion. That project was a design for an online community on the Active Worlds platform, which I put together with artist Miltos Manetas. Initially it started as a copy of Miltos' exhibition at Postmasters gallery in New York, the space for which I was asked to design. We had just discovered Active Worlds so we decided to copy the exhibition onto Active Worlds and to bring this new and exciting technology to a contemporary art gallery setting. The Internet was just beginning to expand as a popular medium, and it seemed that people were getting rich quick, so expanding this exhibition project into a fully blown busi-

ness venture seemed like the logical next step: we would make this a world for art and architecture, give away free gallery spaces and artist studios where our friends could host 'virtual' copies of their exhibitions, and eventually we would charge money for these 'virtual' spaces. The only problem was that most of the people involved in contemporary art at that time saw the computer solely as a communication device, a fancy version of a fax machine, and nothing they saw on a computer screen seemed like art to them. This was of course before the Internet became personal, before Facebook and MySpace transferred their social networks onto their screens and they realized that the Internet was not technology, it was just life. We went ahead with the launch of our project, named it Chelsea after the then new New York area for contemporary art, and even if it did not make a ton of money, it was successful as a media project and as a revelation: You could design buildings online really cheaply, you didn't need clients, didn't need construction crews, and didn't have too many limitations. Suddenly your drawing tools became your construction tools, too. There was no gravity, no rain, and at that point no money, it was close to free to build a building and you could invite your friends for a walkthrough. The real attraction of Active Worlds was not money but architecture: you could design and build buildings on the spot, use readily available libraries of objects such as construction yards, copy-paste walls and windows, and assemble your own fabulous structures. If they didn't turn out too fabulous you could just tear them down with a few clicks. And the real revelation was that suddenly, while you were submerged in your screen focusing on a design for a 'Pink and Black' pavilion, a friend would pop into your drawing, walk around the space of your design and give you feedback or just chat; everything was happening online, and you were designing on the world wide public space of the web, so you had visitors to a building you were just beginning to sketch. Building and drawing collapsed into one, construction and design became one too, and people could live inside your drawings! And you could keep adjusting and changing stuff around even after they moved in! This excitement resulted in an endless array of 'buildings' popping out of my studio, some of them documented, some lost forever in the depths of a tricky Internet server. The only funny side effect was enormous phone bills, because this was before Broadband and Internet cost money by the minute. We didn't care, because we were hooked to these instant 'screenbuildings,' and all we ever wanted to do was be connected all the time, and forever build buildings online.

Citizen of the Screen Designing buildings without dealing with people can be fun but it gets boring after a while, so we started to treat all our friends as potential clients for these electronic buildings, these homes away from home. There, another revelation came along by studying the reaction of these clients to our endless stream of buildings. Like us, they were basically scatterbrain Internet nerds, and so it was clear: Internet people got bored way more easily than regular people. Buildings that were not easy to describe would not catch their attention,

and besides, if you had to type too much explanation into the chat window, you yourself became bored of typing. This new Internet architecture was all about abbreviation; visual abbreviation and conceptual abbreviation, even structural abbreviation. If to build something you had to copy-paste too many different 3D objects from the online 'material yard' then the building became too hard to build, and maybe you even got bored in the process. Plus Internet was charging by the minute, so the longer you took to build something, the more it cost, which made the Internet like real life after all. Looking back at all the buildings we constructed in Chelsea World, it becomes clear that as time progressed, the descriptions for the designs went from something like 'an adaptation of a modernist exhibition space into an Internet era video game type of space where your perspective constantly changes' to the much shorter 'pink and black building' or 'shadow building' (Figure 1). The buildings we produced had to be 'short-attention-span friendly,' they had to have short names, short descriptions and a clear visual impact; they had to work like logos, had to be simple and complex at the same time and they had to convey the idea immediately if not ever at all. You had to remember them even if you were not paying any attention. And the reason for all this abbreviation was simple. Walking around this 3D space in this Internet community was like walking through a space full of links to other spaces, you were not obliged to stay in one place too long; if you got bored you could just click away and teleport to another world, or even be entirely bored and click on one of the other softwares running on your screen and read the news or watch TV. And if all this was of no interest at all, you might even, god-forbid, get up off your chair and leave the computer altogether. You would be a user that we had no chance of attracting again.

The same can happen in an actual constructed building, where most of the time you are allowed to leave if you are bored, though it takes time and it involves exiting physically, which can also be an architectural experience. Exiting a building in an online community takes nothing more than a click! And a blink! You're somewhere else.

Immediately I realized that this was some sort of oblique paradigm shift for architecture, because these nerdy scatterbrained early Internet adopters would be you and me in a few years. This was the society of the Attention Deficit Syndrome citizen. I was sure that the Internet was going to be massive, and that the Internet user of the late 1990s would come to represent the new world citizen, and by extension all the users of all buildings. So, buildings had to start understanding this new attention span issue, otherwise they would be boring to people. Somebody might even invent real-life teleportation, and then things would get really tough. And even if not, everybody's attention span would one day be like those speedy Internet users, and everybody would only be able to pay attention to a space in between reading messages on their blackberry, talking on the phone and listening to other people talking on the phone and even looking at screens and maybe even talking to somebody physically next to them. The space had to overcome these obstacles and win the attention space war.

'While writing this text, I take short breaks to upload videos on YouTube using the neighboring laptop. They say multitasking is not really efficient, but I have no choice anymore. I started using two computers at the same time, in the hope that I would keep one of my screens free of the Internet and thus free of distractions, and that like that I would have a serene 'work' computer and all the other stuff would be delegated to the laptop. Certainly I broke down and the communication stuff crept onto the work screen, and now its distraction times two: stuff blinking and popping on the laptop and stuff beeping on the work screen. So while writing this and uploading on YouTube, I felt like I had not updated my status on Facebook in quite a while, so I skip over between sentences to do that, and on my friend Octavio Zaya's status, I see a brief sentence that reads: 'Arriving at a destination before leaving? We have broken the speed of light?' I just glance at the first lines of the text about some scientists' discovery regarding speed and I guess time travel, but I can't read too much because I have to get back to the text. Does this mean that time will be faster than us? That reality will happen so fast that we won't be able to experience it? Will we have to look at things so fast that we won't even have time to look at them? Is there any point in even trying to assemble all this information about attention span when reality is about to go 'speedscreen' on us? I read no further and continue the text; I guess I have to just stay focused, stay out of Facebook, out of gaydar, out of a million other social networking pages, out of news, out of phone. And it is Saturday afternoon; I'm not even supposed to be working.'

The contemporary condition is just that. A screen engulfs us even when we are not working, a million time-sucks lurking behind each link. You are casually drafting on a 3D program, and endless links and endless updated blogs await, with endless buildings just built and just Photoshopped to briefly demand your attention, and then vanish in the depths of the blogs. It used to be that buildings were to last forever, now buildings need to last about as long as it takes to scroll down the pages of a blog.

ScreenProjects In the late 1990s and early 2000s I worked on a series of projects that studied and played around with some of these Internet and attention span revelations. The talk at DSD consisted of talking through these projects, but this is not a transcript so I will just run through them as examples.

TeleportDiner was originally meant to be a social space installed inside Fargfabriken center for art and architecture in Stockholm. I had visited a diner run by artists in Brooklyn, together with FF director Jan Aman, and he asked me to 'take this diner to Stockholm.' The American diner is a retro-typology about which I was not too crazy and I thought it was too hard to try and update it. So instead of building the diner in Stockholm, I first built the diner in Active Worlds. Using

the readymade diner booths and banquettes we found in the object libraries online, we put together a diner, roughly configured like the space in Stockholm. That diner had webcam links and teleports all over and we advertised it both in Stockholm and New York. Creative Time in New York came on as a partner in the project and slowly people started hanging out in the online diner, which Miltos Manetas dubbed TeleportDiner (Figures 2 and 3). When it came time to build an actual something in Stockholm, instead of copying or translating or remaking an American diner, we copied the TeleportDiner. What was for a few weeks a real Internet space was used as a drawing for a space that was not real anymore but rather a representation. The built space became the drawing, because the real space had been the online space. The space in Stockholm actually even looked like a drawing because when you copy Internet furniture into furniture made of wood, you realize how crudely and simply they are designed, with no detailing whatsoever. I guess on the Internet nobody has time for details. I called this the JPG Minimalism Manifesto.

Other projects followed: *Pause* was another space inside Fargfabriken, this time built to resemble a computer rendering (Figure 4). After we photographed the space it was demolished, and what remained was photographs of a building made to look like it was never built. *Tetris Mountain* was a design for a portable amphitheater made as a pile of soft modules connected with Velcro. You could 'play Tetris' in the space and each time end up with a space for watching projections and hanging out. We realized that Tetris was the oldest and simplest architecture software (Figures 5 and 6). Other projects, like *My Anchorage*, *Mavala* and *Future Paris* examined the relationship of what we call 'real' and what we call 'virtual' (Figures 7, 8 and 9). *Electronic Orphanage* studied the ways a storefront can become a screen and a navigation menu can become a workspace (Figures 10 and 11).

ScreenSpaces All these examples find us just outside the space that we are talking about. Looking at the graphic interface of a screen and interacting with information still finds us sitting on our desk twitching with excitement and boredom, trying to work and not work at the same time. But in reality, we cannot inhabit the screen until a part of us lives inside it; until we have sent our avatar to live there, we cannot claim to have been there. The function that most generously allows us to experience the space inside the screen is gaming. So called video games are the programs that give us an avatar body and let us navigate through an onscreen architecture. We get to run, crouch, shoot, stab, and tip-toe around enemies, just like in Real Life. We get to walk through doors, and even walk through walls. We get to enter large spaces and be awed by their proportions, run up staircases, crawl through tunnels or just simply enjoy a room with a great view. All those ways that architecture can orchestrate and draw emotional and intellectual responses from its users exist in the space and the graphic interface of a video game. Well, perhaps all apart from temperature, tactility and smell, though one is surprised how far visuals go in awakening those

senses too. Hell, you can even die playing video games, as the recent example of Lee Seung Seop proves. Lee Seung collapsed of fatigue and died after playing the video game StarCraft online in an Internet café for almost 50 consecutive hours. He just played too much, and he died of a combination of exhaustion and a sustained adrenalin rush, presumably after shooting dead too many of his online enemies. All his 'screenspaces' collapsed.

Of course, complex onscreen representation has existed forever in cinema, and architectural space in cinema is a well-trodden area of analysis, but experiencing a space in a movie is like visiting a building through the pages of a magazine. You can never say you've been there, until you've really been there.

Also, the 'There' in question has evolved greatly through the years. The first video games were merely an animated drawing, at first a floor plan where two walls literally acted as tennis racquets, as in the game Pong. Later, we experienced space in a sectional drawing (Donkey Kong, Berzerk) but we still inhabited a drawing. It was not until the first driving simulator Night Driver that we could finally experience space in real perspective. Then in the 1990s the first First Person Shooters like Marathon came along with the added bonus of being played over a Local Area Network. This meant that you could enter and navigate the space of the game, and in there you could meet your boring co-workers or fellow students and shoot them to death. Thus the video game as spatial and architectural experience was almost complete in its development. The long dark corridors of Marathon became a cathedral for young students of architecture at Columbia University, enrolled in the first ever paperless studios of the mid 1990s where, for the first time, you had to drop your pencils and design and present your ideas using only the computer. Simplistic as it sounds today, that first semester of paperless studios was a daunting experience. Designing a building on the screen was a direct extension of designing a building on a piece of paper, but getting to know the tools was tricky. So we were forever glued to our screens to catch up on all the possibilities of computer aided design, but every Friday afternoon we would all quit our design software and go to the school-wide shootout in the Marathon game. Each player was located on a different computer, and these computers were scattered all over Avery Hall, anywhere with a LAN terminal and an available PC. To an outsider it might have looked like the building was transformed into a typical 1980s video game arcade with fancy computers instead of clunky wooden consoles, but the experience was vastly different and in retrospect strangely eerie. We were not just sitting in front of our screens, we had become avatars and we were all meeting, experiencing and killing each other in a new space, a screenspace. As we sat crouched in front of our respective screens, locked up in the endless rooms of the late-nineteenth-century building, our avatars met each other and fought in a parallel space. That parallel space of the Marathon complex was somehow comparable to Avery Hall though it was rendered as an

industrial space texture-mapped with readymade grime and scary atmospherics. As time went by and you got lost in the game, you could hear screams of death down the corridors of this industrial complex but also screams of victory down the corridors of Avery Hall, responses to events that took place in the Marathon complex. Slowly the respected Ivy League hall blended with the generic *Bladerunner* inspired dystopia, and as the two buildings became one, you could imagine the game taking place not on the screen but spilling out into real space, merging the two realities into one. Death could await you even if you were just getting a Xerox in the library or a coffee from the basement. A few years later, as I learned about the Columbine High School Massacre, and the alleged news that video games had spawned this violence, I could only wonder what would have happened if Marathon had become reality in Avery Hall.

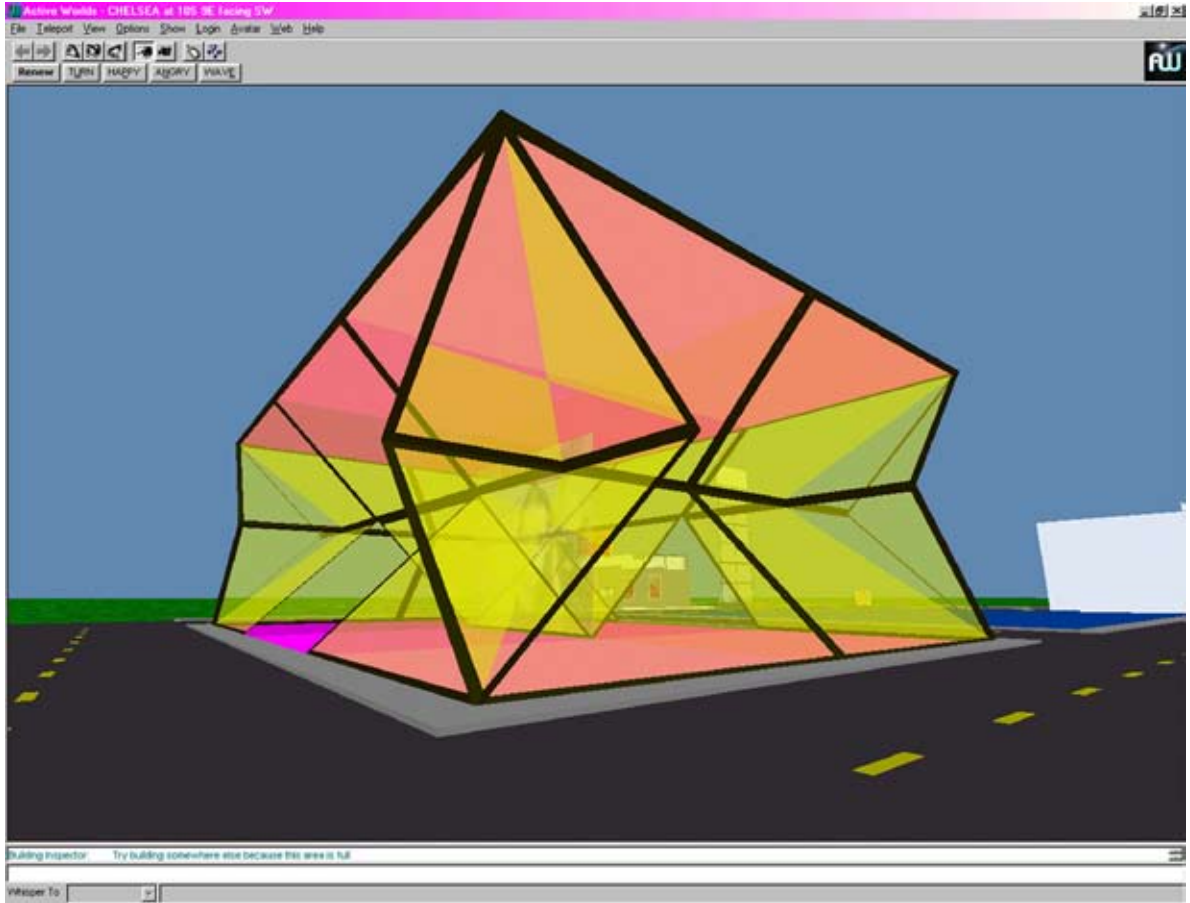
RealityScreen So, even though for the architecture student designing on a screen was an extension of imagining buildings on a white page, existing in a screenspace was a totally new experience both from a physical and a social point of view. These three conditions, designing, shooting, and socializing, came to become what would shape screenspaces in the coming years. In the late 1990s games were divided into first person shooters and strategy games. In the shooters, like Marathon, Quake and Doom, it was you inside the screen and sometimes you could see parts of, or the entirety of your avatar body. You got to walk around 'cinematic' spaces, navigate on your own into mazes and labyrinths, where you could shoot and kill whoever you pleased. Later on, in the 'roam' subcategory of first person games like Grand Theft Auto, your path was not limited to the maze, and the point of the game was not to exterminate the enemy, but rather to roam around town, and waste time in a curious onscreen situationist *dérive*. That *dérive* took place in cities called Liberty and Vice, which were eerily identical to Los Angeles and Las Vegas. You were in a really real place.

Strategy games were an entirely different experience, in that you were not really inside the space of the game, because the game took place in an axonometric space. Here your viewpoint was the all-controlling overview of designer or god. In strategy games you invariably had a city to arrange and to develop, an army to lead and a people to protect. If you developed your city cunningly, your suburbs would become rich, earning you further points and further money; if your suburbs did not catch on, they would become inner city ghettos, poor and in trouble. This would cause land prices to fall, at which point in the game you would of course get a chance to buy back buildings cheaply. Then you would lure artists and other such creative types with the promise of low rents, and this would start redeveloping your inner city ghetto into a wonderfully gentrified yuppieland where frapuccinos were the thing and rents were just getting higher and higher. Strategy games were really a cynical architectural and urban design tool, even though the experience was decidedly more financial than spatial. Later on, popular games like Word of Warcraft

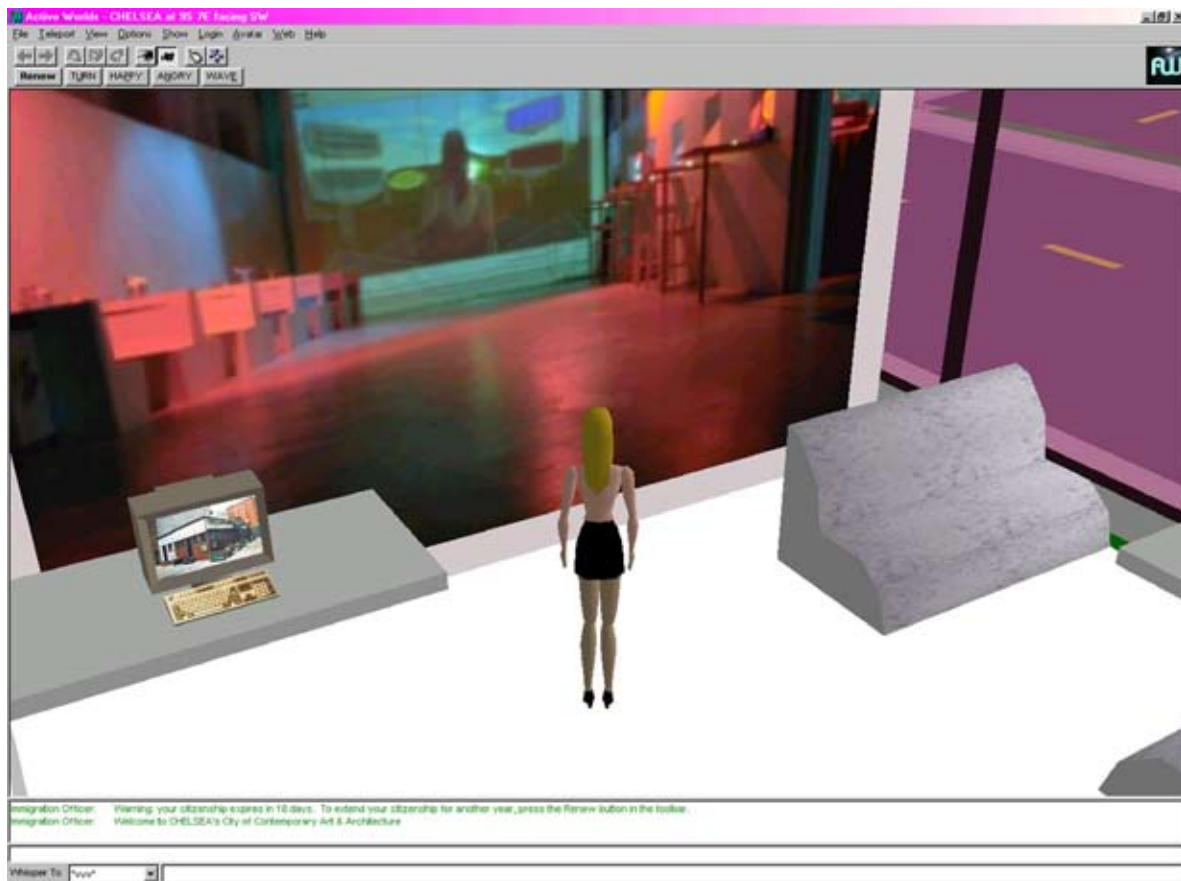
managed to blend the shooter and the strategy game into a faux axonometric fairytale bird's-eye-view perspective where the experience was partly experiential and partly organizational, and all you had to do was to interact with your fellow wow citizens and become better than them (Figures 12 and 13).

Further development in shooters came when cinema studios merged with gaming companies to push each other's products, and suddenly your avatar was not just a guy who looked like a monster or a thug, but a celebrity guy who looked like a monster or a thug. *Chronicles of Riddick* had such advanced graphics that when you played you really felt like you were Vin Diesel, and Vin Diesel was you.

FullScreen Video games and movies will doubtless keep advancing, and this years' *Avatar* movie will bring even more 'virtual reality' in front of our eyes. Objects and spaces in movies and games will keep getting better and better, or maybe trends will shift towards simplified graphics, or even images that look handmade, because by then we will be fed up with too much graphic perfection. I guess reality is never goal oriented and you just have to go with the flow. In similar ways, a lot of the computer generated blob architecture of the past decade has been replaced by a lot of simplistic diagrammatic Japanese architecture where life is what's important and technology is our pet, not our reality. I have stopped playing video games, maybe because Facebook and blogging and working takes up too much time. But as an afterthought, and a tribute to my past gaming life, I load up a copy of *Half Life II*, one of the roaming shooter games of the mid 2000s famous for being so realistic. As I start to walk around the abandoned post-apocalyptic cliché dystopia, I realize that something had escaped me, even if it is the rule in almost all video games: when a game loads on your screen, it leaves room for nothing else. The software is programmed to operate 'fullscreen,' its hunger for graphic processing power does now allow other programs to run at the same time. The game knows that in order to succeed it has to demand your full attention.



1 The 'Pink and Black' building, constructed inside **Chelsea World**, in 1998. The building is made by tilting a coloring pane of glass.



[2]



[3]



[4]

2, 3 TeleportDiner was a space originally designed and built inside the online community Active Worlds. Later, a copy of the online space was constructed inside Fargfabriken center for art and architecture in Stockholm, for the exhibition 'Teleport Diner: From real to virtual to somewhere in-between' in 2000.

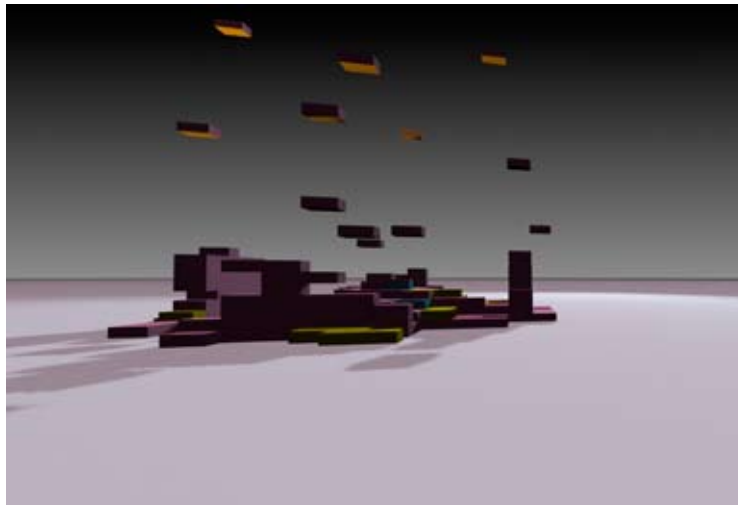
4 Pause was a pavilion built to be photographed. On the photos, it was meant to appear as a 'real' computer rendering, therefore a space not actually constructed. It was a space built to look as if it were never built, and subsequently demolished at the end of the exhibition.

5, 6 Tetris Mountain is a 4-sided mobile amphitheater made up from soft modules that Velcro together in a Tetris pile.

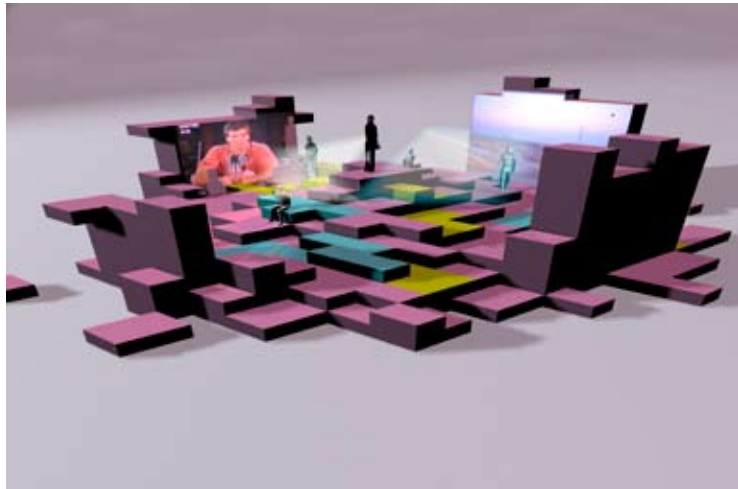
7 My Anchorage was a video work presented at Creative Time's Massless Medium exhibition at the Brooklyn Anchorage, curated by Carol Stakenas. The work presents a space derived from the actual Anchorage space, but presented as a pristine desert landscape, a surrealist sequence of spaces.

8 Mavala was a traditional 19th century industrial building in Geneva. We proposed to paint it bright reflective white, to turn it into a virtual building right in the middle of town, to erase it's reality.

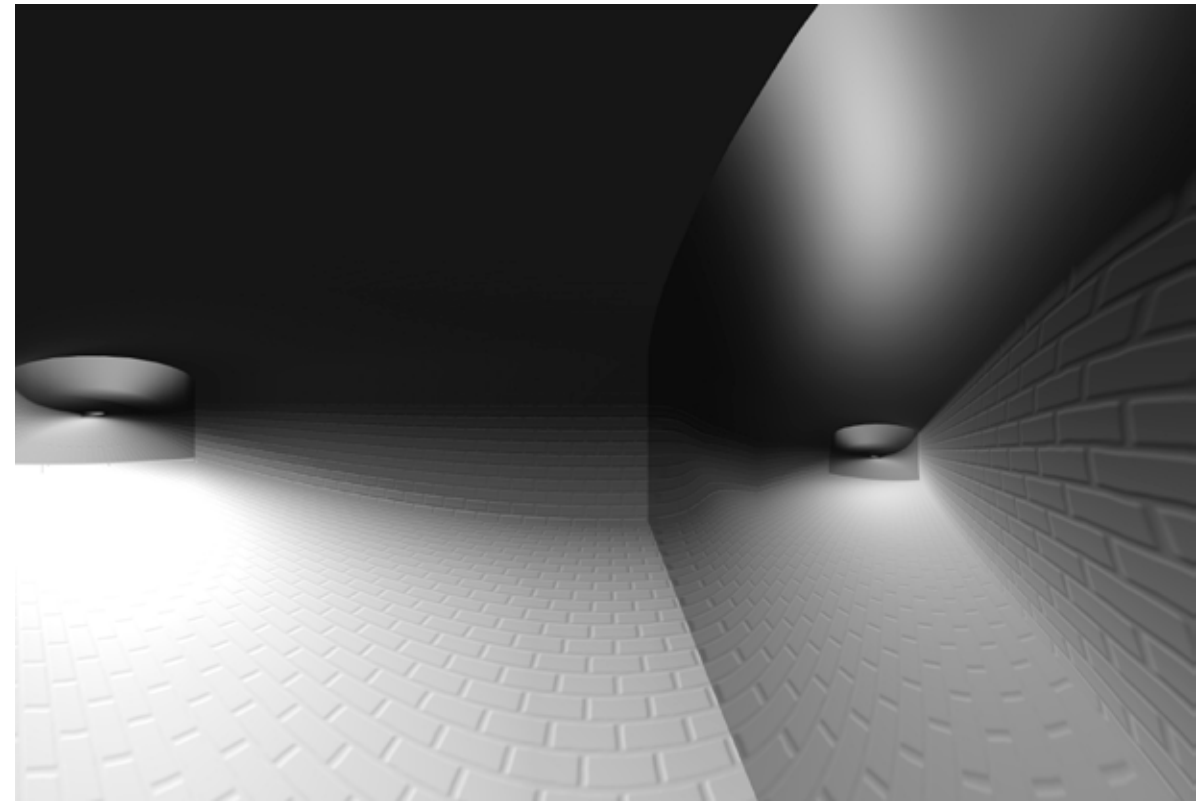
9 Future Paris was a version of Paris imagined as a city of light and reflections. It was produced for the 34th edition of Visionaire, edited by Dior Homme designed Hedi Slimane.



[5]



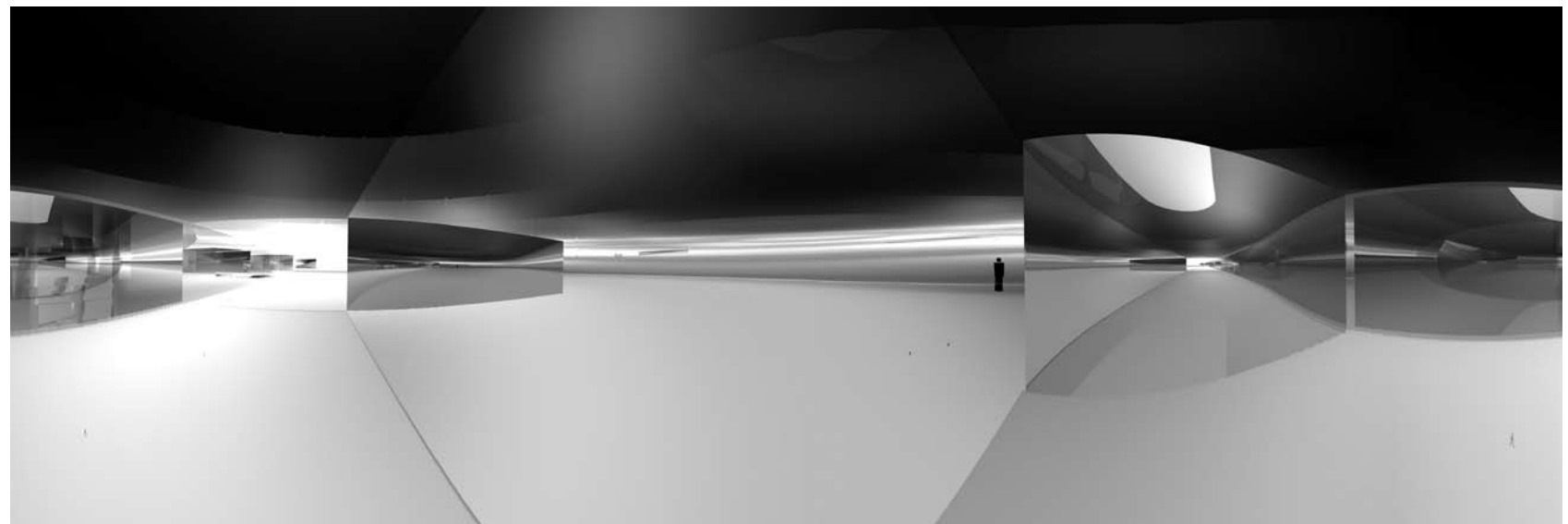
[6]



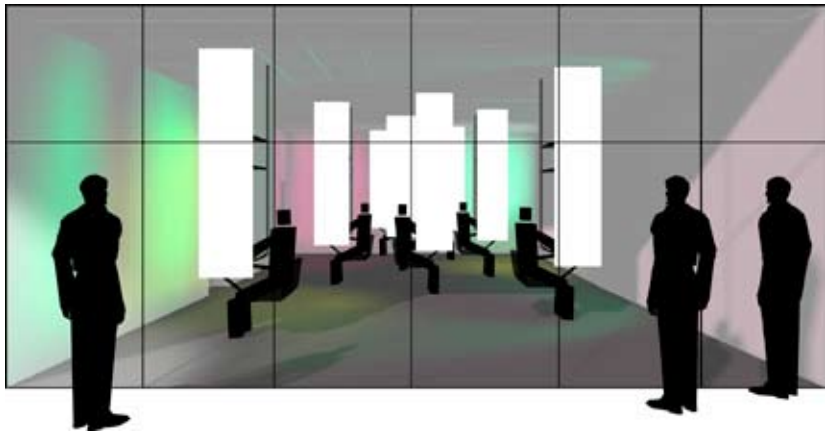
[7]



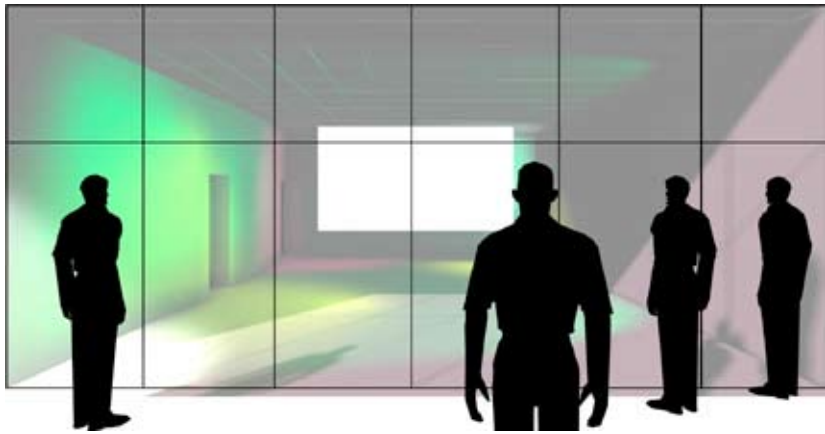
[8]



[9]



[10]



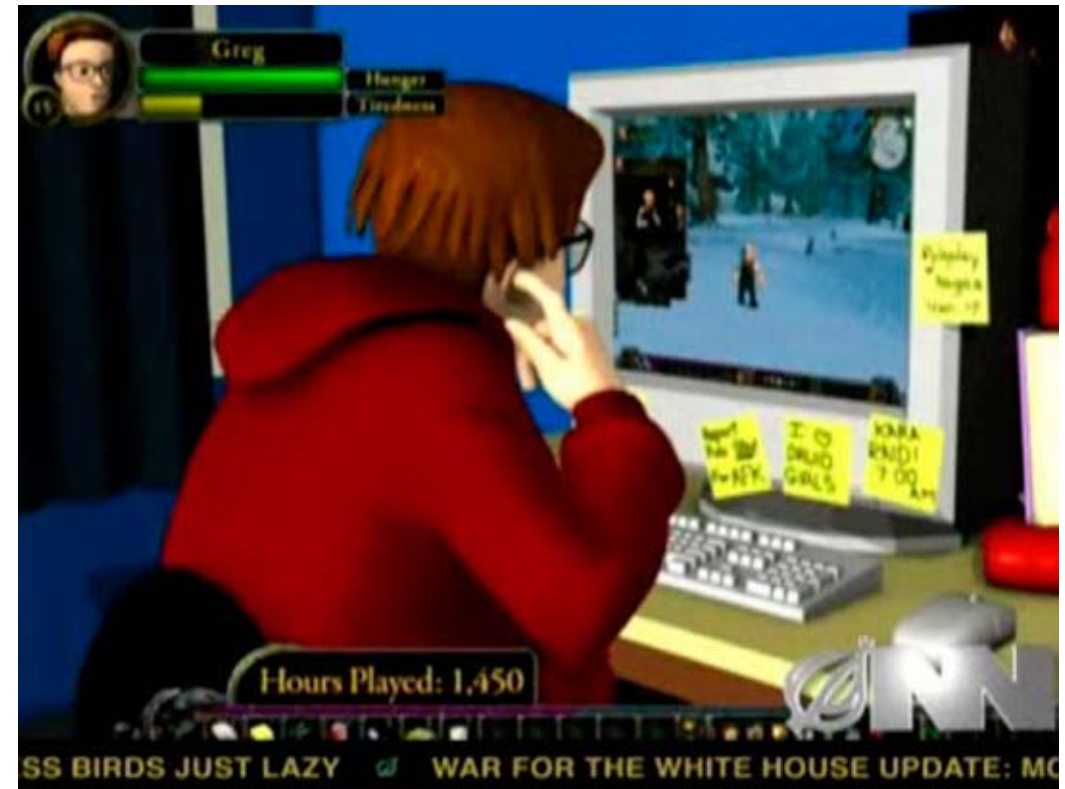
[11]

10, 11 Electronic Orphanage was a storefront organized as a screen, a work-exhibition space that transformed as a pop-up menu.

12, 13 A spoof of the popular 'World of Warcraft' video game. The video presents the 'The World of World of Warcraft', a fictional game where the user controls an avatar that plays World of Warcraft. The spoof video appears on the Onion website.



[12]



[13]

Technologies of Mediation and the Affective: A Case-study of the Mediated Environment of MediacityUK

Lisa Blackman and Janet Harbord

Introduction The relationship between media and architecture has a long and somewhat vexed history of debate. Beatriz Colomina argues that ‘modern architecture only becomes modern with its engagement with the media.’¹ This point is supported by Reyner Banham’s observation that the majority of iconic buildings of the twentieth century are known as photographs rather than bodily experiences.² Media Cities derive from this debate and attempt to depart from it. A generic term for a particularly contemporary architecture, media cities are more precise and precisely designed than the global city; more tactile and fluid than the modernist city. This paper will consider the evolving project of mediacityUK, as a particularly interesting site for considering how the media, mediation and the virtual might be enacted within architectural design and urban planning. Mediacity, based in Salford, is part of an urban regeneration project that is contributing to an architectural re-visioning of a site formerly known as Salford Quays, in order to brand ‘The Quays’ as a ‘place of the future.’ Part of this re-visioning and re-branding involves the BBC (British Broadcasting Company) moving five of its departments out of London and relocating them to Salford. The BBC is thus one of the main actors in the regeneration of The Quays which will result in the construction of a media city,³ which it is hoped will contribute to the growth of a second ‘City-region’ in the UK.⁴ According to McGuire, media cities have been developed as responses to crises in urban space, where the urban environment is ‘planned to be soft, flexible and adaptable.’⁵ The design of such environments thus is seen to mirror and enhance the capacities required by the adaptable worker laboring within new informational and knowledge economies that are presumed to be supported by media cities (this might include creative industries such as design, art, media, and culture, for example). As well as being ‘real estate development project areas,’⁶ the concept of media cities extends the vision of enaction to maximize, enhance, and evolve the mediated environments. This is made possible by the entangling of ambient and digital communication technologies such that *place* in a media city is both virtual and actual. Digital technology is ubiquitous and blended into the physical environment of media cities engendering a creative hub or portal of connectivity allowing for the flow of knowledge, culture and creativity.

The concept of the media city also has links to the rise of sentient cities. These are urban landscapes where ubiquitous computing is networked into the environment, such that environments are credited with capacities that are more usually ascribed to human actors; the capacity to learn, anticipate, and remember, for example.⁷ However, these capacities are affordances that are only

1 Beatriz Colomina, **Privacy and Publicity: Modern Architecture as Mass Media** (Cambridge, MA/London England: MIT Press, 1994).

2 Reyner Banham, **A Concrete Atlantis: US Industrial Building and European Modern Architecture** (Cambridge, MA/London England: MIT Press, 1986).

3 Scott McGuire, **The Media City: Media, Architecture and Urban Space** (LA/London/New Delhi/Singapore: Sage, 2008).

4 Mike Joroff, Dennis Frenchman and Francisca M. Rojas, ‘Report on New Century City Developments,’ Second Global Workshop Stockholm, Sweden May 27-8 2008 (MIT in association with the Urban Land Institute’s European Trends Conference, 2008).

5 Takaaki Chikamori, ‘Between the “Media City” and the “City as a Medium”,’ **Theory, Culture and Society** 4 (2009): 149.

6 Joroff, Frenchman and Rojas, ‘Report on New Century City Developments,’ 1.

7 See Mike Crang and Stephen Graham, ‘Sentient Cities: Ambient Intelligence and the Politics of Urban Space,’ **Information, Communication and Society** 6 (2007): 789-817.

realized through the actions of users, such that people, places, and virtual technologies become entwined, co-enacted and co-constituted in specific ways. The nature of the specific entanglements made possible by ubiquitous networked computing is an important debate and one that is beginning to be considered by scholars across the humanities and social sciences. The journal *Theory, Culture and Society* recently published a special issue exploring the rise of ubiquitous media, and the particular challenges that reconfigurations of space as digital archive present to knowledge production and circulation.⁸ As we will explore later in the paper, one such challenge of the development and proliferation of ubiquitous media is the question of exactly what counts as 'media' within developments such as mediacityUK. As Featherstone argues, 'media are now differentiated, dispersed and multi-modal'⁹ such that the term 'media' itself no longer guarantees a specific entity (television, radio, film, etcetera), and is more usefully substituted with the term mediation. Mediation refers more explicitly to the processes of in-formation.¹⁰ This term is used by Clough to explore the co-production of the human with technics that assumes both the 'dynamism of bodily matter' as well as the capacity of digitization to make 'possible a profound technical expansion of the senses.'¹¹ It is, therefore, important within the perspective of biomediation to not only consider environments as relationally and ecologically entangled with their users, but also to foreground issues of bodily affectivity within discussions of technological development, enhancement, and augmentation.

This question is particularly relevant given the commitment of media cities to extend the vision of enaction to maximize, enhance, and evolve the mediated environments. As we have seen this is made possible by the entangling of ambient and digital communication technologies such that place in a media city is both virtual and actual. One aspect of bodily affectivity that is important to our discussion is the problem of memory. In this paper we will take a genealogical approach to such a question that is indebted to Jonathan Crary's seminal work on perception and attention.¹² Crary explores how the problem of attention emerged in the late nineteenth century and was tied to the problem of 'how a subject maintains a coherent and practical sense of the world.'¹³ He aligns this problem to the emergence of a range of new technological forms and practices which demanded a subject who could 'pay attention' in ways that were integral to new labor and educational practices. This new 'disciplinary regime of attentiveness'¹⁴ required subjects who could 'effectively cancel out or exclude from consciousness much of our immediate environment.'¹⁵ One of the paradoxes that nineteenth-century experimental study of attention within the psychological and behavioral sciences showed, according to Crary, was that the problem was ultimately unrationalizable. As he argues, 'the more one investigated, the more attention was shown to contain within itself the conditions for its own undoing – attentiveness was in fact continuous with states of distraction, reverie, dissociation, and trance.

Attention finally could not coincide with a modern dream of autonomy.'¹⁶ We want to extend this work by specifically focusing on the problem of memory within mediated environments and some of the paradoxes that this exposes. We take our cue from work on suggestion and suggestible environments, which has explicitly engaged with architecture and specifically the concept of 'architectural atmospheres.'¹⁷ This work draws from the work of the French nineteenth-century sociologist and psychologist Gabriel Tarde, who provides an interesting forerunner to the interest in bodily affectivity currently being enacted across the humanities.¹⁸ Tarde's discussion of suggestion has been described as an inter-psychology, rather than an intra-psychology, which posits suggestion as a trans-subjective mechanism of affective transmission. This work has particular implications for how memory might be practiced, understood and produced and becomes more visible in the context of mediated environments that blur the distinction and separation between self/other, inside/outside, virtual/actual, natural/cultural, built/organic, and nature/culture. If mediated environments can develop the capacity to remember, then precisely in what ways is this capacity being remade or potentially undone when what might be rendered visible within such practices are the more trans-subjective qualities of memory? What directions might this open up for re-animating urban city spaces such as mediacityUK in creative and innovative ways, amplifying the way history, memory, and imagination might work in such an environment?

The work that we will develop in this paper draws attention to space as enactment or transduction.¹⁹ Enactment refers to the performative dimensions of space where space is both virtually and actually produced through its imagined, designed, and experienced possibilities. The concept of 'virtual' that we deploy is precisely not then posed as an opposition to the material environment, and as a term also references the recalibration of 'experience' (in this context, memory) that can no longer be modeled on an individual psyche. As Thrift argues,²⁰ one of the features of ubiquitous media and its evolution within contemporary environments is the way in which environments have the

⁸ See Mike Featherstone, 'Ubiquitous Media: An Introduction,' *Theory, Culture and Society* 2-3 (2009): 1-22.

⁹ See Crang and Graham, 'Sentient Cities: Ambient Intelligence and the Politics of Urban Space.'

¹⁰ Patricia Clough, 'The Affective Turn: Political Economy, Biomedicine and Bodies,' *Theory, Culture and Society* 1 (2008): 1-22.

¹¹ Ibid., 2.

¹² Jonathan Crary, *Suspensions of Perception: Attention, Spectacle and Modern Culture* (Cambridge, MA/London: MIT Press, 2000).

¹³ Ibid., 4.

¹⁴ Ibid., 13.

¹⁵ Ibid., 1.

¹⁶ Ibid., 45.

¹⁷ For example see Christian Borch, 'Organizational Atmospheres: Foam. Affect and Architecture,' *Organization* 5 (2009), and Peter Sloterdijk, 'Atmospheric Politics,' (translated by Jeremy Gaines) in *Space Reader: Heterogeneous Space in Architecture*, eds. Michael Hensel, Christopher Hight and Achim Menges (Chichester Sussex UK: Wiley Publications, 2005/2009), 173-184; and Nigel Thrift, 'Different Atmospheres: of Sloterdijk, China, and site,' *Environment and Planning D: Society and Space* 1 (2009): 119-38.

¹⁸ See Lisa Blackman, 'Affect, Relationality and the Problem of Personality,' *Theory, Culture and Society* 1 (2008): 23-48.

¹⁹ Crang and Graham, 'Sentient Cities: Ambient Intelligence and the Politics of Urban Space.'

²⁰ Thrift, 'Different Atmospheres: of Sloterdijk, China, and site,' 119-38.

potential to become suggestible, displacing the idea of the separate actor or user with a more mimetic, relational and entangled notion of brain-body-world couplings better captured by the concept of trans-subjectivity. Space as transduction is a term associated with the work of Gilbert Simondon, who has explored the simultaneous symbolic, technical, and psychic transformations enacted within specific environments, or what he calls associated milieus.²¹ This opens the problematic of affect, cognition, body, and environment to a fundamental relationality and interconnectedness, and emphasizes processual becoming rather than pre-formed entities, individuals and environments.

This paradigm of co-enaction, co-constitution and co-evolution has become central to projects such as mediacityUK. We will argue that discourses of planning are a crucial site for exploring the possible and potential enaction of an architectural complex such as mediacityUK and these will form the main focus of our analysis. In planning discourses, the virtual is an experience of the past as well as the future, and yet the 'media' of media cities operates more often than not as a short-hand reference for the new, the digital and the instantaneous of communication technologies. Our focus turns instead to the importance of memory in considering questions of affect, bodies, and cognitive architecture. The foregrounding of memory, and particularly memory as trans-subjective, collective, and virtually embodied, will enable new questions to be posed and solutions proffered in relation to the question of how mediacityUK can be responsive to the environment that it is co-enacting. It will also enable us to move beyond the 'real-time' based focus of these 'media-architecture complexes,'²² to consider the more affective dimensions of virtuality. What is critical to the functioning of these environments, yet absent from their description, is the transmission of moods, emotions, energies, sensations, and intensities better captured by the concept of affect. This focus on the affective dimensions of the environment, as it might be virtually embodied by different users, discloses the importance of inventing models of cognitive architecture that go beyond cognition and meaning-making. One interesting assumption that has been made within mediacityUK has been that places such as mediacity tell stories.²³ In this sense there is seen to be a process of porosity between place and narrative that can be actualized in different ways (through branding, for example). One way to start to explore the porous nature of place and narrative in mediacity is to consider a brief history of Salford Quays, the site of the current construction that will result in mediacityUK.

Salford Quays: From Port to Portal Salford Quays was once the site of the Manchester ship canal, which joined Manchester and Liverpool with a network of ports that allowed the international circuit and distribution of goods and commodities. The Quays were a thriving hub of industrial activity which provided commerce, labor, security, and opportunity to local, mainly working-class

communities. The Quays were an important landmark of industrialization, which with the decline of shipping in the mid-twentieth century, contributed to the circumstances that led to the Quays becoming a derelict site. We will argue that this iconic site was not only a material object, providing jobs and security for those who were able to skill themselves, but also importantly functioned as a psychic object for neighboring working-class communities. Thus, shipping, understood as an assemblage of elements making up the 'environment,' was one site that enabled neighboring communities to participate in practices that allowed a collective sense of 'holding together.' The importance of 'holding together' for communities with long histories of deprivation, neglect and poverty cannot be underestimated and has been found to be an important component of regeneration practices in areas formally defined by industrial modes of working. Thus, Walkerdine²⁴ focuses on the practices that allow an ex-industrial community in South Wales to retain a sense of togetherness in the face of the decimation of the industrial modes of working that historically brought the community together as a particular kind of collective entity. The psychic geography of such an iconic site as the Quays is therefore important in thinking about the anticipatory project of mediacity as a 'place of the future,' which is also, despite its fall into dereliction, haunted by its iconic status as a 'place of the past.' Although mediacity offers the possibility of a 'new beginning' for Salford and its neighboring communities, the complex histories of such a site point toward the challenge of 'starting anew' in the face of collective memories, habits, affective dispositions and expectations that are more difficult to reconstruct, recollect, and reflect upon. What we might see, rather, is an interpenetration of the past, present, and future, which foregrounds the importance of engaging with memories that are shared, plural, co-constituted and might be felt rather than easily articulated. The importance of memory as *felt* and as 'non-inscribed'²⁵ directs our attention to where these memories might be found, and how the past might be brought into the present in ways that might extend mediacity's responsiveness and capacity to animate place in creative and innovative ways.

The particular way in which we are approaching the problem of memory within mediated environments is aligned to work on memory-as-ghosting or haunting.²⁶ These are memories that are trans-generational and which are transmitted by mediums and practices other than the speaking subject: this might include film, television, photographs, fiction, and less-inscribed, more embodied practices of remembering. Connerton²⁷ suggests that non-inscribed practices of memory

²¹ For an extended discussion of Simondon's work in relation to affect, see Couze Venn, 'Individuation, Relationality, Affect: Rethinking the Human in Relation to the Living,' **Body and Society** 1 (2010): 129-62.

²² Chikamori, 'Between the "Media City" and the "City as a Medium"', 147-54.

²³ Joroff, Frenchman and Rojas, 'Report on New Century City Developments.'

²⁴ Valerie Walkerdine, 'Communal Beingness and Affect: An Exploration of Trauma in an Ex-industrial Community,' **Body and Society: Special issue on Affect** 4 (2010): 91-116.

²⁵ Paul Connerton, **How Societies Remember** (Cambridge/New York/Port Chester/Sydney: Cambridge University Press, 1989), 4.

²⁶ See Nicolas Abraham and Maria Torok, **The Shell and the Kernel: Renewals of Psychoanalysis. Volume 1** (Chicago: University of Chicago Press, 1994); and G. Cho, **Haunting the Korean Diaspora: Shame, Secrecy and Silence and the Forgotten War** (Minneapolis: University of Minnesota Press, 2008).

²⁷ Connerton, **How Societies Remember**.

transmission have a rhythmic quality to them. Unlike inscribed memories that become organized and discursively produced and legitimated through particular codes and nosographic categories, non-inscribed memories are performed and ritualized through specific rhythms of everyday life. These rhythms circulate and are incorporated through associated milieus that organize, produce, and shape their communal nature. One dimension of interrogating how such memories might be researched, produced, and enacted within mediated environments such as mediacity is to consider some of the authorized histories of living in Salford. Robert Roberts²⁸ in his memoir *A Ragged Schooling: Growing up in a Classic Slum* eloquently transmits the 'feel' of growing up in Salford in one of the many slums that have come to define the area. This is an account of growing up in one of the Edwardian slums in the first quarter of the nineteenth century, which inspired Engels to write about the dispossession of the working class in his famous treatise *The Condition of the Working Class in England* (1891). Roberts' memoir is an account of abject poverty and of the many problems that such communities had to endure and cope with in their own everyday practices of survival. However, as many have commented, this isn't just an account of ordinary life in a slum (where *ordinary* life was characterized by high mortality, starvation, lack of jobs, money, healthcare, sanitation, and opportunity), but also discloses the extraordinary practices that enabled people to hold together. These practices are revealed in the rhythms and practices of everyday life, which form the background of affective dispositions and habits evoked by Roberts with great sensitivity and humor. From descriptions of the community-binding rituals that revolved around visits to the corner shop, the pub, the church, and the performative dimensions of 'village gossip,' as well as the importance of strolling on a Sunday evening in the then new Peel Park, 'dreaming of a future all aglow,'²⁹ the reader gets a sense of the repetitions that allowed the enactment and re-enactment of a sense of community. This community wasn't a 'lumpen mass' but rather had its own systems of social stratification, moral codes and practices (particularly in relation to respectability), which allowed the working-class communities to define themselves as much in their own terms, as by, and in relation to the upper and middle classes.

Salford's history is very much mired by slums, slum clearances, regeneration programs with their anticipatory promise of the future, and the problems of proximate communities riven by unequal distributions of capital (social, educational, bodily, and economic) and whose anxieties seem more tied to Salford's past. The heritage of such a past has of course been central to earlier urban regeneration strategies that have already built on the Quays, including the Lowry Art and Entertainment Centre (launched in 1995), providing links and forms of legitimation for certain memories of place. However, what is interesting about mediacity in this context is that it is inspired by the concept of New Century Cities.³⁰ NCCs combine the anticipatory promise of the City as being a 'place of the future' with

a focus on the importance of the relationship between place and narrative. In this sense, as with Castell's concept of the 'technopole,'³¹ NCCs enact the city as an actor or agent of transformation and change, reconfiguring 'cities' as intelligent environments rather than static morphological configurations, that is, as architectural-infra-structural environments. Technopoles and NCCs both share a commitment to 'clustering,' a term that refers to the development of new organizational forms, made possible by the shift to informational and knowledge-driven economies. These organizational forms intensify activity in relation to particular specialist industries that can share resources and benefit from the enhanced creativity and innovation seen to be a healthy by-product of specifically engineered and planned contexts of socialization, learning and exchange. Thus NCCs are hubs or portals that allow place to be re-imagined as no longer fixed or determined by the past, and to exist virtually rather than defined by a notion of geographical boundary or scale. Thus, in the branding of mediacityUK, the shift from port to portal emphasizes the global connectivity, which is engendered by the mediated environments characteristic of this digital hub.

New Century Cities: Places of the Future The concept of New Century Cities refers to existing urban locations in various places around the world: Seoul Digital Media City, the Titanic Quarter in Belfast, one-north in Singapore, Milla Digital in Zaragoza Spain, and Arabianranta in Helsinki. NCCs signal a network of complexes premised on a design that avoids the monolithic qualities and inequities of the global city. NCCs by comparison are responsive environments, open-ended and unfinished, performative in the sense that the infrastructures are created in and through activity. Closer to the messiness of the laboratory than to a twentieth-century design culture, New Century Cities are presented as 'tests, rehearsals and probes.' The boundaries that have produced work and domestic life, production and consumption, education and commerce as discrete spaces are rubbed out in the planning of mixed spaces that are eclectic, bundled, and in a state of productive flux. If Salford Quays as a working port evokes the industrial model of the second law of thermodynamics (a closed system of energy that moves toward a state of maximum entropy), its regeneration is modeled on an open system of fluent energy. The concept of architecture here is an osmotic membrane mediating energy and information, drawing the idea of constant feedback from the realm of cybernetics. The description of Media Cities as 'agile' is further suggestive of a living body, an intelligent environment that is dynamically responsive to the actions of its inhabitants rather than a structure built to engineer behavior. The significance of this shift from industrial to informatic modeling lies in a concomitant switch of focus from 'hard' structures to the concept of a virtual environment, produced through activity. New Century Cities set out the paradigm of space as a network, a virtual system that exists when actors are in transit. A city space is co-constituted by actors (and their linkages) who perform space as emergence and becoming. This focus on a spatial network has temporal implications, located as it is in the real-

²⁸ Robert Roberts, *A Ragged Schooling: Growing Up in the Classic Slum* (Manchester/New York: Mandolin, 1976).

²⁹ Ibid., 3.

³⁰ Joroff, Frenchman and Rojas, 'Report on New Century City Developments.'

³¹ Manuel Castells and Peter Hall, *Technopoles of the World* (London: Routledge, 1994).

time of activity, the emergence of patterns and intensities out of potential chaos and the inter-relationality of behavior as an aggregate form of productive energy. A scene of potential bifurcation occurs in the discourse on NCCs when one considers the inverse of this set of characteristics; in contrast to *becoming*, the *present*, and the intensity of *activity*, resides *being*, the *past*, *memory*, and the *individual*. The potential bifurcation of the past and present also re-emerges through distinctions made between new communities of creative workers and existing local communities. The complexity of the stakeholders and issues surrounding the development of mediacityUK are evidenced in the processes of planning. We will therefore not focus on the discrete architectural design of mediacityUK, but rather turn our attention to these processes where the desire to create and transmit particular 'affective atmospheres'³² meets with 'affective states' articulated by various 'stakeholders'.³³ Our argument will have implications for how the concept of cognitive architecture is conceived, produced, and understood, particularly when addressing the more affective dimensions of spatiality or spacing.³⁴

While New Century Cities mark a break, most obviously from the previous century, but also from earlier modes of production and industrial attitudes to spatial materials as exploitable resources, there are questions to be asked of the concept as a model of change. Our focus here will be on the process of 'planning,' which encompasses an extended time of research, consultation and design that is often neglected in spatial discourse, in favor of analyses of the finished built environment (however 'finished' an environment may be). Here, we find that the concept of 'change' features as a highly charged discourse deployed and evoked in diverse ways. Change is signaled simultaneously as instrumental development, aspiration, exclusion, and abjection. Common to both the vision statements of regeneration and the consultation documents with local communities is a language of affect. This is conveyed by planners in the desire for a particular affective tone or atmosphere to be transmitted throughout mediacityUK, evoked by the need to create a 'buzz'; or to consider how boulevards might be designed that can 'animate and energize'.³⁵ This might be related to what Nigel Thrift³⁶ terms the 'affective grip' of 'sites.' This more affective concept of how one might apprehend an environment is drawn, by Thrift, from the Regency landscape gardener Humphry Repton. Repton created the picturesque style that aimed to induce a more semi-conscious experience of gardens akin to reverie, which placed bodily affectivity at the centre of apprehending a 'vista' that might usually be thought of as a predominantly visual experience. This invokes the more felt, tactile dimensions of seeing, which reconfigure seeing as haptic communication.³⁷ This language of sensation recalls the architectural body as being akin to an 'electronic nervous system,'³⁸ allowing for the transmission and flow of what are viewed as more intensive dimensions of experience. This intensive flow is that which keeps the environment moving and becoming, such that it is more an osmotic membrane than a fixed boundary or

container. The unfinished, processual and fluid nature of the environment is one that has been approached with caution by some critics of the regeneration vision seen to support this. In some policy critiques, mediacityUK is invoked as 'a series of surfaces and containers' within which particular interests can be projected and enacted.³⁹ Thus, mediacityUK becomes spatialized less as an osmotic membrane and more as a particular spatialized object of governmentality where space is used for particular ends.

This tension between space as process in contrast to more conventional ideas of space as container or ordering practice (of interests, for example) is captured by Raco et al.⁴⁰ In their critique of the regeneration policies underpinning the visioning of mediacityUK, they argue that what is interesting about the way time is spaced within the planning documents is the way in which the unfinished ongoing nature of regeneration generates a period of suspension, in which the future is summoned yet not fully materialized. Reading between the lines of purposeful statements, planning is something like a séance, the future rising up as a specter of past and anticipated losses, disappointments and anxieties, while the suggestive plans conversely relay 'aspiration.' In this sense, for some constituents the benefits of regeneration will only come through a process of waiting for long-term benefits, which will primarily be realized through a process of coming to want and see a better future. This is captured through a discourse of aspiration building where the specularization of mediacityUK will provoke particular constituents (specifically neighboring working-class communities) to engage in the kinds of processes of self and community transformation that will equip them to participate in the environment of mediacityUK. The timing of regeneration is a significant issue in terms of local communities 'believing' in the project. While there is a critical sense of the timing of regeneration, and the demand that temporal phases deliver improvements in the short term,⁴¹ the present is characterized by a circulation of affect in which the future is yet to, and may never for some constituents, arrive.

Temporality features as a significant issue in another sense, not only in terms of imagining the future but of incorporating the past within this development. This is not to invoke the past as an isolated melancholic object, but as a complex multilayered temporality that refuses the separation

³² Sloterdijk, 'Atmospheric Politics,' 173-84.

³³ Borch, 'Organizational Atmospheres: Foam. Affect and Architecture.'

³⁴ Erin Manning, **Relationscapes: Movement, Art, Philosophy** (Cambridge, MA /London: MIT Press, 2009).

³⁵ MediacityUK and Quays Point: Salford Quays and Trafford Wharfside Planning Guidance.

³⁶ Thrift, 'Different Atmospheres: of Sloterdijk, China, and site,' 122.

³⁷ D. Boothroyd, 'Touch, Time and Technics: Levinas and the Ethics of Haptic Communications,' **Theory, Culture and Society** 2-3 (2009): 330-45.

³⁸ Joroff, Frenchman and Rojas, 'Report on New Century City Developments.'

³⁹ Margo Huxley, 'Geographies of Government,' in **Space, Knowledge and Power: Foucault and Geography**, eds. Jeremy W. Crampton and Stuart Elden (Ashgate, UK: Ashgate Pub. Ltd, 2007); and Mike Raco, Steven Henderson and Sophie Bowlby 'Changing times, changing places: urban development and politics of space-time,' **Environment and Planning A** 11 (2008): 2652-73.

⁴⁰ Raco, Henderson and Bowlby 'Changing times, changing places: urban development and politics of space-time,' 2652-73.

⁴¹ Ibid.

of past, present, and future. Indeed, the planning and consultation process reveals the ways in which multiple temporal discourses are articulated in relation to planning histories and imagined futures. In the consultation report documenting a series of public debates and meetings, (conducted by Salford University on behalf of Central Salford Urban Regeneration Company), there is a language of 'hard' and 'soft' development,⁴² where the physical properties of architecture and infrastructure are perceived to be unmalleable. In contrast, education, leisure, and familial relations are regarded as soft. Within this discourse, it is the bodily memory of a postwar architecture movement that is informing the present. A modernist agenda of architectural design as social transformation, most spectacularly evidenced by a style of monumental glass and concrete architecture, is recalled as an environment of harsh tactile qualities acting on 'soft' inter-human relationships. In the consultation documents, the past 'injury' of urban planning and development is cited in the history of an arterial road (the A6) cutting through and cutting up neighborhoods. An ambivalent attitude to 'landmark buildings' (echoing the monumental) permeates responses to the plans. In contrast, the negativity toward a built (architectural-infrastructure) environment is countered by positive statements toward green spaces, parklands, and the notion of a garden city, a discourse reproduced in the idea of 'seeding' the future in the present that underpins the vision statement.

The Garden City Movement These responses to the plans for regeneration at once disguise and disclose the complex entanglement of urban histories in circulation. The apparent splitting of nature-culture into component parts on the part of respondents belies another history of development, one from the turn of the twentieth century in Britain, that of the Garden City Movement. Overtly Utopian in principle, the model of the garden city is one of patterning and balance organized around a concentric space, a civil hub if you will. Ebenezer Howard's *Garden Cities of To-morrow* (1898) attempted to rewrite the nature-culture relationship as one of compatibility and correspondence, a vision radically out of step with the internationalist style of architecture at the beginning of the century that embraced 'technology' as a solution. Yet Howard's vision of a garden city is precisely a structured environment, an example of design working across the nature-culture divide. Radically 'provincial' in its time, Howard's text none the less reaches forward to share some of the concerns evident in recent conceptualizations of space as an atmospheric environment, such as Peter Sloterdijk's atmospheric spatiality. Indeed, Sloterdijk's interpretation of the importance of the glasshouse in the mid-nineteenth century illuminates the complex relations between humans, plants and built constructs. Sloterdijk⁴³ uses the figure of the glasshouse or hot-house as one of the conditions of possibility for formulating a concept of the environment as a 'shared climate.'

The glasshouse was a particular architectural design realized in structures such as London's famous Crystal Palace by Joseph Paxton, built in 1851, where built environments incorporated climatic factors such that particular relations of hosting were engendered between natural and non-natural habitats. Glasshouses were hybrid glass/cast iron structures which allowed plants from non-European countries to participate and survive in processes of migration and to settle and flourish in environmental conditions that were artificially planned and produced. The nineteenth-century development of glasshouses inaugurated what Sloterdijk characterizes as 'a new politics of trans-human symbiosis,'⁴⁴ which did not posit the environment as a separate entity to the very processes of (trans-human) subjectivity which were co-constituted and co-enacted through such shared trans-subjective practices of co-evolution. Thus rather than a separation and split between nature and culture, what we see are naturecultures as thoroughly entangled processes which point toward the co-constitutive and co-evolving relationships that produce what might become recognizable as particular kinds of entities; nature and culture, for example.⁴⁵ The influence on Sloterdijk's work of earlier texts, such as Reyner Banham's *The Architecture of the Well-Tempered Environment*,⁴⁶ which posited an alternative to spatial design as material thresholds through a vision of nomadic, energy-based environmental design, has been documented.⁴⁷ Sloterdijk's elaboration of environmental design as atmospheric extends the concept of the environment into that of a sensorium, a sphere that is shared, although we may struggle to enumerate its many sensory aspects, such as the quality of air.⁴⁸ A feature of this paradigmatic shift is its move away from discourses of modernization and the emancipation of individual subjects or communities, toward questions of what it is that sustains life.

Mimesis, Atmospheres, and Foam Sloterdijk's focus on glasshouses is an interesting forerunner to the particular 'atmospheric' approach to built environments that characterizes his philosophy and incorporates this approach to environment as natureculture. Sloterdijk's thinking is attentive to the more vitalist or immaterial aspects of urban planning and development, which he likens to 'psychic urban planning.'⁴⁹ These are the 'atmospheres' or climates that are co-constituted and enacted within shared spaces, and allow citizens (for example) to live together. It is fair to say that Sloterdijk is interested in the processes and practices, material and immaterial, that bind human and non-human elements of built environments together. Sloterdijk, like Gabriel

⁴² URC (Urban Regeneration Company), 'Central Salford URC Draft Vision and Regeneration Framework,' Report on Public Consultation July-October 2005, prepared by Jo Heeley and Bev Fletcher, University of Salford (February 2006).

⁴³ Sloterdijk, 'Atmospheric Politics,' 176.

⁴⁴ Sloterdijk, 'Atmospheric Politics,' 174.

⁴⁵ Donna J. Haraway, *When Species Meet: PostHumanities* (Minneapolis: University of Minnesota Press, 2007).

⁴⁶ Reyner Banham, *The Architecture of the Well-Tempered Environment* (Chicago: Chicago University Press and London: The Architectural Press, 1969).

⁴⁷ Christopher Hight, 'Putting Out the Fire with Gasoline: Parables of Entropy and Homeostasis from the Second Machine Age to the Information Age,' in *Space Reader: Heterogeneous Space in Architecture*, 159-172.

⁴⁸ Bruno Latour, 'Air,' in *Sensorium: embodied experience, technology, and contemporary art*, ed. Caroline A. Jones (Cambridge, MA: MIT Press, 2006), 104-7.

⁴⁹ Sloterdijk, 'Atmospheric Politics,' 177.

Tarde, is focused more on mimesis, or the imitation dynamics orchestrated within particular 'environments,' which he likens to foam. Foam is an interesting metaphor to think about mimesis, for as a substance foam does not have a clear border or boundary, can reconfigure or mutate as it comes into contact with other surfaces (thus always exists relationally), and in extremis can dissolve. Sloterdijk uses the concept of foam to describe the way in which organizations create particular atmospheres or climates that inhabitants shape, respond to, take on, and alter in their own practices of being and becoming. These atmospheres are not taken on cognitively (that is, through some kind of incorporation which might act more like a belief or attitude), but rather more suggestively.⁵⁰ Christian Borch develops Sloterdijk's interest in the philosophy of the French nineteenth-century psychologist and sociologist Gabriel Tarde.⁵¹ Suggestion undermines strict borders and boundaries between the self and other (human and non-human) and instead focuses our attention on processes of transmission that are likened to the workings of hypnotic relations. As Borch,⁵² recalling Tarde's suggestive ontology, argues, the typology of processes of transmission that can be characterized as 'hypnotic' are relationships 'where the one who imitates may think that he or she acts spontaneously, but actually only reacts to hypnotic suggestions.' Borch argues that the implications of Tarde's work for understanding architectural atmospheres are that a focus on suggestion, rather than belief or desire, turns our attention to the mechanisms, practices and processes through which different atmospheres are orchestrated, managed and produced. This combines a focus on space as process, alongside an ongoing commitment to the way in which 'cities' or built environments enact particular generative rationalities or visions. In this sense, although foam acts like an osmotic membrane, allowing the circulation and transmission of particular atmospheres, it also performs a more conservative function engendering specific forms of sociality.

In relation to this latter point it might be instructive to return to mediacityUK and revisit some of the tensions that arise from the planning and policy documents that have been administratively put into circulation. The following points arose from the Central Salford URC Draft Vision and Regeneration Framework: Consultation Review that was prepared by Jo Heeley and Bev Fletcher, University of Salford in February 2006. One key constituency that is absent from the concept of New Century Cities, particularly as it has been put to work in the architectural vision of mediacityUK, are the existing residents of the areas that neighbor the new developments. It is assumed within the regeneration policy documents that these residents will benefit, at some later unspecified time, from raised aspirations which will enable them to rid themselves of and overcome the undesirable connotations attached to the local neighboring areas. This discourse of aspiration building assumes particular models of community and personal change, which liken transformation to forms of attitude change. This is a rather

rationalist model of change that assumes a cognitive model of learning, transmission and exchange. The modern within this formulation is equated to the entrepreneurial, to those capacities and qualities that are aligned to success, creativity, self-reliance, and adaptability. This is a particular model of sociality associated with the 'creative classes'⁵³ where the iconic design and buildings of mediacityUK are presumed to invoke, convey, and transmit this 'experience' as a normative, inspirational desire. However, the tension between the distinctly modern experience of mediacityUK and its heritage-rich histories is disclosed by neighboring resident's responses to the planning documents. They were more taken with the potential for the radical greening of the area, responding more positively to the urban pastoral vision of the framework with its invoking of parklands and waterways more akin to the nineteenth-century garden city. However, this tension was echoed in different ways by potential residents of mediacityUK; the creative workers who did not respond to the 'digital experience' being presented to them as expected. Rather than viewing the electronic nervous system as experimental, innovative, and creative, they instead associated the experience of mediacityUK with a corporate, sterile environment. This research was commissioned by mediacityUK at the end of 2008 and used focus groups and in-depth interviews with a range of groups; BBC employees, Salford University students, potential apartment buyers, potential business tenants, Waste, Ordsall, Seedley and Langworthy residents, and Salford community group workers. The aim of the research was to understand the expectations of mediacityUK held by different groups and to test reactions to specific ideas. Joroff⁵⁴ suggests that the vision did not capture the imaginations of potential residents and tenants who took the digital environment for granted and who found the digital signage too practical and information-driven. It would seem that in the case of potential residents and neighboring communities the vision of mediacityUK as a 'place of the future,' enacted through its branding as a particular kind of modern 'experience,' is one that has been called into question. However, it is not the purpose of this paper to engage in some kind of ideology-critique or policy-critique, but rather to offer some suggestions for how mediacityUK can be responsive to the environment it is co-enacting while maximizing and extending its heritage-rich histories and creating architectural atmospheres that are more likely to induce a range of affective investments and attachments. This will entail asking whether mimesis is useful for thinking about history and memory in mediacityUK, and if so what the implications of this work are for thinking about the concept of cognitive architecture.

Suggestive Histories and Post-Memory If the architectural project of mediacityUK is occurring within a wider discourse of urban regeneration of the Salford area, the subject of media and mediation is notably absent from the documented debates. The conceptualization of

50 Borch, 'Organizational Atmospheres: Foam. Affect and Architecture.'

51 For further details see Lisa Blackman, 'Reinventing Psychological Matters: the importance of the suggestive realm of Tarde's ontology,' *Economy and Society: Special issue on Gabriel Tarde* 4 (2007): 574-596, and Christian Borch, 'Crowds and Economic Life: bringing an old figure back in,' *Economy and Society: Special issue on Gabriel Tarde* 4 (2007): 549-73.

52 Borch, 'Organizational Atmospheres: Foam. Affect and Architecture.'

53 Richard Florida, *Cities and the Creative Class* (New York: Routledge, 2005); and Jamie Peck, 'Struggling with the Creative Class,' *International Journal of Urban and Regional Research* 29 (2005): 740-70.

54 Joroff, Frenchman and Rojas, 'Report on New Century City Developments.'

'media' of mediacityUK is twofold in the proposals. First, media refers to the relocation of a national media producer, the BBC, to the north of England in a desire to broaden the representative remit of the public company. Second, media features as the embedding of digital technologies within the fabric of the city, transforming surfaces into tactile, responsive textures. On the periphery of these twin foci, media functions as a performance of memory in sites related to the development but not officially attached to the process. Outside of the official sites of planning and consultation discourse, a performance of time as a more affectual and visceral experience is taking place. Photography has become a key mediation of a past, both as documents of lives and events from a former age, and as a means to document the discarded signifiers of the redevelopment process. Artist Lawrence Cassidy, for example, has collected street signs and various 'debris' from the demolition of areas of Salford, which now exists as an online exhibition (Figures 1, 2 and 3). This visual documentation of the past is made more complex in the recorded narration of stories told by Salford residents, collected by a community group Salford LIDS (Local Initiatives, Diverse Skills). The performative dimension of these stories is underscored by their re-telling as theatre, particular events where the narration is transformed in each environment that hosts it. Thus, memory is passed on, re-narrated and re-situated in various parts of the city. The emergence of these invocations of memory and a past is a production, a response to the changing environment of regeneration. Thus, the imagination of a virtual future is suggestive also of a past; memory cannot be separated from the design of a future.

Integral to these enactments of memory is the displacement of a single-authored perspective. Memory is passed on, shared, co-constructed in each telling, productive of what we might think of as 'post-memory';⁵⁵ that is recall that is not experienced as 'first-hand' but as relay. While these mediations of the past are accessible as documents, they are *records of a narration*, a mode of telling, rather than static documents fixed by the act of preservation, consigned to a museum of the past. This shift of emphasis from record to performance evidences a mode of temporality where transmission, rather than record, features as the critical nexus. Time is relayed as past, passing and passed on, fluid in form and adaptable in each transmission. The past is suggestively invoked, memories feature as a type of contagion that lead to further elaborations. It is in relation to the critical nexus of transmission and post-memory that the virtual environment of mediacityUK could most productively be explored, developed, and engaged. Sociological studies of community (in this context the neighboring communities that border mediacityUK), which often stress the importance of *location* to understand what binds communities together and what might make them 'tight-knit',⁵⁶ suggest that this focus on location occludes and ignores the more affective dimensions of community that circulate and are transmitted through actions, places, practices, feelings, objects, and trans-subjective bonds. It is not that community is static,

fixed by location and a nostalgic longing for the past, but rather that different senses of community and the past are constantly worked and re-worked in the present. This more dynamic conception of community as a co-evolving ritualized practice of transmission, where shared co-constitutive, plural memories circulate and are performed, shifts attention to the (virtual) potential of mediacityUK for engaging such processes and practices of *mediation*.

The argument we are developing here has resonances with Takaaki Chikamori's⁵⁷ important critique of the way in which media becomes instantiated and enacted as a particular kind of object within McGuire's⁵⁸ concept of the media city. Although digital media are ubiquitously intertwined throughout the electronic fabric of media city, there is still a sense, both in response and design, that media primarily work as representational devices. This is captured in the logic driving the digital signage that as we have seen operate as 'real time' informational devices. What is emphasized is instantaneous communication, rather than the different kind of archiving that we witness outside of the official sites of planning, design, and consultation. As Chikamori has cogently argued, the media in media city is visually centered, technological, and 'real-time' based. The question then of the archive as transmission rather than museum, as alive rather than dead, is perhaps critical to understanding and enacting the relationships between memory and mimesis that are crucial to the design of the media city as a 'place of the future.' Chikamori links the concept of the 'city as archive' to Walter Benjamin's (1986) privileging of the faculty of mimesis in the experience of cities, such as Berlin, as 'mediums of remembrance.' As Chikamori argues: 'At stake is not the flow of information, which appears and disappears instantaneously, but the traces of the past which will continue to remain in the urban space.'⁵⁹

There are echoes here of the way in which Sloterdijk's work on 'atmospheric architectures' has been taken up and extended by scholars interested in the revitalization of suggestion across the humanities.⁶⁰ This work makes important links to a common ontology linking the humanities, natural, and social sciences that emphasize the fact that social and natural phenomena are complex, processual, indeterminate, relational, and constantly open to effects from contiguous processes.⁶¹ Rather than view mimesis or suggestion as a mental faculty, some kind of 'thing' or vital quality that bodies have – a capacity existing independently of relationality – one might think of mimesis or suggestion as a technical capacity.⁶² In other words viewed as a capacity that can be

⁵⁵ Marianne Hirsch and Leo Spitzer, 'What's Wrong with this Picture: Archival Photographs in Contemporary Narratives,' *Journal of Modern Jewish Studies* 2 (2006): 229-52.

⁵⁶ Ray Pahl, 'Are all Communities Communities in the Mind?' *Sociological Review* 53 (2005): 621-40; and Valerie Walkerdine, 'Communal Beingness and Affect: An Exploration of Trauma in an Ex-industrial Community,' *Body and Society. Special issue on Affect* 4 (2010): 91-116.

⁵⁷ Chikamori, 'Between the "Media City" and the "City as a Medium"', 147-54.

⁵⁸ McGuire, *The Media City: Media, Architecture and Urban Space*.

⁵⁹ Chikamori, 'Between the "Media City" and the "City as a Medium"'

⁶⁰ Borch, 'Organizational Atmospheres: Foam. Affect and Architecture.'

⁶¹ Lisa Blackman, and C. Venn, 'Affect,' *Body and Society: Special issue on Affect* 4 (2010): 7-28.

⁶² Also see Celia Lury, *Prosthetic Culture: Photography, Memory and Identity* (London/New York: Routledge, 1998).

‘made up,’ orchestrated, extended, and amplified through processes and practices of mediation. Indeed, Borch⁶³ argues that one of the conclusions that we might make from engaging Sloterdijk’s philosophy of space is the development of research programs that focus on ‘the politics of organizational atmospheres.’ This might turn our attention to a different kind of archiving that is more experiential; performance as archive perhaps.⁶⁴

Paul Connerton⁶⁵ suggests that one of the impacts of the legitimization of a particular kind of archiving is one where memory becomes inscribed and fixed by an act of preservation. Thus what becomes transmitted inter-generationally and inter-corporeally is the reproduction of inscriptions. This has the tendency to institutionalize memory and to foreclose innovation and creativity. Inscription devices tend to be bound to processes of storage and retrieval, and overlook the importance of ‘incorporating practices’; these are practices that are more affective, visceral, performative, and dynamic. ‘Incorporating practices’ are closer to the kinds of transmission of post-memory that we find outside of official sites of consultation, planning and design and that act as hubs or ‘rhythmic mnemonics.’⁶⁶ These ‘rhythmic mnemonics’ are closer to the rhythms and practices of everyday life evoked in Roberts’s memoir, written in 1976, of life in a Salford Slum and which engender the enactment and re-enactment of communal and civic engagement. The focus on ‘rhythm’ as an important *aide de memoire* captures the ritualized and performative elements of post-memory that help to shape personal and communal affective dispositions. ‘Incorporating practices’ require repetition and become part of the ‘habit’ of communities; that which is experienced as most intimate, cultivated and remembered, although often remaining ‘traceless’ when compared to the ‘museums of the past.’ This focus on community-binding rituals that require a more dynamic conception of time and space and which are *suggestive* rather than inscribed, open up the design of the mediated environment of mediacityUK to the affective, the visceral, the intensive, and the rhythmic embodied in the enactment and performance of post-memory.

Conclusion: Body-Memory-Space. A Past Presence

Throughout the paper we have invoked the concept of mediation in order to understand the potential of the design of the virtual environment of mediacityUK to engage, perform, transmit, and rehearse memory. Our understanding of memory is tied to suggestion and to conceptions of memory which posit a plural, shared, co-constitutive, and co-emergent memory, thus emphasizing the dynamics of *transmission*, rather than recall, to understand this process. The transmission of memory is therefore more *affective* than cognitive and aligns the virtual potential of mediation to understandings of affect that are in circulation across the humanities.⁶⁷ Brian Massumi’s⁶⁸ seminal work on the spacing of affect, as well as Hansen’s⁶⁹ focus on the body’s potential for mediation within

new media and digital technologies, both direct our attention to the important task of re-thinking and re-modeling sensation, perception, memory, attention, listening, and emotion – what we understand as ‘cognitive architecture.’ The paradigm of co-enaction and co-constitution which we have developed to understand the concept of ‘environment,’ tracing its lineage through the architectural visioning of garden cities and the concept of New Century Cities, assumes the co-evolution of the human with technics.⁷⁰ The virtual is *not* therefore a mediated space that reveals or discloses what is already there but perhaps not usually rehearsed (captured by the concept of counter-memory for example), but rather offers up the potential for a multisensory experiential stage to choreograph and assemble traces of the past that can animate and alter the present. This understanding of choreography is closest to Sloterdijk’s conception of ‘architectural atmospheres,’ which models understandings of ‘cognitive architecture’ derived primarily through Gabriel Tarde’s work on suggestion.⁷¹ As we saw earlier, for Tarde, what defined the human subject was the capacity for suggestion, where borders and boundaries between subjects were considered porous and permeable. Tarde’s work should be situated within an ongoing concern within the nineteenth century with how to explain contagious forms of communication that were governed by speed of circulation, and which were seen to be transmitted through the registers of feeling, affect, and emotion.⁷² Work on suggestion is currently undergoing a renaissance across the humanities, redistributed beyond the individual psyche, understood as a capacity that can be extended, augmented, modulated, and transmitted such that the duality between self/other, nature/culture, and virtual/actual breaks down. This reconfigures suggestion as prosthetic; always already involving human and non-human actors and never reducible to a personality trait or mental capacity. In this sense, suggestion is closely aligned to the problem of memory; indeed memory itself could work along contagious, suggestive lines.⁷³ This more mimetic, relational conception of the psyche, better captured by the concept of trans-subjectivity, underpins the approach to architectural atmospheres in Sloterdijk’s work. Indeed, Thrift⁷⁴ argues that one of the orientations of this work is its concern

⁶³ Borch, ‘Organizational Atmospheres: Foam. Affect and Architecture.’

⁶⁴ Elaine Aston, ‘Feminist Performance as Archive: Bobby Baker’s Daily Life and Box Story,’ *Performance Research* 4 (2002): 78-85. See also Lisa Blackman, ‘Affect, Performance and Queer Subjectivities,’ *Journal of Cultural Studies* (2010 in press).

⁶⁵ Connerton, *How Societies Remember*.

⁶⁶ Ibid., 76.

⁶⁷ For further elaboration of different perspectives see Blackman and Venn, ‘Affect.’

⁶⁸ Brian Massumi, *Parables for the Virtual: Movement, Affect and Sensation* (Durham, NC: Duke University Press, 2002).

⁶⁹ Mark Hansen, *Bodies in Code: Interfaces with Digital Media* (London/New York: Routledge, 2006).

⁷⁰ See *ibid.*; and Bernard Stiegler, *Technics and Time, 1: the Fault of Epimetheus*, translated by Richard Beardsworth and George Collins (Stanford, CA: Stanford University Press, 1998 [1994]).

⁷¹ Blackman, ‘Reinventing Psychological Matters: the importance of the suggestive realm of Tarde’s ontology’; and Borch, ‘Crowds and Economic Life: bringing an old figure back in.’

⁷² See Lisa Blackman, ‘Feeling FINE: Social Psychology, suggestion and the problem of social influence,’ *International Journal of Critical Psychology: Special Issue on Affect and Feeling*, 21 (2007): 23-49.

⁷³ See Lisa Blackman, ‘Embodying Affect: Voice-hearing, Telepathy, Suggestion and Modelling the Non-Conscious,’ *Body and Society: Special Issue on Affect* 1 (2010): 163-92.

⁷⁴ Thrift, ‘Different Atmospheres: of Sloterdijk, China, and site.’

with what Thrift terms 'suggestible environments' and the art of producing suggestible environments through design and planning.

What is important within this work is to understand the affective investments that are engendered, enacted, and made possible within particular organizational forms or spaces, understood as porous processes akin to foam. Thus organizational forms or spaces are responsive to the environments they are co-enacting and this responsiveness can be differentially orchestrated, amplified, modulated, and choreographed. In the specific context of mediacityUK, although the concept of New Century Cities understands the media city more as an osmotic membrane captured by the notion of the 'portal' (a global hub of connectivity), the question of how it is responding to the environments it is co-enacting is one that is still very much in process. Outside of the official discourses of planning, design, and consultation, and indeed emerging as 'virtual' traces within these discourses, mediacityUK takes on the spectral image of a built environment that has the potential to exclude, raising questions of ownership both by and for potential residents and neighboring communities. The virtual potential of mediacityUK as a mediated environment may disappear from view, replaced by talk of the necessity of gated communities meeting the imagined security needs of residents. The question of ownership is one that could be interestingly and productively reworked if examined within the context of mimesis and memory, shifting attention to affective registers rather than understandings of attitude change or belief formulated through a discourse of aspiration building. This has been the key way to date that transformation and change within neighboring communities has been understood to be situated within a temporal phasing or spacing of change, which, as we have seen, emphasizes the importance of waiting.⁷⁵ The production of an 'atmosphere' of waiting has the potential to draw attention to the specularization of mediacityUK (as a place for others – perhaps more captured by Banham's suggestion that iconic buildings are considered more as photographs than bodily experiences), focusing on the built environment as a container of particular interests, rather than the agile, responsive, flexible environment that it is imagined to be by different stake holders. Rather than polarizing the debate, the enhancement and development of the potential for *mediation* in mediacityUK is one way forward to create what Sloterdijk has termed 'the climate or psycho political conditions for social synthesis.'⁷⁶ The question that remains is what kind of mediated environment mediacityUK could be if it worked with a conception of mediation rather than media, and with a conception of the virtual that is tied to suggestive memory, rather than the intensification of instantaneous communication?

Crang and Graham⁷⁷ have already begun work in the area of mediated environments by turning to artistic interventions that attempt to re-mediate, re-enchant and re-animate city landscapes. These interventions, which use and extend ubiq-

uitous media as forms of theatre for staging memory as trans-subjective, work through a 'double play of presence, haunting and topography.'⁷⁸ This includes the building up of an 'experiential spatial database'⁷⁸ that is accessed via mobile phone technologies that are shifting, multilayered practices continually moving through the addition of user's stories, thoughts, and experiences as they interact with what is already being suggested to them. These forms of collaborate co-authoring are close to interventions that, as we have seen, are already being staged by artists and local communities outside of the official discourses of the planning and design of mediacityUK. These practices perform and materialize memory as it is passed on, re-narrated, and re-situated in various parts of the city. Although one may see the topography of mediacityUK as a built environment extending its iconic buildings across the Salford Quays skyline, what haunts this spectacle are the suggestive memories that transmit across time and space, and that direct our attention to the art of designing suggestible environments that are open to the co-authoring of the past, present, and future. If, as Colomina argues, 'modern architecture only becomes modern with its engagement with the media,'⁷⁹ then by opening the media up to practices of mediation what becomes foregrounded are the very non-linear processes and practices that allow what haunts the topography of mediacityUK to be productively enacted. This is closer to what Massumi⁸⁰ terms 'movement vision,' rather than the mirror vision associated with the static, frozen photographic image. Movement vision turns our attention away from the privileging of vision (and the more representational logic of media) toward forms of haptic communication that move and circulate between bodies and that can be worked up or cooled down,⁸¹ enhancing the embodied, tactile, and multisensory dimensions of environments. This is closer to Banham's⁸² distinction between knowing buildings as bodily experiences rather than photographs. Work on suggestive memory extends bodily affectivity to consider those trans-subjective practices of memory that 'ghost' the environment and have the potential to open up the topography of mediated space to alterity and difference, to the past and present, and most importantly to extend the vision of co-enaction such that mediacityUK may accomplish its vision as a 'place of the future.'

⁷⁵ Raco, Henderson and Bowlby 'Changing times, changing places: urban development and politics of space-time.'

⁷⁶ Sloterdijk, 'Atmospheric Politics,' 177.

⁷⁷ Crang and Graham, 'Sentient Cities: Ambient Intelligence and the Politics of Urban Space,' 808.

⁷⁸ Ibid., 807.

⁷⁹ Colomina, **Privacy and Publicity: Modern Architecture as Mass Media.**

⁸⁰ Massumi, **Parables for the Virtual: Movement, Affect and Sensation.**

⁸¹ See Thrift, 'Different Atmospheres: of Sloterdijk, China, and site.'

⁸² Banham, **A Concrete Atlantis: US Industrial Building and European Modern Architecture.** This paper was written as part of work done by the Goldsmiths Department of Media and Communications team within the FIRM consortium researching mediacityUK. Thanks to Nick Couldry and Richard MacDonald, the other members of the team. The funding support of the EPSRC is gratefully acknowledged.



[1, 2]



[3]



1, 2 Lawrence Cassidy: **Salford 7**. The Lowry, Salford, 2005 Enlarged family snaps of local residents pasted to gallery walls and placed in display stands.

Image Credit: photo by artist

3 Lawrence Cassidy: **Industrial Landscape**, 2009. Street signs collected from demolished streets, family snaps of Salford residents, found objects (coat hangers).

Image Credit: photo by artist

The Industrious Subject: Cognitive Neuroscience's Revaluation of 'Rest'

Felicity Callard and Daniel S. Margulies

Prelude: Post-Fordist Capitalism and the Life of the Mind Let us consider two phenomena: post-Fordist capitalism and the life of the mind. These descriptors point to two different kinds of things and operate at different levels of abstraction. It is one of the tasks of this edited collection to interrogate the relationship between them. Ever since post-Fordism emerged as a category to describe our current political-economic-social configuration, theoretical and empirical researchers have both noted and analyzed the central role of knowledge – and of cognitive capacities – within post-Fordism. (See, as just one example, David Harvey's description of post-Fordist flexible accumulation: 'Knowledge itself becomes a key commodity, to be produced and sold to the highest bidder.')

¹ The philosopher Paolo Virno, in his reworking of Marx's formulations regarding labor and labor-power, provides one of the most trenchant accounts of the centrality of cognitive capacities to current capitalist production. Let us recall that in Gramsci's account of Taylorism and the mechanization of the worker, the Fordist worker's intellect was able to blossom only outside of the factory. In this, Gramsci followed Marx who, in his chapter on the working day in the first volume of *Capital*, pointed out that one of the obstacles preventing the limitless extension of the working day was a moral one, namely that the worker needed time outside work 'to satisfy his intellectual and social requirements.'

² In contrast, claims Virno, post-Fordism is characterized by the fact that work is no longer distinguished from those other human activities: 'Since work ceases to constitute a special and separate praxis, with distinctive criteria and procedures in effect at its center, completely different from those criteria and procedures which regulate non-labor time, there is not a clean-well-defined threshold separating labor time from non-labor time.'

³

On Virno's account, post-Fordism obliterates the bifurcation between labor and non-labor time: labor-time now draws upon, indeed depends upon, the life of the mind. The faculty of thinking in this sense carries out the task of wage labor: in so doing, it becomes a 'pillar of the production of surplus-value,'⁴ such that 'thought becomes the primary source of the production of wealth.'

⁵ In this sense, post-Fordism comes to represent the apogee of Marx's conception of labor-power as the 'aggregate of those mental and physical capabilities existing in the physical form, the living personality, of a human being':⁶ it is only with the arrival of post-Fordism, in other words, that the 'life of the mind'⁷ is fully put to work. In such a configuration, not only has work-time colonized the entirety of life, but labor and non-labor are productive in exactly the same way – through what Virno refers to as *the general intellect*.⁸ By this, he means the 'exercise of generic human faculties' –

¹ David Harvey, **The Condition of Postmodernity: An Enquiry into the Origins of Cultural Change** (Oxford: Basil Blackwell, 1989), 159.

² Karl Marx, **Capital: A Critique of Political Economy, Volume One**, translated by Ben Fowkes (London: Penguin, 1976 [1867]), 341.

³ Paolo Virno, **A Grammar of the Multitude: For an Analysis of Contemporary Forms of Life**, translated by Isabella Bertolotti, James Cascaito and Andrea Casson (Los Angeles, CA: Semiotext(e), 2004), 102-3.

⁴ Ibid., 66.

⁵ Ibid., 64.

⁶ Marx, **Capital: A Critique of Political Economy, Volume One**, 270.

⁷ Virno, **A Grammar of the Multitude: For an Analysis of Contemporary Forms of Life**, 81.

⁸ Virno borrows here from the fragment on machines in Marx's **Grundrisse** (Notebook VII), in

including those of 'language, memory, sociability, ethical and aesthetic inclinations, the capacity for abstraction and learning.'⁹

Virno presents us with a scenario in which the old division between work and non-work is recast, and in which a vast terrain characterized by complexes of human psycho-socio-cognitive capabilities are available for productive mobilization. What is significant, here, is that human aptitudes, propensities, and attitudes hitherto marginal to or marginalized within previous modes of capitalist production are ripe for harnessing by capital. To use Virno's own words: 'The *general intellect* includes, thus, formal and informal knowledge, imagination, ethical propensities, mindsets, and "linguistic games." In contemporary labor processes, there are thoughts and discourses which function as productive "machines," without having to adopt the form of a mechanical body or of an electronic valve.'¹⁰

We shall return to the manifold forms that thought might take as it is folded within a logic of industriousness later in this paper. For now, let us distil two of Virno's key claims regarding the post-Ford era. First, that the field of human action is no longer divided starkly into two (that of *work* and *non-work*): instead, one master term – productivity – both describes and enlists the world of non-labor as well as labor. Second, that the mobilization of the cognitive faculties includes many of those cognitive capacities – distraction, curiosity, and imagination – previously positioned as outside of, and extraneous to, the machinations of productive labor.

Virno is only one of several philosophers and social theorists who have, in the last 20 years or so, addressed the centrality of humans' cognitive faculties – and of the resources of the mind more broadly – to the current operations of neoliberalism. Tiziana Terranova, for example, mines the analyses of governmentality Foucault set out in his lectures at the Collège de France. She argues that he points to a 'new *dispositif* of power which is biopolitical and noopolitical at the same time' – in other words, which considers not only the biological life of the population but its modes of 'thinking, feeling and acting.'¹¹ Maurizio Lazzarato has employed the concept of 'immaterial labor' to describe how 'labor power [within post-Fordism] is ... defined not only by its professional capacities (which make possible the construction of the cultural-informational content of the commodity), but also by its ability to "manage" its own activity and act as the coordinator of the immaterial labor of others.'¹² On Lazzarato's account, 'the brain' is the organ that distills the individual's cognitive capabilities as well as that which enables the coordination and transfer of such capabilities between individuals. It is this organ that is the target of 'noo-politics' – the ensemble of those relations of power that characterize what Lazzarato, following Deleuze, calls 'societies of control.'¹³ The diverse philosophical and sociotheoretical writings of Virno, Terranova, Lazzarato, and others provide a powerful set of analytics through which to interrogate the modulation, valorization, and capture of subjectivity – *qua* mind as well as body – by neoliberal

capitalism. Such work routinely employs such terms as 'cognitive capacities' and 'the brain' – as well as constructs such as attention and memory. But these terms are put to work as generic abstractions rather than as particular psychological concepts: these authors' interests do not lie in elaborating a genealogy through which to flesh out the vicissitudes that these terms have undergone in journeys that have been both scientific and philosophical. In short, their focus is not on explicating if and how the scientific construct 'attention' as it is employed today differs from its use, say, at the height of Taylorism.¹⁴

It is to this task – the task of explicating the history and scope of terms and constructs that indicate humans' 'cognitive capacities' – that we turn in this paper. We do so by addressing one particular area within cognitive neuroscience that, we believe, is effecting a significant shift in how the neurosciences are conceptualizing those capacities. This is the emergent paradigm of 'resting-state' research. What is startling is how research in this field appears to be engaged in a reconfiguration of terrain that bears structural similarities to the account provided by Virno. In one arena, it is the

which Marx discusses the development of fixed capital: 'Nature builds no machines, no locomotives, railways, electric telegraphs, self-acting mules etc. These are products of human industry; natural material transformed into organs of the human will over nature, or of human participation in nature. They are **organs of the human brain, created by the human hand** [*Sie sind von der menschlichen Hand geschaffene Organe des menschlichen Hirns*]; the power of knowledge, objectified. The development of fixed capital indicates to what degree general social knowledge has become a **direct force of production**, and to what degree, hence, the conditions of the process of social life itself have come under the control of the general intellect and been transformed in accordance with it. To what degree the powers of social production have been produced, not only in the form of knowledge, but also as immediate organs of social practice, of the real life process (Karl Marx, **Grundrisse: Foundations of the Critique of Political Economy (Rough Draft)**, translated by Martin Nicolaus (Harmondsworth, Middlesex: Penguin, 1973 [1939]), 706; italics in original).

Note how Marx conceptualizes the human brain as the crucible for the production of knowledge.

⁹ Virno, **A Grammar of the Multitude: For an Analysis of Contemporary Forms of Life**, 103.

¹⁰ Ibid., 106.

¹¹ Tiziana Terranova, 'Futurepublic: On Information Warfare, Bio-Racism and Hegemony as Noopolitics,' **Theory Culture Society** 3 (2007): 126.

¹² Maurizio Lazzarato, 'Immaterial Labour,' in **Radical Thought in Italy: A Potential Politics**, eds. Paolo Virno and Michael Hardt (Minneapolis, MN: Minnesota Press, 1996), 138.

¹³ Maurizio Lazzarato, 'The Concepts of Life and the Living in the Societies of Control,' in **Deleuze and the Social**, eds. Martin Fuglsang and Bent Meier Sørensen (Edinburgh: Edinburgh University Press, 2006), 186. For Deleuze's formulation regarding societies of control, see Gilles Deleuze, 'Postscript on Societies of Control,' **October** 50 (winter 1992).

¹⁴ See, in this respect, the philosopher Bernard Stiegler's writings on the capture of attention by technological means – what he has termed the 'synaptogenesis of attention's destruction.' (Chapter 4 of Bernard Stiegler, **Taking Care of Youth and the Generations**, translated by Stephen Barker (Stanford, CA: Stanford University Press, 2010 [2008]).) Stiegler is interested in how attention today is different from attention a century ago. But his interest lies in how speculative capitalism involves 'the massive capture of children's attention from the earliest age, provoking widespread organological disorders **and the literal destruction of children's affective and intellectual capacities** – and further, provoking dramatic increases in attention deficit disorder ...' (Stiegler, **Taking Care of Youth and the Generations**, 56; italics added). His argument tends to employ current (neuro)scientific findings – as regards, for example, attentional deficits – as straightforwardly authoritative pieces of evidence, and he tends to hold constant the category of 'affective and intellectual capacities.' Our focus, in contrast, is on examining how and with what potential consequences **conceptualizations** of scientific constructs (such as attention and distraction), as well as of 'capacities' and of 'the brain' itself, have changed.

erstwhile division between work and non-work that is recast under a rubric of cognitive productivity; in the other, the implicit division between the brain during 'activation' versus when at 'rest' is recast such that the brain is perpetually industrious and never idle. In both arenas, the previously marginal – in the form of distraction and daydream – is revalorized to such an extent that it is cast as one of the mainsprings of the system's productivity.

That we are claiming a similarity between the configurations of post-Fordist capitalism and the model of the brain advanced through resting-state research does not mean that we are claiming an identity relation between the two. Neither do we wish to make an Althusserian argument in which cognitive neuroscience simply 'thicken[s] the ideological screen separating us from reality'¹⁵ through 'mirroring' in nature an historical configuration of socioeconomic relations.¹⁶ Rather, in pointing to this similarity, we want to keep visible difficult – and still unresolved – questions regarding how we might best articulate the relationship between scientific models and historico-ontological claims about both world and brain. There has been a tendency for humanities and social science scholars rapidly to engage with (neuro)scientific research simply at the level of representation or as statements of fact. What we aim to do here, instead, is to provide an account of the emergence of resting-state research that is centrally rooted in internal scientific debates characterizing the neuroscientific field, yet at the same time recognizes the rapidity with which neuroscientific findings and constructs move metaphorically and metonymically to grasp hold of other phenomena. We note that an impetus toward a rhetoric of 'productivity' and 'hard work' is shared by the scientific research on the resting state and by discourses of post-Fordism; we wish to hold this shared impetus up to scrutiny by us – and, we hope, by other scholars – rather than too rapidly to claim to have interpreted and explained it. Indeed, it is, we believe, only by understanding more of the scientific context out of which resting-state research emerged that we can, subsequently, interrogate the attractions of a language of productivity and hard-work within cognitive neuroscience.¹⁷

There is no doubt that post-Fordist capitalism has an interest in mobilizing and extracting value from human subjects' cognitive capacities. Key to any investigation of how that mobilization might be taking place is an exploration of the epistemological and technological frameworks that press those cognitive capacities into shape. Let us move, then, from characterizations of industriousness within post-Fordist capitalism, to the use of industriousness to characterize the activity of the brain 'at rest.'

The Hard-Working Brain: Restless Revolutions in Neuroscience

Resting state networks' in the brain, provide a clear indication that the human brain may be hard-working. Unlike the cardiac and respiratory systems, which greatly reduce their rate of function during periods of inactivity, the human brain may have additional responsibilities during rest.¹⁸

The brain – as it is being conceptualized and modeled by the neurosciences, as well as disseminated beyond them – is in the process of being reframed by a potent arm of research, that on the brain at rest. This emergent field is little more than a decade old, yet we write at a moment in which articles with such titles as 'The restless brain,' 'Devoted to distraction,' 'Daydream achiever,' 'Perchance to daydream ... and degenerate,' and 'You are who you are by default' are beginning to disseminate this line of research to various publics.¹⁹ The impact and extent of such reorderings within as well as beyond the neurosciences is not yet clear. What is clear is that this nascent field is both deeply engaged with and raising to greater visibility many problematics – mind-wandering and daydreaming, somatic rhythms, introspection, memory and the anticipation of the future, the consolidation and experiencing of the self – that are also topics of live debate and enquiry within the social sciences, humanities, and the arts.

In 2009, the *Journal of Neuroscience* commemorated the 40th anniversary of the Society for Neuroscience by asking a number of prominent neuroscientists to reflect on the changes within the field over the past 40 years. Marcus Raichle, in his paper, claimed that there had recently been nothing less than a paradigm shift in functional neuroimaging.²⁰ Raichle contrasted two perspectives on brain function, each of which, he contended, has had a long and complex history. According to one perspective, the brain 'is primarily reflexive, driven by the momentary demands of the environment'; according to the other, 'the brain's operations are mainly intrinsic involving the maintenance of information for interpreting, responding to and even predicting environmental demands.'²¹ It is the former perspective that has characterized much of the corpus of experimental and theoretical research within the neurosciences. And it is the latter that has, accordingly, been for much of the last century the neuroscientific underdog. For this perspective explicitly departs from existing models of the brain that characterize cognitive neuroscience – and of the attendant self that that brain is said to subtend.

How did rest and 'the resting state' emerge as topics of explicit scientific enquiry within neu-

¹⁵ Andrew Goffey, 'Review: Catherine Malabou, *What Should We Do with Our Brain?*,' *Radical Philosophy* 156 (July/August 2009).

¹⁶ Andrew Goffey provides an interesting critique of Catherine Malabou's engagement with the neurosciences in her widely-read *What Should We Do with Our Brain?*, translated by Sebastian Rand (New York: Fordham University Press, 2008). He takes her to task for focusing on the play of representations – for example, on how neuroscientific accounts of the brain employ concepts and characterizations from the world of post-Fordist work; or on how 'plasticity' is figured within and beyond the neurosciences. Malabou, in Goffey's eyes, thereby misses 'an opportunity to develop a more detailed exploration of the articulations of neuroscience and production' (Goffey, 'Review: Catherine Malabou, *What Should We Do with Our Brain?*').

¹⁷ We hope to pursue such interrogations in subsequent collaborative publications.

¹⁸ Neil B. Albert, Edwin M. Robsertson, Puja Mehta and R. Chris Miall, 'Resting State Networks and Memory Consolidation,' *Commun Integr Biol* 6 (2009).

¹⁹ Christian Jarrett, 'The Restless Brain,' *The Psychologist* 10 (2009); Josie Glausiuz, 'Devoted to Distraction,' *Psychology Today* (March/April 2009); Jonah Lehrer, 'Daydream Achiever,' *Boston Globe*, 31 August 2008; Tom Valeo, 'Perchance to Daydream ... And Degenerate,' in *Dana Foundation* 02 September, 2008; Tina Hesman Saey, 'You Are Who You Are by Default,' *ScienceNews*, 19 July, 2009.

²⁰ Marcus E. Raichle, 'A Paradigm Shift in Functional Brain Imaging,' *Journal of Neuroscience* 41 (2009).

²¹ Ibid., 127-29.

rosience? In this section, we present a brief genealogy, paying particular attention to some of the maneuvering of different neuroscientific sub-disciplines, and to the moments at which initially distinct constructs and terms coalesced. Of particular interest are two distinct paths – with distinct methodologies, techniques, and fields of expertise – out of which the field as we know it today has been constituted: cognitive psychology and neurophysiology. We contend that, over the course of the last decade, the terminology employed within this field has been transformed – in the process moving to vocabulary that is less contentious, arguably more tightly bounded, and primed for a neuroscientific reframing of inner mental life.

Lineage 1 – ‘Default Mode’ A cross with arms of equal length (Figure 1) is an ancient ideogram and also semiotically complex: for mathematicians, it indicates addition, or two perpendicular bisecting line segments; for art historians, the crucifix; perhaps it also suggests a target – for those in the business of aiming at things. For cognitive psychologists and neuroscientists, this cross signifies a classic condition for the control state during an experiment. It is the state of rest, a neutral state, baseline, the moment of ‘crosshair fixation.’ For cognitive neuroscience, this state has long been on the opposing side of the cognition it aimed to study.

Most categories of study in cognitive neuroscience emerged from a century-old lineage of experimental psychology.²² The traditional approach in neuroimaging studies, both in positron emission tomography (PET) and continuing with fMRI, was the contrast of a specific state (such as visual stimulus, sustained attention, memory retrieval) with a state in which subjects were simply asked to rest. Depending on the experimental condition, this ‘resting-state’ could be with eyes closed, eyes open, or fixation on a crosshair. Rest was implicitly considered a cognitive baseline against which task demands elevated brain activity in function-specific regions.

Gordon Shulman and his colleagues at Washington University in St. Louis (one of the foremost institutions in the field of cognitive neuroscience) noted some regions of the brain appeared to *decrease* in activity during the task condition. In 1997, they published their findings in the *Journal of Cognitive Neuroscience* showing that a distribution of regions including the medial prefrontal, posterior cingulate/precuneus, and lateral parietal cortex were more active when subjects were resting.²³ This paper also argued that while a passive control condition in the experimental design might for some appear to be ‘too underspecified’ to act as a reliable control, their analysis indicated that ‘passive conditions’ across a wide variety of experiments produced a ‘consistent set of blood flow changes’ and could thereby serve as a control state.²⁴ Notably, this paper also ruminated on the blood flow decreases caused by ongoing processes in the passive mental state, suggesting

the possibility of unconstrained verbal thought processes, monitoring of the external environment, and monitoring of the body image. (Such constructs would, notably, return in later attempts to theorize what is happening cognitively when the brain is ‘at rest.’) They explicitly considered that processes in the ‘passive condition’ might have an ‘antithetical relationship’ to active task processes (as sleep is antithetical to an alert state, a ‘general exploratory/monitoring state’ might be antithetical to a task-focused state). This shift – which we shall term ‘The Flipping of Contrasts’ – presented cognitive neuroscience with the problem of how to make sense of the data. If a large swath of cortex is more active during a state of rest, what is happening *psychologically* during rest that is driving this increased activity (Figure 2)?

The term ‘default mode’ entered the cognitive neuroscience vocabulary to describe the functional state of rest, in the contemporary sense, with Marcus Raichle’s and colleagues’ publication of three papers in 2001.²⁵ Many of these task-induced decreases in brain activity appeared to be ‘largely task independent, varying little in their location across a wide range of tasks.’ Such consistency made them consider whether there might be ‘an organized mode of brain function that is present as a baseline or default state and is suspended during specific goal-directed behaviours.’²⁶ Through a semiotic linking of functional neuroanatomy to the regions found to be more active during rest, several hypotheses were proposed regarding the psychological content of the resting state. Debra Gusnard and colleagues postulated that the observed medial prefrontal cortex activity reflected the predominance of self-referential mental activity (also observed to implicate the medial prefrontal cortex) that occurs in the absence of environmental demands. They furthermore tentatively pro-

²² Although the tools of non-invasive neuroimaging with high spatial resolution were developed in fields such as physics, chemistry, and medicine, their application to mapping cognitive function was the product of their union with concepts and task paradigms predominantly drawn from experimental psychology. Bringing cognitive psychology’s tools into the neuroimaging environment thus enabled the rapid growth in the field of cognitive neuroscience in the 1980s. Many of the tools of cognitive psychology are, in turn, highly indebted to research by the pioneers of late nineteenth- and early twentieth-century experimental psychology on basic cognitive processes such as sensation, perception, attention, and memory. See: George Mandler, **A History of Modern Experimental Psychology: From James and Wundt to Cognitive Science** (Cambridge, MA: MIT Press, 2007); Kurt Danziger, **Constructing the Subject: Historical Origins of Psychological Research** (Cambridge: Cambridge University Press, 1990).

²³ Gordon L. Shulman, Julie A. Fiez, Maurizio Corbetta, Randy L. Buckner, Francis M. Miezin, Marcus E. Raichle and Steven E. Petersen, ‘Common Blood Flow Changes across Visual Tasks: II. Decreases in Cerebral Cortex,’ **Journal of Cognitive Neuroscience** 5 (1997).

²⁴ *Ibid.*, 657.

²⁵ Debra A. Gusnard, Erbil Akbudak, Gordon L. Shulman and Marcus E. Raichle, ‘Medial Prefrontal Cortex and Self-Referential Mental Activity: Relation to a Default Mode of Brain Function,’ **Proceedings of the National Academy of Sciences of the United States of America** 7 (2001); Debra A. Gusnard and Marcus E. Raichle, ‘Searching for a Baseline: Functional Imaging and the Resting Human Brain,’ **Nature Reviews Neuroscience** 10 (2001); Marcus E. Raichle et al., ‘A Default Mode of Brain Function,’ **Proceedings of the National Academy of Sciences of the United States of America** 2 (2001). Buckner and colleagues note that references to ‘default mode’ are first found in the literature on cognition, in other words prior to the term’s appearance in explanations of neural and metabolic phenomena (Randy L. Buckner, Jessica R. Andrews-Hanna and Daniel L. Schacter, ‘The Brain’s Default Network: Anatomy, Function, and Relevance to Disease,’ **Annals of the New York Academy of Science** 1124 (2008)).

²⁶ *Ibid.*, 4259.

posed that such activity was involved in the 'processing of such representations that *embody aspects of self*'²⁷ [italics added], and linked such processing to the concept of the autobiographical self proposed by Damasio and that of the narrative self proposed by the philosopher Shaun Gallagher.²⁸ Gusnard and Raichle's review in *Nature Reviews Neuroscience* elaborated their theory of a default mode of brain function based in neurophysiological, as well as psychological questions, thus invigorating the long neglected research questions regarding internally-driven mental states.²⁹ These three papers were central – and not solely in terms of their inauguration of a new research field. For they indicated that one 'useful way' to address the 'important concept' of the self was 'to further explore the nature of default state activity':³⁰ in so doing, these authors established an enduring and intimate tie between the resting state and investigation of the neural architecture of the self.

It would take us too far afield from the central concerns of this paper to adequately address the numerous research findings and debates regarding the default mode since 2001.³¹ What follows is a schematic outline of some of those that are most critical to the arguments of this paper. 1) *Goal-directedness*: While activity during the default mode was initially set in opposition to 'goal-directed behavior',³² it was subsequently re-conceptualized as involved in long-term, goal-directed planning, as numerous studies hypothesized its role in prospection, or future-oriented thinking.³³ 2) *Quantification of stimulus-independent thoughts and the invigoration of research on mind-wandering*: More recently, we have witnessed the coalescence of research on the default mode network with other cross-disciplinary areas of research. Most notably, previously dispersed research on stimulus-independent thoughts, task-unrelated thoughts and 'zone outs' has been gathered together under the umbrella term of 'mind-wandering'.³⁴ Through such research, phenomena such as mind-wandering, which have previously been marginal to the theorizations of brain and self undertaken by cognitive science, have been installed as far more fundamental. Mason and colleagues' study in *Science*, for example, contended that mind-wandering constitutes 'a psychological baseline that emerges when the brain is otherwise unoccupied' and that is underpinned by activity in a default network of cortical regions.³⁵ (That the dissemination of such research into the public sphere is undertaken via the use of such statements as: 'Daydreaming seems to be the default setting of the human mind,' underlines how such research is effecting a shift away from a model of the self oriented towards external goals so beloved by orthodox cognitive psychology.) 3) *Self-related processing, episodic memory, social cognition and sense of agency*: Topics of inner rumination, reflection, motivation have been subsumed under the heading of default mode function, with task-based studies used to support the specialized roles of the implicated regions.³⁶ Much support has been drawn from the rationale that the content of mind-wandering is composed of episodic memory, prospection, and the consid-

eration of social relationships. Given the diversity of roles attributed to the default mode network (DMN), more recent work has attempted a network-based rendition of the modular theory of brain function (which postulates that each functional area of the brain has a singular role), thus subdividing the DMN in order to accommodate such diverse theories of function.³⁷

²⁷ Ibid., 4263.

²⁸ Antonio Damasio, *The Feeling of What Happens: Body, Emotion and the Making of Consciousness* (London: Vintage, 2000); Shaun Gallagher, 'Philosophical Conceptions of the Self: Implications for Cognitive Science,' *Trends in Cognitive Sciences* 1 (2000).

²⁹ Gusnard and Raichle, 'Searching for a Baseline: Functional Imaging and the Resting Human Brain.'

³⁰ Gusnard et al., 'Medial Prefrontal Cortex and Self-Referential Mental Activity: Relation to a Default Mode of Brain Function,' 4263.

³¹ Two significant and growing bodies of research that we do not discuss in this paper comprise: 1) The clinical psychiatric literature, which has expanded rapidly to touch on all major diagnostic categories. For a review see: Michael Greicius, 'Resting-State Functional Connectivity in Neuropsychiatric Disorders,' *Current Opinion in Neurology* 4 (2008). 2) Cross-species resting-state research, which provides a means of studying the physiology underlying spontaneous low-frequency fluctuations (for example: B. Biswal and S.S. Kannurpatti, 'Resting-State Functional Connectivity in Animal Models: Modulations by Exsanguination,' *Methods Mol Biol* 489 (2009)), and to facilitate cross-species comparative studies of functional neuroanatomy (see: Daniel S. Margulies et al., 'Precuneus Shares Intrinsic Functional Architecture in Humans and Monkeys,' *Proceedings of the National Academy of Sciences* 47 (2009); J.L. Vincent, G.H. Patel, M.D. Fox, A.Z. Snyder, J.T. Baker, D.C. Van Essen, J.M. Zempel, L.H. Syner, M. Corbetta and M.E. Raichle, 'Intrinsic Functional Architecture in the Anaesthetized Monkey Brain,' *Nature* 447 (2007).

³² Shulman et al., 'Common Blood Flow Changes across Visual Tasks: II. Decreases in Cerebral Cortex.'

³³ R. Nathan Spreng, Raymond A. Mar and Alice S.N. Kim, 'The Common Neural Basis of Autobiographical Memory, Prospection, Navigation, Theory of Mind, and the Default Mode: A Quantitative Meta-Analysis,' *Journal of Cognitive Neuroscience* 3 (2009).

³⁴ Kalina Christoff, Alan M. Gordon, Jonathan Smallwood, Rachelle Smith and Jonathan W. Schooler, 'Experience Sampling During Fmri Reveals Default Network and Executive System Contributions to Mind Wandering,' *Proceedings of the National Academy of Sciences* 21 (2009); Sam J. Gilbert et al., 'Comment On "Wandering Minds: The Default Network and Stimulus-Independent Thought";', *Science* 317 (2007); Malia F. Mason, Michael I. Norton, John D. Van Horn, Daniel M. Wegner, Scott T. Grafton and C. Neil Macrae, 'Wandering Minds: The Default Network and Stimulus-Independent Thought,' *Science* 315 (2007); Jonathan Smallwood, Emily Beach, Jonathan W. Schooler and Todd C. Handy, 'Going Awol in the Brain: Mind Wandering Reduces Cortical Analysis of External Events,' *Journal of Cognitive Neuroscience* 3 (2008). A paper by Smallwood and Schooler – entitled, interestingly, 'The Restless Mind' – helped to bring about the current scientific popularity of the term 'mind wandering.' The authors, noting precisely the fact that research was proceeding using a variety of 'disparate constructs,' called for the phenomenon to be referred to as 'mind wandering': because this term is familiar to the lay person, its use would, they believed, aid the elevation of such research into mainstream psychological thinking (Jonathan Smallwood and Jonathan W. Schooler, 'The Restless Mind,' *Psychological Bulletin* 6 (2006): 946).

³⁵ Mason et al., 'Wandering Minds: The Default Network and Stimulus-Independent Thought,' 394.

³⁶ Ilan Goldberg, Shimon Ullman and Rafael Malach, 'Neuronal Correlates of "Free Will" Are Associated with Regional Specialization in the Human Intrinsic/Default Network,' *Consciousness and Cognition* 3 (2008); Jorge Moll et al., 'The Self as a Moral Agent: Linking the Neural Bases of Social Agency and Moral Sensitivity,' *Social Neuroscience* 3 (2007); Leo Schilbach et al., 'Minds at Rest? Social Cognition as the Default Mode of Cognizing and Its Putative Relationship to The 'Default System' of the Brain,' *Consciousness and Cognition* 2 (2008); Spreng, Mar and Kim, 'The Common Neural Basis of Autobiographical Memory, Prospection, Navigation, Theory of Mind, and the Default Mode: A Quantitative Meta-Analysis.'

³⁷ Jessica R. Andrews-Hanna, Jay S. Reidler, Jorge Sepulcre, Renee Poulin and Randy L. Buckner, 'Functional-Anatomic Fractionation of the Brain's Default Network,' *Neuron* 4 (2010).

Regardless, however, of the cohesiveness of the cognitive constructs under development, or of the precise spatial distribution of the responsible network, a cognitive neuroscience theory of unquantifiable inner experience was taking form through the linking functional roles of brain regions that are more activated during the state of rest with the psychology of unconstrained mental activity.

Lineage II – Spontaneous Brain Activity We have thus far focused on cognitive neuropsychology as it established the foundations and terminology for studying the brain's function in the psychological state of rest. However, interest in 'resting' brain activity, albeit of a different sort, preceded Shulman's 1997 'Flipping of the Contrasts.' Bharat Biswal and other physicist colleagues, who were then based at the University of Wisconsin in Milwaukee, were working under the guidance of James Hyde (a major innovator in the development of fMRI technologies). Rather than asking the *neuropsychological* question posed by Shulman and colleagues, they posed a parallel question about the role of the spontaneous activity that was discarded as noise in analytic models.³⁸ Instead of inquiring about a functionally relevant psychological baseline condition, Biswal and colleagues explored the possibility that baseline physiological activity might be functionally significant for maintaining neural organization.

That spontaneous neurophysiological activity was functionally relevant was not a new idea,³⁹ but it had fallen behind the hypothesis of the input-output model driving behavioral psychology. If the brain were instead primarily driven by the requirement to maintain its own dynamics, with environmental input only modulating, rather than driving its function, the spontaneous endogenous dynamics would be meaningful and not simply unconstrained noise. Biswal and colleagues addressed this question in 1995 with a remarkably simple paradigm.⁴⁰ They began with a standard finger-tapping task in a boxcar design, and expectedly, the motor cortex was activated more during tapping than during the resting-condition. Their innovation was to then take data collected from the same subjects during a rest-only condition and to analyze the correlation between the spontaneous fluctuations occurring in a small portion of the motor cortex and the rest of the brain. They found that the same distribution of motor cortex activated during the tapping task was correlated in its spontaneous fluctuations. Here, the title of their seminal article: 'Functional connectivity in the motor cortex of resting human brain using echo-planar MRI,' reflects the union of fields that was to follow almost a decade later. Thus, it appeared that the brain was functionally coordinated into spatially consistent areas *even in a task-independent state of rest*.

Consolidating the 'Resting-State' Field of Research The links between the field of dynamic physiological properties in the resting human brain with the field of dynamic psychological properties in the resting human brain were not as obvious as they perhaps might now seem. Biswal's findings were not initially pop-

ular within the imaging community, and cognitive neuroscience did not know how to integrate Raichle's work. One may conjecture that the two groups were unaware of each other's work, as no cross citations exist prior to 2003.⁴¹

A young researcher named Michael Greicius who was working in the laboratory of Vinod Menon at Stanford University made the connection. His article, published in *Proceedings of the National Academy of Sciences* and edited by Raichle, was entitled 'Functional connectivity in the resting brain [*note the Biswal reference*]: a network analysis of the default mode hypothesis [*note the Raichle reference*].'⁴² The unification of these two approaches, one psychological, the other physiological, and both essentially a break with the dominant model of input-output brain function, marked the beginning of what we now know as 'resting-state fMRI.' It was here that Greicius and colleagues coined the functional-anatomical term that has become almost synonymous with the name of the field itself: the 'default-mode *network*.' It was this network, they argued, that 'account[ed], in large part, for the phenomenon of task-related decreases in brain activity.'⁴³ The blending of the two fields is most exemplified by a statement by Raichle and Snyder from a response paper published in 2007 in the journal *NeuroImage*: 'The important distinction is not between "rest" and "task" but rather between intrinsic and evoked activity.'⁴⁴ The yoking of the physiological and the psychological approaches to one another has meant that, even as the resting-state research field now appears to be a unitary one, it retains within it distinct theoretical foundations and terminologies. This theoretical fecundity has been advantageous in terms of sparking wide-ranging empirical research as well as giving extra impetus to model building. But it has also meant that the 'resting state' and the mapping of the cognitive function of the default mode network are frequently conflated. The creative semiotic terrain produced through the

³⁸ For a visual example of the temporal dynamics in an fMRI dataset, see: <http://vimeo.com/9871689>, which presents real-time fMRI data of a single individual listening to music. Similar fluctuations are also present in the absence of any overt sensory or behavioral activity.

³⁹ For example, David Ingvar's research on high resting blood flow in the prefrontal cortex, which he attributed to spontaneous self-generated mental activity of the resting human brain. D.H. Ingvar, 'Memory of the Future': An Essay on the Temporal Organization of Conscious Awareness, *Hum Neurobiol* 4 (1985).

⁴⁰ Bharat Biswal, F. Zerrin Yetkin, Victor M. Haughton and James S. Hyde, 'Functional Connectivity in the Motor Cortex of Resting Human Brain Using Echo-Planar MRI,' *Magnetic Resonance in Medicine* 4 (1995).

⁴¹ The assertion that the research communities were independent from one another prior to 2003 can be justified by the lack of any prior cross citations. This claim is supported by the consistency with which Raichle cites Biswal as the seminal researcher in the field in articles and lectures appearing after 2003 (for example: video.google.com/videoplay?docid=7393045011768458913). From the perspective of the surrounding research community, personal correspondence with numerous neuroimaging researchers supports the early general neglect of the 'task-induced deactivations' Raichle was describing. Likewise, Biswal's findings ran so contrary to the popular assumptions in the field that his findings were attacked (personal communication). Another example comes from the closing discussion of the first international conference on resting-state research in December 2008, where a participant commended Biswal's perseverance by quoting Ghandi: 'First they ignore you, then they ridicule you, then they fight you, then you win.' To which Biswal responded: 'And we all know what happened to Ghandi ... they shot him.'

⁴² Michael D. Greicius et al., 'Functional Connectivity in the Resting Brain: A Network Analysis of the Default Mode Hypothesis,' *Proceedings of the National Academy of Sciences of the United States of America* 1 (2003).

⁴³ *Ibid.*, 256.

⁴⁴ Marcus E. Raichle and Abraham Z. Snyder, 'A Default Mode of Brain Function: A Brief History of an Evolving Idea,' *NeuroImage* 37 (2007): 1088.

mixing of these terminologies has aided and will, we suggest, continue to aid the transmission of this research into other disciplinary arenas and into the public sphere.

Implications of a Revised Rest The previous sections have attempted to depict the complexity of the field of transformations produced through the emergence of the resting-state research field and its self-proclaimed inauguration of a new paradigm in functional neuroimaging. These transformations have been not only technical and methodological, but have been accompanied by disciplinary disturbances as well as ontological and epistemological shifts in how the brain is conceptualized and scientifically interrogated. In the remainder, we analyze in greater detail some of the potential implications of these transformations for models of brain, self, and subjectivity.

The methods and objects of resting-state research potentially catalyze a new model of brain and self. The intrigue with and focus on non-observable and unconstrained mental activity, for example, contributes to the emergence of an account of the self grounded as much through mind-wandering and introspection as through deliberate, goal-focused activity; the focus on the rhythm of the intrinsic and spontaneous dynamics of the brain contributes to the emergence of an account of the self specified through and anchored by those dynamics rather than through her responses to the environment and the exteroceptive stimuli that impinge upon her. As resting-state and DMN findings begin to be disseminated, it is possible to discern already how they are being used to ground particular visions both of the self and of the intimate tie between brain and self. The neuroscientists Susan Whitfield-Gabrieli and John Gabrieli, for example, in an online article for *Scientific American* have suggested that the 'exciting discoveries about the resting human brain raise the question of whether we are gaining the novel capacity to measure quantitatively our most intimate and unique inner selves. Are you most "you" when you're racing through work? Or when you're simply sitting in a chair, mind adrift, just being.'⁴⁵

And Raichle, himself, in a recent cover feature for the *Scientific American*, writes: 'The brain's default mode of function serves as a master organizer of its dark energy. Over time neural dark energy may ultimately be revealed as the very essence of what makes us tick.'⁴⁶

If, as Nikolas Rose has argued, the spaces of contemporary biomedicine and biopolitics are opening up 'new ideas of what human beings are,'⁴⁷ then there appear already to be indications that the resting state and the DMN might be installed as a new foundation for the self. In these two quotations, it is the subject 'at rest' that – by dint of her default mode brain activity – potentially holds the key to subjectivity *tout court*. We can see the ease with which the analytical distance between

resting-state data, models of DMN activity, and claims about the nature of subjectivity can be flattened.

The explosive growth of resting-state research has, then, started to make its mark felt beyond the laboratory. In the process, 'rest' has been rewritten to comprise various active, internal psychological states. The past century of experimental psychology was built upon those aspects of cognition that it could modulate and measure externally. The emergence of the concept of a default mode of neural and psychological activity has impinged on the inner territory of the subject, and, in the process, rendered it tangible to experimental neuroscientific paradigms. In little more than a decade, the 'task induced deactivations' noticed by Shulman and colleagues have moved from being a complete mystery to being configured as a coherent network that has been described in *ScienceNews* as 'one of the hardest-working systems in the brain ... despite its laid-back name.'⁴⁸ Rest – to follow Raichle in his frequent use of a quotation from Seneca – has in this formulation certainly become 'far from restful.'⁴⁹

We wish to comment on one particularly noticeable consequence of this reconfiguration of 'rest,' not least because it returns us to the problematics we considered in the prelude to this paper. It also significantly reorients some of the previous assumptions and guiding models used within the humanities and social sciences to describe and conceptualize a self who is not engaged in deliberate and purposive activity. It is our contention that through the reconfiguration of rest, the resting brain has been territorialized: it is conceptualized and materialized as a matrix that is constituted as perpetually productive, as intrinsically creative, and as thrown toward the future. Most notably, the increased focus on the importance of mind-wandering and daydreaming in no way gainsays the brain's industriousness. Buckner and colleagues, for example, in describing resting-state activity, speculate that: 'Rather than let the moments pass with idle brain activity, we capitalize on them to consolidate past experience in ways that are adaptive for our future needs.'⁵⁰ Raichle and Snyder make no bones about the fact that, for them, study of the default mode of the brain enhances investigation of 'the real reason we have a brain': 'not to reminisce about the past nor react in the moment but, rather, to envision the future.'⁵¹ The brain, on Raichle's account, functions as a kind of 'Bayesian inference engine' through which it is able to generate predictions of the future, and to

⁴⁵ S. Whitfield-Gabrieli and J. Gabrieli, 'Idle Minds and What They May Say About Intelligence,' *Scientific American* (January 2010).

⁴⁶ Marcus E. Raichle, 'The Brain's Dark Energy,' *Scientific American* (March, 2010): 49.

⁴⁷ Nikolas Rose, *The Politics of Life Itself: Biomedicine, Power, and Subjectivity in the Twenty-First Century* (Princeton, NJ: Princeton University Press, 2007), 6.

⁴⁸ Saey, 'You Are Who You Are by Default,' 16.

⁴⁹ Raichle is quoting from Seneca: 'The fact that the body is lying down is no reason for supposing that the mind is at peace. Rest is ... far from restful.' Seneca, *Letters from a Stoic*, translated by Robin Campbell (New York: Penguin, 1969 [~60 AD]). Interestingly, Seneca is describing the state of an individual who has not found serenity because his emotions are in turmoil and hence his sleep is 'far from restful'; Raichle, in contrast, quotes Seneca in the service of embedding the restlessness of rest as a generic rather than phenomenologically (and ethically) specific condition.

⁵⁰ Buckner, Andrews-Hanna and Schacter, 'The Brain's Default Network: Anatomy, Function, and Relevance to Disease,' 31.

⁵¹ Raichle and Snyder, 'A Default Mode of Brain Function: A Brief History of an Evolving Idea,' 1089.

link these predictions with its reflections on the past. Such abilities are, moreover, central to 'the development of unique human attributes such as imagination and creativity.'⁵² Unsurprisingly, then, as this research travels through non-peer-reviewed publications, the use of tropes of productivity to characterize states of only apparent idleness, multiply. As Saey puts it: 'It may be off when you're on, but the brain network behind daydreams and a sense of self is no slacker.'⁵³

The model of mind-wandering as industriousness is in distinct contrast to those accounts of daydreaming and mind wandering that dominated late nineteenth- and twentieth-century philosophy and social theory. For Freud, for example, the key conceptual term in his famous essay 'Writers and day-dreaming' is *play*; this is 'serious play,' certainly, but play nonetheless.⁵⁴ Freud's mind is one in which 'hardly anything is harder for a man than to give up a pleasure which he has once experienced.' Indeed, the subject does not give something up but exchanges one thing for another, such that as the child grows, he 'builds castles in the air' rather than castles made out of bricks. The contrast between Freud's formulation (in which subjectivity is weighted by the pull of the past) and that of Raichle and Buckner (with the subject's adaptive orientation to the future) could not be more marked.

The gap that separates some of those philosophical interrogations of memory and subjectivity so central to modernity from current research on the default mode can also be discerned through the repositioning of that most redolent of symbolic objects: Proust's Madeleine. Visual neuroscientist Moshe Bar, in two articles that address the 'proactive brain,'⁵⁵ elaborates how such a brain when 'not engaged in some demanding and all-consuming task,'⁵⁶ continuously generates predictions by 'proactively linking' incoming features to existing, familiar information. Bar argues that there is a 'striking overlap' between the cortical network mediating contextual associative processing and the default network. Such a model means that for Bar there is in fact a 'payoff' for the brain's investment of energy in 'mind wandering, fantasizing and revisiting (and modifying) existing memories':⁵⁷ what appear to be random thoughts and 'aimless' mental simulations create memories. Crucially, he explicitly contrasts his model, in which acquired memory is important for future survival and adaptation with the environment, with one of the key loci for conceptualizations of memory in modernity: 'Consequently, the cardinal purpose of memory starts to seem less for leisured reminiscing, as in the famous example of Proust's Madeleine, and more as a knowledge-base that guides our lives in an increasingly more informed manner.'⁵⁸

Let us set to one side Bar's somewhat strange characterization of a moment in *Swann's Way* in which Proust narrates the surfacing of memory as peremptory and compelled as a moment of 'leisured reminiscence.' Instead, let us note how the 'pay off' that Bar reads into the brain's investment in mind-wandering and fantasizing is one that points to a model of mental activity in which the potential

for the designless, footloose, and aimless is converted into the purposive, generative, and aimful.

The territorialization of rest is also reframing older, analytical frameworks and constructs that functioned in a binary manner. One way in which William James, for example, divided the field of consciousness was to oppose attention to the state of absentmindedness conjured up by the French term *distracted* and the German *Zerstreuung*. For James, it was the abolition of the state of distraction that signaled the awakening of the attention.⁵⁹ In contrast, the model of attention being developed in the DMN literature reformulates absentmindedness or mind-wandering as a form of introspective attention. Here, network brain activity 'at rest' is mapped on to the psychological category of attention, such that attention's opposite no longer exists. Instead, we have two types of attention – the intro- and the extrospective. The neuroscientist Peter Fransson, in a similar maneuver, argues that activity during the default mode disallows the possibility that one might, metaphorically speaking, 'lose track of oneself.' While he acknowledges that there is still uncertainty as regards the 'exact function of this core of intrinsic activity,' he speculates that:

... it represents unconscious and continuously on-going processes that are necessary to maintain a coherent neuronal representation of the 'self.' We believe that irrespective of how focused we are on a specific task [such task-based focus implies lower levels of DMN activity] and no matter how computationally demanding that task is, we cannot, metaphorically speaking, 'lose track of ourselves.' At all times, the brain needs to have a coherent mental model of the self. Cognitive faculties that might be administered by this model include having a sense of who we are and where in space we are and the passage of time.⁶⁰

Fransson is here talking at the level of the brain rather than about the phenomenological self. Nonetheless, his claim that the brain's unceasing and coherent mental model of the self might administer cognitive functions that include such fundamental subjective categories as the 'sense of who we are,' conjures up a conception of the self that is unable to lose its moorings or, in short, to

52 Marcus E. Raichle, 'The Brain's Dark Energy,' *Science* 314 (2006): 1250.

53 Saey, 'You Are Who You Are by Default,' 16.

54 Sigmund Freud, 'Writers and Day-Dreaming,' in *The Standard Edition of the Complete Psychological Works of Sigmund Freud, Volume 9*, ed. James Strachey (London: Hogarth Press and the Institute of Psycho-Analysis, 1908).

55 Moshe Bar, 'The Proactive Brain: Using Analogies and Associations to Generate Predictions,' *Trends in Cognitive Sciences* 7 (2007); Moshe Bar, 'The Proactive Brain: Memory for Predictions,' *Philosophical Transactions of the Royal Society B: Biological Sciences* 1235-1243 (2009).

56 Bar, 'The Proactive Brain: Memory for Predictions,' 1238.

57 Ibid., 1239.

58 Moshe Bar, 'The Proactive Brain: Using Analogies and Associations to Generate Predictions,' 286.

59 William James, *The Principles of Psychology, Vol. 1* (New York: Dover Publications, 1890), 404-5. It is fascinating that James notes that the 'curious state of inhibition' that he is describing can be 'produced at will by fixing the eyes on vacancy,' and that some individuals are able 'voluntarily [to] empty their minds and "think of nothing"' (James, *The Principles of Psychology, Vol. 1*, 404). James here almost exactly describes the instructions commonly given to research subjects in resting-state studies.

60 Peter Fransson, 'How Default Is the Default Mode of Brain Function?: Further Evidence from Intrinsic Bold Signal Fluctuations,' *Neuropsychologia* 14 (2006): 2844.

unfix itself from its self. If the resting-state and DMN literature present a brain and a self preoccupied with daydreaming and fantasy, and characterized by unconstrained mental activity, such activities should, in fact, be regarded as tethered and directed rather than formless and indeterminate.

Rest Moves We have described how resting-state research is in the process of re-conceptualizing models of brain and self within – and potentially outside of – the neurosciences. While such transformations are in certain ways building on – and committed to expanding – already established cognitivist frameworks (note the use and extension of standard psychological constructs such as attention), they are, we suggest, simultaneously delineating a rather different account of the self, one which is ripe for movement into other fields.

The polysemy and complexity of the two terms at the heart of this new research field – *rest* and *default* – are, we consider, likely to continue to be central to the interest in, debates over, and dissemination of findings within this neuroscientific research field. *Default*: The current meaning of default – a condition that obtains in the absence of active intervention – is etymologically very recent: the *Oxford English Dictionary* traces its use to 1966: to define a preselected option adopted by a computer when no alternative is specified by the user or programmer.⁶¹ Here, the 'default' is something that is specifically programmed into a system, rather than being immanent to it. But the artificiality of the system disappears once the term travels beyond the realm of programming, such that the 'default' connotes the neutral state of the system – how it might act in the absence of interventions/stimuli. Such a 'neutral state' easily slides toward connoting the core, functional state of the system; from there, to what the system most 'naturally' returns to; and from there, perhaps, to connoting the 'core' of the self. (Let us recall, for example, how this research field is re-positioning the subject as a default daydreamer. Or how Whitfield-Gabrieli and Gabrieli pose their rhetorical question in relation to the default mode: 'Are you most "you" when you're racing through work? Or when you're simply sitting in a chair, mind adrift, just being.'⁶²

Rest: This term has, of course, a rich philosophical, anthropological, religious, and sociological – as well as biological and physiological – history. It is therefore metaphorically and metonymically very rich, a characteristic that has, as we have seen, been exploited to the full by scientists, external commentators, and critics when discussing research on the resting state. (Those of us who are social scientists ought not to imagine that the term 'rest' has lain uninterrogated by scientists. Indeed, resting-state scientists – along with their interlocutors – have done much conceptual ground-clearing vis-à-vis the difficulties of the term.) The etymology of 'rest,' as described by the *Oxford English Dictionary*, indicates that uses of the word have included: a natural repose or relief from activity; the intermission of

labor or exertion (hence the Sabbath as the day of rest); freedom from distress or trouble; quiet or tranquility of mind; an interval of silence or a pause (in music); the cessation of motion; and continuance in the same position or place. In this sense, rest can variously be regarded as the opposite of: activity, busyness, labor, movement, restlessness, and agitation. We have indicated how the resting-state research field has reworked most of these axes such that the resting brain is now characterized by ceaseless activity, exertion, industriousness, and movement. (The only axis that has not obviously been reworked is the affectively freighted axis that opposes rest to agitation, distress, or trouble.) We have also seen the ease with which the focus can move between analyzing a 'resting' state metabolically, physiologically, and psychologically. Resting-state researchers' characterizations of the 'resting brain' are, indeed, largely intended to be characterizations of *the brain* (whether at a metabolic, physiological, or psychological level). Nonetheless, neuroscientific styles of thought are frequently underpinned by what Vidal has described as a 'brain-self-consubstantiality,'⁶³ such that the 'self' quickly becomes coterminous with those attributes of the brain. As research findings regarding the resting state and the DMN move further afield, then, it becomes likely that the industriousness of a daydreaming brain will metonymically and additionally become an account of the industriousness of a daydreaming subject.

What is noticeable in the rise to visibility of resting-state research is the language used to describe and conceptualize the new scientific object. Both peer-reviewed and non-peer-reviewed literature frequently employs tropes connoting wildness or an underside when describing the resting state and the DMN. Raichle's two papers (one peer-reviewed, one not) entitled 'The brain's dark energy'⁶⁴ point to a fundamental and mysterious property of the brain; Jarrett (in a non-peer-reviewed article), comments, in a similar vein, that 'Perhaps resting brain activity, and the mind-wandering it gives rise to, is psychology's very own *dark matter*.'⁶⁵ Others invoke the well-worn trope of exploration: leading neuroscientist Giulio Tononi describes 'the discovery of a major system within the brain, an organ within an organ, that hid for decades right before our eyes,' and comments that 'it's like finding a new continent.'⁶⁶ Buckner and Vincent explain that: 'We are in uncharted territory.'⁶⁷ But the very moment at which this mysterious new object comes into view is also the moment in which there is a drive either to rebut its strangeness (for example, Morcom and Fletcher's unease that 'mysterious functions' might be attributed to the resting brain⁶⁸), or to render the new object coterminous with other, more familiar knowledges and constructs.

⁶¹ From Weinberg's computer programming primer: 'The use of default attributes can contribute to the ease of writing and modifying a program.' Gerald M. Weinberg, *PL/I Programming Primer* (New York: Mc-Graw-Hill, 1966).

⁶² Whitfield-Gabrieli and Gabrieli, 'Idle Minds and What They May Say About Intelligence.'

⁶³ Fernando Vidal, 'Brainhood, Anthropological Figure of Modernity,' *History of the Human Sciences* 1 (2009): 7.

⁶⁴ Raichle, 'The Brain's Dark Energy.'

⁶⁵ Jarrett, 'The Restless Brain.'

⁶⁶ Tononi, quoted in Glausiusz, 'Devoted to Distraction.'

⁶⁷ Randy L. Buckner and Justin L. Vincent, 'Unrest at Rest: Default Activity and Spontaneous Network Correlations,' *NeuroImage* 4 (2007): 1095.

⁶⁸ Alexa M. Morcom and Paul C. Fletcher, 'Cognitive Neuroscience: The Case for Design Rather Than Default,' *NeuroImage* 37 (2007).

We have argued that the 'new continent' of the brain's (and subject's) state of rest is – as it is ushered into the light – being mapped, filled in, and hence re-conceptualized as positivity. In the process, many of the previous characteristics and connotations of 'rest,' and the constructs associated with it, are being reframed and/or overturned. In the eagerness with which 'rest' is being re-described as the brain's industriousness, the moment of uncovering the mystery of the resting state is also, perhaps, the moment in which its mystery is colonized. Resting-state research has opened up to neuroscience what was hitherto unquantifiable inner experience, and, in so doing, has destabilized many of the assumptions built into the models of cognitive science. In this reworking, the openings beyond cognitivism are arguably being closed: memory, for example, is further dissociated from Proust and instead consolidated as a 'knowledge base' with which 'to guide our lives.'

Conclusion: Putting the Brain to Work In this paper, we have attempted to explicate some of the principal qualities of the brain as it is being re-formulated through the models as well as the modes of argumentation that are employed by resting-state researchers. This is a brain that is, above all, perpetually active. Such activity is, notably, devoted to goal-directed planning, even at moments – such as those of daydreaming and of apparent distraction – that have not in previous research paradigms been characterized by such a productive calculus. This vision of a 'hard-working brain' recasts the previous implicit division between 'rest' and 'task,' and installs instead purposeful activity as the brain's most fundamental attribute.

In the introduction, we pointed to certain formal similarities between this re-conceptualization of the brain and Virno's account of how thought within post-Fordism 'becomes the primary source of the production of wealth.' Recall, for example, Buckner and colleagues' speculation that: 'Rather than let the moments pass with idle brain activity, *we capitalize on them* to consolidate past experience in ways that are adaptive for our future needs.' But this formal similarity extends beyond the fact that both discourses describe a process of 'capitalization' that takes place within the brain. For in each, we witness a more fundamental recalibration of the terrain of enquiry – in which the focus of intense valorization turns out to be that which was previously inscribed as and through negativity. Raichle speaks of the brain's default mode of function as a 'master organizer of its dark energy,' and contends that such neural dark energy 'may ultimately be revealed as the very essence of what makes us tick.' Virno writes that advanced technologies 'reduce the experience of even the most radical alienation to a professional profile' such that 'nihilism, once the dark side of technology's productive power, has become one of its fundamental ingredients, a prized commodity in the labor market.'⁶⁹ In both accounts, a transformation is described in which what was

previously ignored and unvalued now becomes that which is most prized. It should, of course, be emphasized that Raichle and Virno approach the near alchemical process of revaluation that they see occurring in their respective arenas of interest very differently: while Raichle is excited by the possibility of exploring scientifically what might be revealed as the 'very essence of what makes us tick,' Virno is preoccupied by how politically to respond to the ferocities of post-Fordist capitalism in which the supposed 'idle time' of the mind contributes unendingly to the production of surplus-value.

We hope by pointing to these formal similarities to open up space in which to consider more carefully the fecundity of the concept of 'work.' For this is a concept that could itself be said to do a great deal of work – both as it winds its way through resting-state research and in the context of diverse analytical explorations of post-Fordism. To what extent is it possible to draw analogies between how activity of the brain is conceptualized within this emergent scientific paradigm and how Virno conceives of labor-power as literally incarnating potential (*qua* 'the general ability to work')?⁷⁰ What ought we to make of the fact that such 'work' is, in both resting-state research and in Virno's account of post-Fordism, intimately tied to creativity – and, moreover, how is 'creativity' therefore being conceptualized? If we are right to suggest, in our conclusion to section 3 of the paper, that the moment of uncovering the mystery of the resting state might also be the moment in which its mystery is colonized, would such a colonization connote the degradation or the intensification of 'the brain's' creativity? Ought we to be preoccupied by the loss of older conceptions of 'rest' (*qua* relief from activity or intermission of exertion) within cognitive neuroscience – and, if so, why?

As regards the last rhetorical question, we might note that one consequence of the new model of brain activity within resting-state research is that such a brain could in no way 'refuse to' work. And, if we continue to place resting-state research side by side with Virno's account of post-Fordism, the impossibility of such a refusal to work chimes in interesting ways with Virno's earlier attraction – as an Operaist – to the political strategy of 'refusal of work.' (The Operaists radically opposed the transfer of human knowledge to machines – and hence the reduction of life to 'dead labor' via participation in work. 'Refusal of work' was therefore a refusal to submit to the constitution of work as the central practice of human life.) Are there consequences that would follow from the solidification of a neuroscientific paradigm in which the human brain *cannot not work*? We would be loath immediately to install the entire technoscientific enterprise of resting-state research as part and parcel of that ensemble of relations of power that, on Lazzarato and others' account, take the brain as its central organ. Such a formulation would, we believe, be too simple – and would not show the sensitivity required to move between different levels of abstraction (of the brain, the human subject, and the politicoeconomic system) in which the concept of 'refusal' connotes very different models of agency. Nonetheless, Vidal's argument regarding 'brain-self-

⁶⁹ Raichle, 'The Brain's Dark Energy,' 49; Paolo Virno, 'The Ambivalence of Disenchantment,' in *Radical Thought in Italy: A Potential Politics*, eds. Paolo Virno and Michael Hardt (Minneapolis: University of Minnesota Press, 1996), 15-6.

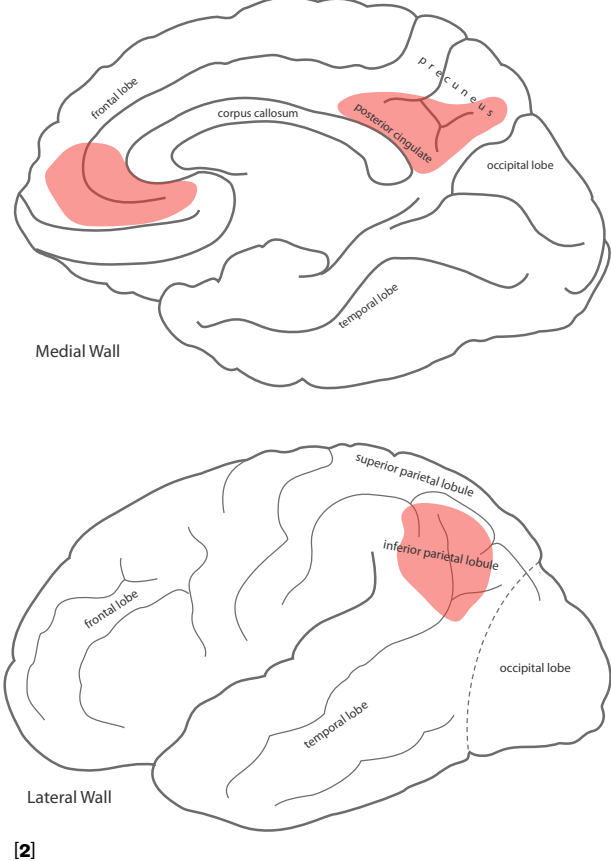
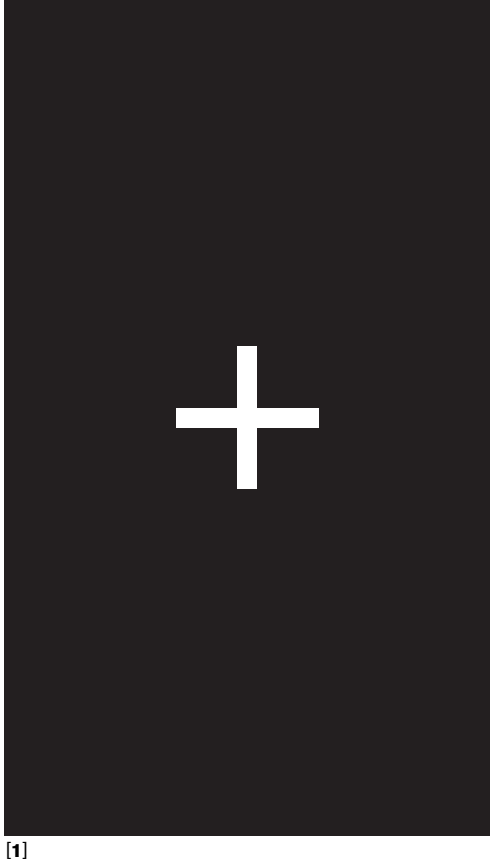
⁷⁰ Paolo Virno, *A Grammar of the Multitude: For an Analysis of Contemporary Forms of Life*, 82.

consubstantiality’ – in which ‘the self’ quickly becomes coterminous with attributes of the brain – might well apply to resting-state research findings as they move out into the public sphere and blur the conceptual distinctions between the industriousness of the brain and the attributes of the human subject. Are there sociopolitical consequences that would follow here from the circulation of a figure of ceaseless exertion?

We are, then, interested in considering how resting-state research might participate in a reshaping of what the human subject is, and of what her cognitive capacities might be. Such a project would need to address how best to understand the articulation between models of the human brain (and of its capacities) and the ways in which human subjects’ capacities are actualized or incarnated in and through praxis. Sylvère Lotringer, in his foreword to Virno’s *Grammar of the Multitude*, argues that Virno’s work aims to provide ‘a cartography of virtualities made possible by post-Fordism, elements in contemporary life that could eventually be mobilized. The problem is not to destroy capital ... but bolster one’s own power. What is a body *capable of*?’⁷¹ If this is the important question, then answering it in relation to resting-state research demands exploring whether such research contributes to the bolstering or to the degradation of the creative capabilities of human subjects.

Acknowledgements Felicity Callard acknowledges the financial support of the NIHR Biomedical Research Centre for Mental Health, South London and Maudsley NHS Foundation Trust/Institute of Psychiatry (King’s College London). Daniel Margulies acknowledges the financial support of the Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig and The Neuro Bureau of Berlin. The authors also acknowledge the support of the European Neuroscience and Society Network (funded by the European Science Foundation (ESF)) for providing the opportunity to initiate this collaboration.

Parts of this paper appear in an earlier article, which is appearing in a special issue of the journal *Subjectivity*, published by Palgrave, entitled *Neuroscience and Subjectivity* (Felicity Callard and Daniel S. Margulies ‘The Subject at Rest: Novel conceptualisations of self and brain from neuroscience’s study of the “resting state”’).



71 Sylvère Lotringer, ‘Foreword: We, the Multitude,’ in Virno, *A Grammar of the Multitude: For an Analysis of Contemporary Forms of Life*, 17.

1 State of Rest Ideogram
2 Anatomy of the Default-Mode Network

IV

The Noo- Sensorium

Deleuze's Time, or How the Cinematic Changes Our Idea of Art

John Rajchman

After the War How does the cinematic change our idea of art? Citing Paul Valéry, Walter Benjamin begins his great 1934 essay on mechanical reproduction with this question.¹ The problem was not so much whether cinema is an art, the so-called seventh one, but how, starting in the nineteenth century, it helped transform what we think art is, and in particular how one thinks in the arts or with the arts. For Benjamin, the problem of the cinematic was already inseparable from the whole question, at once aesthetic and political, of how one thinks with the new mass-industrial audiovisual means of film and projection.

We might think of Gilles Deleuze as taking up this question again after the Second World War, when there arose not simply a new cinema in France but also new styles of thinking – a new ‘image of thought.’ The ‘upheaval in general sensibility’ that followed the war would lead ‘to new dispositions of thought.’² Filmmakers invented new ways of thinking with film and projection, at the same time as those in other domains started to invent related ideas, creating a whole new zone of interference and exchange. Deleuze’s two volumes on cinema are a monumental attempt to see the new European cinema in terms of this constellation, to isolate the notions of image, pace, and time they involved and so show the distinctive ways filmmakers took part in this larger mutation in thought. Even though Deleuze wrote his study of cinema in the 1980s, the basic philosophical notions he uses go back to his 1956 essay on the problem of difference in Henri Bergson, written at a time when Alain Resnais was making documentaries like *Van Gogh* (1948), his great study of the artist’s suicide, as well as, of course, *Night and Fog* (1955). These films would play a key role in Deleuze’s analysis of cinema, in particular by demonstrating the principle that ‘the cinematographic image is never in the present.’³ Deleuze thought Resnais had perhaps gone the furthest with this principle for, in his documentaries as well as in the fiction films he would go on to make, we find not only new kinds of images but also a new function for them: that of rendering a past, at once indeterminate and violent, irreducible to anyone’s memory, any *prise de conscience*.

The Second World War is thus a dividing point not only for Deleuze’s inventory of new signs and images in cinematic thinking, but also for his sense of a particular problem in postwar philosophy and in his philosophy: the problem of the peculiar ‘time that takes thought.’⁴ In effect, cinema makes visible the problem philosophy developed at the same time, for which Deleuze himself

¹ Walter Benjamin, ‘The Work of Art in the Age of Mechanical Reproduction,’ in **Illuminations**, translated by Harry Zohn (New York: Schocken Books, 1969).

² Such are the words that struck Deleuze in ‘Correspondence with Dionys Mascolo,’ in Gilles Deleuze, **Two Regimes of Madness: Texts and Interviews 1975-1995**, ed. David Lapoujade, translated by Ames Hodges and Mike Taormina (New York: Semiotext(e), 2006), 327.

They are also suggestive for his larger encounter with Maurice Blanchot and Marguerite Duras. ³ Deleuze explicates this principle of the cinematographic image introduced in **Cinema 2**, ch. 5 sec. 2, in Deleuze, **Two Regimes of Madness**, 290-1. See Gilles Deleuze, **Cinéma 2: L’image-temps** (Paris: Éditions de Minuit, 1985); or **Cinema 2: The Time-Image**, translated by Hugh Tomlinson (Minneapolis: University of Minnesota Press, 1989).

⁴ Gilles Deleuze, **Différence et répétition** (Paris: Presses Universitaires de France, 1968), 216; my translation. For a full English translation of the text, see **Difference and Repetition**, translated by Paul Patton (New York: Columbia University Press, 1994), 166. At the end of his discussion of ‘the image of thought,’ Deleuze captures with the words ‘time into thought’ the argument he elaborates throughout his study of cinema and the larger idea of ‘aesthetics’ it involves. Kant plays a key role in this turn; see note 8.

would try to work out a new logic of 'events' and their sense. If, especially in France, postwar cinema developed in tandem with postwar philosophy, following its peculiar twists and turns through psychoanalysis and structuralism, it was because, Deleuze suggests, postwar cinema was itself an original audiovisual way of thinking – a peculiar relation of thought to *aisthesis*, a whole aesthetics. That is why the great filmmakers needed to be confronted not simply with writers or painters but also with thinkers and questions of thought. The signs and images they invented involved a new sense of what a creative image is and what it means to think. Even the crisis in cinema brought on by television, and later by digital images, had to be posed on this aesthetic level – as a problem of images that don't force us to think or which keep us from thinking, as with the 'presentifying' tendencies Deleuze saw in most television.⁵ He declared at the start of his study: 'What I call Ideas are images that make one think.'⁶ To write about cinema was to identify these images and to examine the larger 'apparatuses,' or *dispositifs*, through which cinema manages to pose them.⁷ The problem of the new televisual-digital regime must be analyzed in this way and not simply 'media-logically,' as more generally, in Deleuze's approach to the question of technology, and in particular, to the problems of information and control to which his study of cinema led him. For machines, unlike simple mechanisms, always have an indeterminate sensory or aesthetic component, through which they participate in larger fields, larger sorts of arrangements – our senses, our bodies, our brains. Cinema is a way of having ideas with images that introduces a new 'psycho-mechanics,' a new way of affecting our nervous systems. Central to this arrangement was the invention of new determinations of space and time as forms of sensibility in relation to thinking. At the heart of Deleuze's analysis of cinematic images and their *dispositifs*, we find the problem of a determination of a time no longer defined by succession (past, present, future); of a space no longer defined by simultaneity (distinct elements in closed or framed space); and of a permanence no longer based in eternity (instead given as a form of a complex variation).⁸ Such were the new sorts of images that postwar filmmakers gave us to think with and with which they started to work themselves.

Deleuze, then, might have responded to Valéry's question in the following way. Cinema changed the idea of art through the new ways it invented to show or render movement and time, participating in a distinctive manner in a larger aesthetics of duration, connected not simply with new technologies or new forces, but also with new ways of thinking, new questions and paradoxes, new political uses. Across all the arts, whether 'expanded' or not, we see these changes, these new sorts of determinations of space and time, this larger aesthetics, in which filmmaking, starting in its early spaces and with its early means, has played a key role.⁹ As with Benjamin, there was an element of the philosophy of Immanuel Kant in this aesthetic field, but one that comes from Deleuze's new reading of

Kant, or his new idea of the sense in which we are still Kantian. Indeed the crucial distinction between time and movement elaborated in the books on cinema is first introduced in *Difference and Repetition* (1968), where he proposes to see as central to Kant's revolution the problem of a 'time out of joint.' Later, Deleuze would declare that the war offered cinema the condition to effectuate in a much shorter interval its own Kantian revolution, its own audiovisual way of freeing the idea of time from subordination to any prior movement, any extensive space.¹⁰

5 Deleuze, *Two Regimes of Madness*, 291. Deleuze's view of the way television tends to 'presentify' everything is not simply a question of its broadcast medium. One of Deleuze's first writings on cinema is his discussion of Godard's television work. The link between 'present' and 'live' is nevertheless important, as found today in 'reality TV,' for example.

6 Ibid.

7 In this essay I retain the French term *dispositif* for the manner in which cinematic space is put together. This sense of the term is part of the larger question of the 'regimes' of speaking and seeing that Deleuze extracts from Foucault in 'What is a dispositif?,' in Deleuze, *Two Regimes of Madness*, 338. In cinema theory, it might be said to belong to a series of notions of the 'cinematic apparatus' that descend from Marx, who stressed the ways in which automated production involves not simply forces, but also relations of production (or what Deleuze would call a 'technical-social machine'). One variant is to be found in the Brechtian idea of *Umfunktionierung* that Benjamin developed, through which an author, more than a genius-fabricator of useless or autonomous works, becomes a 'producer' whose work alters the larger 'apparatus' of production and distribution in which it finds itself, posing the problem of the link between the 'collectivization' of the means of production and the control of the Party; see note 13. Another is the notion of 'apparatus' that Baudry took over from Althusser's analysis of ideologies, where it is connected to an organization of 'gazes' in the reproduction of social roles. Deleuze starts instead from a notion of 'machine' in which 'desire' functions not as prosthesis or projection of an inner state, but as itself a kind of 'program' at work in larger sociotechnical arrangements, the function of which is to undo the usual 'controllable' connections, for which he cites many artistic examples, notably Kurt Schwitters's *Merzbau*. See Gilles Deleuze and Félix Guattari, 'Balance-Sheet Program for Desiring Machines' in *Semiotext(e)* 3 (1977). With this example, one is close to the problem of cinema as a kind of 'installation,' as in the debates about how cinema went 'into the light' of the gallery out of its darkened room *dispositif*. In this case, the cinema hall or gallery is 'architecture,' just when architecture itself is seen in terms of a given *dispositif* – the darkened room itself deriving from a theatrical *dispositive* transformed by opera, the first modern mass form. Thus, for example, when in Deleuze's 'Time, or How the Cinematic Changes Our Idea of Art' Barthes stresses that 'cinema' refers to a place as well as what is shown in it, he opposes the 'eroticism' of that place to the awful familial setting of the television set. See Roland Barthes, 'On Leaving the Cinema.' Sartre stresses the 'democratic' appeal of the cinema hall to the hierarchical organization of the bourgeois theatre in order to explain the source of his enthusiasm for it. See Jean-Paul Sartre, *Les Mots*. To see such spaces as *dispositifs* is to see them as arrangements of sensibility, which in turn can be analyzed in terms of their relation to what 'forces us to think.' By that criterion, many 'darkened room' experiences are more intense than their equivalents in galleries.

8 See Gilles Deleuze, 'On Four Poetic Formulas,' in *Essays Critical and Clinical*, translated by Daniel W. Smith and Michael A. Greco (Minneapolis: University of Minnesota Press, 1997), 28-9. For Deleuze, Kant introduces the distinction between time and movement, as developed in and through the cinema volumes. The distinction is first introduced in Deleuze, *Difference and Repetition*, 118, 186, in passages devoted to the problem of introducing 'time into thought'; later, on pages 130 and 198, Deleuze already develops the consequences for the notion of 'aesthetics' that he puts into practice in his analysis of cinema. Prior to Bergson, Kant was the central philosophical figure for Deleuze's film aesthetic, to the point where he declares Bergson much closer to Kant than he allowed. 'On Four Poetic Formulas' resumes the lecture course Deleuze gave on Kant in 1978, which runs through his larger aesthetic enterprise in the 1980s, and directly concerns the 'paradox of inner sense' Kant elaborates on in *Opus Posthumum*.

9 In the essay 'La chambre' (1994), which takes off from Deleuze's analysis of the room in Samuel Beckett's *Film*, Raymond Bellour suggests one way of linking the problem of the 'room' in cinema to the room in which it is shown in 'the other cinema' of film and video installation. See Raymond Bellour, *L'Entre-images 2: Mots, images* (Paris: P.O.L., 1999), 281-316.

10 Deleuze, *Two Regimes of Madness*, 252.

Kant had already taken space and time as forms of intuition, or as a priori conditions of an *aesthesis*, or of what he already called 'sensibilia.' The forms of sensation are thus distinct from the categories of the understanding, and can only be linked to them through the workings of a mysterious 'schematism' or through the 'productive imagination.' What matters for Deleuze is the independence of these forms from the understanding, not the way they figure in a unified consciousness. In freeing time from its subordination to the identities of movement in a closed world, and in associating it with forces or virtualities of another sort, the great postwar filmmakers would thus free the forms of sensibilia themselves from any such schematic link with understanding, making them instead a matter of artistic experimentation or invention in relation to another kind of thinking – precisely that of 'ideas.' The 'time that takes thought' would be freed from categories of causality or even teleology; the postwar filmmakers would link it instead to a whole new relation to character, milieu, space, and action. What is new in Kant for Deleuze, then, is how, with the disjunction between our sensibilia and our categories for understanding substance or causality, there arises a new experimental zone where other sorts of determinations of space and time (such as when, in music or literature, one 'occupies without measuring' a sensory milieu) are linked to ideas.¹¹ Fyodor Dostoevsky's title character in *The Idiot* (1869), for example, not only moves in a much altered novelistic space and time, but in the process is also obliged to think, simply because there are no schemata to govern his actions – a situation Deleuze sees Akira Kurosawa later exploring in cinema. The cinematic lies in the distinctive ways filmmakers invented to disjoin the forms of sensation from the understanding, using them instead to give us 'ideas' and so new 'personae' in thinking, like *The Idiot*.

We see this, for example, in Deleuze's demonstration of how Marguerite Duras or Jean-Marie Straub and Daniele Huillet turned the disjunction between sound and visual images into a veritable 'idea in cinema,' a whole new exploration of the peculiar postwar intersection of 'stories without places' and 'places without stories.'¹² Indeed, it is precisely this sort of 'non-relation' between what we see and what we say that shows why it so misleading to think of cinema as language rather than as a 'signaletic material.' Deleuze was no textualist or narratologist; the signs and images he finds in cinema are given by no theory of language or code. Rather, in each case they are the result of a singular invention. He thought that even in literature we should look not to linguistics or narratology, but rather to the ways great writers invent a 'foreign language' in our language, tied up with the invention of new percepts and affects. His examples include the 'complicated time' in Marcel Proust; the 'crack-up' of the characters in F. Scott Fitzgerald; and the peculiar relation of the characters to a 'secret past' in Henry James's short stories, later exploited in film by Joseph Mankiewicz. The cinematic, in short, is this strange great complex of signs and images that filmmakers invented to explore the prob-

lem that arises when space and time, regarded as forms of our sensibilia, are disjoined from the schemata that tie them to our understanding and are linked instead to another kind of thinking, governed by logic not of propositions and truths but of the sense (and non-sense) of what is happening to us.

Deleuze's study of cinema was his attempt to elaborate this problem, at once philosophical and aesthetic. He saw filmmakers as developing an original way of exploring what Kant called the 'paradox of inner sense,' or of the peculiar way we can be said to be 'in time.' This is a problem that Deleuze thought Resnais had explored further than Proust or Bergson. The question of the sense in which we are 'in time' was, of course, also a central one in modern philosophy; and, in his books on film, Deleuze takes up this issue by contrasting the ways Edmund Husserl and Bergson each formulated it in relation to science and mathematics. Husserl still imagined the forms of space and time to be centered in a consciousness, whereas Bergson offered a new idea of image freed from this assumption – closer to the way filmmakers explore a-centered spaces prior to anyone's point of view. The cinematic is found in images that make visible or palpable this a-centered condition, or that 'sensibilize' us to it. The images in cinema are thus forms that explore a strange sort of movement in our lives that is irreducible to translation in extended space, the lines of which are freed from starting and ending points, instead tracing trajectories, at once fictive and real, in indeterminate milieus; they thus call for a time or a duration based not in chronology and succession, but rather in an interlocking topology or overlapping seriality. That is how cinema posed the question of how we actually think, how we are oriented and disoriented in our thinking, our lives, our relations with ourselves and to one another. In *Cinema 1* and *Cinema 2*, Deleuze tried to analyze how, through the possibilities of camera movement, framing, editing, and projecting, cinema would invent a whole new 'psycho-mechanical' way to make visible such times and spaces in our worlds, situations or milieus, prior to (and immanent in) our conscious selves, as individuals or groups.

The principle that 'the cinematographic image is never in the present,' for which Deleuze would find such a striking application in the troubling 'sheets of time' in *Night and Fog*, was thus part of a larger transformation in the very idea of the image itself in all the arts – in painting, photography, or literature, as well as in new practices that would break away from such traditional mediums. We know, for example, that Soviet cinema would be seen to play a key role in the process in the 1920s and 1930s that Walter Benjamin analyzed in the avant-garde when he spoke of the new function of author as producer.¹³ At the same time, the principle of 'not being in the present' was a philosophical matter that concerned the very concept of image and the way it presents things before they are represented for a unified subject or consciousness. Deleuze's conception of 'images' in

¹¹ Ibid., 292.

¹² Deleuze, *Cinema 2*, 257; translation modified. Deleuze draws on the detailed analysis of Duras in Youssef Ishaghpour, *D'une image à l'autre* (Paris: Bibliothèque Médiations, 1982).

¹³ Walter Benjamin, 'The Author as Producer,' in *Reflections: Essays, Aphorisms, Autobiographical Writing*, ed. Peter Demetz, translated by Edmund Jephcott (New York: Harcourt Brace Jovanovich, 1978), 220-38. See also Sergei Tret'iakov, 'Our Cinema' [1928], *October* 118 (2006): 27. There is something in the *Umfunktionierung* characteristic of author as pro-

cinema breaks from the idea that they are inner representations in our minds or brains, linking them instead with new questions explored in neurology and psychology – fields of knowledge, including especially psychoanalysis, with which cinema would have so many relations throughout the nineteenth and twentieth centuries.¹⁴ To introduce movement and time into the very idea of the image was inseparable from the extensive neuroscientific literature on how images figure in our bodies or brains, or in the ideas of consciousness and of unconsciousness, in which the new memory sciences play a key role; one example of this is Deleuze's discussion of the dissociation theories of Pierre Janet. Indeed, that is how the 'cinematic' – regarded as a way of thinking with the forms of sensibilia – could be seen to extract itself from the great stupefying explosion of images in our lives that mechanical reproduction facilitated (before the 'control' of the postwar information-type machines) with its clichéd pictures, ordered words and relations with propaganda and advertising. If, as Deleuze proposes, the invention of a cinematic sensibilia arises from the crisis in psychology concerning the status of images, it is developed through and within the new industrial mass means, which we see at the same time in the psychological or social sciences.

In philosophy, Martin Heidegger had already shown in the 1920s how time and the problem of 'inner sense' was central to the Kantian enterprise and to his own attempt to move beyond its still metaphysical enclosure. But Deleuze's writings on difference in Bergson suggested a fresh way of taking up the question of time, which moves away from Heidegger's idea of a constitutive finitude or the *Dasein* of a *Volk* disclosed in and through the work of art. Deleuze tried to develop an ungrounded element in the kind of time and movement the cinematic image makes visible. In cinema, as in philosophy, he discovers something at once inhuman and vital. It is already to be seen in the kind of movement Dziga Vertov explored through the intervals in his editing or 'montage,' or with the ability of the camera to capture a-centered worlds with 'indeterminate' zones in Orson Welles. He tried to work out an original notion of a world, closer to the perspectivism of Gottfried Leibniz than to Husserl's grounding in a life-world. Cinema not only invents images; it surrounds them with a world – a world that for Deleuze has become light or deterritorialized, irreducible to our 'being-there.'

We are thus 'in time' in a peculiar way, irreducible to the familiar division between subjective (or lived) and objective (or clocked) time. The problem is rather how we are affected by time and 'affect ourselves through it,' at once objectively and subjectively; it is the problem of time itself as this uncontrollable potential in who we are or may become. The function of cinematic images is to show the workings of this time in our lives and our worlds. That is why the time-images in cinema are ones that defeat the presumed coincidence of subjective and objective images on which a whole tradition of story or narrative has rested. Such relations

between space and viewing are undone as the description of space frees itself from the presumption of a single objective viewpoint, and the form of narration frees itself from domination of a single narrative voice, as if in a free and indirect style. The forms of description and narration, in other words, depend on the role of mobility and indetermination in the images, and so with the sense and non-sense of what is happening. In Bergson (as well as in the Russian city of Vertov's *Man with a Movie Camera*), Deleuze finds a multiple, moving universe in which things appear without appearing as such *to* anyone, or to any one point of view. He finds images that make visible a world that can't be united or made fully present to our conscious selves, the sense of which nevertheless unfolds in time, through movement and the forms of sensibilia that are images. It is such a world of illumination without revelation that would later be taken up in time-image cinema. The topological superposition of 'sheets of time' in Resnais shows in particular, in a vivid way, the sense in which a terrible past coexists with the present, in a manner irreducible to flashbacks or conscious recollection, rendering the present uncertain and forcing us to think while dispossessing us of our ability to say 'I' or 'We.' Time is no longer a matter of either Man's finitude or God's infinite understanding – neither humanist nor Salvationist, it is directly linked to questions of life and death themselves.¹⁵

In exploring how, through the means available to it, cinema makes sensible this kind of time in worlds, Deleuze thus develops an original view of space and time as forms of sensibilia that cause us to think. He frees those forms from their Kantian subordination to what he saw as the two great functions played by the philosophical idea of the subject: 'consciousness' and 'individualization.'¹⁶ The world that cinema shows us is an impersonal (or 'pre-personal') world prior to consciousness and to individualization. In this way, cinema takes part in Deleuze's larger attempt to put the question of 'a life' in the place of the classical notion of the subject or of the self – a life that contrasts precisely with 'the life of the corresponding individual' as with the conscious self, yet remains as a concrete question and possibility for our bodies and our brains.¹⁷ Thus the *espaces quelconques*, or 'any-spaces-whatever,' that Deleuze isolates, especially in postwar cinema (as well as in structuralist film), involve spatial and temporal distributions that are indeterminate or *quelconque* just in the sense that they precede the supposed unities of conscious selfhood, or of static, grouped,

ducer that is akin to Foucault's analysis of the individualizing 'function' of authorship, and his own attempts to get out of it; an important difference, however, concerns the way that the problem of 'power' in Foucault is purposefully posed in a way irreducible to any Party control. Deleuze relates the problem in Vertov to a new 'materialism of the eye.' See François Zourabichvili, 'The Eye of Montage: Dziga Vertov and Bergsonian Materialism,' in **The Brain is the Screen**, ed. Gregory Flaxman (Minneapolis: University of Minnesota Press, 2000), 141-9.

¹⁴ Jonathan Crary, in an analysis influenced by Deleuze, discusses Vertov and Cézanne in relation to the neuroscientific question of 'attention' in his **Suspensions of Perception: Attention, Spectacle and Modern Culture** (Cambridge, MA: MIT Press, 1999).

¹⁵ Deleuze develops this view as an original approach to questions of biology and technology in the appendix to Gilles Deleuze, **Foucault**, translated by Séan Hand (Minneapolis: University of Minnesota Press, 1988), 124-32. Daniel Birnbaum returns to this idea in his attempt to see Doug Aitken as part of an unwritten 'Cinema 3' in contemporary art. See Daniel Birnbaum, **Chronology** (New York: Lucas & Sternberg, 2005), 49-55.

¹⁶ Deleuze, **Two Regimes of Madness**, 253.

¹⁷ *Ibid.*, 386. The notion of an 'impersonal yet singular life' figures in Bellour's conception of 'the room'; see note 8.

definite, or definable individuality, exposing worlds, situations, or milieus prior to them. Indeed, that is why any-spaces-whatever are populated with a new, less definite kind of character and action that requires a new art of indefinite description that is realistic without being naturalistic. Cinema thus maps the workings of a time once pre-individual and un-conscious. Deleuze offers an inventory of images that show this time, irreducible to destiny, providence, causality, or predictability, even statistical or probabilistic, which nevertheless affects us in ways we don't normally perceive. Such is the sort of time given by series and juxtapositions (rather than succession) and by indeterminate spaces of displacements and departures (rather than a 'situated' intersubjectivity or world). It is the kind of temporality that requires a change in the nature of belief – a turn to a more pragmatist belief-in-the-world, without need for salvation or historical destiny.

We see this time already in *Night and Fog*. Resnais's juxtapositions – of a past, shown through black-and-white archival materials, with a present given by cinematic mapping of mental spaces (in color and with his famous tracking shots of the peculiar mental spaces of the concentration camps) and with the uncertain future given through Jean Cayrol's famous voiceover – form part of a larger constitution of cinema as a postwar kind of audiovisual thinking. If, as Deleuze argues, in this great documentary we can see the sum of the different ways of avoiding 'the piety of the recollection image,' it is because of the way image and thinking discover in the film a new relation to the past and the way it figures in the present. The aim is no longer to re-capture or re-collect the past in a consciousness – individual or collective – which would have succeeded it but, on the contrary, to prevent any such closure within private memory or public commemoration, showing, rather, the sense in which it is still at work in the present. This function affects fiction as well as documentary film, undoing the usual distinctions between the two, and forming part of the new 'realism' in postwar cinema that Deleuze contrasts with an earlier naturalism. Indeed, Resnais would go on to explore in his great fiction films this past-coiled-with-the-present that seems to haunt our banal lives like a terrible secret; he would explore how it forces his characters to think as if they had come back from the dead, moving about in a world without salvation or redemption, providence, or phenomenological grounding.

Deleuze would thus pose a new question, at once philosophical and cinematic, which, across a whole range of arts and practices, he sought to introduce into the very idea of what an image is, and of what it means to think in and with images in mass industrial society.

Cinema Today Today it would seem that the situation of cinema is no longer quite what it was for Deleuze in 1984 any more than for Benjamin in 1934. Cinema is no longer alone; it no longer has the key role that fell to it between

silent film and television. It forms part of a larger complex of images and spaces, where it discovers new roles to play, geared to altered geographies and responding to new forces on a global scale. Deleuze now belongs to world cinema rather than simply to European. As with anything new, there is nostalgic talk of a 'postcinematic' condition. The history of film has itself become a matter not simply of preservation and distribution, but also of an art of obsolescence that looks back to what it has been, as if illustrating Marshall McLuhan's old dictum that when a technological medium is over it is turned into an art. Deleuze himself tried to resist such nostalgia back in 1984 when there was already much talk of a crisis of cinema. His quarrel with Jean-Luc Godard on the last pages of *Cinema 2* is one indication. The crisis meant not the death of cinema (with its corpse to be put into edited histories in melancholic anticipation of a more hopeful time), but, rather, the emergence of new possibilities inseparable from the larger fate of the kind of aesthetic thinking Deleuze had tried precisely to work out in cinema. The time had come to ask not simply: 'What is cinema?' but also, and more importantly: 'What is philosophy?' The great filmmakers had used new technical means to invent a mode of audiovisual thinking, which formed part of a larger aesthetic to which it then seemed important for Deleuze to turn. What, in fact, does it mean to 'have an idea' in and with the arts, in relation to other arts and other practices? This is the larger problem that Deleuze would go on to explore together with Félix Guattari in their 1991 volume *What Is Philosophy?*

This problem of thinking in and with the arts is already to be found in Deleuze's treatment of the abstract, experimental, or expanded cinema traditions that tried to use filmic techniques in ways closer to the practices of the visual arts. While Deleuze doesn't focus on these traditions, what he does say is suggestive. He was drawn to Antonin Artaud's enthusiasm for silent film (as seen in Artaud's role in Carl Theodor Dreyer's great *Joan of Arc*, 1928) when he argued for the superiority of such works with respect to an abstract cinema still content to ape developments in painting, still too 'cerebral.' Artaud thought that the peculiar 'witchcraft' of silent film was much closer to the 'cruelty' in gesture and word that he was seeking in the theatre; and Deleuze sees this idea as part of a larger invention of 'theatricality' peculiar to cinema, as seen in 'bodily attitudes' and their relation to time, explored in different ways in many arts. Abstract and experimental film figures in Deleuze's study when, not content to imitate what other arts are doing, it takes part in the ways the cinematic changes our ideas of theatre or of art, as Deleuze thought was the case for structuralist film in its relations with the 'perception-image.'¹⁸ In other words, abstract film is not abstract in a simple modernist or self-referential sense, but rather in the ways it experiments with the very spatiotemporal conditions of sensibilia and thought, which the great postwar filmmakers exploited for their own purposes; in that sense, it is quite concrete. Indeed the very term *espaces quelconques*, which Deleuze develops in a striking way, for example in his discussion of Michelangelo Antonioni's

¹⁸ Gilles Deleuze, *Cinéma 1: L'Image-mouvement* (Paris: Éditions de Minuit, 1983), 122; or *Cinema 1: The Movement-Image*, translated by Hugh Tomlinson and Barbara Habberjam (Minneapolis: University of Minnesota Press, 1989), 84-5. Deleuze amusingly suggests one sense in which the 'expansion' in structural as well as expanded cinema was related to the 'expansion of consciousness' in taking drugs, as part of the larger 'community,' rather unlike the Soviet case, with which these North American experiments were linked.

work, derives from experimental film; and it is not hard to imagine extending the problem of empty, disconnected spaces that Deleuze already sees in another way in the films of Robert Bresson to a range of other arts and art practices occurring around the same time as structuralist film. Rather than a stark opposition between narrative and abstract work, Deleuze identifies an exchange or connection made on the basis of a common exploration of forms of sensibility – an exploration taking place concurrently in different ways in many arts. It is perhaps something like this larger exchange that we see today in a situation where cinema no longer dominates or stands apart. What, then, would it mean to take up Deleuze's idea of the cinematic in today's altered circumstances, in relation to current or contemporary questions and to new wars and kinds of war? What role might cinema and philosophy yet play in a situation that some have perhaps been too quick to characterize as 'post-cinematic' and 'post-theoretical'?

I'd like to look at how this question might be formulated in relation to the visual arts. How did the cinematic – regarded as a postwar *dispositive* to render the workings of time – help transform the very idea of the 'visual' in the visual arts? And in what ways does it continue to be involved in the new 'conditions of visibility' today? No doubt this is a complex question with several parts that go off in a number of directions. First, there is the whole question of how to think with movement- and time-images. In what ways have they changed our understanding of what might be called 'un-moving pictures'? How do questions of time and movement change the very idea or sense of images in painting, photography, or drawing, as well as our ways of seeing and talking about such things? Such questions have been explored in a variety of domains: in Sergei Eisenstein's discussion of Asian scroll paintings as well as the Corbusian 'architectural promenade'; with the study of movement in Paul Klee's *Pedagogical Sketchbooks* (1923) or in Marcel Duchamp's *Gestalt*-defeating *Rotoreliefs* (1935) and *Nude Descending a Staircase* (1912); and, in another way, in certain practices of kinetic art or in futurism. More recently they have been taken up by Philippe-Alain Michaud in his analysis of Aby Warburg's *Mnemosyne Atlas* and his related Beaubourg theme show about the 'Movement of Images'.¹⁹ Deleuze himself develops this question, of course, through his account of how Francis Bacon renders the forces of time in relation to figures through the a-signifying zones of possibility in the 'pictorial facts.'

Even Deleuze's treatment of the 'expanded' sensibilities in structuralist film in terms of 'molecular perception' and the role of drugs can itself be read along these lines. This is also true of his account of the peculiar bodily, sexed, or gendered theatricality of duration explored not only in the films of Andy Warhol but also those of Chantal Akerman, whose encounter with art and film experimentation in New York in the 1960s helped determine her own approach to questions of time in her cinema and later in her installations. At the same time, there is per-

haps something peculiarly 'Asian' in the fixed frame and long duration, which Deleuze works out in Yasujiro Ozu's films, to be found in the early cinema techniques to which Warhol returned, and more generally in the priority Deleuze accords time with respect to narration; indeed Wu Hung has recently argued for a kind of proto-cinematic sense in Asian hand-scroll paintings.²⁰ We find a related strategy in Deleuze's treatment of the encounters of cinema with old-masters' paintings; take, for example, the striking pages in *Cinema 2* in which Deleuze connects the problem of depth of field in Orson Welles's invention of time-images to the de-centering of space in the baroque as read by Heinrich Wölfflin. Deleuze's many references to modernist painting include: the way the problem of the 'inhuman' in Paul Cézanne's sensations is taken up in turn by Vertov and the Kinoks; and the way that close-ups and affection-images in Eisenstein's film may be analyzed in terms of the questions of pathos or of faciality – a key point in Deleuze's book on Francis Bacon, who himself was struck by images from *Battleship Potemkin* (1925) in his effort to paint the scream and not the horror.²¹

A context and impetus today for going back to look at such encounters of cinema with the visual arts is the wave of interest in moving pictures in art spaces today. Assisted by technical and distribution possibilities that appeared only after Deleuze wrote his cinema books, filmmakers and artists now have a new exhibition arena outside the traditional darkened room of the movie theatre or familial televisual viewing spaces. Raymond Bellour and Giuliana Bruno have each analyzed the role of the actual room and its architecture in such practices, and in their relation to earlier forms or *dispositifs* of image installation.²² Let me add to their analyses two brief remarks about how Deleuze's general picture of having ideas in cinema might be used in these circumstances. First there is the issue of how the new uses of art spaces to exhibit time intersects with larger questions that Deleuze develops in relation to postwar cinema of what movement and time are themselves; and it is perhaps significant that while Deleuze wrote nothing about such practices, his work remains popular among certain artists working with them – Pierre Huyghe, for example. In addition, these practices are tied up with the larger process through which 'contemporary' came to be distinguished from 'modern' art or art practices. Visual art and art spaces played a key role in the 1960s in their attempt to free the very idea of art from a series of distinctions and related practices in which it had been traditionally enclosed (traditional mediums and skills, studio production and exhibition in 'white cube' spaces) and, at the same time, from critical distinctions between art and mass or popular culture, critical discourse, information, or everyday life. Cinema participated

¹⁹ Philippe-Alain Michaud, *Aby Warburg and the Image in Motion*, translated by Sophie Hawkes (Cambridge, MA: MIT Press, 2004), 278-91; Philippe-Alain Michaud, *The Movement of Images*, exhibition catalogue (Paris: Centre Pompidou, 2006).

²⁰ Wu Hung, 'The Painter Screen,' in *Critical Inquiry* 1 (Autumn 1996). The idea is developed further in Wu Hung, *The Double Screen: Medium and Representation in Chinese Painting* (Chicago: University of Chicago Press, 1997).

²¹ See Gilles Deleuze, *Francis Bacon: The Logic of Sensation*, translated by Daniel W. Smith (Minneapolis: University of Minnesota Press, 2003).

²² Raymond Bellour, 'An Other Cinema,' in *Black Box Illuminated*, eds. Sara Arrhenius, Magdalena Malm and Cristina Ricupero (Helsinki: NIFCA, 2003) – and reproduced in the current volume; Giuliana Bruno extends the analysis begun in her *Atlas of Emotion* (New York: Verso, 2002) in her *Public Intimacy: Architecture and the Visual Arts* (Cambridge, MA: MIT Press, 2007).

in these attempts – in Robert Smithson's questions of site and non-site, in the violence of Gordon Matta Clark's 'anarchitecture,' or, in another way, in Hélio Oiticica's interventions. Current work must also be understood in relation to such changes. In contrast to, say, Godard (who is still making great films), Huyghe uses film as part of a range of practices, similar to the way he uses Japanese Manga images – introducing advertising signs in urban spaces or orchestrating participation in parades.

Deleuze had posed the question of projection in terms of the larger *dispositifs* of camera movement, framing and editing as they appear in the early history of film and are later transformed. He was interested in how projection practices, along with editing and framing, freed themselves from the conventions of 'natural perception' (and from the mimetic conception of projection itself) to invent new sorts of images affecting our nervous systems. We see that from the start there is a sense in which the screen was less an illusionist window or *ersatz* classical stage than a moving frame with an 'out-of-frame' that allows movement and time to be rendered in new ways that would move beyond the conceptions of space in classical painting or theatre, suggesting alternatives to them. Thus Deleuze argues that the relation of cinema to a classical theatre space (and 'theatricality') is poorly posed as matter of a loss of or substitution for live presence. Rather, we find a new *dispositif* for creating images and spaces (and so of 'having ideas') with links or interferences with one another, which is connected to the two great efforts in theatre to create new kinds of image and space – Artaud's theatre of cruelty and Brecht's epic theatre, each of which is related to the cinematic exploration of time in 'bodily attitudes.'²³ Using the techniques of shooting, editing, and projecting, cinema found a peculiar way to undercut the divisions between objective and subjective viewpoints or between the sound and image space in order to explore other spaces and times, which, even in darkened rooms, can strike our nervous systems in ways that are just as intense or cruel as live performances (which can often seem rather more predictable). If we try to then set current practices in a larger history of 'theatrical uses' of exhibition spaces, we need to include the whole problem in terms of the kinds of questions of 'images that force us to think' that Deleuze identified in postwar cinema.

The darkened room of theatrical cinema might then be seen as one highly successful *dispositif* in a larger history of image installation, itself conceived in terms of different ways of thinking in the arts. In this role, it became a laboratory to fabricate creative images – images to free our brains both to the patterns of clichés or *mots d'ordre*, which in turn serve to control our perceptions and affects, reducing them to easily identifiable opinions. Just as the filmic image is not, for Deleuze, a code or a language but an original way of expressing times and spaces that can't be contained in natural perception or affection, so filmic space, even in

the darkened room, is more than a simple story-and-illusion apparatus. It is rather a *dispositif* that introduces a new 'psychomechanics' that directly affects the brain, as Eisenstein and then Artaud imagined, and to which Jean-Louis Scheffer would later attest in his picture of the postwar film-goer. The cinematic 'autonomization' of images offered new ways to think and to make visible the role of time and space in thinking, and, indeed, it is just from this angle that Deleuze takes up the question of cinema as a mass, industrial art. He had already analyzed the whole question of rendering a 'complicated time' in signs and images in relation to a new kind of 'intelligence' learned without prior method – an intelligence that always 'comes after,' through encounters that force us to think – in his study of 'signs' in the Proustian novel.²⁴ But when the same sort of problem (and notion of sign) is transferred, via the cinematic, to mass society, this kind of artistic intelligence encounters new enemies and rivals, and must be inserted into new circuits. It must also contend with a new conception of the public (typified in television ratings) – a 'statistical public' characterized by a whole new professionalization of vision and a new massive machine of control over what we can see and say, think and do. In this way, Deleuze argues that, after the war, Hans-Jürgen Syberberg goes beyond Benjamin's preoccupations with mechanical reproduction and aura to ask more generally how cinema can create relations or arrangements of seeing, saying, and acting irreducible to larger arrangements of information, communication and the public.²⁵ He thinks it is also why the history of cinema is a long 'martyrology' in the struggle to create new images, and why there is so often in cinema the dramatization of a conspiracy against this attempt – an ongoing battle with the institutional forces of mediocrity from which an encounter with the visual arts or visual art spaces can offer one avenue of escape. The problem of cinema as mass art – 'postindustrial' as well as 'industrial' – is not simply a matter of the role that the cinematic *dispositif* plays in changing technical machines of production and reception; it has also to do with changing relations between having ideas and 'collective arrangements of enunciation' – hence, between intellectuals and the masses.

What is distinctive for postwar time-image cinema for Deleuze, in this regard, is a new political principle seen in altered relations between filmmakers and their actors and publics. Unlike the 'mass-subject' of an Eisensteinian epic, the 'subjected masses' of a Leni Riefenstahl rally or the much-calculated numbers of a Hollywood blockbuster, the problem Deleuze associates with 'thinking with cinema' – and, in a singular way, thinking with time-image cinema – is that the

²³ Deleuze draws on Barthes's analysis of Eisenstein and the Brechtian 'gest' in developing his analysis of 'bodily attitudes' in cinema as seen, for example, in John Cassavetes's **Faces**, while he sees Carmelo Bene as close to Artaud. Ceremonial or everyday 'bodily attitudes' are time-images since the body shows them through the workings of time irreducible to plot or 'subject matter'. See Deleuze, **Cinema 2**, 189; and Roland Barthes, **Music, Image, Text**, translated by Stephen Heath (New York: Hill and Wang, 1978).

²⁴ Gilles Deleuze, **Proust and Signs**, translated by Richard Howard (New York: George Braziller, 1972), 5-7. Deleuze introduces in this study the question of the implications of 'showing time' for what he calls, for the first time, 'the image of thought.'

²⁵ Deleuze discusses the problem of information in relation to Syberberg in 'What Is a Creative Act?', in Deleuze, **Two Regimes of Madness**, 322. He presents in terms of cinema the question of 'control' that he would later set-out more generally in his essay 'Postscript on Control Societies,' in Gilles Deleuze, **Negotiations**, translated by Martin Joughin (New York: Columbia University Press, 1995), 177-82.

'the people are missing'; they must yet be invented along with making the film itself. In his analysis of the new relations of directors to actors as well as to their publics in 'minority' and 'third-world' cinema, Deleuze tries to work out these changes, at once aesthetic and political. His sense of Straub-Huillet as great 'political' filmmakers is a striking case of this view, but he elaborates it as well in his account of how the very idea of 'minority' breaks open the whole genre of ethnographic and documentary films toward a new aesthetic form beyond the fiction-document division. 'Mass' becomes indeterminate and irreducible to 'class' at the same time as there arise new ways of making it visible. We could imagine extending this idea to the global situation of the cinematic today; for example, beyond the division of fiction and documentary, contemporary artists and filmmakers will invent images to get at 'events' in which an often violent, indeterminate past is tied up with the 'fabulation' of peoples moving in and across borders, irreducible to fixed classes or groups, related religious divisions, or 'clashes of civilization.' Deleuze's study of postwar cinema may be read as a kind of aesthetic workbook for the questions of the multiplication of such situations in cinema and of their relation with the visual arts and visual art spaces.

New Analyses How, then, does the cinematic change our idea of art? What would it mean to take up this question again today in new situations – for example, in relation to transformations in the visual arts? What role might theory or philosophy yet play with respect to notions of art to which the cinematic might be linked? To what kinds of new uses might we put this larger problem of 'showing time' through images that 'cause us to think'? In what ways, in the process, might we refashion the larger postwar image of thought that underlies Deleuze's analysis? One side of such questions concerns the style of analysis Deleuze forges in his cinema works. In the first place, there is a question of method. While Deleuze's books range over the entire history of cinema since the late-nineteenth century and are shot through with many historical, technical, social, and political arguments, they are not history books or the books of a historian. They have another selective aim: to extract from the generality of films those singular non-linguistic signs and images invented by great filmmakers to express time or movement in our own situations, milieus, or worlds. They are thus not a-historical. Rather, they are abstract in another way, tied not to eternity but to the present and new problems, at once artistic and philosophical. It seems important to preserve this experimental aesthetic zone of questioning with which history is linked, but to which it is not reduced.

In Deleuze's case, the new problems intersect in an increasingly complex spiral around the questions of time and thinking through which postwar cinema would be linked to postwar philosophy (and the 'theory' to which it gave rise). In this way, the war itself becomes more than an event in historical, legal, or religious

discourses. It becomes, at the same time, an 'aesthetic' matter – a turning point in the very nature of the images and having ideas, in which the cinematic would play a key role, especially, but not exclusively, in France. Thus the war – *this* war (with its mass destruction, its shame, the terrible secrets it left within and with respect to official histories) – figured in the cinema that came after it not simply in the manner Paul Virilio analyses – as a 'field of vision' or as a technological and propaganda machine anticipating the real-time wars of today – but precisely as the kind of upheaval in sensibility that called for the invention of new 'dispositions of thought.' Cinema would play a key role in the invention of a postwar aesthetic, exploring the ways a violent and indeterminate past figures in our very psyches, as in the early films of Resnais – for example, *Muriel* (1963), with its Boulogne-Algeria relations, and, of course, *Hiroshima Mon Amour* (1959).²⁶ For, along with camps, the questions of decolonization the War brought with it belonged to that aspect of the past with which cinema was concerned. Beyond his work with Duras, this is what links Resnais, in documentary and fiction, to the larger question developed in literature by Maurice Blanchot, who had his own sense of 'not-being-in-the-present,' tied up with the disaster that would befall the very possibility of friendship in thought or of the 'philia' in philosophy. The philosophical concepts Deleuze forges in cinema – the idea of the image itself in its relations with fact, truth, 'realism,' the space-time these images make visible, the peculiar role of body and brain in the way characters move about in them – no doubt derive from this larger context, even if they go off in other directions. Indeed, that is one reason why Deleuze insisted that the overlapping inventions and problems that he was trying to get at 'in cinema' nevertheless had to be fabricated independently of it and its history, in relation to other practices and inventions yet to come. To extract the peculiar kinds of philosophical creations that Deleuze called 'concepts' is to give them a life of their own, as indeed is the case for many of the conceptual inventions he works out in the course of his study. Theory departs from history in this way just when it ceases to be a reflective meta-discipline (as it still is with Kant), and instead becomes a source of new questions, encounters, interferences, and exchanges, which cast older problems in a new light. That is what Deleuze seems to have had in mind when he declared that 'the life and survival' of cinema lies in its struggles with the informational regime of control, which he feared constituted a new rival to the very activity of thinking.

Deleuze's film books are thus not narratives, and to take up the problems or concepts that they work out in cinema doesn't require that one insert oneself in any one story or history. They can be (and indeed have already been) used in many different ones. Deleuze's film books are rather 'montage books' of a roving philosophical spirit that try to introduce into the criticism (or reading) of film something of the collage approach and the 'stratigraphic time' that Deleuze had worked out

²⁶ Paul Virilio, *War and Cinema: The Logistics of Perception*, translated by P. Camiller (New York: Verso, 1989). In a larger discussion of these same themes, Virilio says that the paradox of the documentary treatment of war starting with Rossellini's *Rome, Open City* is one that has 'haunted me since I was born ... In 1959, *Hiroshima Mon Amour* provoked an upheaval comparable to the one caused by Seurat or Cezanne in the Impressionist period.' See Paul Virilio, *Politics of the Very Worst* (New York: Semiotext(e), 1999), 29. The film is exemplary of the way artists use technologies to 'diverge' from the larger functions of propaganda or advertising.

for the history of philosophies, as in his famous image of a 'nomad' style of thinking. He thought there no more exists an intrinsic narrative in the history of the arts than in the history of philosophy, whose melancholy themes have long tended to overdetermine what Deleuze took to be the false problem of the 'end of art' (or 'the end of philosophy'). Part of the force of fabricating concepts 'in cinema' for uses outside of it was precisely to free them from a sort of intrinsic or internalizing history, or a sense that cinema is a fixed language or medium whose only critical gesture would be to examine itself. The critical relation of the fabrication of concepts to the present is of a different sort. It is more a matter of introducing new histories into given ones. It supposes that there exist situations in which the usual stories no longer suffice once monolithic histories start to break off into many complicated paths. In this respect, the cinema books continue the strategy of many overlapping 'rubrics,' which Deleuze adopted in his study of Francis Bacon, each going off in different directions, with sometimes unrecognized precursors and unforeseen applications, such that, in one such rubric, Deleuze can declare that each new painter recapitulates the history of painting in his or her own way. Against the search for a single great story or history in art or philosophy – reflected in the great nineteenth-century European dream of a great encyclopedic Library or Museum containing all words and images in ordered sequence – Deleuze proposed a new sort of pedagogy of images and concepts to complicate the present, disrupting its classificatory presuppositions in a process from which the invention of new kinds of images and thoughts is always emerging.

Deleuze adopts two interrelated principles in his cinema books to exemplify this approach. The first says that 'all criticism is comparative' and one must thus examine the cinematic in its larger overlaps with other arts and practices, since there is 'no work that doesn't have its continuation or its beginning in others.'²⁷ The second, found in the last sentences of his study, asserts that 'it is on the level of interferences with many practices that things happen, beings, images, concepts, all kinds of events.'²⁸ Together these principles encapsulate a preoccupation in Deleuze's writings in the 1980s with a reactive moment associated with the idea of 'postmodernism,' in which, as if unable to create any further movement, thinking would retreat back into meta-reflection or meta-art, or else ironic re-appropriations of past inventions. The notion of 'interferences and resonances' worked out in Deleuze's analysis of the signs and images of cinema, then developed in *What Is Philosophy?*, may even be regarded as a kind of antidote to this tendency, an attempt to get things moving again, to suggest sequences in which the cinematic might yet be inserted – 'we all need our interceders,' he declared.²⁹

Deleuze's study of cinema is itself filled with such interferences, and overlaps with many disciplines and practices, such that the cinematic lies precisely in the peculiarities of the way film figures in larger complexes, at once aesthetic, social,

technical, or political. When Deleuze calls postwar cinema 'modern,' he doesn't mean 'modernist' in the sense of that word associated with medium self-reference, an idea he rejects or displaces in all of his studies of the arts. He doesn't at all see modern cinema as a melancholy retreat, turning in on itself in the face of kitsch. Its relation to 'clichés,' its forms of abstraction, are of a different kind, linked rather to making visible new zones of space and time, and the new kinds of characters who inhabit them, using the *dispositifs* of mass industrial society. That is why the problem of 'meta-cinema' doesn't mean much to him, and why he is at such pains to distinguish the problem of the time-image from a simple opposition between narrative and non-narrative film. He insists that cinema's signs and images don't form a code or language that can be distinguished from others in some epic effort at differentiation and purification. André Bazin had spoken of an 'impurity' peculiar to cinema or the ways it turns to literature, or the visual arts, architecture, or popular culture, for ideas to create its images. Deleuze extends this idea to include relations with philosophy or theory, as well as with sciences or techniques, as part of a larger image of thought. In the place of Kant's 'reflexive' idea of critique, Deleuze wanted to substitute a 'creative' one, in which the forms of sensibility that are space and time are themselves thrown open to experimentation across many different disciplines at once.³⁰ Deleuze adopted Klee's Bauhaus principle 'to make visible' as a watch-word for this process, and he associated it with a question in painting that Robert Delaunay formulated when he declared: 'Cezanne broke the fruit-dish; too bad the Cubists [stuck it together] again.'³¹ It is in this sense that for the signs and images of cinema – for its logic, its peculiar manner of thinking with images – there pre-exists 'no determination technical or applied,' not even a cultural or media-logical one; the signs and images must be precisely invented in a long and often difficult process.³² For having an idea in cinema, there preexists no fixed sphere of competence, only available means and an inchoate necessity. As in any domain, an idea in cinema is something rare, given through many trials, moving back and forth, with many dead ends, where one sometimes looks to other arts or disciplines for inspiration. Encounters across the arts, or through ideas in the arts, are not governed by fixed models, analogies, or morphologies, but rather through the peculiar ways one invents to develop ideas, often through sensory means or in sensory spaces and time. It is not as if the 'contents' in each art could just be shuttled around from one 'form' or medium to the next. However, in making such invention possible, *dispositifs* like the cinematic are distinguished as something more than 'media' or technical supports, more than means of transmitting and receiving information; they are, rather, ways of disposing of our senses in such a way as to enable thinking, to make ideas possible.

The cinematic *dispositif* Deleuze isolates in the postwar period made possible the invention of new

²⁷ Deleuze, *Two Regimes of Madness*, 285; translation modified.

²⁸ Deleuze, *Cinema 2*, 280.

²⁹ *Intercesseurs* is translated as 'mediators' in the essay by that title in Deleuze, *Negotiations*, 121.

³⁰ Deleuze writes: 'The limit common to all of these series of interventions ... is space-time. All of these disciplines communicate at the level of something that never emerges for its own sake, but is engaged in every creative discipline: the formation of space-times.' See Deleuze, *Two Regimes of Madness*, 315.

³¹ Deleuze, *Foucault*, 52-3.

³² Deleuze, *Cinema 2*, 280.

ways, beyond informing (through documentation) or narrating (through traditional characters and stories), to get at those events we can't make present through merely informing or narrating, or which require the invention of new kinds of 'image' that undo the classical division between the two. That is why it is so misleading to imagine that new kinds of *dispositifs* simply take over or replace older ones. While it used new audiovisual technical means, the new cinema was not an attempt to supplant the book or the Gutenberg galaxy, as a hasty reading of Marshall McLuhan might suggest. It was a way of taking up the problems in the 'new novel' to create a 'new cinema,' a way of linking creative ideas in books with those in darkened rooms. It was a way of breaking through the *sensus communis* supposed by our cliché-governed habits of thought, not only for the characters, but also for filmmakers and spectators. For there is something 'dissensual' in the ideas that force us to think. That is why the new cinema led to the emergence of a new public, the sort of virtual audience that Serge Daney thought involved a critical 'supplement' of a sort. Deleuze thought critical thought should continue in relation to new conditions of informational control.³³ One is thus at some distance from the kind of communicational model of the public and public space, about which Alexander Kluge and Oskar Negt would challenge Jürgen Habermas in their search for another kind of 'public sphere.' In the place of a communicational sociability, Deleuze was interested in the way filmmakers exploited the disjunctions of sound and image to expose another idea, developed philosophically by both Georg Simmel and Mikhail Bakhtin. Indeed, we find this notion already in Deleuze's analysis of 'wordly signs' in Proust, to which he returns in the passages in *What Is Philosophy?*, where he is concerned more generally to contrast thinking and communication.³⁴ The problem of sociability in cinema might thus be linked to what might be called the sociability of cinema, or the way it creates new ways of thinking and thinking together. We thus find a larger principle that Deleuze developed in perhaps its most elaborate form in his study of cinema: the idea of a 'people to come' as a basic presupposition of philosophy, art, their relations with one another, and their critical or political function.

How then does the cinematic change our idea of art? In looking at Deleuze's answer to this question from a number of different angles, we may start to better see the ways his conception of the cinematic fits with a larger series of transformations in the arts, and of the idea of art. These transformations suggest new zones for pursuing cinema's possibilities and, perhaps, new ways to play the singular game of art and thinking, for which Deleuze, in pursuing his investigations and developing his ideas 20 years ago, offered a larger aesthetic frame.

*This is a revised version of a text previously published in *Art and the Moving Image*, ed. Tanya Leighton (London: Tate, Afterall, 2008)

³³ See 'Letter to Serge Daney: Optimism, Pessimism, and Voyage,' in Deleuze, *Negotiations*, 72. Here the function of 'a little bit of art and thinking' is contrasted with the public as social consensus and the way it figures in the larger issue of information and control.

³⁴ See Gilles Deleuze and Félix Guattari, *What Is Philosophy?*, translated by Hugh Tomlinson and Graham Burchell (New York: Columbia University Press, 1994), 87-8. Here the problem of a 'sociability' in thought in opposition to imperial power is seen as the start of a problem of 'philia' in philosophy, taken up later through notions of 'fraternity' or 'solidarity' in relation to capitalism, and hence to Blanchot's attempt to rethink notions of 'community' and 'communism' after the disaster of the Second World War.

Spectacle versus Cinematic Sociality: Art and the New Media Architecture

Ina Blom

Compare two black screens. Two distinct rejections of cinematic imagery, separated in time by some 50 years. Two media productions in which there is, quite emphatically, ‘nothing to see.’

The one is a 64-minute-long celluloid film dominated by long passages in which you are presented with nothing but a dark screen and a mute soundtrack. At times the silence is broken: short instances during which you are exposed to a kind of fractured speech, a jumble of quotations from various literary, journalistic, and political sources. During these instances the screen is illuminated, but all you see, absurdly magnified, are the dust and the scratches that accumulate on clear celluloid as a film passes through the projector or is otherwise handled as a tangible material object. The film ends with 24 long minutes of totally mute blackness, a brute offering of the masses of empty silence that its creator not only deemed necessary to break open cinematic narrative, but that he also saw as the means of revolt specific to cinema itself.

The other is an 81-year-long computer-based video film that starts out with total darkness: a black screen in a darkened room. The darkness lasts for weeks, even months. But gradually, so slowly that the human eye does not register the change, the darkness lifts. Coming back at a much later date, a spectator may notice a more grayish hue. Even later, grays give way to browns and then, with the same imperceptible slowness, to other colors. Yet there is nothing static or immobile about this work. At every moment, change is taking place, pixel by pixel the screen continually changes from one hue to the next until all the color nuances available through the medium of digital video have been screened, over a duration of 81 years. Deep greens, blues, violets and reds appear 20, 30, 40 years into the work. At the end there are years of white light. In fact, this is video in its most raw or reduced state, a dispenser of light and time that can never be surveyed or controlled by a human consciousness that stands ‘outside’ of it and watches it: the real-time span of the work simply lasts longer than the waking hours in the life of any human being. And to the extent that cinematic imagery is generally understood to be structured around the attention of human subjects, the work could be seen as yet another rejection of its presentational formats or modes of capture.

These two rejections of imagery are of radically different kinds. They attest to different understandings of the way in which media interact with human perception, and the social and political implications of this interaction. The aim of this essay is to trace the anatomy of this difference, as it is presented – one could even say staged – within the field of a contemporary art practice invested less in the production of images and forms than in an interventionist engagement with the forces that structure everyday life. This is a practice that continually reworks a key question of twentieth-century avant-garde art: What are the conditions for collective creation under an

advanced capitalism that engages not just working bodies, but the entire human sensory apparatus – including our capacity for perception, cognition, and thinking? Since the late 1960s Guy Ernest Debord's critique of *the spectacle* and its overpowering media images has functioned as the pivotal point around which much of the artistic work on this question seems to have been organized. And yet, during the last 20 years, an increasing number of art productions seem to approach the question from an angle that differs in significant ways from the terms of Debord's critique and the strategies of his own aesthetic-political actions. What distinguishes these works is not just the way in which they seem to posit a new kind of media subject, one constructed around the close alignment of media apparatuses and the working of the human brain. Even more pertinently, they seem to explore the collective world of this media subject by exploring certain key features of an architectural environment whose 'housing' functions must be understood in terms of a specific and constructive interaction between media technologies and the shared forces of thinking, imagination, and affects. In these works we encounter a mediatic environment that resists description through the set of terms subtending the notion of 'spectacular architecture' (an architecture noted for its ability to define itself through striking media images). Other terms need to be deployed in order to see what may perhaps be the rudimentary outline of an architectural noopolitics, formulated in and through artistic practice.

The first film is *Hurlements en faveur de Sade* – Guy Debord's infamous 1952 attack on what he was later to call 'the society of the spectacle,' a social condition indicative of late capitalism and of which cinema was a key symptom. Under this condition, Debord claimed, all that was once directly lived had been transformed into representations or images. This new image-world presents itself as a separate and autonomous pseudo-world, a sphere of isolated visual phantasmagoria that splits apart the essential unity of the life-world. Yet at the same time this pseudo-world also functions as an instrument of artificial unification or homogenization, since it is that part of society 'which concentrates all gazing and all consciousness.' Capturing our eyes and our minds – our entire cognitive and sensorial apparatus – it exerts a unique form of domination over all other social domains or activities.¹

Still, the insidiousness of this form of domination only really stands out once one pays attention to the way in which the spectacle structures time, or, more precisely, how it organizes the interaction between individual and collective temporalities or forms of memory. A product of a society given over to historical time – the time of successive events and accumulative achievement that is now recorded and lived not just by a select administrative elite but by all members of society – the spectacular image-world of the mass media nevertheless seems to negate this event-time and its emphasis on mobility and change, on constant newness. Since its major productions are generally emptied of all real traces of conflict and contradiction, they seem to return us to a mythical time before his-

tory, the harmonious Arcadias of a cyclical or ritualized time devoted to the regular celebration of the social collective. Yet, as a product of a historical time that is above all the time of capital mobility and expansion, this Arcadian image-world does not represent any existing social formations. It is a pseudo-ritual or pseudo-cyclical realm, a mere form whose function is that of blinding the eye and restructuring memory, so as to better cover up the actual forces at work in contemporary production.² From costume dramas to retro fashions to the formatting of geographical locations into 'travel destinations,' the past is turned into an image; its emptied-out forms circulating like a film loop.

Hurlements en faveur de Sade is a weapon specifically designed to target this empty circulation. A double dialectics of intrusive sound and unbearable silence, monolithic white-light vision and a refusal of the gaze to introduce antagonism and incommensurability at the place where one normally expects a harmonious collaboration between sound and image. Here, the image-world is quite literally isolated and then reduced to a purely perceptual-material entity, as if a gross parody of the way in which the all-encompassing 'visions' of the spectacle produce social separation. Reduced in this way, cinematic imagery is notably emptied of its mythical or quasi-mythical contents and so also placed outside of both historical event-time and cyclical ritual time. It is in this sense that Debord's work functions as an intervention in the spectacular image-world, and it is also in this sense that it effectuates a *détournement* of its specific mechanisms of separation and unification.

Today we know such interventionist strategies quite well from numerous works of art and writings produced in the years after 1952, we are used to the deconstruction of the autonomy of images, the dissection of the ideological functions of the gaze and of various modes of representation. And, in extension of this, contemporary art production has more or less internalized a critique of the institutions that seem to promote and perpetuate this autonomous image world, from the apparatuses of film and television to the modern art museum that sets up a timeless realm of select images at the same time as it inscribes them in a history of events. Targeting the mechanisms of the spectacle has become the default mode through which contemporary visual art formulates its position of difference vis-à-vis the contemporary world of production and management.

What, then, to think of that other work – Tobias Rehberger's *81 Years* (2002) – the video film that, like *Hurlements*, also seems to reduce cinematic experience to a perceptual minimum? (Figure 1) For unlike what was the case in *Hurlements*, this particular reduction of experience cannot simply be seen as an act of revolt against the social power of media images and their capacity for domination and misrepresentation. In fact, *81 Years* even seems to pass beside the paradigm of 'watching' or 'concentrating the gaze' that structures the very concept of the spectacle. The immediate experience that there is 'nothing to see' derives here not just from the lack of visual

¹ Guy Debord, *La Société du Spectacle* (Paris: Editions Gallimard, 1992).

² Ibid., 125-60.

events in the ordinary sense of the term, but also from the sheer duration of a piece that extends so far beyond any sensible notion of the human attention span that it does not even really seem to address attention as such. In contrast, the work presents itself like a luminous presence in relation to which one is not so much a spectator as a fellow presence. More than anything, the work seems to function like a mood lamp, a simple producer of atmospheres or ambiances – similar to the many other atmospheric works of recent years, such as Olafur Eliasson's *The Weather Project*) installed at the Tate Modern in London. And photographic documentation shows that audiences also tend to treat the work in atmospheric terms: rather than being frustrated by the lack of visual action, they camp on the floor, basking in the colored light from the screen.

Hence, the work also seems to pass beside the kind of temporal analysis that subverts *Hurlements* interventionist efforts, that is, its effort to disturb the superficial adaptation of ritualistic time to the progressive logic of capitalist event-time. For Debord's intervention is of course structured around the way in which a systematic directing of the gaze toward a fantasy-past informs the production of social memory. To engage with the medium of film at a properly materialist level is, as Walter Benjamin understood it, to engage not just with a medium of mass reception but, even more significantly, with a medium of mass *recording*. As Samuel Weber has pointed out, Benjamin seems to indicate that the mass should in fact be identified with the reproductive inscription that takes place in a film production; the 'mass' is simply that which 'takes up' or repeats the modern shock events in which the imagined historical unity of time and place are scattered or multiplied. The mass is here not understood in numerical terms, as a multiplication of contemplative subjects 'receiving' media content, but in temporal terms, as the critical agency responsible for the repetition and dispersal of harmonious presence. It is in this sense that the medium of mass recording has a unique potential to stage an encounter of the mass with itself and thus also provide – potentially – a real history of its coming into being.³ Yet spectacular cinema manages to avoid the production of such a history by systematically diverting attention away from the disruptive potential of a form of social memory shaped by the modern technologies of recording and distribution, that is, a social memory based on the time of events. Instead attention is locked onto cyclical and unitary memory forms that no longer organize society at large. The overarching goal of a film like *Hurlements en faveur de Sade* – which seems to focus on the very disjunctions and incoherencies of the apparatuses of recording – is thus to wake you up to a 'real' sense of history, one adequate to the actual forces at work in capitalist society.

A different memory function is at work in *81 Years*. For the key operation in Rehberger's work is an exploration of the minute dynamics of 'moving images' – a dynamics that may be inferred from film, but that presents itself with even more

urgency to anyone handling the medium of video. If the definition of a moving image is that movement is an intrinsic feature of the image itself, and not a function of a phenomenological relation where as a spectator your eye or body 'activates' an image-material, video dramatizes the implications of this definition. It confronts you with a signaletic material that is temporal through and through, light signals that may, but will not necessarily, condense into a meaningful image.⁴ And the emphasis on this specific feature of moving images opens onto another conceptualization of the relation between technology and social memory, one that takes shape in conjunction with technologies that seem to replicate (if only at a very rudimentary level) certain key aspects of the memory-functions at work in the human brain. The comparison between video technology and mental operations can be traced back to the inventions and theorizations of the early video artists of the 1960s and '70s, but in recent years it has entered the field of political philosophy thanks to Maurizio Lazzarato's efforts to describe modern-time technologies as the key social machines of a postindustrial era fundamentally informed by the exploitation of human cognitive and perceptual processes, that is, by the forces at work in intellectual and affective work. Here, video and other real-time technologies are given a special significance due to the fact that their capacity for temporal manipulation (the flexible ways in which they condense, extend, and recapitulate time) resemble the temporalizing capacity of the human brain. Video technology seems to technologically access a non-linear experience of time, a transposition of past and future within the constant flow of a real-time now; on a structural level it evokes Henri Bergson's non-psychological account of human memory as a sort of ontological or virtual memory where the past and the future coexist in the duration of the living present.⁵ Such memory functions are activated in a medium that challenges the standard definitions of graphic images as two-dimensional representations of spatial experiences or phenomena. To the extent that video could be said to produce images, such images do not analogically 'contain' or fixate a spatial continuity; spatial information is, in contrast, translated into points and lines that have no spatial extension, only temporal existence. If 'image' is the appropriate word for such signaletic streams it is perhaps best understood in terms of a Bergsonian ontology where image is just another word for matter and where matter is understood as streams of light – asignifying forces that act on other forces. Images are then not phenomena that spring out of subjective imagination or even out of human activity; they exist outside and beyond such activity, as autonomous material instances. Human perception only enters the story as it creates its own cuts or intersections in matter, establishing a relation between meaningful visual durations and random streams of light.⁶ This is why the constantly 'live' organization of the flow of signals in video images is better understood in analogy with perceptual operations, rather than in terms of their ability to represent reality. 'Video' is quite literally the 'I see' indicated by the Latin name of this technology.

³ Samuel Weber, *Mass Mediauras. Form, Technics, Media*, ed. Alan Cholodenko (Stanford: Stanford University Press, 1996), 78-107.

⁴ Gilles Deleuze, *Cinema I. The Movement-Image*, translated by Hugh Tomlinson and Barbara Habberjam (Minneapolis: University of Minnesota Press, 1986), 1-11.

⁵ Maurizio Lazzarato, *Videophilosophie, Zeitwahrnehmung in Postfordismus* (Berlin: b- books, 2002).

⁶ Henri Bergson, *Matter and Memory*, translated by N.M. Paul and W.S. Palmer (New York: Zone Books, 1991).

It is precisely this purely technological incarnation of human memory and perception that is the point of focus in *81 Years*. For this is a video work that does not produce images in the ordinary sense of the term, only time, a lifetime's worth of live signals (the qualitative multiplicity of the color spectrum). It might, in fact, be best understood as a replica of the 'time machine' of memory, first of all because it can fast-forward or backtrack to any desired point in time, but also in the sense that its asignifying streams of colored light (the color spectrum that Bergson used as an example of what he called 'qualitative multiplicity' or pure duration) may in principle contract or condense into any kind of meaningful image.⁷ But if *81 Years* presents us with a rudimentary version of the operations of perception and memory, the point of the work is obviously not just to investigate perceptual processes per se. For the all-important thing here is the explicit and intimate association that is set up between biological life, human memory, and a dominant media technology – an approach that presents this association as a specific and autonomous entity. This approach differs markedly from the many art works that explore the semiotic and ideological messages of contemporary media and the various forms of reception that such messages can engender, most notably because one is here above all forced to consider a peculiar technological constellation: the specific way in which these media technologies integrate the human brain as part of their productive machinery. One is in other words forced to consider the efficient coordination of human and non-human components in the real-time technologies that manage to exploit not just the 'work-time' of the traditional definition of labor but also the far more open concept of 'mental time,' the perceptual and cognitive 'work' that goes into any engagement with sensory and informational material.

This form of work has been described as involved above all in a production of subjectivity, and more specifically a subjectivity production based less on adaptation to a preconceived mindset or political/cultural norm than on the open-ended forces of becoming. Such subjectivity production and its time technologies seem to literally run on the activation of personal memory materials – and with the soundtrack to Rehberger's film, the very 'mechanism' of this intimate apparatus is so to speak brought out for closer inspection. At the level of technical organization, this soundtrack operates as an independent memory structure or time machine that runs parallel to the video production. The sound of an ordinary four-minute pop recording – 'This Is the Day' by 1980s' British pop group The The – has been digitally 'stretched out' to a 24-hour duration, a full 'day in the life.' However, in contrast to the 81-year-long video, the signaletic material of the soundtrack is here not a generic or all-encompassing spectrum, but a specific ensemble of frequencies that are intimately linked with the personal mythology of Tobias Rehberger himself. The song was chosen for the central role it played in Rehberger's personal history: a defining soundtrack of his early teenage years – of his negotiation of the passage from childhood to adulthood – it was this song

that ignited his first desire to 'become an artist' (and not a tennis player, as he had initially envisaged). However, with this autobiographical charge, it is doubly significant that Rehberger does *not* present the song as a fully formed memory-document of a golden past. In contrast to much use of pop songs in film soundtracks, this is *not* a musical time capsule through which one may nostalgically return to the pop-driven *rites de passage* of modern youth culture (another form of escape to the quasi-cyclical temporality criticized by Debord). Rehberger's digital reorganization of the song not only transfers it from the closed temporal structure of a musical work to the generalized duration of life processes. It also turns the melodic and harmonic structures of the song into an aggregate of unlimited and asignifying sonic material – pure frequencies – that perfectly mimes the way in which visual material – light – is treated in the video film. The 'matter' of Rehberger's personal 'memory' is quite simply opened up to new affective organizations and reorganizations.

The independence of the sound and image registers is important for understanding what it is that a work like *81 Years* actually confronts us with. Gregg Lambert's discussion of the relation between cinema and thinking in the philosophy of Gilles Deleuze is informative here, since he picks up on Sergei Eisenstein's ideas on the relation between images and sound in film. Eisenstein notably rejected the idea that sound and visual images should accompany or illustrate one another in a harmonious and well-synchronized way. In contrast, the concept contrapuntal montage opened for the production of 'overtone conflicts' between sound and images, with the result that the arrangements of aural and visual signals couldn't be determined spatially. Such production of overtone conflicts between various kinds of signaletic material was first made possible with cinema, and underlines the significance of the cinematic apparatus for registering a sensation of movement that is impossible for natural perception:

This is because visual and aural overtones are a 'totally physiological sensation' and consequently they are of one and the same kind, outside the sound and visual categories that serve as guides, but rather function as conductors that introduce new effects within the spectators perception-consciousness system and engender the possibility of newer and ever finer affective capabilities on the part of the mass audience.⁸

If anything, Rehberger's disconnected yet simultaneous activation of pure frequencies and pure light takes Eisenstein's emphasis on the production of new sensorial and perceptual effects to an extreme, to the point of moving beyond the dialectical project envisaged by Eisenstein. As it reconfigures autobiographical material in terms of two of the basic durations that structure human life – the biological lifespan of an average West European citizen and the astronomic time

⁷ Henri Bergson, *Tiden og den frie vilje*, translated by Hans Kolstad (Oslo: Aschehoug Forlag, 1990), 41-55.

⁸ Gregg Lambert, 'Cinema and the Outside,' in *The Brain is the Screen, Deleuze and the Philosophy of Cinema*, ed. Gregory Flaxman (Minneapolis: University of Minnesota Press, 2000), 253-93, 254.

of the earth's revolving around its axis – the work seems to quite literally posit a perceiving entity or subject that categorizes space-time and that we may, again with reference to Lambert, call a 'purely cinematic subject.' (We here use 'cinema' as a general term for images that are defined by their immanent capacity for movement and temporal manipulation). This cinematic subject, which is primarily an effect of optical and aural situations that delivers 'shocks' to the nervous system, could be understood as instance of thinking – a sort of self-reflexive 'I think' – interposed between the brain and the world. In Eisenstein's montage model, the cinematic subject or 'I think' was understood as the key relay in a circuit that includes the author, the film, and the viewer in a dialectical process of thought-production – a process that ultimately breaks open the historically alienated forms of perception in order to restore the immediacy of the relation between the subject and thinking.⁹

Rehberger's cinematic subject cannot, however, claim to contribute to any such restorative project. Still, contra the numerous cinematic works that rely on standard mechanisms of representation, as well as on the well-used catalogue of visual, musical, and narratological clichés, it insists on the primordially of physiological sensations that has the capacity to trigger thinking. Yet, as it is connected with registers of pure duration or temporalization rather than with the precisely orchestrated movements of montage, this thinking has nothing self-evident about it. It is framed only as a sort of not-yet-thinking, a virtual thinking that is perhaps reminiscent of the notion of a 'powerless' thought that was central to Artaud's work on cinema and that Deleuze saw as the alternative to Eisenstein's cinematic dialectics.¹⁰ The cinematic subject posited by Rehberger never appears as a whole subject, since the 'brain' evoked by its thinking can only really be understood in Bergsonian terms, that is, not as an entity (the 'muscle' of thought), but as an interval or a gap that only opens onto a virtual whole.¹¹ The fact that Rehberger chooses to work with video and digital sound – with signal-based materials in the most direct and 'raw' state rather than with cinema in the more traditional sense of the word – makes a lot of sense here, since in video each point in the image may be seen as a moving force and a divergent line, an independent event that is essentially a sensorial trigger. It is therefore no coincidence that efforts to quite literally posit an 'open' subject or a distinct if uncertain 'I think' generated from signaleptic situations have taken place, in various ways, within the discursive framework of video art. Video quite simply presented artists with a newly acute sense of the autonomy and indeterminacy of sensory and perceptual materials, whether visual or aural, now liberated from of all representational structures. The 'I see' of video, which identifies the moving image with a perceptual activity that moves at different speeds than natural perception, could in other words be translated as a specific version of the cinematic 'I think.'

It is only from this perspective that the apparent rejection of meaningful imagery

in *81 Years* may be appreciated in its full difference from Debord's blacked-out cinema screen. In fact, terms like 'rejection' or 'lack' of imagery are not really appropriate here, since to omit a meaningful image in a video production is not to take anything away in any fundamental sense of the term. It is not a destruction or *détournement*, merely a temporary reorganization of the relation between signifying and asignifying forces, a fact that was the subject of intensive investigations in the late 1960s, when artists first had occasion to work with broadcast signals. Simply playing with magnetic devices close to the TV screen was enough to produce such temporary reorganization, and with video synthesizers or closed-circuit feedback installations such effects could be explored in ever more sophisticated ways. The very definition of our relation to the spectacle changes once this relation is not just read in terms of a theatrical concept of a representational space, where the image is like a temporal trap that cuts you off from the time of the present. Now this relation must rather be described in terms of a more fine-tuned analysis of the mediatic harnessing of our sensorial and cognitive capacities. Rehberger's work (as well as the work of a number of other artists who engage with cinematic materials that have been 'liberated' from the realm of standard film production and presentation) might then be seen as the historical effect of a situation where moving images attest to two apparently divergent projects. On the one hand the absolute manipulation of thought, an industrial production of ideological scenarios on previously unheard-of scale, as well as an industrial exploitation of the powers of thinking. And, on the other hand the absolute liberation of the sensorial materials that triggers thinking, materials that remain at the service of whatever is unthought in thinking itself. It is in this situation that the 'purely cinematic subject' is literally conjured up as a sort of quasi-being or quasi-human presence, at once identified and not identified with Rehberger himself and framed only by the concept of human durations. It is, quite simply, an effort to think the possibilities and impossibilities of cinematic thinking.

And yet, this emphatic positing of a cinematic subject, complete with autobiographical memory material, is only the initial link in the chain of associations set up by Rehberger's *81 Years*. For ultimately the positing of this particular subject opens up the question of the relation between time technologies and human memory to include also the question of inhabitation, the question of what it actually means to inhabit spaces that are themselves effects of media production or information processing, emphatically 'designed' spaces that play on our ever-evolving capacities for new sensations and perceptions. As Felicity Scott has noted, this is a situation in which architecture and design are no longer understood to have precise disciplinary boundaries, they are considered not as distinct media but rather as relays functioning within larger environmental systems

⁹ Ibid., 265-66. Deleuze's discussion of Eisenstein and the cinematic circuit is found in **Cinema 2, The Time Image**, translated by Hugh Tomlinson and Robert Galeta (Minneapolis: University of Minnesota Press, 1989), 158-64.

¹⁰ Deleuze, **Cinema I. The Movement-Image**, 165-70.

¹¹ As Lambert points out, Deleuze's cinematic reconsideration of Kant's concept of the sublime is key here: it is in the sublime experience, where imagination cannot be represented, that subject appears as a whole. The total physiological sensation of moving images, described by Eisenstein, constitute just such a sublime experience, yet the question of the emergence of the subject-as-whole may be described differently once the problem of representation is no longer the point of departure for thinking, or creating an image of thought (Lambert, 'Cinema and the Outside,' 259-65).

and new information ecologies. This is why both disciplines can cede to new media formats, new materialities and processes, new institutional logics, even new relations to human subjects.¹² The initial appeal of *8r Years* is related to the fact that it seems to generate space. Since it also plays up the way in which cinema functions as a mood lamp of sorts, a distributor of pure light and atmosphere, the work inscribes itself in a discourse that concerns architecture or the constructed environment in the broad sense of the term. As Gernot Böhme puts it, atmospheres may be the result of a subjective perception, but they are also object-like emotions that are cast into shared space, so to speak.¹³ To focus on atmospherics is then to emphasize a highly particular feature of the constructed environment, notably the way in which it is collectively formed and shaped by 'mental materials' such as shared emotions and affects.

The most immediate reference for this take on architecture is the environmental constructions in Rehberger's own work, his endless production of spatial designs and architectural surrounds that have all the seductive force of the best and most original inventions of the design industries. Yet, Rehberger's work does not enter into the production lines of design and architecture, and it does not even really posit itself as a 'limit practice' that challenges the boundaries between art and design or art and architecture. For what distinguishes these works is a set of additional features that would seriously complicate their integration in the ordinary production line of design. Almost every single design object or architectural environment created by Rehberger is actually also a time machine, formed and informed by real-time processes and cinematographic materials in the broad sense of the term. Take, for instance, his many beautiful lamp designs or lamp interiors. If television is often appreciated for the atmospheric light it emits (the television-as-fireplace trope), Rehberger's lamps could, for their part, be called televisual in the sense that they not only emit light but transmit signaleptic material as well. For their light sources are usually connected to a computer program that allows them to transmit, in real time, the light in some distant time or place, such as current light conditions in the South-American city of Montevideo, or – hour by hour – the quality of light on the day Edith Piaf died, based on historical meteorological data. The immediate sensorial appeal of design (and the fact that significant sections of contemporary economic production seem to revolve around ever more refined design sensibilities) is in other words presented in a way that aligns it with an expanded cinematographic reality whose key operation is the sensorial provocation of the brain into thinking. A number of these works even dispense with the habitual technical machinery of real-time processing; by playing around with the 'temporal manipulation' inherent to architecture and design itself – the complex way in which the constantly changing design styles and their related sensibilities work and rework memory material – the same cinematographic reality is evoked.

What is presented in these works is then a particular strategic inroad into a topos that is central to discussions of contemporary spectacular culture, notably 'architecture and film.' A special relation seems to exist between film, architecture, and design, in fact, film has been compared with architecture since its invention due to the way in which it seems to mobilize both spatial and temporal modes of reception. First of all, stage sets and locations are vital parts of any film, at times they may even function as the protagonist or subject matter of the film itself. Second, it is generally recognized that film is not just a visual but also a spatial practice, in the sense that one has to take into consideration the cinema space itself and the relation between the film and the spectator's body. Third, cinema is seen to have played a key role in the modern spectacularization of space – the formatting of complex geographical and geopolitical sites into the homogenized 'locations' of the tourist industries, the kind of places that can be marketed for their untarnished 'pastness' and quasi-ritualistic resistance to change. Fourth, there seems to be a structural relation between architecture and film based on the fact that both art forms are intimately related to the big state and capital institutions and their systems of majority and in fact depend on the interest of these institutions for their existence. And, finally, it has been argued that film and architecture are structurally similar in the sense that both are received by a collectivity in a mode of distraction, received that is, in an incidental, absent-minded way, reminiscent of the attitude of a person drifting through a city and as opposed to the alert and contemplative vision associated with the viewing of paintings or sculpture. This was, at least, Walter Benjamin's perspective in his essay on the work of art in the age of mechanical reproduction, no doubt informed by the early cinema of sensations rather than the later narrative films of the Hollywood traditions: only the non-organic, disintegrating presentations of non-narrative cinema could evoke an equally unfocused state of mind. According to Joan Ockham, this concept of distraction is the structuring principle of the Jacques Tati film *Playtime*, where the hypnotic glass spaces of International Style architecture emerge as the film's real protagonist as well as a visual metaphor for the luminous and 'transparent' screens of film itself.¹⁴ In this context, Tati's comic hero is basically just a prop, an anonymous everyman whose failure to make sense of this space doubles as a failure to produce coherent film action.

But this emphasis on a mode of *reception* shared by architecture and film differs in significant ways from the particular association between architecture and film set up by Tobias Rehberger. Even if his works may come across as architectural environments that are open to the interaction of the spectator (if only in terms of the desire to lounge around his spaces), the focus is not on reception but on production – more specifically, the production of thinking, and the conditions for thinking this production of thinking itself. Eventual participants are not at the receiving end of an architectural or mediatic 'presentation' or spectacle, but are rather implicated in a cognitive machinery at work. This specific approach, which is far from unique to the work of Rehberger, may be explored more in-depth with reference to a collaborative project of the artist and film-

¹² Felicity Scott, *Architecture or Techno-Utopia. Politics after Modernism* (Cambridge, MA: MIT Press, 2007), 90.

¹³ Gernot Böhme, *Atmosphäre. Essays zur neuen Ästhetik* (Frankfurt: Suhrkamp Verlag, 1995).

¹⁴ Joan Ockham, 'Architecture in a Mode of Distraction: Eight Takes on Jacques Tati's *Playtime*,' in *Architecture and Film*, ed. Mark Lamster (New York: Princeton Architectural Press, 2000), 171-96.

maker Philippe Parreno and the architect Francois Roche. This is a work where the encounter between 'film' and 'architecture' revolves around one highly peculiar construction, an assembly hall – a social center – whose spatial and social functions cannot be separated from its cinematic functions. Named variously *Hybrid Muscle* and *The Boy from Mars* – depending on whether you approach the project from the point of view of the architect or the artist (filmmaker) – the work could be understood, alternatively, as a shelter that produced a movie or as a movie that produced a shelter (Figure 2). The project was realized on the premise that Francois Roche would create a construction that would serve as the set for Parreno's film *The Boy from Mars*, but that the film production for its part would leave behind a permanent structure that would be used for social and communal purposes (as opposed to most film sets, which are destroyed on the completion of the film).¹⁵

Still, the relation between 'film' and 'set' is far more complex than what this simple contract would seem to indicate. From a standard architectural point of view, *Hybrid Muscle* is an open, shelter-like construction consisting of simple scaffolding covered with layers of thin elastomer sheets that make the whole thing into a crossover between a house and a tent. Yet this house, which was constructed on an off-grid territory in the northern part of Thailand, is also an 'animal engine,' an engine that is supposed to run on the muscle power of a pachyderm (Roche finally had to settle for a water buffalo). A key part of the building's construction is notably a device for storing mechanical energy through the lifting of a two ton counterweight and for transforming this energy into enough electricity to power ten light bulbs, laptops and cell phones. Once the animal muscles get working and the engine starts running, the flimsy tent-like construction comes into its own. The building is actually a giant lamp illuminating the night landscape; with its gossamer sheets it looks as if it might have been designed by Isamu Noguchi. And the social or communal functions of the building have to be thought of as somehow integrated in the functioning of this lamp, aligned with its production of atmospheres and communications. Since there is no separate room or area that is simply serviced by the machine components of the house, whatever is defined as its 'social activity' will have to take place, so to speak, in the middle of a production mechanism whose circuit describes a continuous relation between muscular activity and information processing, biological and intellectual life.

The question is then of course in what sense this lamp building could be said to function as a film set. For, as it turns out, the interchange between Roche's construction and Parreno's film redefines the very concept of a film set, not only in terms of its status as a physical construction beyond the realm of moving images, but also in terms of its status *within* the film itself. It quickly turns out that this building is not just a design environment in which the action of the film is located, this is one of those cases where the architecture is actually the protagonist of the film, the element around which the cinematic action is organized.

However, the dominant passages of *The Boy from Mars* convey a form of stillness that is structurally reminiscent of the appearance of stillness in Rehberger's *81 Years*. In other words, the accepted dialectics between action and reaction – so fundamental to the cinematic sense of action – is completely absent here. To the extent that something 'happens' in this film, it is not related to the sense of action that is triggered thanks to the intimate relation between automatic forces at work in a human sensory-motor schema and the automatisms of moving images and their sophisticated montage techniques.¹⁶ In fact, a motionless camera simply records the building as the daylight disappears and the lamp gradually lights up, the only movements in the image are the changes in natural and artificial light. This strategy aligns cinematic movement not with action but with the simple passage of time, a generalized, open-ended, or 'natural' time that unfolds beyond the limits of an artistic formatting of time into specific narrative action-blocks. This open-ended or generalized time is at one with the general modulation of light and is presented as intrinsic to the cinematic image itself (since this image, whether created through celluloid, tv-signals or digital processing, is notably defined in terms of the signaletic material of light). Through this opening onto *time-in-general*, architecture and film, lamp building, and luminous image here emerge as one and the same thing. We are, in other words, presented with a cinema-architecture whose wood and elastomer constructions are just components of a larger, never-completed ensemble that is defined by a production of light and time – a form of radical temporalization whose only real correlate is the 'sense of time' produced in the human brain.

As demonstrated in *81 Years*, this quasi-human sense of time also includes the possibility of contracting and expanding time in numerous ways. When Parreno's film finally makes use of some camera movements and cuts, it basically seems to deploy such devices in order to build up an aggregate of temporal layers. More specifically, it is as if the camera moves away from the stilled focus on the lamp building only in order to store up on related instances of the light production and their temporalities. A continuity is drawn up between a series of such time/light situations. Starting with the lamp building, the film gives us the durations of nearby street lamps, of the moon that emerges and disappears behind drifting skies and of the sun that breaks through the morning fog – as well as that of a strange light phenomenon in the night sky that is most readily understood as an alien visitation (the only nod to the sci-fi sounding title *The Boy from Mars*). All the film does is to present these independent durations, a composite of micro-events that are not dynamically coordinated into any kind specific movement or action. When the camera finally starts to trace the internal working of the engine that lights up the building (a parallel to the many films that reference the cinematic projection machinery), there is of course muscular action at work – animal muscle. But this muscular action is as if displaced since it does not logically engender more action, only – once more – a kind of strange, stilled, duration. In the passage from the animation of the buffalo muscles to the pull on the concrete counterweight to the working of the

¹⁵ Parreno's film and Francois Roche's construction (*The Boy from Mars/Hybrid Muscle*) were realized in 2003 as part of Rirkrit Tiravanija's *The Land* project near Chiang Mai in northern Thailand – a project for alternative communal living that include the contributions of a number of contemporary artists, among them Tobias Rehberger, Carsten Höller, Superflex, and Angkrit Ajchariyasophon.

¹⁶ Deleuze, *Cinema I. The Movement-Image*, 141-55.

dynamo, the action/reaction chain of normal cinematic narration and motor action breaks off as abruptly as it had begun. The production of electricity, a silent and 'invisible' production of asignifying signaletic events, cannot be accounted for in these terms. Suitably, the final passage of the film loops right back to the generalized duration of the brightly lit lamp building: through its translucent sheets we can now see the vague contours of a group of people moving inside it. As specified in the 'contract' between Parreno and Roche, it is, after all, an assembly hall (Figure 3).

If the film set is also an assembly hall, the fundamental lack of distinction between 'film' and 'set' (or architecture and cinema) in this construction also has consequences for the way in which we understand its social events. And it is precisely this question of 'sociality' that is raised to a principle as artists like Rehberger and Parreno/Roche extend the notion of the cinematic apparatus to include the architectural surround and the concomitant notions of inhabitation and collectivity. The project of concretely thinking the cinematic conditions for the production of thinking cannot stay with a classical notion of the human subject, but must extend to an environment that is itself increasingly described in mediatic and informational terms, that is as an effect of the forces of thinking. A preliminary conclusion: the assemblies or social events of the lamp building are shaped by the principle that underpins its cinematic definition of architecture, notably the open-ended 'real-time' durations that replicates the working of human memory. It presents, in short, a notion of social or collective life defined in terms of noopolitics – a politics that *departs* from the question of the sharing of sensations, perception, attention, and memory rather than the question of how the means for subsistence are shared, and that undoes the traditional deduction of the former from the latter.

Debord's concept of the spectacle was prescient in its apprehension of the way in which the human environment under late capitalism was the object of a sort of generalized cinematographic formatting that was above all a formatting of collective consciousness. Yet, as Rehberger and Parreno/Roche approach the cinematic environment by exploring the wider implications of the proximity between the endlessly flexible durations of signaletic material and human memory, the very notion of the formatting of collective consciousness becomes more complicated. It is simply a bit harder, now, to believe that cinema actually has the power to relegate all but the most resistant minds to an obsolete form of social memory. Its potentials for mental control, while no doubt considerable, cannot be separated from the open-ended or indeterminate moments that comes to the fore once mental life is also seen as an independent origin of politics and not just as a more or less passive object of capture for the media apparatuses. Just as the cinematic designs of Rehberger and Roche indicate a built environment that cannot be totalized or fully accounted for (however visually striking or sophisticated,

their works are not 'finished' architectural constructions or design solutions), they also seem to indicate a form of collective being that is not simply or not only the result of a totalizing capitalist socialization.

A social theory adequate to the specific mode of collectivity outlined in these works does exist. Among other things, the recent recycling of the nineteenth-century sociology of Gabriel Tarde seems to provide a contemporary ground for approaching the politics of these works. For as Tarde challenged the transcendental status given to the concepts of value, scarcity, and need in usual economic accounts of human collaboration, he also described society as a brain-like network of synaptic relays where collaboration is accounted for in terms of the operations of mental forces such as desire, belief, sympathy, and the capacity for imitation and differentiation.¹⁷ In such a description, the complexities of thinking take on a new political centrality. However, the works described in this essay do not simply attest to the acuity of this new ontology of the social. More specifically, their particular way of positing collectivity is an intervention in the dominant discourse of images and aesthetics in contemporary culture, a discourse that wavers ambivalently between victimization and demonization whenever the question of the role and force of images and visual phenomena arises. A lot could be said about the role of modern media apparatuses when it comes to reinforcing age-old beliefs in the unassailable powers of the image-world. But these same apparatuses may, through growing familiarity with their 'mode of existence,' also have contributed to a different understanding of images – precisely because the images they produce increasingly appear to us as functions *of* apparatuses, that is, of assemblages that activate a heterogeneous array of human and non-human agents in processes too complex and open-ended to be reduced to one single will or function. Versus Debord's all-out rejection of media images, the new architectural/cinematic works present the same images as social sites, the sites of collectivities about to think their own reasons for existence – for good as well as for bad.

¹⁷ I am here referring to the many references to Tarde in the work of Bruno Latour as well as to Maurizio Lazzarato's reevaluation of Tarde in **Puissances de l'invention. La psychologie économique de Gabriel Tarde contre l'économie politique** (Paris: Les empêcheurs de penser en rond, 2002). In this context it is also relevant to consider Tarde's fictional work **Underground (Fragment of Future Histories)** (1896) where he presents his social theory in the allegorical form of a science-fiction narrative of a post-catastrophic society. In this fiction, social life has moved underground and paying attention to the satisfaction of physical needs is secondary in relation to the sharing of ideas and sensations. Significantly, in this society architecture has lost its monumental status, as it is reduced to the carving of interior spaces that can never be surveyed as finalized forms, only moved through, and that are continually evolving in all directions like an evolving network of connective passages. See Gabriel Tarde, **Underground (Fragment of Future Histories)**. Updated by Liam Gillick (Brussels: Les Maitres des Formes Contemporains and Dijon: Les Presses du Réel, 2004).



1 Tobias Rehberger, **81 years**, 2002
Photo Credit: Courtesy Tobias Rehberger.
 Photograph: Marc Damage.
2, 3 Philippe Parreno & Francois Roche,
The Boy From Mars/Hybrid Muscle, 2005
Photo Credit: Courtesy Parreno/Roche and
 Galerie Air de Paris.



[2]



[3]

Edible Architecture

Philippe Rahm

As architects, we would suggest that a primary reason that architecture exists is related to the enzymes necessary for the biochemical reactions of the body's metabolism. Thus, if we want to know the essence of architecture, we have to return to our endothermic condition, which carries the necessity of maintaining the human body temperature between 35 and 37.6°C. Man has to maintain his constant physical temperature independently of the outside conditions. In order to control their body temperature, human beings regulate by internal means with various mechanisms of physiological thermoregulation and by external means such as clothing and the construction of shelter. In this sense architecture is not autonomous, as it must address a range of means to maintain our endothermic condition close to the 37°C necessary for biophysical survival. The body itself addresses both decline and increase in body temperature by, for example, vasodilatation mechanisms, sweating, thirst, or muscular contractions. Both the body and its environment develop means of regulation which range from the natural to the artificial, microscopic to macroscopic, biochemical to meteorological, nourishment to urbanization; in other words, mechanisms that range between physiological determinations and sociocultural responses. Within this undertaking, architecture appears as a way of vasoconstriction, or, conversely, nourishment appears as a smaller variant of architecture. Within this framework architecture can be viewed as little more than a mechanism of physical thermoregulators, an exogenous change, and artificial thermogenesis or thermolysis.

When we feel that we are too cold or too warm, we typically find external causes, such as the climate (at an atmospheric level), and we respond with attempts to correct them. From an anthropological point of view, this could be considered the origin and the mission of architecture. Thus, we would propose that the first signs of architecture are physiological and totally internal: to perspire if it is too warm or to shiver if it is too cold – the first answers to a rise or reduction in body temperature due to an unfavorable thermal environment. Subsequently, the most rudimentary gestures arise, that is to hydrate if it is too warm in order to lower temperature by evaporation, or to eat if it is too cold in order to stimulate digestion (the combustion process of nutriment) that will produce heat within the body.

After these endogenous corrections, if the body does not manage to regulate temperature brought on by the conditions of the environment, a range of external corrections develops. For instance, migration (or transhumance), which is to change geographic location, in other words to move from a cold to a warm environment; or, on a local scale to simply seek sun or shade. A second action would be simply to compensate with our clothing, to wear white or black clothing in order to reflect or absorb heat (depending on the tightness or looseness of the garment as well as air movement and other variables), to dress in fabrics that insulate or those that wick moisture away from the skin. The third action is the one most directly associated with architecture – that is to build a protective environment, shelter that shades, protects from wind, rain, etcetera. Of

course, these exogenous measures form only an external bodily protection; they fall outside the phenomenon of thermogenesis and thermolysis.

Thermogenesis is an organism's ability to produce heat. It arises as a consequence of a sports activity or with the body's absorption of food. For instance, on the bases of thermogenesis we seek nutrients, mainly proteins such as meats or fish, and also sugar. The digestion of proteins, their combustion in Krebs' cycle in particular, provokes a strong heat, increasing body temperature. By thermogenesis the body activates its shiver response, stimulating metabolism and various hormones that increase the body's temperature in order to maintain it at approximately 37°C. The process consumes much energy. Thermolysis (an organism's thermal decomposition as a result of extreme heat) on the other hand, produces an internal form of the same process of thermal reactions as the one urging us to build houses in cold climates. Also, typical constructions in warm countries – riads, porticoes, thick walls – are exteriorized forms of thermolysis, which serves to dissipate a surplus of heat by vasodilatation or sweating.

To paraphrase Vitruvius, architecture in cold countries or winter appears as an increased, exogenous thermogenesis, outside the body. And architecture in warm countries or summer gives itself as an exteriorized thermolysis, artificially correcting the uncomfortable part of nature.

It might seem surprising to seek a return to a fundamental understanding of these reasons and means of architecture; however, the problem of global warming certainly brings the climatic mission, the responsibilities of architecture, into mind. Contemporary architects now investigate the extent of architectural means that make sense of sustainable development. They have to understand how to limit energy consumption and the production of greenhouse gases and, as we are now fully aware, sustainability is also about the reduction of energy expenditure in buildings due to heating and cooling. We take measures now concerning building where we advocate, on the one hand, for the use of renewable energy and, on the other, for a considerable improvement of heat insulation of the building envelope coupled with a controlled renewal of air. Today we have taken measures concerning not only individual buildings but processes of urbanization as well. We advocate essentially for a densification of the city and for a concentration of functions to limit wasted energy. But do we have architecture acting on a more moderate, finer, smaller, thriftier level? Less weighted, less present architecture, a diluted, almost homeopathic architecture, while still having the ambition of a climatic correction of elements that need to be respected? In our practice of architecture we investigate further down the scale of measures with regards to climatic corrections, in order to examine zones closer to the body's sensorium, in other words, at the limits of our largest organ – the skin – in order to reach the point where architecture dissolves and becomes pure thermogenesis.

But, make no mistakes, for this research does not merely consist in saving energy

spent in buildings so as to advance the fight in global warming, it is also a question of discovering new modes for the design of houses and spatial compositions, of elaborating new strategies of design and beauty, where scales mix, where architecture and environment recover their fundamental relation to the human body.

'Do we know the moral effects of foods? Is there a philosophy of nutrition?' This question of the link between the mind and food is paraphrased from Friedrich Nietzsche. Today we know of many cerebral structures, such as the hypothalamus and the limbic center, that constitute a link between food intake and behavior – such as sexual and learning behavior. We are also aware of the mood-altering effects of some substances; serotonin, for example, contributes to adaptive social behavior, or, its lowered levels may cause aggression. It has therefore become difficult to conceive of art that exists only externally to the body, producing solely visual or auditory forms that must be decoded semantically. The contemporary forms of architecture should conceptually accept the participation of the body by acting, for instance on the neurons, on the neurotransmitters, by chemically stimulating desire and mood. Modern biology draws a distinction between corporeal and extracorporeal space. The first is the communication space managed by neurons and hormones, *inter alia*. The second is the space outside the body, that which informs us through the senses. Today an object can no longer be apprehended if its effects in either of these spaces are overlooked. Thus, as the neurobiologist Jean-Didier Vincent explains, the meaning of an object exists only in this 'interaction of internal factors related to mood variations and cell metabolism (the corporeal space) and incitant external factors (the extracorporeal space).' Architecture acts both in corporeal and extracorporeal space. By defining space in a physiological manner as a certain quantity of air and light, equilibrium could be found between the information that we emit outside the body and that emitted on the inside, within the body. It becomes possible to reduce, for example, the quality of extracorporeal space while increasing the quality of corporeal space. For instance, ingesting a vitamin D supplement compensates the depletion of natural light, which suppresses the synthesis of vitamin D by ultraviolet radiation. Oxygen depletion of the air is offset by a digestive intake of erythropoietin, a peptide hormone that increases muscular oxygenation by elevating the number of red cells in the blood.

In the following projects, we explore an architecture that gazes on the microscopic level, one that explores the molecular aspect of space, to be tasted, to be eaten.

The New Olduvai Gorges The New Olduvai Gorges, shown in 2009 at the School of Architecture of The Royal Danish School of Fine Arts, is a part of this kind of strategy. It generates new architectural solutions around a comfortable climate where the body temperature can remain

effortlessly at 37°C; not only by controlling external conditions, but from the inside, from endogenous architectural solutions. It investigates microscopic, digestible, electromagnetic forms of architecture, somewhere between dietetics, thermogenics and aesthetics. This project creates three stations in an exhibition room, three spots that each answer to an uncomfortable situation that we typically find in our environment: two of which answer to a too cold and to a too warm climate and the third answers to a too dark situation.

More Warmth The first spot is a place where we find different solutions for stimulating an endogenous thermogenesis that develops little by little outside the body without ever becoming a garment or a house. Our work begins at this moment by recomposing space from bodily necessities, by mitigating one by one the lacks and deficits of heat. Architecture is here a juxtaposition of elements that answer a lack or incapacity, provoked by the coolness of the Danish winter. Here architecture, closer to and in the body, is one that brings answers element by element such as heat (temperature) and nutriment (sustenance).

Description:

- A black polyethylene platform, matt, squared, to gather most of the electromagnetic radiations present in the room, to trap and transform these ambient elements into heat.
- A grated platform, under which is a field of hot peppers (heating in the earth) lighted by photosynthesis lights. Hot peppers stimulate the ionic channel and the neurotransmitter TRPV1: the one that detects temperatures up to 44°C and also bustles in presence of 'capsaicin', a molecule we find in red hot peppers. Together, the capsaicin and temperatures up to 44°C stimulate the TRPV1 which activates the sensation of strong heat.
- A device to produce warm tea with hot pepper, to drink the heat of hot peppers, and a cup distributor for the tea.
- A professional cooking device for boiled meat so as to ingest proteins which constitute fuel for the body and produce heat to maintain a temperature of 37°C, and fondue forks or wooden sticks for the boiled meat.
- Techno music spread by directional speakers with a beat of 120 BPM to induce the heart rhythm to increase from 60 beats to 120 beats per minute; thereby increasing metabolism and muscular activity, generating a surplus of heat.
- A bench for five persons, to huddle and share body heat.

More Coldness Description:

- A grated platform under which is a field of mint (heating in the earth if necessary). Menthol stimulates the ionic channel and neurotransmitter TRPM8 (transient receptor potential): the one that detects temperatures under and to 15°C and also bustles in presence of menthol, a molecule we find in the mint. The menthol and

temperatures under and up to 15°C stimulate TRPM8 which activates the sensation of coldness.

- A fountain of fresh water with infused with mint.
- A fan that creates a movement of air, providing a feeling of freshness to the body.
- A wardrobe with coat hangers to strip-off the thermo-isolation layer of clothing.

More Daylight The third spot is a place that increases the level of light during periods of decreased sunshine and the short days of winter in northern latitudes plunged into winter. Architecture provides here endogenous solutions to the deficiencies in vitamin D, vitamin A and melatonin provoked by the absence of sunlight.

Description:

- A carrot field, which we can eat from in order to improve night vision and supplement vitamin A.
- A horizon of ultraviolet ray to assist the synthesis of vitamin D, missing because of the short duration of days in Denmark's winter.
- An electromagnetic radiance in 470 nanometers to block the secretion of melatonin engendered by the weakness and absence of daylight.
- A rectangular table (polyethylene) covered with oily fish like salmon, trout, halibut, herring, sprat, and mackerel, presented uncooked as sashimi, to be eaten also to supplement vitamin D deficiency.

Digestible Gulf Stream The problem of global warming has placed the relationship between climate and architecture at the center of current debates. In order to assume our responsibility in the face of these new ecological concerns, we must reappraise the field of architecture in a broader way, extending it to other dimensions, other perceptions, from the physiological to the atmospheric, from the sensorial to the meteorological, from the gastronomic to the climatic. A 'Digestible Gulf Stream' is the prototype for architecture that works between the neurologic and the atmospheric levels, developing a landscape that is simultaneously gastronomic and thermal.

Architects should no longer merely build spaces, but rather create temperatures and atmospheres. With the Digestible Gulf Stream, two horizontal metal planes are extended at different heights – the lower plane is heated to 28°C, the upper one is cooled to 12°C. Performing like a miniature Gulf Stream, their position creates a movement of air using the natural phenomenon of convection, in which rising hot air cools on contact with the upper cool sheet, then falls and is reheated on contact with the hot sheet, thus creating a constant thermal flow akin to an invisible landscape. What interests us here is not the creation of homogeneous, established spaces, but of a plastic, climatic and dynamic environment – the activation of forces and polarities that generate a landscape

of heat. In this case the architecture is literally structured on a current of air, opening up a fluid, airy, atmospheric space. This architecture is based on the rules of meteorology. The inhabitant may move around in this invisible landscape between 12°C and 28°C – temperatures at the two extremities of the concept of comfort – and freely choose a climate according to his or her activity, clothing, dietary, sporting or social wishes.

The concept of thermal comfort depends not only on external temperatures, but also on clothing, the physical activity of those who live in the space and their diet. For example, when we feel too hot, we have five ways of cooling down, each of which act on different scales:

- 1 Reducing the air temperature in the room, for example with air conditioning (atmospheric solution);
- 2 drinking, or the intake of liquids (physiological solution);
- 3 removing our clothing (social solution);
- 4 resting, thereby reducing the production of heat by the body (physical solution);
- 5 stimulating a sense of coolness with the mind (neurological solution).

Each one of these solutions can be understood as a form of architecture. Architecture is a thermodynamic mediation between the macroscopic and the microscopic, between the body and the cell.

We then add two culinary preparations to the two plates that directly stimulate the sensory receptors of hot and cold at the cerebral level and that can be eaten or applied to the body. Similarly as described above, the first preparation on the upper cold plate contains mint, which has molecules of crystalline origin known as menthol that cause the same sensation in the brain as the coolness perceptible at a temperature of 15°C. The menthol activates the TRPM8 molecular sensory receptors on the skin and in the mouth, which stimulate the group of peripheral sensorial neurons known as cold-sensitive units. The second preparation on the lower hot plate contains chili, in which one of the molecules, capsaicin, activates the neuroreceptor TRPV1, which is sensitive to temperatures over 44°C.

The traditional field of architecture thus expands, operating on both the atmospheric and gastronomic levels; subsequently breaking down the barriers between internal and external, body and space, neurology and physiology. The sensations of hot and cold may be perceived as much inside the body (diet) as outside (atmosphere). So the question of diet also comes into the field of architecture on par with its climatic dimension.

Our architecture extends between the microscopic and the macroscopic, the gastronomic and the atmospheric, the visible and the invisible. Architecture becomes a 'Gulf Stream' that polarizes the contrasts on different scales (hot/cold,

low/high, clothed/unclothed, internal/external, rest/activity) to give rise to architecture as a convective movement of air, creating a geography and designing a space of climate, atmosphere, and gastronomy.

Fermented Movies The new ecological awareness of our responsibility in respect to the phenomenon of global warming modifies our relationship to our environment both in abstraction and in relation to contemporary technologies and information. If modern techniques, like electricity, electromagnetism, or digital technology, and manners which utilize these technologies (artificial light, cinema, mobile, Internet telephony, etcetera) have only appeared to us until recently as dematerialized and thus relatively neutral and without consequence, today we understand their weightiness, and attend to their presence and effects. Because such phenomenon are virtually dematerialized, they remain only remotely visible; and yet one discovers that even a simple search on Google consumes some energy and also throws back 0,2 grams of CO₂ into the atmosphere. In reality, today everything seems to take on weight, nothing escapes the physicality of the sensitive world; nor even the so called virtual world where our avatar, as our body, also produce CO₂. Even the domain of the 'wireless' with non-ionizing radiations could have yet unforeseen impacts on the body and consequences on health. Carbon assessments and energetics are now calculated at every level of impact on the world. Chemical, physical, and biological exchanges are outlined between the body, the atmosphere of the planet and the most dematerialized technologies. The beginning of the twenty-first century sees all things interconnecting, with no single form existing independently of others. Alive and sluggish (active and latent) are henceforth chained one to the other in seemingly infinite ecological cycles of exchanges between material and energy; where the simple act of switching on a light bulb in the kitchen has a consequence on the climate of the planet.

Our proposal for a cinema, Fermented Movies, addresses these concerns for energy with a new form of material consciousness. Our purpose is to accept that physical links – transfers of materials and energies – exist between things, which, until only recently, have been conceived and presented in separate ways. We want to build consciously – energy, material, food exchanges – to escape the autonomy of seemingly disparate elements. Our project creates chemical and biological links between otherwise differentiated things. For what we want to do is to organize the passage of energy from one form to the other, to concretize the otherwise invisible streams, to reuse wasted energies, to organize an interaction between the organic and inorganic worlds – between space and the body, computational logic and physiologies, and between culture/architecture and food.

With this project a 35mm film projection is no longer the disembodied place of a pure distribution

of immaterial images. Images come to light and we discover them made of a light that appears as also made of heat. Images in movement consume energy and produce greenhouse gases. For a two-hour film, more than 2000 gr of CO₂ are thrown back in the atmosphere, produced by the 35mm projector, which consumes 4 kW/HOURS in electricity that it transforms almost entirely into heat. Because images of cinema are electromagnetic brilliances resulting from a projector, it is waves of heat and light that cross the room to burst onto the white screen, here to communicate in colors and intensities and break themselves apart in becoming heat. A projection beam is an electromagnetic field composed of visible and invisible wavelengths of light and of heat.

If the emissions of the projection process in cinema are not energetically neutral, neither is its reception. To watch a movie, even if we are only sitting in an armchair, also produces a loss of body energy. This expenditure of physical energy – transferred by an emission of heat at 37°C – is made to assure the basic metabolism of cardiac beating, respiratory movements and the synthesis of hormonal balance. We can quantify the energy loss over the period of a two-hour movie as 120 kcal. When we sleep, this expended energy falls to 50 kcal or, if we go in for sport, rises to 2000 kcal. It is an energy loss that occurs naturally during the day that we compensate by a caloric intake of at least 1500 kcal/day.

Of course, the project incorporates sustainable strategies; for instance, a system of double-stream air renewal is installed providing a reduction by a factor of four on the energy spent on heating. Yet, what interests us here are the energy links that remain hidden between a movie projection, the spectator's loss of calories, and further, food or consumption. It is a cycle we want to emphasize, where the overlap of the aesthetic and physiological, or culture and food occurs. It is also a typological re-questioning of the notion of program, where the standard cinema experience is coupled with the distribution of such things as popcorn, candy, and soda. To realize energy, or make it visible (as with a scientific experiment where a coloring agent is added to a substance in order to track and distinguish it within a given system), we propose to give the energy a white color. We suggest manifesting this plastic characteristic with milk, the various forms of which will give rhythm to the transformation of energy during the cinema session. White is also the color of the screen, providing a necessary value to other colors as well as a brilliant field for reflection. We propose to make the screen as a fine translucent cavity, which will be filled with nine liters of milk at the beginning of projection. During the two-hour screening the milk will be warmed by absorbing heat from the projected images and will begin a process of fermentation. At the end of the screening, the screen will be emptied of these nine liters of milk and will be used to fill yoghurt-makers in the nearby room. This will produce 60 yoghurts (of 150 ml, each containing 120 kcal), which will be offered to each spectator at the end of

the movie, so recovering 120 kcal lost by metabolism during the show.

The yogurt-makers utilize a cleaning system with very simple pump (such as those used in dairies) and with a water and alkaline cleaner, by sodium hydroxide (as with Ecolab P3-mip) guarantee the hygiene of the system as well as the cleanliness of the screen.

In reality this project is very close to the current practice of cinema, where viewing a film comes along with the consumption of popcorn and sodas; but here, the projectionist is also a cook, and culture and food mix and merge into the same energy cycle. In this process we find forms of thought where morality and physiology, aesthetics and biology converge. If milk is chosen because of its white color, which also represents the screen, it is also the nourishing value that interests us. Further afield, there is also a distant echo to the diet of nursemaids at the beginning of the nineteenth century, when we thought that the morality of a nursemaid could influence the quality of her milk and be passed on to the infant and in turn influence the morality of the child. With this metaphor, 60 yoghurts, which will have fermented during the projection of the film, represent a fermented form of this film's content and so we might 'taste' this in the product.

Finally, a printing device is also to be placed in the room with the yogurt-makers. The label of the yogurt will be 'Fermented Movies' and stickers will be affixed to indicate the name of the film. The screening room is totally mat black except for the milk in the screen, the preparation room is in a complete shiny white partially made of silicon and glass.



1-7 (previous pages) The New Olduvai Gorges, 2009. The Royal Danish School of Fine Arts, Installation

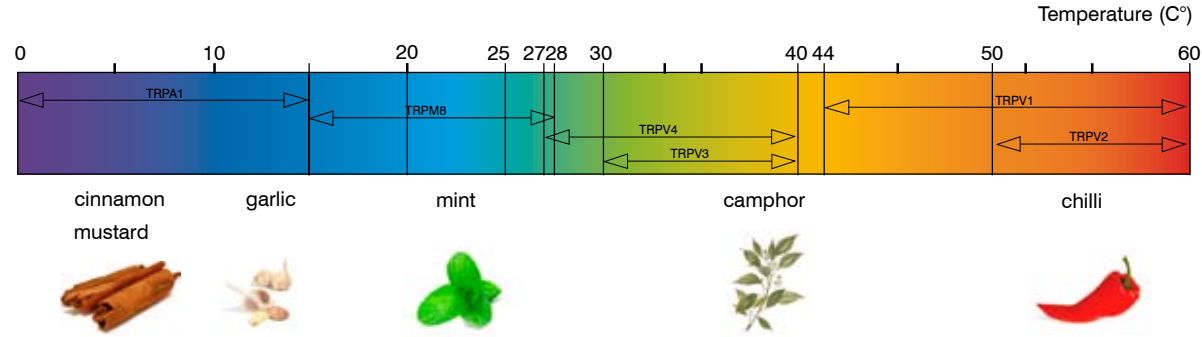
8-13 The Digestible Gulf Stream. Venice Biennale 2008



[8]



[9]



TRPA1 : transient receptor potential ankrin transmembrane protein 1
TRPM8 : transient receptor potential melastatine 8
TRPV4 : transient receptor potential vanilloïde 4
TRPV3 : transient receptor potential vanilloïde 3
TRPV2 : transient receptor potential vanilloïde 2
TRPV1 : transient receptor potential vanilloïde 1

[10]



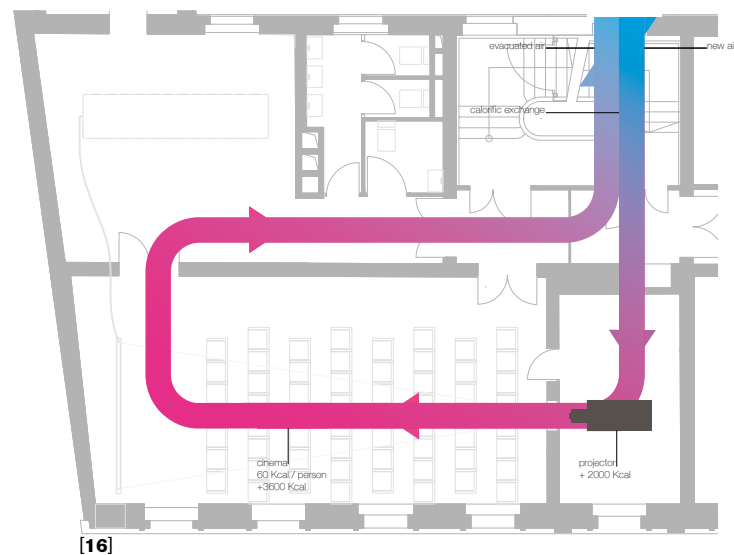
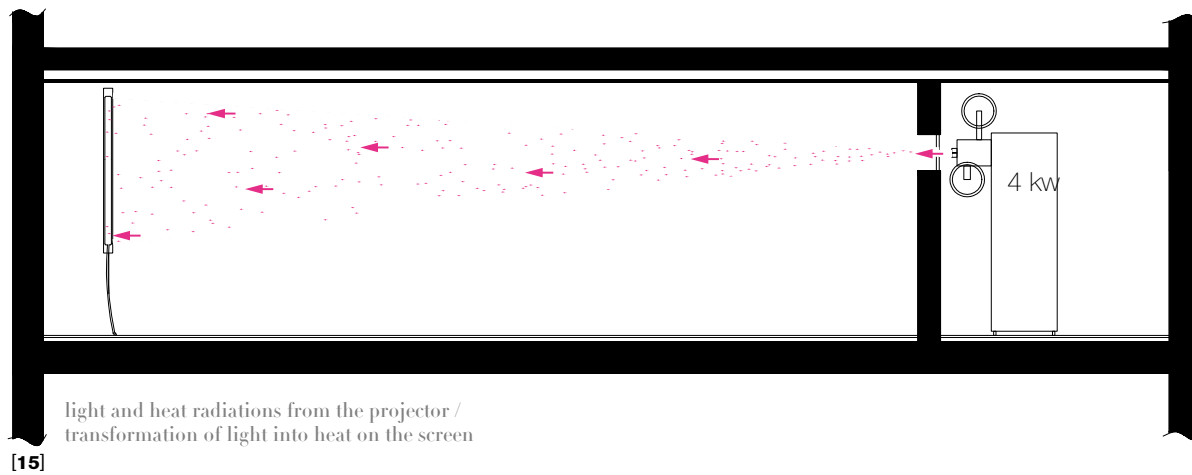
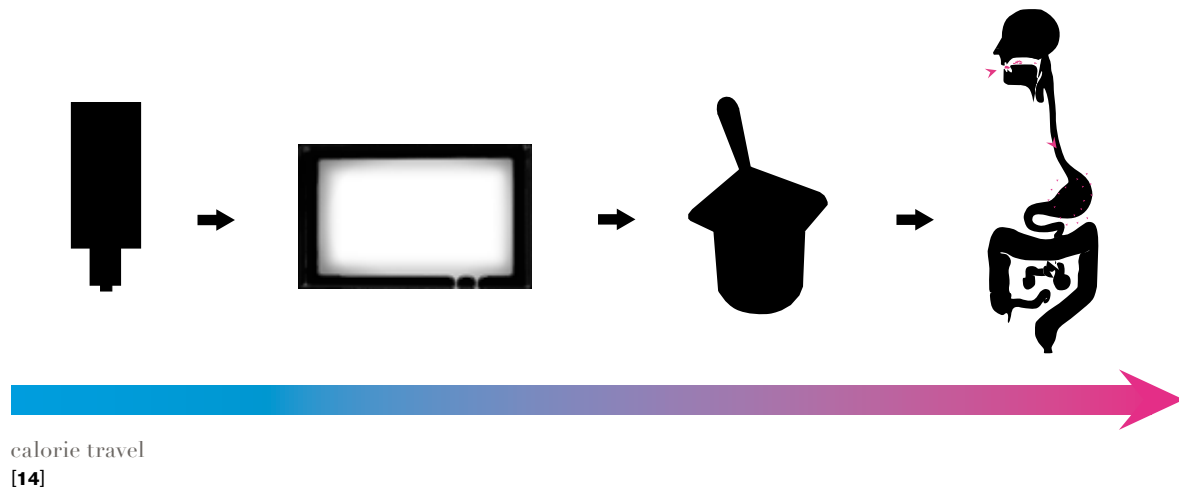
[11]



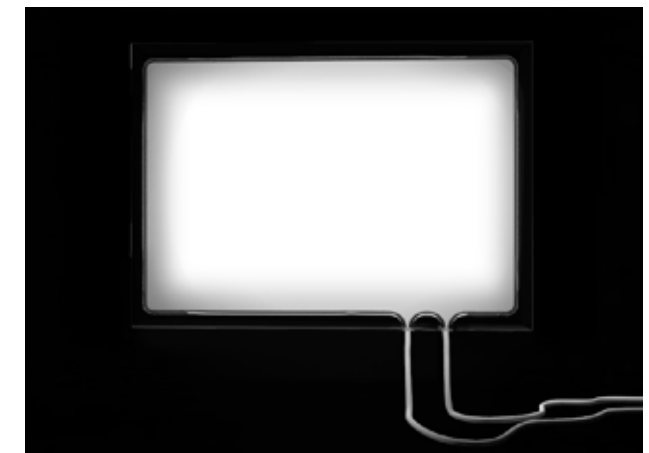
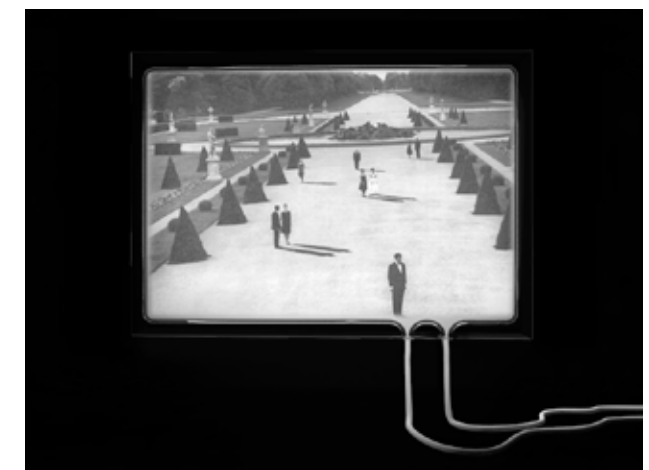
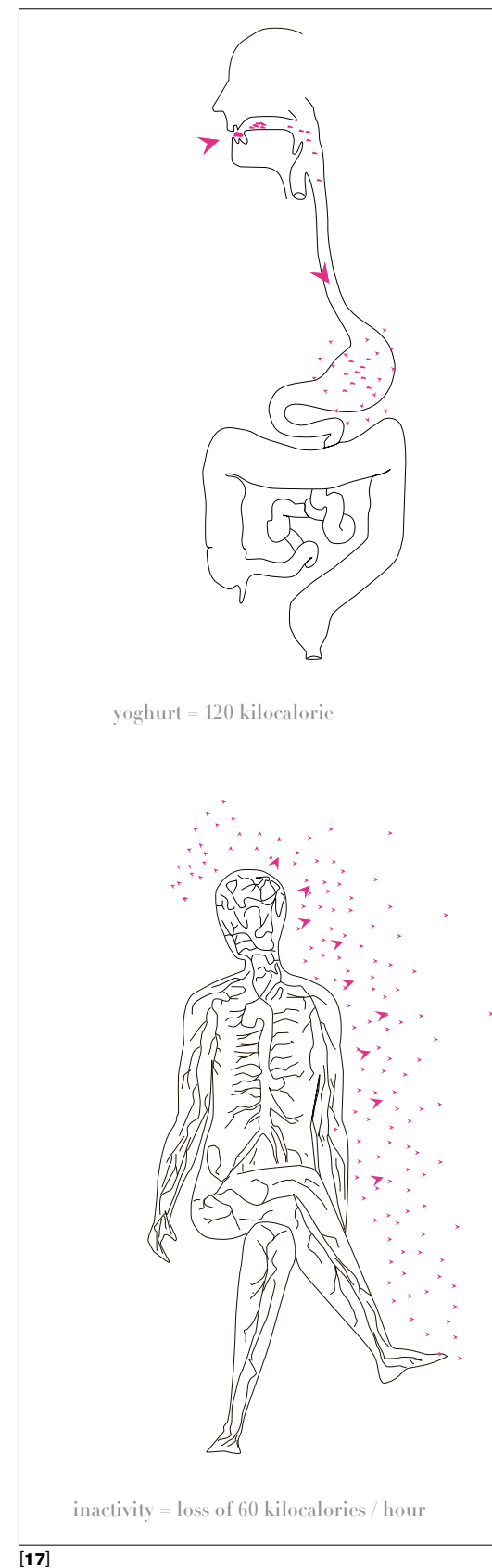
[12]



[13]



14-20 Fermented Movies, 2009. Berlin,
Institute for Contemporary Art, Installation



Movement, Agency, and Sensing: A Performative Theory of the Event

Jordan Crandall

The world moves, and we aim to harness its movements. We channel flows of energy and matter in order to achieve an advantage of some kind. We occupy movement through calculative technologies that seduce us with the illusion of control, the ability to catalyze events and shape outcomes. In a modern, calculative world, all movement is subjected to tracking: translated into a measurable form that can be durably reproduced, in ways that standardize this movement, optimize it, and infuse it with the potential to be predicted.

In tracking, one detects and codifies a moving phenomenon – a stock price, a biological function, an enemy, a consumer good – in order to extrapolate its future position, for the purpose of gaining advantage in a competitive or cooperative theater, whether the battlefield, the social arena, or the marketplace. Tracking is a form of strategic, calculative seeing: perception infused with the logics of tactics and maneuver. It is fundamentally *anticipatory*: narrowing the gap between detection and engagement, or desire and its attainment, it aims for a real-time perceptual agency, a live concert of forces, while always aiming to transcend the limitations of the real.

■ In the science of video analytics, movement is tracked algorithmically. It uses a variety of rules that are tailored to the scene and its observed objects, in order to detect and determine ‘suspicious’ behavior before any incident can occur. In order to allow this suspicious or dangerous activity to be inferred, algorithms screen out non-critical movement activity in order to allow security staff to focus their attention and resources, rather than getting distracted, or bogged down with false alarms. A typical application is perimeter protection analytics, which allow the user to identify specific areas where intruders will be identified – virtual fence lines that trigger when an intruder crosses over them or dwells in them for too long. Dwell time or counter flow analytics allow parking lots, one way streets, doorways and other specific areas to be monitored to avoid cars being left in no-parking bays; to identify vehicles or people moving in the wrong direction or ‘against the flow’; and to highlight excessive loitering. Abandoned object detection analytics allow the identification of objects that have been left behind or left stationary for too long. Congestion detection analytics monitor the density of humans or cars: people amassing or traffic-jammed.

On the surface this technology might seem contradictory. As a ‘proactive’ tool, it reaches for the event, yet it also seeks to prevent this event from occurring. Yet the *event*, too, is irresolute: as an attention-worthy incident, a matter of fascination or concern, it is at once a *violation* and an *affirmation*. The event is a disruptive occurrence, an exception, a deviation from the established norm – a violent agitation of the sanctity of the default. At the same time, it is a cooperative congealment, an affiliation of actors that have come together to engender *something* – a constructive affirmation of the salience of the gathering.

The event destabilizes, yet it is also sets forth a demand for interoperability. The technological, social, and institutional programs of analytics, as these intertwine with those of the event, compel

adherence to their demands for movement, convertibility, and translation: for all information, whether text, image, or sound, to be digitized and rendered interoperable, able to cross the boundaries of the specific domains within which it was conventionally produced and utilized, and ordered according to common standards, categories, and formats, as these last are embodied in all manner of new practices.

II Video analytics, outgrowth of tracking, has emerged from decades-old practices of cartography, surveillance, and data mining, as these fields are transformed by technological and ideological change. For many, this is a period of deep transition that is fundamentally transforming the practice of science. According to some computing researchers, a new scientific paradigm is emerging due to an ‘exaflood’ of observational data that is threatening to overwhelm scientists – an era in which the amount of information available may well subsume all existing data sources, technologies, and methodologies.¹ Demands for interoperability – movement, conversion, translation – are accompanied by a crisis in the structural management of a data flood that threatens to consume us. In order to cope with it, a new generation of scientific computing tools for its management, visualization, and analysis is emerging. The goal is not to have the biggest, fastest single computer, but rather to have a world of distributed computing – a world of cheaper, interoperable clusters of computers.

Technological change brings new models of inquiry. Fueled by increased capacities of information storage, processing power, and networking, and new data-mining tools and techniques, tracking technologies are able to reach far back into the past, further back than was previously possible, through the use of *regressions*. These are statistical procedures, or analytics, that allow patterns to be envisaged in the datasets where tracked phenomena, as detected and codified, reside – patterns that might suggest a continuity, a propensity, a taste of what is to come. As more analytics, including random back-tests, are used to test a pattern’s accuracy, stability, and ability to forecast, it may then be refined in a *formula* – a functional modeling of data-mined analytics, a site where statistics are stabilized in a productive, working form.

A pattern is revealed, derived from the past, and this demonstrates a likelihood, a propensity, for what could happen today. This pattern might be stabilized, made operational in a formula, but this retains the potential to be destabilized, since new factors can always be introduced that may modify it. The aim is not for rigidity but *provisional stability* – something stable enough to do the job.

One plugs specified attributes into the regression formula, and nearly any moving phenomenon – a shopper, a biological process, a product or part – is codified and understood in a historical trajectory. From this, its subsequent position may be

extrapolated. With ever-expanding volumes of stored data to draw upon, and new ways of connecting people, machines, and forces – distributing and sharing their functions in a larger field of human and machinic agency – relationships are uncovered among widely disparate kinds of information. Through a technologically-enhanced perception, a mathematical seeing, patterns come into view that could not be previously seen by the naked eye, in ways that augment, or occlude, traditional observational expertise and human intuition.

Technologies, practices, and mindsets inform one another. Statistical analysis, supplemented with increasing amounts of data, processing power, and storage, challenges the relevance of all other tools. Since statistical algorithms do the work, data can be analyzed without hypotheses – without coherent models, unified theories, or mechanistic explanations – to the extent that, for some, it not only introduces a paradigmatic shift in science, but heralds the end of the scientific method itself, along with all theories of human behavior: ‘Who knows why people do what they do? The point is they do it, and we can track and measure it with unprecedented fidelity. With enough data, the numbers speak for themselves.’² Causal models become irrelevant – *correlation* is enough. From this viewpoint, the barrier to the truth is not the reality, but the limitation of the tools used to analyze it – limitations that recede with the rise of abundant data, processing power, storage, and data-mining techniques as authentic identities advance to the fore, conjured out of the data that records habits, transactional patterns and characteristics, and the statistical algorithms that conduct its mobilization.

This emphasis on the past, however, is one that Karl Popper, for one, would minimize. For him, causation is just a special case of propensity – ‘a *determining* demand, or force, for realization.’ The future situation is not determined by the past. ‘It is not the kicks from the back ... that *impel* us,’ he writes, but rather ‘the attraction, the lure of the future and its competing possibilities, that *attract* us, that *entice* us.’³

A probable construct exists – an ideal scenario – that stands in relation to reality as its *tendency*. It configures as a statistical inclination, a weighted possibility. It becomes a silhouette that models future positions, a ghostly forebear into which reality flows. For Popper, propensities are actors – they can act, they are actual, they are real – though they are more on the order of situations than objects. Here one might place causes and effects on the same plane of action, and regard them as actors one and the same. Though an actor can affect other entities, it is, as Manuel DeLanda would say, catalytic rather than causal.⁴ The issue is not causality but *correlation*. It is not as if the effect were produced, as if out of thin air: perhaps equally, what is ‘produced’ is the action by which the effect manifests itself. Effects cooperate or compete for the causal actions that will justify them. The event jostles for attendances; it maneuvers for the actors that will support it. Actors act in

¹ Jim Gray, cited in John Markoff, ‘A Deluge of Data Shapes a New Era in Computing,’ *The New York Times*, 14 December 2009.

² Chris Anderson, ‘The End of Theory: The Data Deluge Makes the Scientific Method Obsolete,’ *Wired* 16 (2007).

³ Karl L. Popper, *A World of Propensities* (Bristol: Thoemmes, 1994), 20-1.

⁴ Manuel DeLanda, *A New Philosophy of Society: Assemblage Theory and Social Complexity* (London and New York: Continuum, 2006).

ways that amplify or diminish the relevance and endurance of events.

Consider the book that will likely appear to me on Amazon.com, recommended through its prediction engine – which seems to know what I want before I know I want it, and therefore helps to create a want. A bit of a world stands in wait for me, beckoning me. It subtly shapes my foray, one click away.

For Kallinikos and Mariátegui, data-mining practices serve little more than to inflate the present. The abundance of information ‘makes the event and its ephemeral constitution central elements of social and institutional life.’ Information is about novelty – in order to be informative, it must ‘pick up a new fact or state and convey it. But novelty does not and cannot last. It dies out at the very moment it is consumed.’⁵ The increasing abundance of data serves only to make it more fleeting, more perishable, more disposable, and so, this ‘pending evaporation of information triggers a complex institutional game to maintain its value through a variety of mechanisms.’⁶ If information is an actor, it must, like all actors, maintain itself in a continuing move. Witness the culture of the *update*, as well as the constant need for information to simply proliferate itself: data begetting more data, the constant expansion of the universe of information. Without constant updating, the data-rich environment would implode – markets around the world would collapse. And yet, as this perpetual updating escalates, it only serves to facilitate a more rapid expiration of the data upon which it depends.

III Tracking practices have shaped a world in which movement is understood as something quantifiable and predictable – divided into its component parts, analyzed, and extrapolated with the aid of a computational support. Tracking not only compels a particular orientation in the world, but performs a world entirely in its own image by characterizing and standardizing it in certain ways – generating an ‘enhanced’ environment in which potentially every entity, defined in terms of its location and its tracked and anticipated movements, can become the subject of its calculative procedures.⁶ These analytical procedures infiltrate social life, construct the perception of social events, define priorities and relevancies, and frame approaches.⁷ All actors in the world are locatable, yet subordinated to movement, and thus fundamentally able to be tracked, modified, and transported.

With tracking, movement becomes calculable. Yet a much more pervasive field of calculation, characterized by distributed forms of cognition, has, at least since the mid-twentieth century, constituted its enabling horizon. Since then, contemporary urban space has been driven by computational architectures and analytics. Following Nigel Thrift, one could look to its genesis in global architectures of address, which produced a genuine locatability such that ‘objects could be followed from location to location as a continuous series so simulating movement in a way that was, for all intents and purposes, indistinguishable from movement itself’ – a process that gave rise to the need for standards and protocols in order to

ensure that all parts of a system are able to be transcoded, or located by all other parts. Or, one could look to its beginning with the mid-twentieth-century invention of logistics – ‘a set of knowledges synonymous with movement, effectively the science of moving objects in an optimal fashion’ – to make certain that the right information and materials can be brought, spatially and digitally, to the right place at the right time.⁸

As the nodes used to access the Internet diversify and shrink into all manner of mobile devices, access to communications is amplified. Advances in coverage and bandwidth of wireless channels, especially in urban environments, are met with improvements in interface design. Networked computing elements become embedded into physical objects and environments – in appliances, buildings, cars, infrastructure – to the extent that the Internet becomes a part of everyday space, allowing the environment to gain digital qualities, such as computer-addressability through unique identification codes, and the ability of its actors to communicate wirelessly.⁹

Of vital importance to this environment of pervasive calculation and ‘ubiquitous computing’ is sensing research – spatial sensor networks developed within the sciences and the military – as this research places greater importance on data, data processing, and mathematical and statistical models for environmental and urban phenomena.

A sensor responds to a change in state. ‘The medium in which the state exists might be mechanical, electrical, magnetic, hydrostatic, flowing, chemical, luminous, or logical. The change might be a discrete event, the gradual attainment of some threshold, or the establishment of a pattern.’¹⁰ Sensors measure the physical world, detecting mechanical, thermal, biological, chemical, optical, acoustic, and magnetic phenomena (sight, sound, weight, pressure, heat, moisture, acceleration, electromagnetic radiation, particulates). Seismic sensors measure ground vibrations; chemical sensors detect harmful residues or explosive agents inside packages, parcels, containers, tanks, and vehicle compartments; acoustic sensors recognize explosions, breaking glass, engine noise, and high decibel screams.

Sensors are integrated with processors and actuators, such as in Micro-Electro-Mechanical Systems (MEMS) which combine them with mechanical elements and decision-making and control capabilities. As sensors measure the physical world, actuators initiate physical response (moving, positioning, regulating, pumping, filtering), thereby intervening within, or controlling, the environment for some purpose. Along with sensors, microprocessors, and actuators, these systems include communication links, tags, controls, displays, and software.¹¹ They increasingly include locationing capabilities, as in new acoustical signature recognition technology that not only

5 Jannis Kallinikos and José-Carlos Mariátegui, ‘The Life of Information,’ **TELOS** 2007. URL http://www.telos-eu.com/en/article/the_life_of_information.

6 Nigel Thrift, **Non-Representational Theory** (New York: Routledge, 2008), 89–100.

7 Jannis Kallinikos and José-Carlos Mariátegui, ‘Databasing Life Patterns,’ **TELOS** 2008. URL http://www.telos-eu.com/en/article/databasing_life_patterns.

8 Thrift, **Non-Representational Theory**, 95.

9 Jerry Kang and Dana Cuff, ‘Pervasive Computing: Embedding the Public Sphere,’ **Wash. & Lee Rev.** 62 (2005): 93–147.

10 Malcolm McCullough, **Digital Ground** (Cambridge, MA/London: MIT Press, 2004), 75.

11 Ibid., 73–93.

identifies a gunshot profile, but instantaneously pinpoints its location. Especially as location and temporal referencing becomes critical, tracking has become bundled into these systems, in ways that change its agency, its materiality, and its orientation.

A transformation within academic research has occurred as embedded networked sensing has moved from the laboratory to the urban environment, and networks of miniaturized, wirelessly interconnected, sensing, processing, and actuating computing elements are embedded into the physical world.¹² Some of these systems are inaccessible to consumers, or permit the tracking of their movements in ways that are not apparent. Some of these systems, in contrast, are highly accessible, having entered the social arena in the form of all manner of mobile devices.

Networking and sensor technologies are used by law enforcement, the military, and national security. They are incorporated into body-monitoring systems, sometimes via implants, in the military and medical spheres where they participate in the translation of corporeal information (heart rate, hormone levels, temperature) into data, 'facilitating hyper-individualized control and the commodification of life functions.'¹³ Over the past decade there has been a shift to embed RFID tags in a growing number of personal items, consumer products, and identity documents. In these RFID systems, everyday objects, embedded with sensors and identifiers, are endowed with properties of cognition, communication, and action, yet much of this activity does not even involve humans, let alone consumers.

The tracked patterns from consumer activity are bought by companies that recombine them into profiles to be used for targeting promotion. Consumers rarely have access to the profiles that are used to define them. Interoperability is key in the production of these aggregated profiles: insurance companies combine information about individuals that is spread across different digitized sources – banks, medical records, tax returns, travel agencies – to produce individualized premiums that map risk and life profiles; police forces construct profiles of criminals by data mining aggregate financial transactions, travel records, and communication.¹⁴

At the same time, embedded network sensing has entered the social arena in the form of new generations of 'citizen activated sensors' in the urban environment. Perhaps chiefly, this occurs through the agency of the cell phone. Mobile phones are passive sensors that can silently and continuously collect, exchange, and process information in terms of sound, sight, and location: they sense sound (voices); they sense images and movement through built-in cameras; they sense location through GPS receivers or basic triangulation.¹⁵ New generations of 'citizen activated sensors' are visible through the proliferation of geocoded data and the accompanying GIS platforms for its visualization, through Google Earth, mapping APIs, and location-based services. Such GIS (Geographic Information Systems), which merge cartography and database technology to capture, store,

analyze, manage, and present data linked to location, are widely used across all sectors of urban life, in urban planning, land surveying, crisis management, and navigation. Web 2.0-enabled applications offer the ability to mashup or otherwise display customized layers of sounds, images, video, and statistics on visual schematics or maps, combining content from multiple sources.

Embedded network sensing in its citizen-activated variety has 'greatly reduced the technical barrier to visualize data in real space, to construct maps of layered information, and to analyze locational phenomena over time.'¹⁶ It is creating opportunities for collecting and managing a wide range of urban information, whether environmental, economic, or social, and thus opens up possibilities for new participatory models, in contrast to the proprietary ones outlined earlier – even as these participatory models retain, or amplify, surveillance potential.

These proprietary and participatory dimensions can be brought together in combinatory practices of 'urban sensing.'¹⁷ Practices of urban sensing shift focus and control away from the scientist or regulatory agency at the center, opening up the possibility of new forms of science, and new urban practices (scientific, artistic, political, sociological, etcetera), built from citizen-initiated data collection. Here data is collected and interpreted in ad hoc ways by everyday citizens, in ways that some suggest could rework the basis of the scientific method – moving 'beyond science itself.'¹⁸ Here statisticalization is augmented, over overshadowed, by a 'social data analysis' that might work on 'crowdsourcing' models, especially with the ease and increasing use of locationing technologies and Web 2.0 tools, along with the efficiency of new applications, resources, and mashups for managing and distributing information. Potentially, citizen-driven crowdsourcing communities could form to gather and maintain timely urban information that will supplement and possibly replace some out-of-date information obtained from official channels.¹⁹

Spatial information has become indispensable for urban development, planning, and management, due to advances in spatial information capture (especially satellite remote sensing and positioning), management (utilizing GIS and database tools), access (through web-mapping services), and analytical techniques (such as high-resolution mapping of urban environments).²⁰ The challenge is to break down the barriers of access and interoperability: to implement spatial data policies and standards, common metadata, formal data sharing arrangements and access mechanisms between

¹² Dana Cuff, Mark Hansen, and Jerry Kang, 'Urban Sensing: Out of the Woods,' **Communications of the ACH** 3 (2008): 24-33.

¹³ Torin Monahan and Tyler Wall, 'Somatic Surveillance: Corporeal Control through Information Networks,' **Surveillance & Society** 3/4 (2007).

¹⁴ Kallinikos and Mariategui, 'The Life of Information.'

¹⁵ Cuff, Hansen, and Kang, 'Urban Sensing: Out of the Woods.'

¹⁶ Ibid.

¹⁷ Ibid.

¹⁸ Ibid.

¹⁹ Robin McLaren, 'The Role of Urban Sensing in Managing Megacities,' International Workshop on Spatial Information for Sustainable Management of Urban Areas, FIG Commission 3 Workshop, Mainz, Germany, 2-4 Feb 2009.

²⁰ FIG Commission 3, 'Rapid Urbanization and Mega Cities: The Need for Spatial Information Management' Research Study, Copenhagen, Denmark: The International Federation of Surveyors (FIG) (2010).

units or agencies, in order to allow the real-time merging of data and services from various sources across the city, along with data-mining techniques and GIS that allow the integration of a wide range of spatial information and visualization strategies, including predictive simulations and models.

Tracking has developed in the centuries-old cartographic tradition, where it has traditionally relied upon observational expertise. Its history is based in the agential node of the vigilant observer, harnessed to the screen, interpreting movements on images or maps, however pictorial or schematic, urban or geographic. This cartographic tradition endures, yet not necessarily in such a participatory way. While most video analytics systems operate primarily in the image plane, many operate in the geospatial frame of reference. They aim to add 'geospatial awareness' – the geo-referencing of moving objects fully integrated into GIS systems. In the case of Geospatial Exploitation of Motion Imagery (GEMI), for example, video data is ingested from ground and aerial sensor platforms, then geo-referenced, indexed, and stored in a database, enabling queries for user-specified patterns of movement. When suspicious events are detected, the geo-referenced view enables users to pinpoint and trace back the activity in full integration with GIS systems.²¹

Even as tracking's cartographic tradition endures, however, the geographical is no longer its primary interface. GIS systems are simply one of many different modalities of interfacing data: the geo-spatialization of calculative operations. All of the actors involved in tracking do not require spatial representations, since most are not human. In a larger sense, tracking is being absorbed into locationing, much of which operates in non-visual ways, or in ways that are not directed at humans.

Location models are becoming essential for several reasons. As casual ad hoc connections between devices come into play, the relevant relationships between these actors can no longer be confined to the fixed infrastructures of the Internet – much interoperability is simpler, and at lower networking levels. Also, many physical activities are too fine-grained for GPS systems. Specialized site-embedded systems cannot operate independently in large numbers: they need to corroborate their respective representations. The more individual systems for sensing motion, establishing position, or controlling environmental elements aggregate and accumulate, the more they need to share some representation of who or what else is present, so that they do not produce contradictory results, or become redundant. Architectural elements of physical space often frame and cue actions.²²

Locationing is a form of spatial and agential articulation: to use a GIS for traffic information is to *declare* your presence. While one may want to be present in one location, one may want to be absent in another – or to strategically pass for someone or something else. As calculation, action, and materiality intertwine –

as movement is calculatively- and locationally-enhanced – a gesture can 'speak.' What, however, is it speaking *for*?

The challenge is to grasp the program at work in the environment within which one moves. And, further, how this program conducts speech and action: how it implements spatial, agential, and behavioral framing in a way that not only registers material presence, but also constitutes it.

IV Data-intensive, multi-agential environments – characterized by combinations of inexpensive sensors, interoperable clusters of computing platforms, high-bandwidth networks, and large-scale coordination among different database systems – are accompanied by analytical tools, modes of inquiry, forms of being, and practices of movement. As information and the technologies by which it is produced penetrate deeper and deeper into the fabric of everyday life, they remake a large range of everyday tasks, redefine the meaning of established ways of doing things, and introduce new practices and habits.²³ Technological systems are bound up in the production of social norms and protocols; connected to political economies, discursive regimes, and cultural mythologies, they acquire momentum and symbolic force through discursive constructions of the future.²⁴

This analytical, data-intensive surround can certainly be regarded as a new kind of environmental space – 'a background host of calculations of movement' that has become naturalized as part of the normal functioning of the world, to the extent that it now conditions all activity, becoming synonymous with mobility itself.²⁵ Within this information-intensive, analytics-driven environment, tracking has become elevated into a condition. It is part of a new regime of 'ambient informatics' where information processing dissolves not only into space, but into behavior²⁶ – along with new modalities of agency.

For Mark Weiser, who was one of the first to envision computers as a pervasive part of everyday life, the *intelligent agent* was the metaphor for the computer of the future.²⁷ With the advent of systems such as RFID, with its network of sensors, readers, computers, and back-end databases, even the most mundane objects suddenly seem to be endowed with some degree of cognitive ability: all manner of objects can, in some capacity, be understood to think, communicate with one another, and act in concert, in ways that do not necessarily involve humans.

As Katherine Hayles describes it, research in distributed cognition focuses on creating interrelated systems among sub-cognizers, readers, and relational databases – systems in which 'small sub-cognizers that perform within a very limited range of operation are combined with readers

²¹ T. Windholz, M. Toothaker, A. Stefanidis, and A. Caglayan, 'Geospatial Exploitation of Motion Imagery,' Technical Report, Milcord LLC, Waltham, MA (2007). See: DTIC AD Number ADB329555.

²² McCullough, *Digital Ground*, 98-102.

²³ Kallinikos and Mariategui, 'The Life of Information.'

²⁴ Monahan and Wall, 'Somatic Surveillance: Corporeal Control through Information Networks.'

²⁵ Thrift, *Non-Representational Theory*, 92-9.

²⁶ Adam Greenfield, *Everyware: The Dawning Age of Ubiquitous Computing* (Berkeley: New Riders, 2006), 24-6.

²⁷ Mark Weiser, 'The Computer for the 21st Century,' *SCI. AM.* 94 (1991): 94-95.

that interpret that information, which in turn communicate with relational databases that have the power to make correlations on much wider (and extensible) scales.' Combined together, 'the components constitute a flexible, robust, and pervasive "internet of things"' – a network of cognizers that 'senses the environment, creates a context for that information, communicates internally among components, draws inferences from the data, and comes to conclusions that, in scope if not complexity, far exceed what an unaided human could achieve.'²⁸

The human body itself can already be understood as a distributed system – the physiology through which thought occurs composed by networks of actors operating at multiple scales, and which extends into the surrounding world. In the case of these distributed cognitive systems, the human is one kind of actor among many others – objects, environments, hybrid sensing/computing instruments – whose activity is coordinated in distributed networks. Nonhuman actors become active partners, active consorts, endowed with agential and communicative abilities on their own. Ad hoc physical aggregations of actors congeal – including humans, microprocessors, sensors, communication links, tags, actuators, controls, software – becoming systems in themselves, in such a way that interoperability becomes critical.²⁹ All manner of new forms of agency begin to populate the urban world in ways that challenge the ontological centrality of humans. The challenge is not only to consider what can be *known*, but what can be said to *exist*,³⁰ as human and machinic capabilities and functions are distributed in new sensor/processor/actuator affiliations.

Consider 'intelligent material systems' as used in aircraft, advanced car designs, and infrastructure. Such intelligent materials or structures can sense their environment and adapt to it, varying their properties autonomously on the basis of external influences. 'Adaptive linear crash systems' for cars enable the force level of the energy absorption element to be individually adjusted. Structures that can sense their environment and generate data for use in health- and usage-monitoring systems are already well established in the field of aerospace. An aircraft constructed from a smart structure can self-monitor its performance to a level beyond that of current data recording. One can imagine the ability to control the aeroelastic form of an aircraft wing, thus minimizing drag, to the vibration control of satellites. Smart materials technology is being developed to monitor civil engineering structures, to assess durability and provide warning of structural problems, as well as for buildings and urban structures to automatically respond to adverse weather conditions, energy shortages, nearby fires, and crime events. Such structures might contain optical fiber sensors for monitoring load history and damage accumulation and adaptive structures containing novel piezoceramic, electrostrictive, magnetostrictive and 'shape memory actuators,' for real-time vibration and shape control.

As bandwidth and storage increase, powerful scientific instruments emerge that are part sensor, part computer, and which are capable of producing and capturing vast floods of data³¹ – for example, CERN's Large Hadron Collider – while at the same time, as sensors become ever cheaper, constellations of smaller sensor/processor/actuator systems multiply. The instrument becomes a filter or modulator of abundant data, built on distributed cognition, interoperability, and infused with social considerations. Such actor-instruments serve as sensory and proprioceptive conduits, filters, facilitators. They perform all manner of adjustments at the registers of the linguistic, the sensory, and the rhythmic – processing codes, transmitting intensities, and calibrating rhythms. They also serve as *aggregators*, for they do things in concert with other actors – actors that may have qualities similar to or different from their own.

In this way these actors are, in a Bergsonian sense, 'centers of indetermination' – selective processors or filters. Such an actor 'selects, from among the universe of [actors] circulating around it and according to its own embodied capacities, precisely those that are relevant to it.'³² The emphasis is on filtering, converting, modulating, gathering – in a way that can necessitate a certain vulnerability, and even loss. Perception is discernment – a narrowing of the field, a selection from the boundless aggregate of available material. Yet one could also regard the actor less in terms of a subtractive model, in favor of an additive one – that is, one where an actor is continually engaged in 'adding new features to physical matter (and especially all manner of pervasive infrastructures) which, arguably, alter the sense of what matter is about.'³³ Or, one could adopt an interventionist model, where actors produce disruptions or "clearings" that disclose opportunities to intervene in the flow.'³⁴

Spinoza would characterize such actors – whether skis, microchips, animals, sounds, compositions, books, ideas, stones, or songs – as 'the individuating affective states of an anonymous force.'³⁵ Rather than simply *relating* to one another as discrete entities, these actors *modify* one another, at the level of both matter and meaning. Through this modification, their ability to act, think, and materially exist is increased or decreased, aided or restrained, amplified or diminished. A primary component of this modification is affect. According to Brian Massumi, affect is not a personal feeling, but 'a prepersonal intensity corresponding to the passage from one experiential state of the body to another and implying an augmentation of diminution in that body's capacity to act.'³⁶ Affect is a vitality, a pure potentiality – an undifferentiated, moving kaleidoscope of sensations and states. It is a contradictory dimension in which anxieties and pleasures cohabit before they can be categorized as such. It is a form of activation that is not necessarily available to the con-

²⁸ Katherine Hayles, 'RFID: Human Agency and Meaning in Information-Intensive Environments,' *Theory, Culture, and Society* 2-3 (2009): 47-72.

²⁹ McCullough, *Digital Ground*, 73-93.

³⁰ Hayles, 'RFID: Human Agency and Meaning in Information-Intensive Environments.'

³¹ Markoff, 'A Deluge of Data Shapes a New Era in Computing.'

³² Mark Hansen, *New Philosophy for New Media* (Cambridge, MA: MIT Press, 2004), 2-3.

³³ Thrift, *Non-Representational Theory*.

³⁴ Knor Cetina, cited in Thrift, *Non-Representational Theory*.

³⁵ Spinoza, cited in Thrift, *Non-Representational Theory*, 13.

³⁶ Brian Massumi, in Gilles Deleuze and Felix Guattari, *A Thousand Plateaus* (Minneapolis: University of Minnesota Press, 1987), xvi.

scious mind, but is shared nonetheless by the synaesthetic perceptual faculties of the body substrate – including the proprioceptive (the unconscious sensory flow from the movable parts of the body, through which position and tone of motion are continually adjusted) and the visceral (the deeper excitations registered by the organs and systems of the body before they can be processed by the brain).

Affects, then, are both smaller and larger than individuated internal responses. They work through resonance instead of relation. They are absorbed and transmitted by and between bodies, as well as between bodies and environments, in ways that complicate the boundaries between them.³⁷ Affects are material, physiological phenomena: they are the means through which actors act on or influence one another in ways that can alter their material constitution – their physiology, their anatomical makeup. Like discourse, affect is material and materializing – meaningful by virtue of its embodiment in physical arrangements.

As networked computing elements become embedded into physical objects and environments to the extent that they become a part of everyday space, the physical environment, having gained digital and communicative qualities, becomes ‘animated’³⁸ – it becomes able to respond directly to what it apprehends, in ways that might be considered automatic (such as building climate control) or autonomous. Whether or not one has a direct connection to this data-intensive surround does not necessarily matter, since its effects are everywhere, and ‘the environment acts as a prosthesis which offers cognitive assistance on a routine basis’³⁹ – and, one might add, *ontological assistance*. There is an information ambience, a ‘sense of continual access to information arising out of connectivity being embedded in all manner of objects.’⁴⁰ This ‘sense of access’ cannot solely be regarded in terms of a politics of rights, because it is also a *sense* rooted in all manner of psychic, somatic, and social practices, or programs, with implications in the realms of affect, imagination, and identity. It outfits space with ‘new kinds of locational fantasies and fears, new ambulatory tropisms and tendencies.’⁴¹ Combinatory practices congeal that are activated not just by individuals but by complex assemblages of agency that span familiar designations and ontological distinctions, and which connect deep into the realms of the unconscious, the somatic-sensorial, and the imaginary.

V While human behavior exhibits relatively stable patterns, it is impossible to write a set of rules that can be expected to cover the full range of possible behaviors for any given environment. Thus, video analytics is limited by its rules-based requirements. A newer generation of analytics aims to bypass this limitation by incorporating ‘adaptive learning.’ In essence, adaptive learning technology is a combination of video analytics, computer vision, and machine-learning capabilities.⁴² The technology takes the input from existing video security cameras, recognizes and identifies the objects in each frame to learn what activity normally

takes place within the area under surveillance. It then analyzes the changes, activities and motions of those objects, and builds a model of established behaviors. The system can then compare current behaviors to these normal patterns it has learned through observation, in order to detect, track, and classify abnormal behavior – activity that is deemed high-risk or potentially threatening – and alert security personnel accordingly. All of these activities take place ‘automatically,’ without the need of constant human involvement to create rules and update settings. In theory, adaptive learning systems can adapt to changes in the observed environment ‘on their own,’ adapting to new scenes and learning from experience, allowing them to identify threats and behaviors that were not previously defined or anticipated.

Unlike rules-based analytics, adaptive learning allows the computer to classify objects without any preprogrammed definitions or specifications. No human is required to define parameters for the software to recognize behavior or objects; the software reports unusual or suspicious behaviors based on memories it has acquired through observations over time. For example, in the case of a system developed by BRS Labs, every object in the camera’s view is classified by a ‘Machine Learning Engine’ based on ‘its own observations and memories it creates itself.’ The learning engine gathers information about dominant object content – tracking, for each object, features like a subject’s size, color, reflectivity, sheen, shape, and level of autonomy. The system decides, ‘on its own,’ how a human is classified as opposed to a car or animal or any other object. All objects are categorized and classified based on information unique to each camera – the software learns and stores the activities and behaviors that are normal for each view on pan/tilt/zoom cameras, quickly learning new scenes each time the camera is moved. This enables the system to observe the scene and learn to identify not only normal and anomalous behaviors, but also the types of objects that exhibit those behaviors in the scene – in theory, providing a more in-depth understanding of scene content.

Such systems are frequently referred to as ‘automatic’ or even ‘autonomous.’ In this way the algorithm is dehumanized. However, algorithms are human decisions expressed in code.⁴³ They may be implemented by a computer, but humans have commanded the computer. We forget this because we do not see the human, or even what we recognize as human language, and although code is generally written in the imperative or declarative, it is often perceived as passive. ‘Algorithms are powerful expressions of human will that humans can hide behind to dodge responsibility for their actions.’⁴⁴ And yet, what exactly do we mean by the term ‘human’? In a world of ambient informatics where computing, materiality, and behavior intertwine, is there a human outside algorithm?

³⁷ Teresa Brennan, *The Transmission of Affect* (Ithaca/London: Cornell University Press, 2004).

³⁸ Kang, and Cuff, ‘Pervasive Computing: Embedding the Public Sphere.’

³⁹ Thrift, *Non-Representational Theory*, 92–9.

⁴⁰ Ibid.

⁴¹ Ibid.

⁴² Eric Eaton, ‘Learning to Adapt,’ commentary on Network Centric Security website, 2008. URL <http://netcentricsecurity.com>.

⁴³ Amy Alexander, Nettime mailing list, 3 August 2008. URL: <http://www.nettime.org>.

⁴⁴ Ibid.

The fact that a deed was done by a computer does not make the decision mechanical, blind or objective⁴⁵ – yet certainly, there is a combinatory agency at work here. Qualities intercede within the realm of the algorithmic, and thus, when considering its orientation in the world, this is a combinatory mode of organization that carries with it a *disposition*. To foreground disposition – affectively-grounded behavioral tendencies, attitudes, moods, or general temperaments that condition action – is to acknowledge intangible, corporeal dynamics of movement, sensation, and rhythm, as well as calculi of symbolic positioning. If human and machinic capabilities and functions are distributed in new sensor/processor/actuator affiliations, then distinctions such as ‘automatic,’ ‘autonomous,’ or ‘unmanned’ are misleading due to their imposition of absolutes. If we begin with the assumption that there is nothing fully machinic nor fully human – all are multi-agential affiliations – then the question becomes one of the nature of the combinatory agency at work – an agency that, in its combination of algorithm, materiality, and behavior, *is as it does*. The question is, what does it do, and how is that activity harnessed, shaped, registered? With what actors does it affiliate? The emphasis shifts from an inquiry as to who or what is observing, toward one regarding the practice – the nature of the *program* at work.

To proceed in this way is to open the ‘black box’ of autonomy, the automated or autonomous system within human agency is concealed. According to Bruno Latour, an actor is always a multiplicity, but we ‘black box’ it.⁴⁶ An actor is simply an affiliation that has been ‘black boxed.’ When a gathering of heterogeneous actors becomes stable enough to be regarded as a single actor, a singular coherent entity in time, however provisionally, it can be regarded as an affiliation. An affiliation is not simply a gathering, however, but also a distributed network, since these actors, even though they are able to act in concert, are not necessarily in the same place. In this way affiliations exist on the order of Latour’s actor-networks,⁴⁷ Deleuze’s assemblages,⁴⁸ or Guattari’s ‘eco-philosophical’ entities⁴⁹ – dynamic, multi-scalar organizations that span the biological, the social, and the urban. They draw on concepts of emergence – however the ‘becoming’ that they enact does not happen primarily *within* the actor but *across* it, through the actor’s *extension* in affiliations, and in this sense they adhere to what Graham Harman calls a ‘functional’ concept of emergence, where ‘a thing emerges as a real thing when it has new effects on the outside world, not because of any integral emergent reality in the thing itself.’⁵⁰

Affiliations operate at multiple scales, through a variety of actors, according to different programs, at different times. Multiple levels of organization are at work, with ongoing translations between orders of complexity. Affiliations foreground ‘the massive and dynamic interrelation of processes and objects, beings and things, patterns and matter’ – revealing how ‘elements of complex systems “cooperate” to produce more than the sum of their parts.’⁵¹ As with actor-networks, these affilia-

tions demand nonreductive approaches, nonreductive networks of interpretation; the challenge is to find ‘ways to conceptualize and use the interplay between such states, rather than reduce them to grand isolates.’⁵²

Even though characterized in terms of affiliations, then, actors are never fully contained within them: transversal mixings, transmissions, and bondings are always possible, across multiple spatial and temporal scales, in larger or smaller affiliations. As such, while locationing may be a vital component of the affiliation, the affiliation is not entirely subject to geospatial dictates. Disposition is a necessary adjunct to position: an affiliation may not be able to be localized, but one can try to apprehend what it *tends to do*.

To ‘open’ this box, to look ‘under the hood’ of an affiliation is to witness a strange confederation of players – ‘a bestiary of agency, kinds of relatings, and scores of time.’⁵³ It can require a great deal of labor, and so it is often more convenient to agree to keep the hood closed. An affiliation, as a multiplicity, is constituted as an accordance: it is a linguistic and formal device, a platform of departure, a strata of agreement, from which to examine the constitution of an event. And yet, it is not simply a symbolic construction but a material entity existing in the world.

To delve into the nature of the program at work – to open the ‘black box’ within which agency is concealed – is to question the ‘naturalization’ of an ambient, calculative surround, its congealment into a standardized or ‘default’ space, a normalized atmosphere or force, which is no longer seen in terms of specific analytic operations. It is to inquire into the embodied practices and algorithmic procedures that construct the norm against which the event, as a deviation, flares up.

Programs are *practices*, ripe with political potential. Algorithmic rules, programmed with some degree of human agency, are based on various sets of assumptions. As Kallinikos and Mariátegui write, classification and standardization presuppose the operation of a logically constructed scaffold on which categories are crafted and make sense – a scaffold that gains significance at the expense of other ways of perceiving and framing life events. What appears in algorithms and databases must pass through this scaffold as well as the standardized forms of information that the system as a whole admits. As this occurs, contemporary forms of life are constituted as derivatives of these associations.⁵⁴ Following Geoffrey Bowker’s call to create flexible databases that are

45 Amy Alexander, ‘About ... Software, Surveillance, Scarieness, Subjectivity (and SVEN)’ in **Transdisciplinary Digital Art: Sound, Vision and the New Screen**, ed. R. Adams, S. Gibson, and S. Müller Arisona eds. (Berlin, Heidelberg: Springer-Verlag, 2008), 471.

46 Cited in Graham Harman, **Prince of Networks: Bruno Latour and Metaphysics** (Melbourne: Re:Press, 2009), 34.

47 Bruno Latour, **Reassembling the Social** (New York: Oxford University Press, 2005).

48 DeLanda, **A New Philosophy of Society: Assemblage Theory and Social Complexity**.

49 Félix Guattari, **The Three Ecologies** (London/New Brunswick: The Athlone Press, 2000).

50 Harman, **Prince of Networks: Bruno Latour and Metaphysics**, 158.

51 Matthew Fuller, **Media Ecologies** (Cambridge, MA: MIT Press, 2005).

52 Ibid.

53 Donna Haraway, **Modest_Witness@Second_Millennium.FemaleMan_Meets_Onco-Mouse** (New York: Routledge, 1997), 6.

54 Kallinikos and Mariátegui, ‘Databasing Life Patterns.’

as rich ontologically as the social and natural worlds they map,⁵⁵ the challenge is to *extend* program to allow for the accommodation of more structures of life. This is not to ‘critique’ it in a reductive way, but to work with it, expand its potential, its ontological and epistemological horizon. What does program do, what does it demand? How can it be ‘opened up,’ made flexible, more accommodating?

As the info-intensive, ‘animated’ physical environment acts as a prosthesis that offers cognitive and ontological assistance,⁵⁶ the ‘sense of continual access to information’ that arises out of the connectivity and interoperability among all kinds of data-enhanced actors cannot solely be regarded in conventional political terms, because it is also a *sense* rooted in all manner of bodily, psychic, and imaginary practices, to the extent that it may even constitute a technological or environmental ‘unconscious’⁵⁷ – one that outfits space with ‘locational fantasies and fears,’ new formats of movement and tendency.⁵⁸ This suggests a political approach that avoids generalizing concepts such as ‘power’ or ‘control,’ as combinatory practices congeal that are activated by complex affiliations of agency that span familiar ontological, social, and agential distinctions. As qualities intercede within the realm of the algorithmic, and affiliations harbor dispositions, a *politics of program* confronts new challenges that question the very nature of the political.

VI Tracking seeks to render all actors locatable – tagged and locationed by way of their movements. Yet it subordinates all positioning to movement. It seeks to quantify and harness activity, yet the entity that is tracked, as constituted in this activity, it not simply a movement devoid of substance. As analytics, materiality, and behavior intertwine, material ‘being’ is interpolated into a path, a nexus of coordinates, in the same way that behavior is inferred.

Consider Bruce Sterling’s concept of the ‘SPIME,’ developed in order to rethink the constitution of the object in multi-agential environments, particularly as manifest with RFID technology. Here the object is reconceived as a kind of output or instantiation of a flow; the SPIME is ‘not about the material object, but where it came from, where it is, how long it stays there, when it goes away, what comes next.’⁵⁹ As Katherine Hayles points out, in an RFID world ‘property is defined by two interpenetrating but distinct systems: one based on possession of the material object, and the other on data about the object.’⁶⁰ Which does tracking, as a practice, want to harness: my patterns, my objects, my acts, or ‘me’? For Sterling, it’s the pattern, more than the thing itself; but even more, it’s the pattern more than the *act*. ‘My consumption patterns are worth so much that they underwrite my acts of consumption.’⁶¹

With technologies like RFID, humans are tracked by way of their objects – their increasingly cognizable companions – in terms of items purchased, transported,

consumed, and items that are gathered together with them in attendance. As actors gather together, ‘being’ is interpolated into the gathering.

As Nietzsche has written, ‘there is ... no “being” behind doing, effecting, becoming; “the doer” is merely a fiction added to the deed – the deed is everything.’⁶² There is no entity outside of action. Constituted as *action-densities*, actors are not subject to traditional containment metaphors. They are not produced, pre-existing objects or subjects; rather, they are performatively engendered along a potentially equal field of action, and through this instantiation they are endowed with, or accrue, particular capacities, knowledges, awarenesses, abilities. Especially with a focus on interoperability, the constitutive relation between action, agency, and presence – between pattern and act, movement and materiality – requires performative models.

As Karen Barad defines it, matter is performed substance – ‘a stabilizing and destabilizing process of iterative intra-activity’ – ‘not a thing but a doing, a congealing of agency.’⁶³ Emphases on subjectivity are necessarily diminished in favor of transindividual modes of apprehension and existence distributed among actors. There is no a priori differentiation between body and other, or subject and object, or thought and action: a material state, and a condition of subjectivity or objectivity congeals, to the extent that positions can be adopted and flows calibrated, perhaps, but not necessarily, in terms of identity. Actors are engendered through recombinations of variations and interoperabilities that occur below and across the surface of bounded spaces and bodies. Agency is congealed, moved, and sustained in affiliations through its *extensions* – its introjective ‘reachings.’

Extension, as a relational process, can be broadly understood as will to power if, following Heidegger’s reading of Nietzsche,⁶⁴ we do not understand this ‘will’ as simply desiring, striving, or wishing – heading toward something or going after something. It is not about the willing of a particular object as such. Neither is it simply a command: will is an *affect of command* – and even though it is a basic act of assertion, the very basis of establishing the determining ground of action, of preceding to establish something, it is not about volition, control, or possession. It is a reaching, but one that also reaches within.

Extension, as will, fundamentally reaches out beyond itself. Such a state of ‘being beyond one-

⁵⁵ Geoffrey Bowker, *Memory Practices in the Sciences* (Cambridge, MA/London: MIT Press, 2005), 256.

⁵⁶ Thrift, *Non-Representational Theory*, 92-9.

⁵⁷ Katherine Hayles, ‘Traumas of Code,’ *Critical Digital Studies: A Reader*, eds. Arthur and Marilouise Kroker (Toronto: University of Toronto Press, 2008).

⁵⁸ Thrift, *Non-Representational Theory*, 101.

⁵⁹ Bruce Sterling, cited in Hayles, ‘RFID: Human Agency and Meaning in Information-Intensive Environments,’ 109.

⁶⁰ Hayles, ‘RFID: Human Agency and Meaning in Information-Intensive Environments.’

⁶¹ Sterling, cited in Hayles, ‘RFID: Human Agency and Meaning in Information-Intensive Environments.’

⁶² Cited in Alphonso Lingis, ‘The Will to Power,’ in *The New Nietzsche*, ed. David B. Allison (Cambridge, MA: MIT Press, 1977), 37-63.

⁶³ Karen Barad, *Meeting the Universe Halfway* (Durham/London: Duke University Press, 2007), 151.

⁶⁴ Martin Heidegger, *Nietzsche, Volumes I and II* (New York: HarperCollins, 1979), 41-54.

self' is what Nietzsche calls 'the primitive form of affect.'⁶⁵ One is not necessarily in control of this: this 'being beyond oneself' can be read on the order of an 'agitating seizure,' where something comes over us; we are seized by something; we are 'beside ourselves' – 'our being master of ourselves is transformed into a manner of being beyond ourselves where something is lost.'⁶⁶ Thus will is not just about mastery or intentionality. Extension is a state of agency's being beyond itself, an actor's being beyond itself, not necessarily of its own accord. In extension, something is gained through something lost. The entity vibrates out of itself, is vibrated out of itself, through affect and rhythm as well as language.

How then to characterize extension's enabling ground? It could be understood as a turbulent flow of energy and matter that is fundamentally 'con-divided.' This con-divided field of ontological possibility is undifferentiated, yet nonidentical to itself: it harbors what Agamben might refer to as an immanent otherness ('not an other I, but an otherness immanent to selfness.')⁶⁷ To regard this ontological field as con-divided in this way is only contradictory if it is understood in terms of pre-constituted agency and is subjected to the demands of a successive model. To entertain this process requires a performative principle of irresolute simultaneity: the expansive, active traversal of a moment, through which times and spaces, in their plurality, are engendered.

For Karen Barad, con-divided agency can be said to 'intra-act' rather than 'interact,' in order to signify the mutual constitution of entangled agencies.⁶⁸ Intra-acting, con-divided agency is awash in transmissions of energy and pattern – transmissions that are affective, rhythmic, and linguistic. At the level of affect and rhythm, this involves the emission and reception of electro-chemical signals (via, for example, touch and smell) and electric or nervous impulses (via, for example, touch, sight, and sound).⁶⁹ At the level of the cognitive, this involves vibrations emitted and received at different frequencies that are processed in terms of language, however it is broadly understood.

Agency is awash in transmissions as both sender and receiver, conduit and modulator. Filtering or modulating activity allows this transmission to be resisted or transmuted – in ways such as deceleration or acceleration, recoding or coding, or the translation of an affect into a code. In a Bergsonian sense, this is agency's constitution as a selective processor or filter.⁷⁰ As agency modulates transmission, it is gathered, it gathers itself as actor. In this way, the filtering, resistance, or modulation of transmission is instantiating. Transmissions gather and instantiate through modulation. This modulation is not 'mediation,' as there is nothing between actors except other actors. If there is mediation, then it is a performative one that the actor does with its own 'body' or, through affiliation, with the 'bodies' of other actors. Modulation is more on the order of *entrainment* – a process through which transmission is materialized or stabilized, affective responses are

linked and repeated, and actor's nervous, cognitive, and hormonal systems are brought into some degree of alignment with one another.⁷¹

Transmissions exceed actors, flowing through them. To speak of transmission and modulation is to include a multiplicity of implicated, constituted actors who are awash with affect and rhythm as well as language. As Teresa Brennan describes it, a stream of affect can be transmitted in such a way that an actor congeals through a discernment – perhaps even a judgment – that is made about the recipient. The affect can be 'offloaded,' transferred elsewhere, in such a way that one actor instantiates oneself as 'absolved' of it: by redirecting the affect onto another agent, one actor constitutes itself through a discernment of what it is not. It can imbue the other actor with all of the affective qualities that it wishes to disavow, and in the extreme case, militate against it, with the aid of, and in the form of, a judgment.⁷² By means of this transmission, one actor instantiates oneself as separate from this other, in a qualification distinct from the other, imposing a role upon the other even though that actor's own sense of role is most likely different. There is no denying the satisfaction of such a transferral, even though such satisfaction may not stabilize as a known emotional state – and in fact many traverse several conflicting states such as joy and hatred. A discernment can still allow a flow, but a judgment blocks it: both produce an agential distinction, but the latter is more restricting, buttressing one's illusion of self-containment by the severing of extension.

Instantiation is action. An affective transmission is absorbed, a discernment is made about the sensory state that this conjures, and this affect is transmuted and stabilized in an actor's expressed gesture. The human, the raised hand, and the raised eyebrow all are actors instantiated. To instantiate is to modulate transmissions – linguistic, affective, and rhythmic – among actors. The action *is* the performative modulation of these signals in a field of multiple actors. The action and the embodiment each happen in conjunction with the other, to the extent that they go hand-in-hand. When and where modulation happens, agency is instantiated as an actor: an actor exists then and there, in relation or exchange with another actor who exists then and there.

Extension, then, is the process whereby 'con-divided' agency reaches *into* and *across* itself, stationing itself abroad among actors so as to establish a field of action.⁷³ It is the process of engendering *conductive exteriorities within* agency: interiorities-in-exteriority, exteriorities-within-phenomena⁷⁴ that are not just constituted as differences that can be related but as transmissions that can be modulated. This relation-modulation is the basis of communication between instanti-

⁶⁵ Cited in Heidegger, **Nietzsche, Volumes I and II**, 42.

⁶⁶ Ibid., 46.

⁶⁷ Giorgio Agamben, **What is An Apparatus? and Other Essays** (Stanford: Stanford University Press, 2009), 34.

⁶⁸ Barad, **Meeting the Universe Halfway**, 33.

⁶⁹ Brennan, **The Transmission of Affect**.

⁷⁰ Hansen, **New Philosophy for New Media**.

⁷¹ Brennan, **The Transmission of Affect**, 68.

⁷² Ibid., 119.

⁷³ Heidegger, **Nietzsche, Volumes I and II**, 48.

⁷⁴ Barad, **Meeting the Universe Halfway**, 140.

ated agencies. It is both the catalysis and the result of the instantiation. Extension serves to congeal agency and materiality, as both productive of and part of the phenomena produced. It con-divides agency, differentially activating its inherent con-dividedness, its immanent otherness – enacting conductive, differential being within an undifferentiated field of presence.

VII As tracking has become elevated into a condition, dissolving into space, behavior, and all manner of social practices, ‘being’ is interpolated into a cluster of calculation, materiality, and behavior – performatively enacted between pattern and act. This performative relation must be considered with the true extent of tracking’s anticipatory orientation in mind. Ultimately, tracking seeks to characterize an actor not in terms of what it is doing, but what it will do. (In human terms, perhaps this is simply the furthering of the body’s anticipatory predisposition at the biological level – its genetic ‘priming’ for strategic advantage in the competition for resources; as such, one could regard tracking as a practice whose impetus exists in ecologies both below and above the timespace scale of the human.) Inferred through tracking’s predictive impulse, actors are infused with tendencies – what they might want, where they might go – generated through calculative operations. They *are* as they *do*, and what they do is inflected by what they will do.

In tracking’s world of strategic calculation, then, reality does not fully coincide with itself. Embroiled in externalizing agitation, the conducting of introjective reachings into and across one another, an actor is real, fully actualized, but it *also leans out of itself*, both voluntarily and involuntarily. It is a cluster of materiality and action – a performatively constituted, material congealment of rhythm, affect, and code – that never fully self-coincides. It is a leaning-position, an instant-trajectory, a position-passage.⁷⁵

In order to maintain this contradictory ontological state between material being, activity, and tendency, we can say that an actor is always *tending*. It is tending to the activity at hand (engaged in the present task); it is tending to do something (exhibiting a tendency to move in a certain way); it is being attentive (in whatever degree, and with whatever faculties); and it is attending an event (gathered together with other actors in attendance). All of these ‘dimensions’ are operative, though not in equal measures. The anticipatory orientation can be diminished, for example, and the attending orientation amplified: one can focus primarily on what an actor is doing, along with its modes of attentivity and attendance, rather than what it will do.

Through performative means, the actors gathered together in tracking are primed, conditioned, to *expect* an action, however causally understood. Tracking constitutes events in expectation. The expectation is programic, infused with program.

It can congeal in a disposition: the tracked object, along with the actors gathered with it, accrue a disposition, and they are mutually attuned, stabilized accordingly. The stabilization can be disrupted – the event can slice through it – or it can be met, perpetuated. A scrim of expectation is overlaid upon the real, which all of the actors in attendance uphold. They uphold it to some *extent* – they *extend* into and across one another in a web of influence and expectation. This web is however tenuous: it is provisionally stabilized – stable enough to do the job – but it is also bound up in destabilizations that both threaten and strengthen it (giving it agility, adaptability).

In this way the event is constituted as an object of fascination or concern through the stabilization and destabilization of a web of action, whether this is understood in terms of space, sensation, materiality, or attention. It soothes and arouses its attendant actors – the actors that it has drawn together in tending, and that have drawn it together in tending.

Since agency is performatively enacted, it must not only gather but maintain itself in a continuing move – the move from one gathering into and across the next. It must be sustained in some way; otherwise it would simply disappear as soon as it was instantiated. The performative instantiation of an actor can endure only if other actors continuously modulate it – that is, only if it is active in affiliations that maintain it. An actor must do or disappear: it must affiliate with other actors, perpetuate its modulation in affiliations that extend it, ‘slide’ it forth. This is the basis of movement and continuity: affiliations perpetuate that toward which the actor inclines, leans, *tends*. Once an actor ‘gets moving’ in this way, it becomes more difficult to stop it: it achieves momentum. It imposes its demands on others – especially if, as a program, it accrues influential standards.

Agency congeals in its movements: it congeals in its modulations of lucidly gathering ‘holds’ within agency – moves that are not necessarily intentional or willed. In order that transmission and gathering can be ‘held,’ regularized enough to be interfaced with, resonated with, and shared, some degree of stabilization or durability in the transmission and instantiation must occur – a coherency or constancy must be engendered, in order that transmission and instantiation can be made familiar or common enough to be discerned as something.

Extension, as will, involves a resoluteness of command ‘by which willing can come to grips with what is willed and the one who wills’ in a foundational and abiding decisiveness.⁷⁶ This ‘decisiveness’ is the state of having a stance, a stationing, yet it does not imply a sealing-off or closing-up: it is not about a producing so much as a taking up and transforming.⁷⁷ If extension can be understood to enact a ‘hold’ or ‘grip,’ then, it is not a clutching – not about the establishing of a hard and brittle encapsulation or connection. Rather, it is an interactive, regularizing ‘holding’ that requires an active, negotiated dynamic between stabilization and destabilization – a *dynamic stability*. It is about engendering something stable enough or reliable enough to do the job – as using one’s

⁷⁵ Brian Massumi, *Parables for the Virtual* (Durham and London: Duke University Press, 2002), 66.

⁷⁶ Heidegger, *Nietzsche, Volumes I and II*, 41

⁷⁷ *Ibid.*, 61.

cupped hands to move dirt from one place to another (they're stable enough to reliably transport the dirt, even though some of it will filter through). There is always a modulating component to this gripping. It is both creative and destructive, involving both expanse and annihilation; gain and loss. Thus 'willing' does not always imply a 'willing for more,' for it is also a *willing for less*. Extensive modulation is always about the discharge as well as the accumulation of energy.

Affiliations are what move the actor, slide it forth, perpetuate its existence, allow it to endure. An actor must cultivate affiliation, then, in order for it to continue to exist: it must cultivate its relevance and influence. The actor must be push forth, be pulled forth, through affiliation, whereby its modulation is continuous and entraining. In order for this to occur, some degree of regularization or stabilization in the transmission and instantiation is necessary in the gathering. A dynamic coherency or constancy is needed, in order that transmission and instantiation can be regularized enough to be discerned, sensed or made sense as something.

VIII A discernment is an apprehension, in matter of degree, from a soft distinction to a hard judgment, derived from a consistency of transmission. Discernments are directed inwardly and outwardly – that is, agency discerns 'itself' as it discerns 'others.' Since agency is divided, nonidentical to itself, 'the I and the [other] are the two faces, or the two poles, of this con-division or sharing.' There is 'an otherness immanent to selfness, a becoming other of the self.'⁷⁸

This process involves regularity, commonality, and accumulated use. Attributes that are relatively stable, standardizable, and reproducible must congeal, in such a way that discernments can be selected from these available attributes, and shared to a certain degree by other actors. A community can only exist through some form of routinization and agreement – adherence to protocols. Attributes are relatively stabilized and shared discernments: sets of characteristics, features, or properties of instantiated actors, performatively enacted, stabilized, and made durable to some degree. If discernment is selection, an attribution is a selectable and *affiliable* aspect, quality, or feature. Discernments are selected from available attributes, however, attributes establish the ground upon which stable and enduring discernments can be made.

A linguistic transmission is stabilized enough on both the sending and receiving end to be discerned, decoded, and recoded in a qualified response. In order for this to have occurred, the discernment must have been based on features that both sender and receiver share. A rhythmic transmission is absorbed and imitated, its features matched, in such a way that the receiver adjusts rates of movement and coordinates with the sender, in a conscious or unconscious need to achieve a level of intimacy and trust – a stabilized space built on common characteristics, perhaps with very little discernment, or perhaps with a higher degree of

judgment. Affects, rhythms, and codes work in conjunction with one another, and as such, affective, linguistic, and rhythmic modulation is combinatory: a linguistic transmission can be stabilized as an idea, but an accompanying affective and rhythmic transmission can transmit the *tone* of the idea – allowing it to be absorbed, discerned, and qualified in rhythmic and sensory adjustment.

To select from available attributes is to affiliate with available actors. Some attributes must be shared in order for communication to occur at all, and thus, attributions always have the possibility of becoming standardized – stabilized as mutually shared bases for communication and action. In this way an attribute can also function as an actor, where it is gathered and 'held' in such a way that it can be counted upon to facilitate agreements.

Program is an actor-attribute that allies with language and rhythm to magnify the affiliate's potential for standardization. Through programs, languages, and rhythms an increased ability to engender variable replication in the form of template mechanisms, standards, and protocols is demonstrated. Standards involve the adherence to presets, the setting forth or furthering of regulations and reproducible agreements; they are about continuities, not differences. Program, then, is an actor stabilized *as* or *with* an attribute such that it can facilitate higher-order agreements among actors: a kind of structural alliance across affiliations that can allow them to communicate, replicate, or extend one another, expanding networks of intimacy and influence. It thus has the possibility of achieving a higher-order performative mode of affective, cognitive, and rhythmic stabilization and entrainment.

Program is a relatively stable actor that can lead to enduring commonalities and agreements between affiliates, yielding larger-scale (macro) affiliates. Program allows actors existing at multiple scales to affiliate through common templates and standards that link micro- and macro-levels of social reality. Programs are capable of operating at multiple spatial scales simultaneously and allow actors operating at different spatial scales to replicate, as when an organization opens a new branch in a different locality and transmits its operational protocols to new employees who must adopt them.⁷⁹ New routines, procedures or rituals can be introduced in affiliates which alter or preserve their attributes. The city, as an affiliate, sustains and perpetuates itself through these kinds of transmissions; its actors affiliate across both the horizontal and vertical planes of existence, so to speak. Programs can ignite replication, amplification, extension; they can be inscribed in barely perceptible ways, as in the amorphous, yet standardized, configuration of a queue. Actors exert cumulative influence on developing affiliates (as they are shaped by them) to the extent that they can facilitate programs, expanding their sphere of influence by replicating and developing alliances – generating relevance, influence, and intimacy through accumulated use.

Affiliation is what 'carries forth' the actor, perpetuates its existence. Program is a specialized actor

⁷⁸ Agamben, *What is An Apparatus? and Other Essays*, 34-5.

⁷⁹ DeLanda, *A New Philosophy of Society: Assemblage Theory and Social Complexity*, 45.

that has accrued such a vast degree of durability and influence that it sedimentates into the constitution of all affiliates in one way or another, becoming particularly influential as an actor's necessary lifeline – the very condition for its existence.

IX Discerned attributes that are relatively stable, reproducible, and shared, engender sets of *expectations*. Actors are instantiated with certain leanings, affordances, tendencies. One can stabilize, discern, and qualify an actor in terms of its tending, then, in the form of what one expects it to do. It can be stabilized and discerned in terms of these expectations. We can expect actors to do something, to perform in a certain way – we 'count on' them to do something, to *tend*, to conform to our expectations. One waits to be satisfied in this way: the pleasure of the routine.

Expectation can be bundled into extension, into one's discernment of the actor – but it may not be shared; it may not endure. The actor or affiliate that internalizes these expectations – these relatively stable, regularized, reproducible, and shared attributes – or is saddled with them, in an enduring way, accumulates dispositions. A disposition is a relatively stable, reproducible, and shared attribute, carried forth through enduring expectations. It is the qualification of an actor's tending – its character, temperament, non-essential 'nature,' attitude, or inclination to act in a particular way. It is an actor's 'interior' sense of self that informs its attitudes and orientations toward potential outcomes. Yet it is also imposed from without.

Dispositions acknowledge intangible, corporeal dynamics of movement, sensation, and rhythm, as well as calculi of symbolic positioning. They can be understood in terms of behavioral tendencies, attitudes, moods, or general temperaments, which condition action. They can mobilize conscious and unconscious states that can be understood in terms of desire or fear, trust or suspicion, anticipation or avoidance, ease or unease. In this way disposition can be understood as *readiness* – the qualified, embodied arousal of an actor as it anticipates encounter with other actors.

Readiness is a disposition to act that exists somewhere between an internal bodily state and a conscious opening out onto the world, between ambiguous bodily arousal and focused alertness. It is the body's way of preparing itself for expression, a lived interior state that pushes at the boundaries of activity. With the aid of new micro-technologies and techniques of physiological measurement, tracking and its calculative demands probe deep into the biological substrates of these micro-movements: micro-states and processes that may be expressed in gesture, posture, or speech – but not necessarily. Physiological states that were not formerly visible to the observational expert are made newly measurable, sortable, and operative, arrayed as calculations and simulations, quantified in terms of statistical inclination. These technologies have revealed that a particular action is already set in motion by the body about 0.8 seconds before we consciously

experience the performance of it. The body readies itself for action before it has a conscious experience of the action. Compared to our sense perception, our thought processes are too slow, and so, especially when it comes to quick events, nature has routed around them: the parts of the brain that activate movements are linked directly to the centers for sense perception. In working with the phenomenon of 'readiness potential,' Benjamin Libet, an American neurologist, showed that consciousness lags hopelessly behind action: thought follows action, even though we do not consciously experience it in this order.⁸⁰

Particular concepts, affects, and rhythms accrue meaning, relevance, and influence because they become actors extended in enduring affiliations, sharing relatively stable, standardizable, reproducible attributes that allow a basis for shared discernments. They sedimentate into the expectations and dispositions of enduring affiliations. To endure, to become relevant, is to be able to conform, to some degree, to an affiliate's expectations and dispositions – and thus, this process is entraining.

Program is indispensable in this process. Program, in this sense, is not simply an algorithmic procedure but an organizational and standardizing practice, in line with Alexander Galloway's concept of protocol,⁸¹ but which occurs across the affective, symbolic, and rhythmic registers of experience – where it can be understood in such terms as biological states, psychological orientations (such as anxieties, desires, fears), social entities, space, or movements. In this way it is not simply a technological entity but a psychoanalytic one. Program allows complexes of affects, signs, and rhythms to become cumulative, durational, and replicable: they are linked, gathered, repeated as a kind of *influencing assemblage* of linguistic and affective states that can, in the case of human actors, be understood as a kind of *sensory motif* – something on the order of the Lacanian *sinthome*, a kind of absorptive, recurrent motif of non-meaning ('idiotic enjoyment') that is very unlike the *symptom*.⁸² And yet, program necessarily counters psychoanalytically oriented philosophies in their emphases on language, difference, and lack – instead adopting a focus on excess⁸³, 'impersonal sameness,'⁸⁴ and studies of affective transmission informed by the life sciences.⁸⁵

In order to apprehend the working of affiliations, then, relational modes are required that function in non-reductive and non-reflective ways, working through multiple registers of apprehension and awareness – dimensions of affective and rhythmic experience that at times align with thoughts and representations but which are not entirely driven or contained by them, countering emphases on self-containment upon which linguistic and cognitive analyses are based. There is no quantification without qualification, no coding without affect. They must not only incorporate transmission, coding, and calibration, but also thresholds of translation: those points or zones

80 Benjamin Libet et al, **The Volitional Brain: Towards a Neuroscience of Free Will** (Exeter: Imprint Academic, 2000), as cited in Stefan Klein, **The Secret Pulse of Time: Making Sense of Life's Scarcest Commodity** (Cambridge, MA: Marlowe & Company, 2006), 80-1.

81 Alexander Galloway, **Protocol** (Cambridge, MA: MIT Press, 2004).

82 Slavoj Žižek, **Looking Awry** (Cambridge, MA: MIT Press, 1991), 128-9.

83 Georges Bataille, **The Accursed Share, Vols II & III** (New York: Zone Books, 1991).

84 Leo Bersani, **Intimacies** (Chicago: University of Chicago Press, 2008).

85 Massumi, **Parables for the Virtual**.

across which one thing suddenly becomes something else, a gathering of actors enters into a more- or less-complex state, an event erupts as a destabilization of the norm, or a novel occurrence congeals against the backdrop of the ordinary.

X A focus on interoperability lessens emphasis on difference as a foundational structure of relationality. It shifts the balance between difference and similarity. As Alphonso Lingis writes: ‘To see difference is not to see absolute opposition, contradiction; it is to see gradations of divergence. But if we see greater and lesser difference, that means we also see lesser and greater similarity. . . . Being, *physis*, incessant unfolding of a show of ever new, ever divergent appearances – continual differentiation – is also continual *logos*, continual assembling, assimilation, of all that appears.’⁸⁶ In the case of program, the emphasis is on sameness as much as difference: on potentials for standardization that can always be increased or reduced. Program builds not simply on differential relation but structural similarity – protocol, frequency, synchronization – registering and introducing commonality. This can involve ‘handshaking’ or the setting forth of interoperability between organisms: the mutual orienting of domains as a precondition for communication and affiliation.

It is not simply that actors jostle for relevance and influence, as if life were a game to be won by sheer cunning, sheer maneuvering for position, as we find in actor network theory, where ‘all relations in the world are of one kind: trials of strength.’⁸⁷ To cultivate relevance, endurance, and intimacy is not simply to engage in a competitive struggle but to foreground negotiation, cooperative measures. With program, the emphasis is on the establishing of commonality and interoperability, in a way that admits vulnerability. Its relationality is not grounded in antagonism and misapprehension – where ‘to meet the world is always to see the world as a place where I am not’ or, if I am there, as an ‘alienated and/or unrecognizable being.’⁸⁸ Rather, it is grounded in the generation of accordance, extensibility, and likeness. Here we reach the limits not only of difference, but of lack, as the condition of desire.

Actors are not reducible so much as extensive. They are inclined toward one another. They seek out those affiliations that will justify them, uphold them, extend them. Actors seek structural similarity – protocol, frequency, synchronization – through which a commonality is introduced and maintained. This can involve a sense of *inclination* toward another actor that is not necessarily based in an *identification* with that actor. One actor is inclined toward another not necessarily out of difference but of similarity or likeness: because it shares an affinity, resonates or relates to its disposition, given its own. Affiliations are not primarily competitive as much as cooperative. They move toward agreements, standards – the spaces and settings of the *default*.

Program constitutes the event as an object of fascination or concern through the normalization of space as well as through the arousal of its attendant actors, however violent or soothing. A dynamic of stabilization and destabilization is at work, whether this occurs in terms of space or sensorium, agency or attention. Programic normalization is achieved as a stabilization against a backdrop of destabilization, and in this sense, it is a cooperative congealment – an affiliation of actors (human, environmental, expressive, linguistic) drawn together in attendance. And yet the event is also a violent exception, a disruption of this established norm – a *destabilization* of the stabilized field. The cooperation can simply occur in the form of a subtle agreement, a social protocol; the violation as an expressive outburst or physical act.

If actors are *action-densities*, constituted in movement, to the extent that they *are* as they *do*, then the challenge is to know what they *do*: how they gather together in attendance; how they endure; how they modify one another, harness one another’s energies, gain influence, relevance, and intimacy. Actors act in an enduring way by affiliating with other actors – actors with specific qualities – such that *something happens*. A careful study of the nature of the affiliation involves an inquiry as to how its actors are allied, how they modulate, transmit intensities and calibrate rhythms, how they amplify or diminish, how they accrue influence and relevance, how they endure, how they achieve intimacy.

Like all actors, effects cooperate or compete for the causal actions that will justify them. As with all affiliations, the issue is how specific actors maintain themselves in their continuing moves: how they achieve stability, however provisionally; how they ally with one another in enduring, relevant, and influential ways. Actions (whether causes or effects) jostle for influence, endurance, and intimacy. Temporal moments compete or cooperate for the actors (whether spaces, objects, actions) that will justify them. The event maneuvers for attendances; it maneuvers for the tending actors that will support it. Actors tend in ways that amplify or diminish the relevance and endurance of events.

⁸⁶ Lingis, ‘The Will to Power,’ 39.

⁸⁷ Harman, *Prince of Networks: Bruno Latour and Metaphysics*, 25.

⁸⁸ Leo Bersani, ‘Sociality and Sexuality,’ *Critical Inquiry* 4 (2000): 649.

Figure, Discourse: To the Abstract Concretely

Andrej Radman

If you want the correct explanation
Why embryos grow into men
The Alsatian begets an Alsatian
A hen's egg gives rise to a hen
Why insects result from pupation
Why poppies grow out of a seed
Then just murmur 'canalization'
For that is the word that you need.

Chorus Then three cheers for canalization
Oh, come on now, hip hip hooray
A stiff dose of canalization
Will drive all your troubles away.¹

The greatest discovery of contemporary psychology was to include the environment in the study of the psyche. Only recently have biologists considered the effect of the 'niche construction' on the inheritance system.² It is high time for the discipline of architecture to do the same, albeit from the opposite angle. J.J. Gibson's contribution is indispensable in his tying of perception to potential action (degree zero of perception). His focus on the *before* (things are named) ranks him among the pioneers of *Noosphere*. Brian Massumi has recently cautioned against the military and right-wing monopoly over the 'soft power' of *Noopolitik* where perception is targeted not on the level at which actions are decided but on the level at which the very capacity for action is forming:

This is a point before 'knowability' and 'actability' are differentiated from one another. At that point modulation of perception is directly and immediately a change in the parameters of what a body can do ... This antecedent level of capacitation of potentialisation is proto-epistemological and already ontological in that it concerns changes in the body's degree and mode of enablement in and towards its total situation or life environment. Any application of force at this level is an onto-power, a power through which being becomes.³

¹ The song 'Magic Words' sung to the tune of **Mush mushalorum** by Conrad Waddington's colleagues on the occasion of his 50th birthday. Published in the obituary by Alan Robertson: **Conrad Hal Waddington 1905-1975** (Bibliographical Memoirs of Fellows of the Royal Society, vol. 23, 1977), 583.

² See John Odling-Smee, 'Niche Inheritance: A Possible Basis for Classifying Multiple Inheritance Systems in Evolution,' **Biological Theory** 3 (2007): 276-89. The 'epigenetic turn' calls for a re-examination of the status of Lamarckism. In contrast to Darwinism, Lamarckian inheritance is the idea that an organism can pass onto its offspring characteristics that it acquired during its lifetime.

³ Brian Massumi has recently argued that The US Defense Advanced Research Projects Agency (DARPA) is aware of this. These effects are not to be confused with **subliminal** influence but taken as **existential** operations creating pragmatic fields of potential action and thought that modulate without directly causing the outcome. Brian Massumi, **Perception Attack** (Dictionary of War, 2007) http://dictionaryofwar.org/concepts/Perception_Attack (accessed 21 February 2010).

The first step is to acknowledge that – with or without us – matter does matter. This is what Charles Sanders Peirce refers to as ‘firstness.’ Then there are relations or ‘secondness.’ Crudely put, the dyad marks the difference between the (intrinsic) properties and (extrinsic) capacities. Finally, there is also the ‘centre of indetermination’ or ‘thirdness’ where an interval between perception and action is inserted. This is the brain. It is crucial to remember that secondness presupposes firstness and that thirdness incorporates both firstness and secondness.⁴ This is to say that the first-order isomorphism and linearity inherent to the representational thought is dismissed as utterly reductionist: it is neither about the appearance of the essence, nor is it about the apparition of the senses (conditions of possibility) but about the *reciprocal* determination of the virtual and the actual.⁵

In *What is Philosophy?* Gilles Deleuze and Félix Guattari distinguish between three (brain) becomings: Philosophy, Science and Art. What seems to be the essential difference between them is the ‘direction’ they take with regard to becoming.⁶ Science and philosophy take opposite directions. Science operates ‘down the stream’ of actualization (dynamic genesis, differentiation), whereas Philosophy chooses to go upstream as in counter-actualization (static genesis, differentiation). Art does something completely different. It preserves the infinite in the finite. Architecture as a discipline needs to transect all three planes. Only then can we rightfully claim that the culture of hylomorphism has given way to the life-affirming creative morphogenesis.⁷ If form is not to be imposed from the outside (by decree or architectural *plan*) but rather ‘teased out’ of the potentiality of the *plane* (of immanence), a more humble and yet empowering disposition is required. The paper will attempt to offer a discourse on this utterly non-discursive practice.

Architecture In April 2009, *Harvard University Graduate School of Design* organized a conference on ecological urbanism where Rem Koolhaas of OMA delivered a keynote lecture. Through a historical overview stretching from Vitruvius to the Renaissance and the Enlightenment to the present day, Koolhaas identified two opposed design outlooks vis-à-vis nature – those of dominance and submission. At the midpoint of the lecture a graph depicting a downturn in the stock market ‘broke the symmetry’: (Figure 1)

What about architecture? What the crisis will mean for us is an end to this regime. For those who did not realize this is a collection of masterpieces by senior architects in the last ten years. A skyline of icons showing mercilessly that an icon can individually be plausible but collectively they form an utterly counterproductive and self-cancelling landscape. So, that is out! (The audience laughs).⁸

The message could not be clearer. No more false dialectics between ‘natural’ Wright and ‘cultural’ Mies! It won’t do. Slide One – *Falling Water*. Slide Two – *Farnsworth*. Slide Three – an anonymous vernacular house seen through thermal vision goggles. How are we to interpret the third image? Is this yet another attempt to shift our attention from ‘cultural form’ towards ‘urban substance’? In an interview with Robert Venturi and Denise Scott Brown, Koolhaas notes how in their *Learning from Las Vegas* (1977) a shift from substance to sign arose precisely when he himself was trying to decipher the impact of substance on culture in what was to become *Delirious New York: A Retroactive Manifesto for Manhattan* (1978).⁹ But now the wager seems to be raised, in that the classical logic of taxonomy is displaced from the visible into the invisible domain. This effectively ends the linear (retroactive) causality between the content and form, in other words, drawing homologies between the (discrete) ‘engendered’ and the (continuous) ‘engendering’ is but a resuscitation of the representational approach. Its tautological nature simply precludes any account of emergence.¹⁰

⁴ Charles Sanders Peirce, ‘The principles of Phenomenology,’ in *Philosophical Writings of Peirce*, ed. Justus Buchler (New York: Dover Publications, 1955), 74-97.

Deleuze bases his Movement-Image analysis on Peirce’s semiotics. See Gilles Deleuze, **Cinema 1: The Movement-Image** (London: The Athlone Press, 1986 [1983]). However, in the subsequent volume on Time-Image Deleuze dispenses with the sensorimotor ‘schema.’ See Gilles Deleuze, **Cinema 2: The Time-Image** (London: The Athlone Press, 1989 [1985]). Deleuze’s bringing of the progressive disembodiment to its culmination can be seen as his succumbing to the purely formal understanding of the medium: the (organic) kinetic regime is traded for the (crystalline) chronic regime. For a similar critique see the introduction by Mark B.N. Hansen, **New Philosophy for New Media** (Cambridge, MA: MIT Press, 2004), 1-12.

⁵ Gilles Deleuze, **Nietzsche and Philosophy** (New York: Columbia University Press, 2006 [1962]), 3.

⁶ Gilles Deleuze and Félix Guattari, **What is Philosophy?** (New York: Columbia University Press, 1994 [1991]), 155-56.

⁷ ‘Hylomorphism’ is a compound word composed of the Greek terms for matter (**hyle**) and form or shape (**morphe**). It was the central doctrine of Aristotle’s philosophy of nature denoting a model of the genesis of form as external to matter, as imposed from the outside on an inert material. In contrast, the Stoics’ **spermatikos logos** (immanent principle of organization) requires a different, experimental, attitude of partnership with matter. There simply are no methodologies to follow. It is therefore most puzzling to find the following as the concluding lines of an otherwise outstanding book: ‘As Deleuze understands it, living contemplation proceeds at an immeasurable distance from what is merely lived, known or decided. Life lives and creation creates on a virtual plane that leads forever out of our actual world.’ So far so good, but then Hallward concludes: ‘Few philosophers have been as inspiring as Deleuze. But those of us who still seek to change our world and to empower its inhabitants will need to look for our inspiration elsewhere.’ See, Peter Hallward, **Out of This World: Deleuze and the Philosophy of Creation** (London: Verso, 2006), 164.

⁸ **Ecological Urbanism: Alternative and Sustainable Cities of the Future** Conference. The conference, held on 3-5 April 2009, brought together design practitioners, students and theorists, economists, engineers, environmental scientists, politicians, and public health specialists, with the goal of reaching a more robust understanding of ecological urbanism and what it might be in the future. <http://ecologicalurbanism.gsd.harvard.edu/> (accessed 21 February 2010).

⁹ ‘I sensed in your book a pair of architects who, in spite of their love of architecture, were horribly fascinated by its opposite – while I was becoming fascinated by architecture, coming from its opposite.’ Rem Koolhaas and Hans Ulrich Obrist interview with Robert Venturi and Denise Scott Brown, ‘Re-Learning from Las Vegas,’ in **Content** (Cologne: Tachen, 2004), 150.

¹⁰ Foucault employs ‘archaeology’ to demonstrate how scientific knowledge is dependent on the prevailing **epistemes** of a culture at particular moments in time. Michel Foucault, **The Order of Things: An Archeology of the Human Sciences** (London: Routledge Classics, 2002 [1966]).

The non-representational alternative requires a great leap of imagination. It requires no less than an entirely new logic which is to complement the old logic of discreteness. Thinking the continuum calls for a 'logic of sense' where 'sense' in Deleuze could be said to stand for significance (conditions of real, not merely possible experience). A whole new vocabulary needs to be invented, as well as a new set of conceptual tools. Geometry becomes indispensable. Apart from being a branch of mathematics, geometry has always been a mode of rationality. Bernard Cache argues that it should at last be taken as a cultural reference.¹¹ This is no trivial matter, as we rely upon a 'different rationality' where the 'law of the excluded middle' is vehemently rejected (where Schrödinger's cat is both dead and alive).¹² The geometry which fits the purpose has been with us for over 150 years and is called 'topology.' Its current appeal for architects merely at the formal level is more than obvious and rather sad as it rarely goes beyond mimesis.¹³

The new conceptual tools are legacies of esteemed rheologists – a term we may now retrospectively apply – such as Gottfried Leibniz (differential calculus), Carl Friedrich Gauss and his disciple Bernhard Riemann (manifold), Henri Poincaré (phase space) and Felix Klein (Erlangen program), to name but a few.¹⁴ To adopt a topological approach to architecture and urbanism is to think in terms of capacities (to affect and be affected), rather than mere (intrinsic) properties. As Gregory Bateson maintained, capacity is always relational (secondness): 'It makes no sense whatsoever to try to understand the anatomy of half a chicken.'¹⁵ By publicly denouncing the dialectic between nature and nurture (submission and dominance), Koolhaas tacitly repudiated the 'paranoid critical method' as exemplified by his famous Daliesque diagram (Figure 2). The amorphous blob supported by the Cartesian crutch from *Delirious New York* still relied on the 'retroactive reasoning' from the domain of the visible. It approached the obscure from the clear.

Koolhaas's anti-dialectical stance resonates strongly with the thesis Deleuze outlines in his book on Francis Bacon. Deleuze distances himself from both (natural) abstract expressionism and (cultural) abstraction à la Kandinsky.¹⁶ After all, Jackson Pollock is notorious for his statement that he does not paint from nature but that he *is* nature.¹⁷ Following the 'logic of sensation,' Deleuze opts for a 'third way' through the concept of the 'Figural' (as opposed to figurative) of Francis Bacon who is 'working with sensations as material.'¹⁸ The architect too might be said to be in the business of the 'distribution of the sensible.'¹⁹ Certainly, these considerations call for a radical rethinking of media specificity at both the material and immaterial intersections of aesthetics and politics. It is precisely this attitude of cutting across previously held dichotomies (nature/culture, matter/thought, aesthetics/politics) that provides Bacon with the 'goggles' to access the virtual. It is arguably for the same reason that Koolhaas conspicuously aligns his current work with that of a true architectural maverick – Buckminster Fuller. Naturally,

this is not the first time that the founding partner of the Office for Metropolitan Architecture (OMA) is rethinking his strategies. Another of his widely published and very influential diagrams was revamped, at least verbally, on the occasion of the 2007 'Intelligent Coast' conference in Barcelona. Asked to comment on the Dubai urban strategy he replied that it was about an 'ongoing developers' orgasm' of total saturation. He seems to have taken seriously Jeffrey Kipnis' criticism of the OMA Masterplan for the Urban Design Forum in Yokohama where they similarly proposed a programming that was to guarantee round the clock (24/7) activity (Figure 3).²⁰ A guarantee that no longer holds as Koolhaas is well aware that, although anything is possible in the world of design, this might not be the case in the design of the world.²¹ The manifold does indeed contain

¹¹ Peter Macapia's interview with Bernard Cache in *Saint Ouen l'Aumône*, June 2008, where Cache (Objectile, EPFL) and Macapia (LabDora, GSAPP) debate about several conceptual changes in the contemporary use of geometry in the field of architecture. <http://www.adrd.net/crowdcast/video/11.html> (accessed 21 February 2010).

¹² A term taken from the Scott Lash's book of the same title *Another Modernity: A Different Rationality* (Oxford: Blackwell Publishers, 1999).

¹³ The same concern is expressed by Sanford Kwinter in 'A Discourse on Method' in *Explorations in Architecture*, ed. Reto Geiser (Basel: Birkhäuser, 2008), 46.

¹⁴ Rheology is the study of deformation and flow of matter. The term – inspired by Heraclitus' famous expression *panta rei*, 'everything flows' – was coined by Eugene Bingham, a professor at Lehigh University in 1920.

¹⁵ In his contribution to *Questions of Taste*, Barry Smith in fact upholds Gregory Bateson's view of the properties of opium: it does not contain a 'dormitive principle.' It is the entering into a differential relation of the two series (organism and substance) that produces an effect. Barry Smith, 'The Objectivity of Taste and Tasting,' in *Questions of Taste: The Philosophy of Wine*, ed. Barry Smith (Oxford: Signal Books, 2007), 41–78.

¹⁶ Gilles Deleuze, *Francis Bacon: The Logic of Sensation* (London and New York: Continuum, 2003 [1981]), 73–7.

¹⁷ As quoted by Lee Krasner in an interview with Dorothy Strickler (1964) for the Smithsonian Institution Archives of American Art. In Krasner's words, 'When I brought Hofmann up to meet Pollock and see his work which was before we moved here, Hofmann's reaction was – one of the questions he asked Jackson was, do you work from nature? There were no still lives around or models around and Jackson's answer was, "I am nature." And Hofmann's reply was, "Ah, but if you work by heart, you will repeat yourself." To which Jackson did not reply at all! The meeting between Pollock and Hofmann took place in 1942. <http://www.aaa.si.edu/collections/oralhistories/transcripts/krasne64.htm> (accessed 21 February 2010).

¹⁸ In his first major philosophical work, *Discourse, Figure* (1971), Lyotard distinguished between the meaningfulness of linguistic signs and the meaningfulness of plastic arts. He argued that, because rational thought or judgment is discursive and works of art are not, certain aspects of artistic meaning require a different treatment. Gilles Deleuze was highly influenced by Lyotard's criticism of adequacy of both structuralism and phenomenology, which led him to opt for a kind of expressionism. Similar concerns are anticipated by the American philosopher of art Susanne Langer, best exemplified by her *Feeling and Form: A Theory of Art* (New York: Scribners, 1953).

¹⁹ 'The distribution of the sensible' is a reference to the subtitle of the book by Jacques Rancière who reassesses the centrality of aesthetics to politics. Jacques Rancière, *The Politics of Aesthetics: The Distribution of the Sensible* (London and New York: Continuum, 2004).

²⁰ It is rather ironic that Kipnis, who is versed in dynamic systems theory, would not demonstrate the same scrutiny when in 2002 he curated 'Mood River: An International Exhibition Examining Impact of Design on Contemporary Life' at the Wexner Center for the Arts, Columbus, OH, USA. This aesthetically pleasing show was the perfect example of what Deleuze would condemn as the fallacy of 'tracing' (bad formalism of conflating the form with the formation).

²¹ The maxim is borrowed from the subtitle of Bruce Mau and the Institute Without Boundaries book, *Massive Change; It's not about the world of design. It's about the design of the world* (London: Phaeton, 2004).

remarkable (singular) points, but it also includes ordinary ones. It is a matter of consistency, of holding. Any- and everything does not go.

Through its 'anexact yet rigorous' approach to the genesis of form, OMA offers an emancipating alternative to both minimalist and parametricist claimants to the status of contemporary architectural avant-garde. It continues to avoid the Scylla of the all too autonomous 'critical' white cube and the Charybdis of the all too complacent 'high performance' blob. Most important of all, it fosters the 'affective turn' that is addressed below.

Ecologies More often than not, architecture as a discipline has sought legitimacy from without. It is high time for a genuine change of heart triggered by the realist/materialist approach of ecological perception that embraces the complementarity of people and their environment. This 'coupling' was a life-long project of the psychologist James Jerome Gibson, whose contribution to a broader radical empiricism is still underappreciated.²² The discipline of architecture should regain self-confidence and do what it does best. When a society manipulates its matter it is not a reflection of culture – it *is* culture. Architecture is a non-discursive practice. Formed materiality (territorialization) and its expressivity (coding) are irreducible and must not be confused with 'specialized lines of expression,' such as genes and words. Marcos Novak, who often does the wrong things ('melting all that is solid into air') for all the right reasons precisely hits the mark with a statement implicitly related to Kant's *Critique of the Power of Judgement* (1790): 'There is meaning before language, meaning before taxonomy, meaning before discourse ... beauty is multi-modal formalism, is a very, very deep thing – the mind and the body are not separate and the whole thing is about not being mimetic.'²³ It is therefore possible to argue that the *Third Critique* does not simply 'complete' the other two, but in fact provides them with a ground. In the words of Brian Massumi:

Alfred North Whitehead characterized his philosophy of process as a 'critique of pure feeling.' William James, with whose thought Whitehead aligned his own, considered a notion of 'pure experience' an indispensable starting point for philosophy practiced as what he termed a radical empiricism. In both of these formulae, what the qualifier 'pure' asserts is a world of experience prior to any possibility of apportioning reality along a subject/object divide or positioning it in preconstituted time and space coordinates. These, on the contrary, are understood as emergences from feeling. The world, for Whitehead and James, is literally made of feeling. Often misunderstood as a solipsism or anything-goes voluntarism, these approaches on the contrary see themselves as rigorous philosophies of determination, no less than of novelty of emergence and creative formation.²⁴

In order to avoid parochial anthropocentrism a true realist cannot but separate ontology from epistemology. There is simply much more to the world than catches the eye (and other senses). Or – to put it even more simply – reality is in excess to the phenomenal. Content is bigger than the form: 'How many fingers?' asked Gregory Bateson raising his hand at a public lecture in anticipation of the wrong answer. 'Five,' readily answers the puzzled audience. 'Wrong,' replies Bateson with perverse delight. The answer is 'No,' because the five fingers are but a derivative of the *four* bifurcations that allow for a *numberless* set of relations.²⁵ This is a standard Batesonian lesson about the inevitable tautology inherent in our predominant epistemology. We seem to be condemned to misplacing concreteness. According to Whitehead, one commits this fallacy when mistaking an abstract belief, opinion or concept about the way things are, for a concrete reality. In other words, by the time we perceive Bateson's five fingers through 'presentational immediacy,' 'causal efficacy' will have kicked in, passing below the threshold of consciousness (the very same consciousness that works so hard to ensure its superior role). Our bodily experience is primarily an experience of the dependence of presentational immediacy upon causal efficacy and not the other way around.²⁶ 'Physical world' is therefore a concept. This, of course, is as counterintuitive as Deleuze's positing of difference before identity in his metaphysics, or Gibson's emphasis on the movement at the basis of perception. To put it bluntly, consciousness is overrated as Katherine Hayles rightly claims:

In the posthuman view ... conscious agency has never been 'in control'. In fact the very illusion of control bespeaks a fundamental ignorance about the nature of the emergent processes through which consciousness, the organism, and the environment are constituted. Mastery through the exercise of autonomous will is merely the story consciousness tells itself to explain results that actually come about through chaotic dynamics and emergent structures ... emergence replaces teleology; reflexivity replaces objectivism; distributed cognition replaces autonomous will; embodiment replaces a body seen as a support system for the mind; and a dynamic partnership between humans and intelligent machines replaces the liberal humanist subject's manifest destiny to dominate and control nature.²⁷

There is possibly one thing that is even more damaging for creativity – provided that we are interested in the problem of the new and not merely in bare repetition – and it is meta-consciousness.

²² His major work is James Jerome Gibson, *The Ecological Approach to Visual Perception* (New Jersey: Lawrence Erlbaum Associates, 1979).

²³ Novak even dares to use the term 'beauty,' which has virtually been banned from recent architecture discourse. See Marcos Novak, 'Alloaesthetics and Neuroaesthetics: Travel through Phenomenology and Neurophysiology,' *Journal of Neuro-Aesthetic Theory* 4 (2005). <http://www.artbrain.org/neuroaesthetics/novak.html> (accessed 21 February 2010).

²⁴ <http://www.arts.cornell.edu/sochum/sct/courses.html> (accessed 27 September 2009).

²⁵ Gregory Bateson, 'Lecture on Epistemology' <http://www.archive.org/details/Gregory-BatesonOnEpistemology> (accessed 21 February 2010).

²⁶ Alfred North Whitehead, *Process and Reality: An Essay in Cosmology* (New York: Free Press, 1978). Based on the Gifford Lectures which he delivered at the University of Edinburgh in 1927-28.

²⁷ Katherine Hayles, *How We Became Posthuman; Virtual bodies in Cybernetics, literature, and informatics* (London: The University of Chicago Press, 1999), 288.

Consciousness about consciousness supplants the ontological problem of *creation* with the epistemological problem of *foundation*. Goethe knew how ‘unproductive’ this was, argues Jochen Hörisch in his *Theoretical Pharmacy*.²⁸ So did the main protagonists of *Delirious New York* who, despite their outstanding intelligence, acknowledged the necessity of keeping a distance from their own self-awareness. It is this particular attitude of the first generation of New York architects, according to Koolhaas, that allowed the aspirations of the collective to coincide effortlessly with those of a client: ‘I had the idea that this was something we would never see again. That we were condemned to consciousness.’²⁹

Individuation According to Deleuze, affect is distinct from affection. Affection, such as feeling, emotion or mood, relates to the status of the body caused by the *encounter*. Since affection has to be enveloped by the human body, it is subject to biographical or social mediation (we do not know what meaning is being created for each individual). An affect, by contrast, is an intensity. As such, it belongs to a non-extensive non-metric and consequently non-representable realm.

Rendering palpable the intensive *process* deserves the three cheers from the opening poem. That is why Sanford Kwinter considers the ‘Chreod’ to be the greatest achievement of twentieth-century thought (Figure 4). This neologism of Conrad Waddington’s denotes a necessary path of any becoming. Of course, there is hardly anything necessary about it once we appropriate the *reciprocal* determination between the actual and the virtual. It is a ‘figure of time.’ A good illustration is Goethe’s *Urpflanz*, although the term is misleading insofar as its prefix signifies the origin. The genius of Goethe was his ability to see the (morphogenetic) Chreod beyond the actuality of the plant. In other words, if Bateson had a chance to hold this flower in his hand and ask Goethe ‘How many petals?’ he would most certainly answer: ‘No. It is the wrong question.’

There is a strange paradox with this new materialism that has in comparison to its opposite – idealism – turned out rather ‘formalist’ as a project. But this is not the pejorative formalism where the process and the product are conflated. It is the ‘good’ formalism in the tradition of the ‘greatest formalists such as Goethe and Foucault,’ explains Kwinter:

The very idea that the figure ... might enfold within it a resonant, transmissible logic of internal control, one that can be at once dissociated from its material substrate *and* maintained in communicative tension with it, was once an assertion of great contentiousness. The moment of its rigorous demonstration became one of the watersheds, not only of modern aesthetics, but of modern science and philosophy as well.³⁰

The shift from the ‘generic’ to the ‘genetic’ approach should be good news for architects since they are good at handling form(ation). However, the radically new ‘logic of becoming’ presupposes the existence of both the ‘form of content’ and ‘form of expression.’ The bad news is that there is no ‘form of forms’ to bridge the gap.³¹ The virtual and actual need to be always thought together, as Brian Massumi rightly insists: ‘The virtual is neither an input nor an output but rather a throughput.’ This throughput is the ‘fuel’ of individuation as proposed by Gilbert Simondon. It is an intensive ‘horizontal’ process that ‘unfolds’ the ‘universal singular’ into the actual (individual singular), in contrast to the vertical axis of the general/particular. However, one needs to avoid the nominalist trap of claiming that only the particular exists. The real ‘battlefield’ is at the level of a ‘difference that makes a difference,’ to cite Bateson once again. This is the level of a ‘Problem,’ a genuine reservoir of potentiality (pure difference) of ‘static genesis’ with a temporal form of *aion*.³² In contrast, to operate exclusively at the level of ‘dynamic genesis’ – the unfolding of *chronos* – is ‘futile.’ This is perhaps why Walter Benjamin considered both Art Deco (aestheticization of technology) and futurism (technologization of aesthetics) as failures.³³ The criticism equally applies to the data fetishism of today, which is also fixated on actuality (presentational immediacy). It also explains why Deleuze, as previously mentioned, questions both the (too slow) ‘code’ of Kandinsky and the (too rapid) ‘chaos’ of Pollock. Bacon’s work offers an alternative. It is seen as diagrammatic in the true Foucauldian sense: it does not render *the* visible, but it renders visible, as Paul Klee would have it. Phenomenology with its maxim ‘back to phenomena’ will obviously not suffice here. It is for this very reason that Deleuze is keen to appropriate the term expressionism. As Steven Shaviro explains: ‘phenomena are generated out of the encounter between subject and object in Kant – but if one is willing to let rocks, stones, armies, and Exxon join in the fun of being excluded from the in-itself, then we can say that phenomena are positively generated out of *all* encounters between objects.’³⁴ Phenomenology remains human, all too human, and therefore – in spite (or perhaps because) of its anthropocentrism – ultimately anti-human and even suicidal, as Claire Coolebrook recently argued.³⁵ The Spinozian principle of a *conatus* is narrow in its disregard for the long-term (ecolog-

²⁸ The ontological problem of **creation**, was thus superseded by the epistemological problem of **foundation**. Jochen Hörisch, *Theorie-Apotheke: Eine Handreichung zu den humanwissenschaftlichen Theorien der letzten fünfzig Jahre, einschließlich ihrer Risiken und Nebenwirkungen* (Frankfurt: Eichborn, 2005), 201.

²⁹ Ole Bouman and Roemer van Toorn, ‘Architecture at Remdom; The Blinkers that Make the Visionary,’ in *The Invisible in Architecture* (London: Academy Editions, 1994).

³⁰ Sanford Kwinter, ‘Who’s Afraid of Formalism?’ in *Phylogenesis: FOA’s Ark*, eds. Michael Kubo and Albert Ferré with FOA (Barcelona: Actar, 2003), 96-9.

³¹ This intricate interdependence has been the fulcrum of my own architectural practice in partnership with Igor Vrbaneck. <http://www.arhikord.hr> (accessed 21 February 2010).

³² Considered in the mutual immanence of the differential relations that compose it, structure is **static**, indifferent to the measurable space-time and the discrete magnitudes that characterize individuated actuality.

³³ Susan Buck-Morss, *The Dialectics of Seeing: Walter Benjamin and the Arcades Project* (Cambridge, MA: MIT Press, 1991), 144-5.

³⁴ <http://www.shaviro.com/Blog/?p=712> (accessed 21 February 2010). Shaviro’s latest book furthers this research: *Without Criteria: Kant, Whitehead, Deleuze, and Aesthetics; Technologies of Lived Abstraction* (Cambridge, MA: MIT Press, 2009).

³⁵ Keynote lecture by Claire Coolebrook at the **7th European Feminist Research Conference** (Utrecht, 4-7 June 2009): Gendered Cultures at the Crossroads of Imagination, Knowledge and Politics. Under the title ‘Sexuality and the Politics of Vitalism,’ Coolebrook declared a

ical) consequence of striving for self-preservation.³⁶ For phenomenology (Husserl), consciousness is always *of* something, whereas for Deleuze *qua* Bergson it is something. Correlationism of how I as a subject perceive that object over there is to be met with the same rigor of Batesonian skepticism.

With the thesis of *univocity*, Deleuze finally dispels all dualisms: 'being is said of all things in the same sense.' The question is how to think relation exterior to its terms (thirdness). This could not be done from the so-called third space of 'lived experience' that was to allegedly counteract instrumental rationality and the consequent mathematization of life. The postmodern potion of Dionysius' passion to complement the modernist Apollo's cool did not work either. All these attempts never left the realm of Bateson's five fingers. The strategy of *defamiliarization* (including the discourse on the sublime) also reached its limits.³⁷ It was promising in the attempt to circumvent straightforward re-cognition (are they five fingers or something else?) but it failed to meet the requirement of the second part of Bateson's answer, namely, engendering an alternative (space for) life. Sadly, it remained at the level of indulging in object fetishizing. In contrast, Kwinter's 'radical anamnesis' requires remembering not the past that has happened but the past that has not happened, although it might have.³⁸ This marks a cardinal difference between the mere possible (always retroactive hypostatization) and the reservoir of pure potentiality of the (ideal yet real) virtual.

Superior Empiricism Even materialism needs to eventually come to terms with the 'spiritual.' Deleuze's answer is neither *transcendental* empiricism nor transcendental *empiricism* but *transcendental empiricism*. The formation and form, the emerging and the emerged, pertain to two modes of *one* reality. Everything starts from the sensible but is subsequently extended into the intelligible. This is what Deleuze means by 'pedagogy of the senses.' The convergence of thought and matter is diagrammed in *The Fold* as two floors of a baroque house (Figure 5). It is important to stress yet again that there is no structural homology between the two floors. To borrow Dan Dennett's powerful metaphor, there is no *homunculus* sitting in the Cartesian theatre (where all the evidence is gathered). The form of expression and the form of content do not share a form. There is no meta-form. There is only folding and unfolding of progressive differentiation. What connects the two is a process.³⁹

Deleuze's main adversary in this respect is not Plato but the great systemizer Aristotle, who 'operates' between the general and the particular on the basis of resemblance (as in representation).⁴⁰ But for Deleuze there is more resemblance between a race horse and a race car than between a race horse and a plough horse.⁴¹ Universality does not explain anything; it itself requires an explanation. In the 'flat ontology,' genera are as contingent as the particular species. There is no

logical relationship between the 'individual singular' of the five fingers and the 'universal singular' or the manifold (pinball machine) that engenders them.

The Aristotelian syllogism, which has not lost a scintilla of its prestige over the past two millennia, is still indispensable for discrete (binary) logic. So is Euclidian mathematics for metric space, as well as Newtonian physics for isotropic space. But when it comes to the logic of continuity it was Leibniz who provided the much needed conceptual tools. More recently, Deleuze recognized the creative potential of science in general, and differential calculus in particular, to deal with becoming. The 300-year-old mathematical convention allowed for the treatment of relations independently of their terms. The emphasis shifted from signification to significance or to the distribution of singularities structuring the manifold. The clear emerges from the obscure. The five fingers emerge from a topological 'body-plan,' the very same plan that unfolds into a flipper or a wing.⁴²

recent shift in knowledge paradigms away from linguistic, intellectual, and cognitive approaches to experience accompanied by turn to embodiment, affect, vitality, and the dynamism of knowledge. According to Colebrook, many of these vitalist appeals to corporeal and transhuman life, for all their claims to radicalism and posthumanism, harbor highly normative masculinist, organicist, and Western presuppositions regarding proper life. By examining the ways in which the crisis of our imagined future has enabled a return to life she put forward the case for a counter-vitalism that is also anti-organicist.

36 In his essay 'Atmospheric Politics' in **Making Things Public: Atmospheres of Democracy**, eds. Bruno Latour and Peter Weibel (Cambridge, MA: MIT Press, 2005), Peter Sloterdijk recalls the term 'environment,' which was first used by the biologist Jakob von Uexküll exactly 100 years ago (**Umwelt und Innenwelt der Tiere**), as one of the most significant discoveries of the twentieth century that would influence the development of **ecology**. The military was once again quick to tap into the latest discovery of the inextricable tie between the organism and its environment, albeit in a sinister way — new First World War chemical warfare targeted the environment instead of the soldiers, thus revolutionizing killings that happened in a mediated way and no longer by direct action on the body. One should therefore extend the notion of **corporeality** in a threefold way, as Arie Graafland proposes in 'Looking into the Folds' in **The Body in Architecture**, ed. Deborah Hauptmann (Rotterdam: 010 Publishers, 2006), 157: 'the territorial body of the planet and ecology, the social body or socius, and our human body.'

37 The term 'defamiliarization/ostranenie' was coined by the Russian formalist Victor Shklovsky, in **Art as Technique** (1917): 'The purpose of art is to impart the sensation of things as they are perceived and not as they are known. The technique of art is to make objects 'unfamiliar,' to make forms difficult, to increase the difficulty and length of perception because the process of perception is an aesthetic end in itself and must be prolonged. Art is a way of experiencing the artfulness of an object; the object is not important.' <http://www.fas.harvard.edu/~cultagen/academic/shklovsky1.pdf> (accessed 21 February 2010).

38 Sanford Kwinter, **Far From Equilibrium: Essays on Technology and Design Culture** (Barcelona: Actar, 2008). In the essay that is the key to the book, the 1996 'Radical Anamnesis (Mourning the Future),' Kwinter concludes: 'Through (selective) memory the future becomes possible, a future that the past could not think and that the present — alone — dares not.'

39 Gilles Deleuze, **The Fold: Leibniz and The Baroque** (London and New York: Continuum, 2006 [1988]), 5.

40 Deleuze's 'battle with the Hegelian power of re-cognition and the negative, culminating in self-awareness as absolute knowledge' is explained by Patrick Healy in **The Model and its Architecture** (Rotterdam: 010 Publishers, 2008), 84.

41 Deleuze writes in **Spinoza, Practical Philosophy** (San Francisco: City Lights Books, 1988), 124: 'You will not define a body (or a mind) by its form, nor by its organs or functions [but by its] capacity for affecting or being affected.... For example: there are greater differences between a plow horse ... and a racehorse than between an ox and a plow horse. This is because the racehorse and the plow horse do not have the same affects nor the same capacity for being affected; the plow horse has affects in common rather with the ox.'

42 The basic idea is that of a common source of form, a 'body-plan' that, through different fold-

The long lasting legacy of privileging *episteme* over *techné* needs to be rethought, as Bernard Stiegler repeatedly advocates. The Second Law of Thermodynamics is to the sciences what Shakespeare is to the humanities. It is most unfortunate that the self-appointed guardians of disciplinary boundaries are working hard to keep the realms separate. It is equally damaging to privilege linguistic theories on account of their academic prestige given the limitations of the representational approach. Humanities are bankrupt when it comes to dynamic far-from-equilibrium systems. They cannot but commit the fallacy of ‘tracing’ – conflating the process with the product. If we carry on merely relying on the ‘agency of mapping’ we will continue to see Bateson’s five fingers.⁴³ Thinking needs to go in the opposite direction (counter-actualization) towards the virtual and ‘mapping of agency.’

Old habits die hard. For that reason the best way to approach (visual) perception is through non-visual senses. Charles Sanders Peirce proposes a thought experiment: a pitch black cave with no gravity where one relies upon one’s own proprioception (joint sense), smell, and temperature sensing.⁴⁴ Note that these senses only operate locally through an interval of change with no reference to extrinsic space. Through navigation, one starts to distinguish zones in the gradient field and their thresholds (there are no clear-cut boundaries). Eventually one is able to identify invariants as the three series start to relate (proprioception, smell, and temperature). Gradually we witness the ‘conrescence’ of extensive and therefore mappable space which is born out of topological intensive space of sensation. ‘Smooth’ space has turned into ‘striated’ space. Massumi stresses that the striated Euclidian geometry in no way contradicts the topological one. They are enfolded. The ‘nesting’ of geometries according to their respective ‘resilience’ to transformation or level of ‘generality’ (euclidian > projective > affine > topology) is explained by Manuel DeLanda in *Intensive Science and Virtual Topology*.⁴⁵ This is an important point often overlooked by eager proponents of the ‘topological turn’ in architecture. What is truly remarkable is that the order of movement and space is reversed. Points in space do not pre-exist their connection. The logic of sensation leads to the logic of relation. Movement does not happen in space. Rather, space is a derivative of movement.

Brian Massumi emphasizes the stark contrast between Peirce’s cave and the most famous cave parable – that of Plato. Curiously enough, in Plato’s version the beholders are immobilized by chains and therefore compelled to rely exclusively on their vision, wondering whether (mediated) appearances might be but illusions. In the Peircean version there is no room for doubt since everything results from one’s unmediated interaction (contemplative versus participative space). In the short essay ‘Factory,’ Vilém Flusser makes a similar assertion: ‘*homo faber* becomes *sapiens sapiens* because he has realised that manufacturing means the same thing as learning – i.e. acquiring, producing and passing on information.’⁴⁶

Stillness of the beholder is the *sine qua non* of most optical illusions (Figure 6). This is not a minor issue. There is a long-standing dispute between two great experts in the field of visual culture which mirrors the cave parable: that of James Jerome Gibson and Ernst Gombrich.⁴⁷ For Gibson it is evident that pictorial representation is a contingent (chronologically late) discovery. To put it bluntly: (3D) space comes first, (2D) images follow. In contrast, Gombrich believes that pictorial representation mirrors the representational architecture of the mind. He thus spends a substantial part of his career trying to account for the depth in the pictorial surface (3D out of 2D). In Gibson’s sensorimotor (kinaesthetic and synaesthetic) understanding of perception ‘the problem of depth’ does not arise at all. According to him we *do not see images anyway!* One needs to bear in mind that the geometry of information must be kept independent from the geometry of the receptor surface (retina in the case of visual perception). Only then will we not succumb to the first-order isomorphism fallacy of equating optics with perception. This is what *ecological* perception is about.

Stradivarius Syndrome Pictorial representation is an extension of the elaboration of perception, and not the other way around. Action and perception form a continuum of experience. This is especially pertinent to architecture, given that its basic medium is *ipso facto* the ‘field of experience’ rather than geometry, CAD, design, critique, or any formalizable field.⁴⁸ Implications for the discipline are enormous and still highly unappreciated, as we are just beginning to feel the loosening of the linguistic grip. Ironically, even the social sciences have been more eager to turn toward the realist and materialist paradigm. If shaking off the ‘linguisticity of experience’ and losing the scare-quotes above the word real was difficult enough, tackling the nature of (graphic) representation will prove even more difficult. This means that the current reliance on mapping could be fatally overstated. Gilbert Ryle distinguishes between propositional (symbolic and discrete) knowledge of *that* and (performative and continuous) knowledge of *how*.⁴⁹ One cannot

ings and stretchings during embryological development, is capable of generating a wide variety of specific forms. See Manuel DeLanda, ‘Uniformity and Variability,’ essay at <http://www.t0.or.at/delanda/matterdl.htm> (accessed 21 February 2010).

⁴³ James Corner, **The Agency of Mapping: Speculation, Critique and Invention from Mappings**, ed. Denis Cosgrove (London: Reaktion Books, 1999), 231-52.

⁴⁴ Charles Sanders Peirce, **Reasoning and the Logic of Things, The Cambridge Conferences Lectures of 1898**, ed. Kenneth Laine Ketner (Cambridge, MA: Harvard University Press, 1992), 242-68, brought to our attention by Brian Massumi’s superb interpretation at **Experimental Digital Arts** lecture (EDA, 2000). http://design.ucla.edu/eda/archive/serve.php?stream=/mnt/video/design/video/041700_massumi.rm (accessed 21 February 2010).

⁴⁵ Manuel DeLanda, **Intensive Science and Virtual Topology** (London and New York: Continuum, 2002), 18.

⁴⁶ Vilém Flusser, **The Shape of Things, A Philosophy of Design** (London: Reaktion Books, 1999), 50.

⁴⁷ Gombrich/Gipson Dispute (on picture perception) is accessible from the Gombrich Archive. To our mind it is every bit as actual as when it started in 1971. <http://www.gombrich.co.uk/dispute.php> (accessed 21 February 2010).

⁴⁸ The ‘field of experience’ thesis was put forward by Brian Massumi: ‘The Diagram as Technique of Existence,’ **ANY (Architecture New York)** 23 (1998): 42-47 (special issue **Diagram Work**, edited by Ben van Berkel and Caroline Bos).

⁴⁹ Gilbert Ryle, **The Concept of Mind** (Chicago: University of Chicago Press, 1949), 25-61. The introduction to the 2000 edition was written by Ryle’s student Dan Dennett.

learn to swim by reading a manual. It requires entering into an assemblage with water and trying out different ways of propulsion through one's own idiosyncratic bodily movement and eventually acquiring a unique style. Where does this leave us with the discoveries of Kevin Lynch's 'cognitive mapping'?⁵⁰ The fact that my wife cannot map a city has no bearing on her capacities to navigate it with more efficacy than a 'trained professional' such as myself. You walk the walk or talk the talk, not talk the walk. The sentiment is best reflected by Reyner Banham: 'So, like earlier generations of English intellectuals who taught themselves Italian in order to read Dante in the original, I learned to drive in order to read Los Angeles in the original.'⁵¹

In his latest book Richard Sennett blames the famous violinmaker Antonio Stradivari for failing to transmit knowledge to his disciples. Again, the problem lies in the failure to distinguish between the encyclopedic factual (propositional) and the knowing-how-to-make-a-violin knowledge.⁵² Curiously, there is a similar naiveté with a substantial part of the artificial intelligence (AI) community who refuse to reject the 'input-output' view of cognition in favor of the embodied, embedded, extended, enactive, and affective (4EA) approach to the mind.⁵³ The same cleavage seems to be at the core of Danny Boyle's *Slumdog Millionaire* from 2008 where the main protagonist unexpectedly wins a popular quiz-show by knowing *how* rather than knowing *that* (the answer is a, b, c, or d).

We have long been witnessing the most unlikely alliance between Cartesians and Cybernetics. Catherine Hayles blames it on a pathological fear of death (soul as software lives on). Hubert Dreyfus argues in his polemic with Marvin Minsky that if the AI community had ever read Maurice Merleau-Ponty they would not have wasted as much time on the disembodied (symbolic) approach. In the subsequent reprint, his masterpiece *What Computers Can't Do* was renamed *What Computers Still Can't Do*.⁵⁴ According to Dreyfus the fallacy rests on both epistemological and ontological assumptions. The epistemological assumption is that all activity (by animate or inanimate objects) can be formalized (mathematically) in the form of predictive rules or laws. The ontological assumption is that reality consists entirely of a set of mutually independent atomic (indivisible) facts. It is because of the epistemological assumption that experts in the (symbolic) AI field argue that intelligence is the same as formal rule-following. The ontological assumption leads them to argue that human knowledge consists entirely of internal representations of reality. Sadly, placing images in consciousness and movement in space happens to be the predominant *modus operandi* of the architectural community. We have yet to distinguish between *hodological* and Euclidian space. Luckily, at least for cognitive sciences, symbolic computing is gradually being superseded by the more promising connectionist approach where 'training' (and thus embodiment) plays a major role.⁵⁵

There is an uncanny resemblance between the two public disputes: Gibson versus Gombrich and Dreyfus versus Minsky. Strictly speaking, they are not disputes at all. They are perfect illustrations of Thomas Kuhn's 'paradigm shift' where the proponents operate in different 'contrast spaces' with a different logic, as in the example provided by DeLanda:

Priest: Why did you rob the bank?

Prisoner: There was more money there than in a post office.⁵⁶

The true ambition is always measured at the level of the (virtual) problem rather than the (actual) solution. Already in the seminal *Difference and Repetition* Deleuze posited that Problems-Ideas were extra-propositional and sub-representative. It is plausible that Whitehead is the *éminence grise* of Deleuze's *Fold*. His replacement of the subject by the 'superject' (as well as 'prehension' for relational understanding) resonates with Hume's theory of subjectification. Hume sees the subject as 'coagulation' (Whitehead's 'conrescence,' Peircean 'thirdness,' Deleuzian 'folding') in the field of sensation.⁵⁷ He foregrounds habitual association as the basic (sensorimotor) mechanism. Mind is brought to nature, as perceiving is neither representing nor presenting for that matter; it is enacting perceptual content. Memory is seen as the low-intensity replica of raw sensation. Henri Bergson agrees that memory is *content* retrievable, as opposed to the communicational model where data is *address* retrievable. This is the major obstacle of symbolic computing. Take *Googling*,

⁵⁰ Strong ocularcentric reduction of experience is evident in the very title: Kevin Lynch, *The Image of the City* (Cambridge, MA: MIT Press, 1960).

⁵¹ Reyner Banham, *Los Angeles: The Architecture of Four Ecologies* (London: Allen Lane, 1971), 5.

⁵² Richard Sennett, *The Craftsman* (London: Penguin Books, 2008), 75-9. One cannot but be equally wary of the otherwise worthwhile (post-theoretical) theory of Michael Speaks' *Design Intelligence* whereby knowledge is somehow devoid of ideology.

⁵³ The key is to expand the explanatory framework. For more information on ways of thinking about cognition that depart from standard cognitivist models, see John Protevi's 4EA blog at http://protevi.blogspot.com/4ea_cognition/ (accessed 21 February 2010).

⁵⁴ Hubert Dreyfus, *What Computers Can't Do* (Cambridge, MA: MIT Press, 1972) and *What Computers Still Can't Do* (1992). Nöe's latest book, which reiterates some of Dreyfus' basic arguments, could be seen as a natural sequence (What Computers Will Never Do?): Alva Nöe, *Out of Our Heads: Why You Are Not Your Brain, and Other Lessons from the Biology of Consciousness* (New York: Farrar, Straus and Giroux, 2009).

⁵⁵ The term 'hodological space' is derived from the Greek word 'hodos,' path, way. In contrast to the mathematical concept of space as presented on maps, plans, and so on, 'hodological' space is based on the factual topological, physical, social, and psychological conditions a person is faced with on the way. Connectionism is a set of approaches in the fields of artificial intelligence, cognitive psychology, cognitive science, neuroscience, and philosophy of mind that models mental or behavioral phenomena as the emergent processes of interconnected networks of simple units.

⁵⁶ Manuel DeLanda, *Intensive Science and Virtual Topology* (London and New York: Continuum, 2002) 129-130. In this regard compare the **contrasting** analyses of fragmentation versus unity of Mies's Barcelona Pavilion (1929) by Hays and Evans respectively. Michael Hays, 'Critical Architecture: Between Culture and Form,' *Perspecta* 21 (1984); Robin Evans, 'Mies van der Rohe's Paradoxical Symmetries,' *AA Files* 19 (1990).

⁵⁷ The subject emerges from the world, the world does not emerge from the subject. The American pragmatist William James insisted that we are sad because we cry and that we are scared because we run and not the other way around. His major work is William James, *The Principles of Psychology*, vol. 1 and 2 (New York: Dover Publications, 1950).

where both textual and graphic content is retrievable only through the address. Try to find an image you have seen earlier. This is impossible unless you remember the name. The signifier is of course arbitrary. DeLanda wittingly proposes that you either believe that the Inuit people distinguish between 29 kinds of snow because they have 29 different names for it ('linguisticos') or that the synonyms have started to accumulate because local conditions require that the population interact with the snow on a daily basis (materialists). Surely, there was a *world* long before the *word*. Environment is always seen as meaningful. We cannot put the cart before the horse. The relationship between stimulus information and the environment is therefore natural (motivated) rather than arbitrary.

When René Magritte writes 'This is Not a Pipe' in the caption below the image of a pipe he is hinting at the peculiar nature of representation. In the same vein, Robin Evans reminds architects that they do not make buildings but drawings for buildings (Figure 7).⁵⁸ Lars Spuybroek is thoughtful in stressing the arbitrariness of the convention of architectural representation (horizontal program versus vertical appearance) and the need to get to grips with the continuum of experience.⁵⁹ Action and perception are inseparable. Curiously, he is less attentive to the difference (in kind) between the actual 'experience of space' and the virtual 'space of experience.' As Bernard Cache cautioned in the seminal *A Plea for the Euclid*, not a single architect seemed to realize that the Mobius House had already been built back in the 1970s, albeit in Euclidian geometry. He meant the *Centre Pompidou* by Richard Rogers and Renzo Piano.⁶⁰ To presume that the non-metric topological 'geometry of experience' needs to be maintained in (striated) actuality at any cost is a common misunderstanding of the contemporary 'avant-guard.' What is forgotten is that there is no structural homology between the realms of sensible and intelligible. In other words, not only would Magritte need the caption 'This is Not a House' below the image of a house but also in front of an erected (actualized) house, as it were. We do not yet know what a house (body) can do, to paraphrase Spinoza.⁶¹ It is certainly impossible to make any judgment on the basis of its geometry just as we could not study the anatomy of half a chicken in any meaningful way. Things themselves are bearers of ideal events which do not always coincide with their properties. The 'leeway' was already identified by the ancient Stoics: it's not where the form stops (outline) but rather where the action stops (affect). Lars Spuybroek is therefore as wrong about the 'stupidity' of the straight line as Le Corbusier was about the 'stupidity' of the curved line which he notoriously took as the sheer index of a donkey's movement.⁶² This is especially pertinent as it occurs at the opposite pole from that of *concentration*. To quote Walter Benjamin from *The Work of Art in the Age of Mechanical Reproduction* (1935): 'Architecture has always represented the prototype of a work of art the reception of which is consummated by a collectivity in a state of *distraction*' (emphasis added). However disadvantageous this may seem for the architectural profession,

it will not prove to be the case once we fully grasp the 'affective turn' and its implications for architecture. Quite the contrary, it might turn out to be the royal road to the understanding of 'space.'

Ex Uno Plura According to Dennett, 'If you make yourself really small you can exteriorise everything.'⁶³ This monadic attitude has been gradually superseded by the nomadic, as the advanced fields of neuro- and cognitive science recognize the porosity and contingency of the boundary between the inside and the outside (as in Evan Thompson, Andy Clark, and Alva Nöe). However, one should not dismiss the importance of autonomy at certain levels and not just for practical purposes. This is why Deluzian 'deterritorializations' are always followed by 'reterritorializations,' or why they should be. It is just as much about the 'striated' as it is about the 'smooth' (yet another lesson disregarded by the so called avant-garde). It might well be that the rhetoric of 'We Build our Cities and in Return They Build Us' is to be taken literally.⁶⁴

Humans operate in a very restricted portion of reality.⁶⁵ Technology, in the broad sense of the term including 'epigenetics' and its 'sedimentation' 'epiflogenetics' (buildings), expands the realm

⁵⁸ In his essay from 1986, 'Translation from Drawing to Buildings' (London: AA Documents 2, 2003), on page 154 Robin Evans writes: 'Before embarking on the investigation of drawing's role in architecture, a few more words might be spent on language; more particularly, on the common antilogy that would have architecture be like language but also independent of it. All things with conceptual dimension are like language, as all grey things are like elephants.'

⁵⁹ Lars Spuybroek, 'The Primacy of Experience,' in **The Architecture of Continuity; Essays and Conversations** (Rotterdam: NAI Publishers, 2008), 78.

⁶⁰ Bernard Cache, 'Plea for Euclid,' **Arch'it, rivista digitale di architettura**, 1998: http://architettura.supereva.com/extended/19990501/index_en.htm (accessed February 21, 2010).

⁶¹ See the Delft School of Design (DSD) journal **Footprint**, issue 4, dedicated to **Agency in Architecture: Reframing Criticality in Theory and Practice**, eds. Isabelle Doucet and Kenny Cupers (Spring 2009), <http://www.footprintjournal.org/issues/current> (accessed 21 February 2010). In his contribution, Scott Lash expresses his concern about the teleological over-tone of the notion of agency. The 'problem of agency' in Foucault is tackled recently by Jeffrey T. Nealon, **Foucault Beyond Foucault; Power and its Intensifications since 1984** (Stanford, CA: Stanford University Press, 2008) 101-2: 'in Foucault's work there's quite literally nothing but agency. There are in fact many more forms of "agency" than there are "agents". Sexuality, surveillance resistance: these things are verbs or deployments of force, or at least that's what they are before they become attached to nouns, subjects, or states of being.'

⁶² Both statements figure as unfortunate cases of the mode of representational thinking. Fortunately, Le Corbusier was never as consistent as Lars Spuybroek.

Brian Massumi's advocating of the 'topological architecture ... as in a way of continuing its process in its product' in his otherwise indispensable **Parables for the Virtual; Movement, Affect, Sensation** (Durham: Duke University Press, 2002) proves that the very proponents of the new materialism sometimes fail to live up to their own standards. Sadly, he commits the 'fallacy of misplaced concreteness' after 190 pages of pure 'critique of pure feeling.'

⁶³ For Dennett's account on the inadequacy of the predominant impoverished theories of experience, such as phenomenology, see: Dan Dennett, **Consciousness Explained** (Boston: Back Bay Books, 1991).

⁶⁴ A real-socialist slogan also attributed to Churchill. On (re)territorialization see Elisabeth Grosz, **Chaos, Territory, Art: Deleuze and the framing of earth** (New York: Columbia University Press, 2008), 69: 'Territory is produced, made possible, when something, some property or quality, can be detached from its place within a regime of natural selection and made to have a life of its own, to resonate, just for itself. Territory is artistic, the consequence of love not war, of seduction not defence, of sexual selection not natural selection.'

⁶⁵ $1/(3 \times 10^{35})$ is the (very very small) fraction of the electromagnetic spectrum that we detect and call 'reality'. From Howard C. Hughes, **Sensory Exotica; A World Beyond Human Experience** (Cambridge, MA: MIT Press, 2001).

of sensibility.⁶⁶ It acts as scaffolding, as Andy Clark argues. This is also known as *Baldwian Evolution* or evolution by other (epigenetic) means.⁶⁷ Coping with the world – thanks to the co-evolution of the environment and the animal (human) – is rather effortless. One does not need any representational schema in order to assess the opportunities and risks that the environment offers or provides. One does not see the shape first, recognize its (necessary and sufficient) properties for belonging to the category with the essence of ‘chairness’ before one eventually decides to use it for sitting. What one sees according to Gibson is the (proto-epistemological) ‘affordance,’ that is, the ‘sit-on-ability’ as an event. One can indeed turn neo-Kantian in rare cases of brain damage, as reported by Merleau-Ponty (Schneider example), and has then got to go through all the rational steps (this is my arm, I am now going to raise it ...).⁶⁸

Human beings have the marvelous capacity to zero in on the ‘matter of concern’ precisely because they do not need to calculate or represent anything. Ego-logy gives way to eco-logy at a ‘mezzo-scale’ which is commensurate with life. This approach is as opposed to the ‘ghost in the machine’ as it is to neuroreductionism. To try to capture the whole of the 4EA experience through the late (in terms of evolution) graft of linguistic theories or the more current input/output processing is certainly appealing (in terms of formalization), but wrong because there is simply no structural homology between the analogue and digital. Zeno’s paradox still haunts us. This is not unrelated to ‘Moravec’s paradox’: It is comparatively easy to make computers exhibit adult-level performance on intelligence tests or a game of checkers. However, it is difficult or impossible to give them the perception and mobility skills of a 1-year-old.⁶⁹

Gibson’s second important concept is that of the extraction of ‘formless invariants’ in perception (over time!). The key is to trace permanence in the face of change (of position or perspective or both). Topology is helpful yet again in addressing a second (or higher) degree order of abstraction: how the change changes. This is closely related to his insight into occlusion, that is to say, accretion and deletion in the visual field. At any rate, clear-from-the-obscure seems to be the recurrent pattern of *mathēsis universalis*. Clear and stable actuality is emerging from the field of potentiality – the virtual. The maxim *E Pluribus Unum* (out of many, one), whereby imperfect reincarnations all stem from a single perfect essence, needs to give way.⁷⁰ Multiplicity provides for a radically new relationship between *one* and *many* with no primacy of either. What we have is one world with two modes of reality: the actual and the virtual in constant chiasmic eventful interaction.

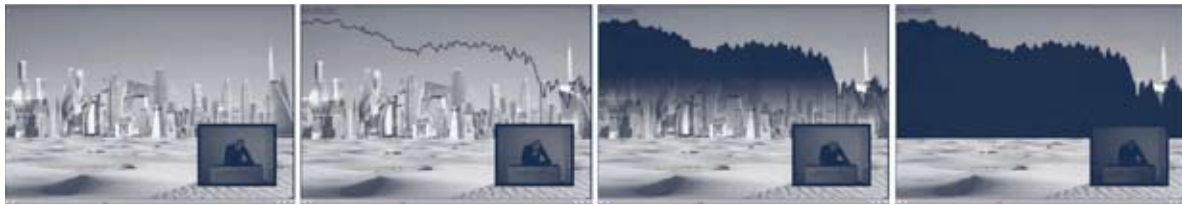
⁶⁶ Bernard Stiegler, ‘Who? What? The Invention of the Human,’ in **Technics and Time, 1: The Fault of Epimetheus** (Stanford, CA: Stanford University Press 1998), 134-79.

⁶⁷ Charles T. Wolfe, ‘De-ontologizing the Brain: from the fictional self to the social brain,’ **CTheory**, ed Arthur and Marilouise Kroker (2007), <http://www.ctheory.net/articles.aspx?id=572> (accessed 21 February 2010).

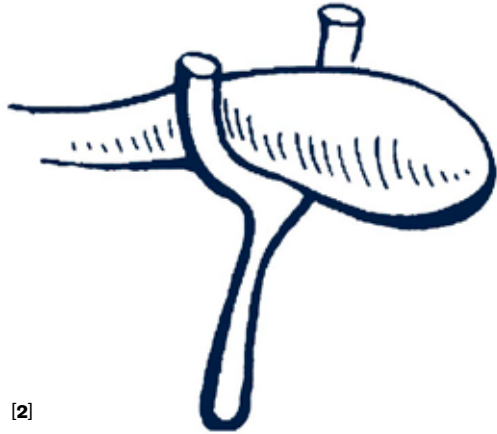
⁶⁸ Merleau-Ponty centers his critique on the pathological case of Schneider, a German soldier wounded in the First World War. Schneider was able to perform ‘concrete movements’ (for example light a lamp), but not ‘abstract’ movements (such as ‘extend your arm parallel to the floor’) without watching his limbs; he could not describe the position of his limbs when they were stationary, etcetera. Maurice Merleau-Ponty, **Phenomenology of Perception** (London: Routledge Classics, 2003 [1945]), 130, 181.

⁶⁹ The principle was articulated by Hans Moravec, Rodney Brooks, Marvin Minsky, et al. in the 1980s.

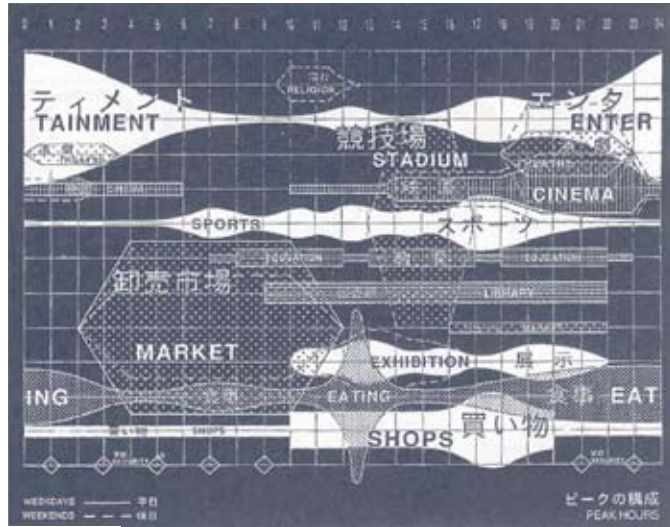
⁷⁰ According to the media theorist Roy Ascott: ‘During the 20th century there was much ado about *e pluribus unum*, out of many, one: a unified culture, unified self, unified thought, unity of time and space. Now at the start of the 3rd millennium, it could be the reverse!’ He is advocating the syncretic approach of bringing together disparate entities – material and non-material – and their philosophic, religious, and cultural customs and codes. Roy Ascott, ‘Syncretic Strategies’ (2007), http://www.eaf.asn.au/2007/symposium_p_ascott.html (accessed 21 February 2010).



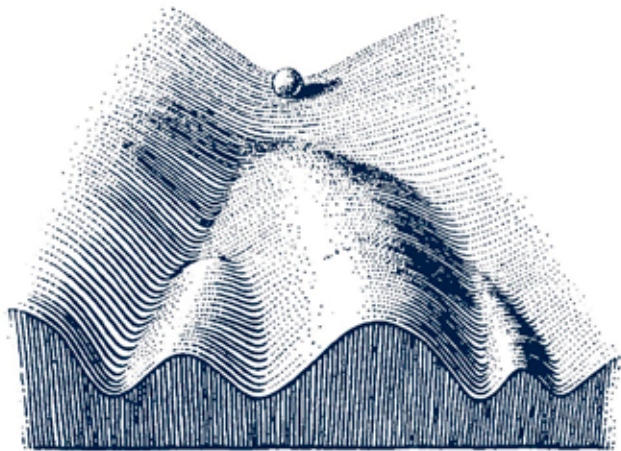
[1]



[2]



[3]



[4]

1 Four stills from Koolhaas' keynote lecture at GSD in April 2009.

2 Paranoid critical method diagram from Koolhaas: **Delirious New York** (1978).

3 Peak hour programmatic diagram by OMA: Yokohama (1992).

4 Conrad Waddington's 'epigenetic landscape' later to become 'chreod', a visual analogy of the stable pathways of development diagrammed as a (morphogenetic) pinball machine, with the (morphic) ball.

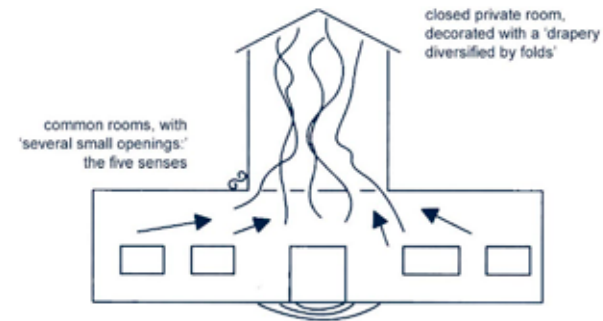
5 The baroque house diagram from Deleuze: **The Fold** (1988).

6 Shigeo Fukuda: **Lunch with a Helmet On** (1987) 848 forks, knives, and spoons.

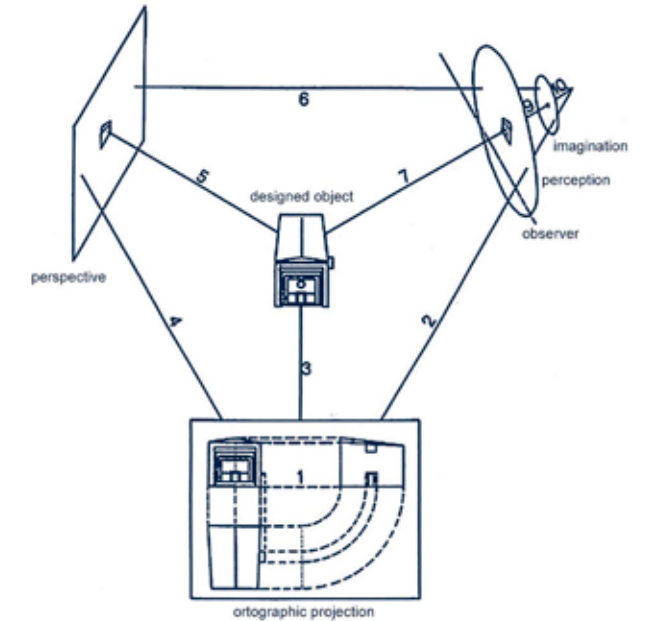
7 **Projection and its Analogues; The Arrested Image** from Robin Evans: **The Projective Cast** (1995).



[6]



[5]



[7]

V

Capitalism and the Mutating Intellect

Mutations in Contemporary Urban Space and the Cognitive Turning Point of Capitalism

Yann Moulier Boutang

Introduction: The New Encroachment of Biosphere and Noosphere, Crisis of Space, and New Space Space, as mankind's built environment on Earth, depends on two things: the *biosphere* – as the complex ensemble that allows sustainable reproduction of life as a whole; and the *noosphere* – which we can characterize as another global ensemble, that of human activities produced by the brain (from language, art, culture, religion, technique, and sciences, to civilization as the material traces of these activities that precisely cannot be reduced to biosphere).

Noosphere has always been considered an important or crucial object either in hot or cold societies, be they with or without state and written history.¹ It might seem that up until the period of late modernity that biosphere was only thought of as an implicit condition of noosphere. Yet this is not totally true. Many religions have forecast the possibility of a global catastrophe that would destroy all life (for example: the non-return of the sun in Aztec or Inca civilization, or the deluge in the Bible). Although a link between man's guiltiness in these matters (for example: the seven plagues of Egypt, or Sodom and Gomorra) and the end of life was clearly established, direct causality between human behavior and the destruction of the biosphere was not seen as inherent, as the Earth was threatened only by an almighty God who, as a creator, had the power to punish and retaliate against human sins. Of course, since the mid-twentieth century, this understanding has radically changed.

The turning point occurred with Oppenheimer at Los Alamos and the first real test of an atomic explosion. The scientist, for the first time, understood that an apocalypse of mankind was held in the hands of humankind. Thereafter ecological knowledge and consciousness (and paradoxically in this respect the followers of the Enlightenment), have installed the belief that the biosphere is directly dependant on mankind, hence on the noosphere. In other words, the potential of catastrophic actions are both implicit and explicit within the efforts of intellectual activity.

Consequently, this introduces a new era for architecture, urbanism and design. Indeed, sustainable growth has introduced in architecture and urbanism many new principles. But, to my mind, what is at stake requires a much broader change than merely fighting global warming or the reduction of carbon-based economies. The famous subject/object disjunction and the independence of *partes extra partes*, or *res extensa* (Descartes) is coming to an end; as is the doctrine of *technè* as an imitation of nature or the mimesis of art as a partial imitation of nature, as well as a going beyond of what nature can bring forth (Aristotle). Simply put, the noosphere no longer relies on the model of nature as it well exceeds such boundaries.

This paper will put forward two main arguments:

- Political economy as well as capitalism have both experienced a drastic and systemic change, which I call the intensifying of cognitive capitalism² and its economy of contribution as a result of

¹ I am referring here to Levi Strauss's notable distinction between 'hot' and 'cold' societies, which are distinguished primarily through their respective approaches to their own cultural history – the former being driven by change and (technological) progress, while the latter are resistant to change remains reliant on mythical structure. Later, of course, Marshall McLuhan took up this distinction and extended it to 'hot' and 'cool' media – the former requiring less participation by the viewer, while the latter requires more effort in order to extract meaning.

the digital revolution in a society of pollination and generalized interactivity.³

- Urbanism and architecture (design) are deeply transformed by this turning point. We shall examine the main features of this new Great Transformation and why it explains the urban crisis.

This paper will conclude by stressing which fundamental principles the development of urban space should follow in order to ensure pollination and creative cooperation.

I Cognitive Capitalism and the Economy of Contribution in Digital Networks: Introducing Beeconomics

Urban Beehives Recently in two major metropolises of Old Europe, odd scenery could be seen. Hives of honeybees were proliferating in London, acting as an acute testimony of pollution. On the roof of the Garnier Opera in Paris, honey collected from hives that have been settled there for decades proved to be of better quality than honey from those found in the more rural countryside.

In England, a liberal democrat MP, Vincent Cable, asked for more hives to be brought into the city of London. A request that found Cable scorned by both Tony Blair and Gordon Brown. Alison Benjamin and Brian McCallum commented in *The Guardian*:

Cable's point, rather, is that Tony Blair and Gordon Brown, poor deluded saps, didn't understand *beeconomics*. 'I asked parliamentary questions about bees, first of Blair, then of Brown and they ridiculed me, saying that I wanted to spend thousands of pounds of research on bees and how this was typical of Lib Dems wanting to spend money on stupid things. I now realize their ridicule was based on incomprehension.'⁴

On the other hand, the strange result of the scrutiny of the bees on the roof of the Opera in Paris was less of a demonstration of the good atmosphere of the French capital than of the worrisome state of the nation's countryside. Various diseases have impacted the hives of the *apes mellifera* all over the world, not only in France.

The Importance of the Colony Collapse Disorder The article in *The Guardian* ended with the following statement: 'If the bee disappeared off the surface of the globe then man would only have four years of life left. No more bees, no more pollination, no more plants, no more animals, no more man.' This terrifying statement was attributed to Einstein, although no written evidence has been found that he actually said this. However, *La vie des Abeilles* by Maurice Maeterlink was published in 1905 and reprinted 23 times. It is hence plausible that Einstein may have commented of this very famous book. Whoever uttered this dire prophecy, we now know that it is true.

A proof *a contrario* is to be administrated with a strange disease that appeared

in 2006. It is called CCD (Colony Collapse Disorder). CCD is a phenomenon in which worker bees from a beehive or honeybee colony abruptly disappear. While such disappearances have occurred throughout the history of apiculture, the term Colony Collapse Disorder was first applied to a drastic rise in the number of disappearances of Western honeybee colonies in North America in late 2006.⁵ European beekeepers observed similar phenomena in Belgium, France, the Netherlands, Greece, Italy, Portugal, and Spain, and initial reports have also come in from Switzerland and Germany, albeit to a lesser degree. Possible cases of CCD have also been reported in Taiwan since April 2007.

Causes of such diseases, which bring about the death of adult bees far from the hives, are numerous: traditional bee pests and diseases; the ways in which bees are fed and types of bee food; how bees are managed; the lack of genetic diversity and lineage of bees; chemical use in bee colonies; chemical toxins in the environment; genetically modified crops; Varroa mites and associated pathogens.⁶ A recent article has shown that the immunizing defense system of the bees could be seriously damaged by sub-lethal doses of pesticides like Regent, Gaucho or Cruiser, as well as by the lack of variety in alimentation (especially canola crops).⁷

Various such diseases have destroyed between 45 to 90 per cent of the population of some colonies. They are responsible for a total mortality of 28 per cent of the colonies in the USA (of beekeepers owning more than 5 hives). Between 2004 and 2008 the virus struck quickly in the USA; in March of 2007 CCD spared no more than 20 states, while in April there remained only ten unaffected states.⁸

2 Yann Moulrier Boutang, *Le capitalisme cognitif, La nouvelle grande transformation* (Paris: Editions Amsterdam, 2007). The new (2008) English edition is forthcoming in 2010-2011 with Polity Press, London.

3 Yann Moulrier Boutang, *L'abeille et l'économiste* (Paris: Carnets Nord, 2010).

4 <http://www.guardian.co.uk/politics/2008/oct/27/vincent-cable-liberal-democrats>.

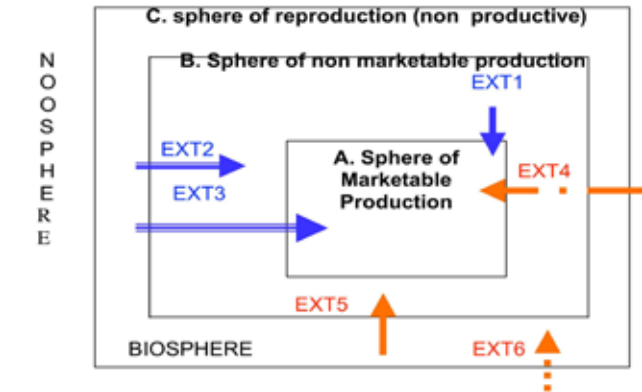
5 Colony Collapse Disorder: In October 2006 Dave Hackenberg, a professional migratory beekeeper, dropped off 400 colonies of bees from Pennsylvania to spend the winter in the warmth of central Florida. When he returned to his Florida apiary a month later he was surprised to find that many of his bees were missing. The number of bees in hives that were still inhabited had dropped greatly, these hives contained only the queen and some younger bees, though the colonies still had stored nectar, pollen, and many developing bees. The older foraging bees, who specialize on gathering nectar and pollen to feed the hive, had simply disappeared. Stranger yet, the wax- and honey-eating pests that usually infest empty honeycombs, wax moths and small hive beetles, were absent from the collapsed colonies. In the end only nine of the original 400 colonies survived. In the months following Hackenberg's somewhat mysterious loss, 23 per cent of commercial beekeepers in the USA experienced similar losses, with affected operations losing an average of 45 per cent of their colonies. Beekeeping is not the idyllic endeavor that many envision – bees often suffer from viral, bacterial, and fungal infections in addition to parasitic mites and insecticides – so beekeepers are accustomed to losing bees and colonies. Prior to 2006, according to a survey conducted by the Apiary Inspectors of America, beekeepers lost an average of 17 per cent of their colonies each year due to various causes. But in the winter of 2007 the loss of colonies was more serious and more sudden and the cause of loss more mysterious than anyone had seen before. The term 'colony collapse disorder' was coined to describe the sudden disappearance of foraging bees leading to the eventual demise of whole colonies.

6 Jamie Ellis, ENY-150, Colony Collapse Disorder (CCD) in Honey Bees, a series of the Entomology and Nematology Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL. Publication date: May 2007.

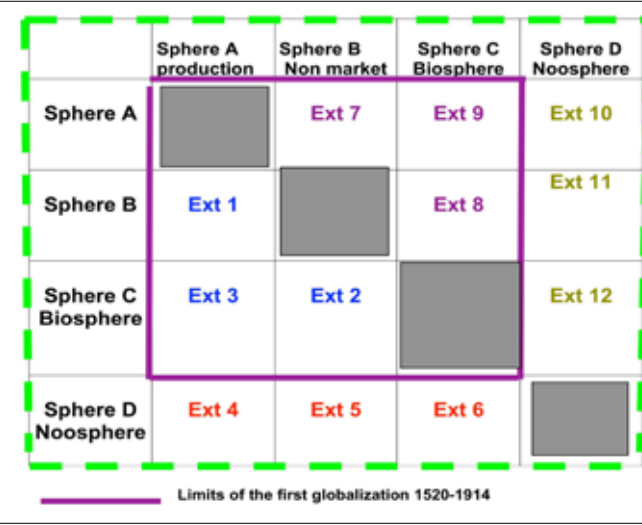
7 James D. Ellis, Jay D. Evans and Jeff Pettis, 'Colony losses, managed colony population decline, and Colony Collapse Disorder in the United States,' *Journal of Apicultural Research* 49-1 (December 2009): 134-6.

8 <http://graphics8.nytimes.com/images/2007/04/23/science/bees-LG.gif>.

D. Activities of cooperation, life, culture, knowledge, learning

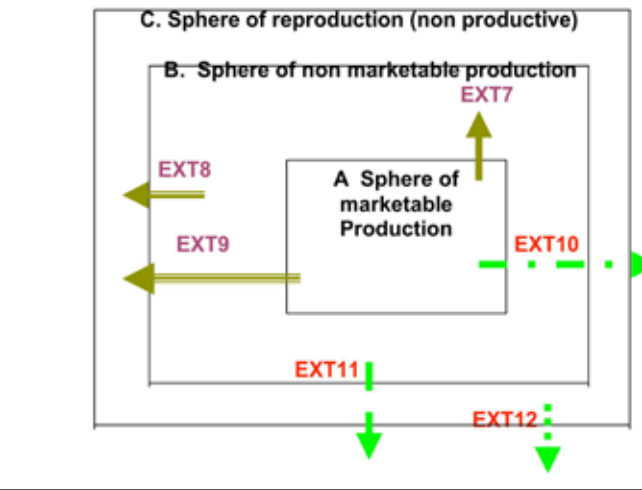


[1]



[2]

D. Activities of cooperation, life, culture, knowledge, learning



[3]

- 1 Positive Externalities within Four Spheres
- 2 Negative Externalities within Four Spheres
- 3 Matrix of Externalities According to the Four Spheres

The enormous fading of honeybees is becoming an emblem of the evolving global crisis of the biosphere and the warning flag of ecology, indicating the need to care for the planet along with many other partial problems such as the erosion and destruction of arable fields, scarcity of water, climate warming and the melting of the icecaps.

But another lesson may be drawn from the utility of bees. It deals with the way in which the activity of the bees has been taken into account by political economy since the famous fable of Mandeville.⁹

What Do Bees Do? What exactly is it that bees do? What makes them particularly precious? We know that they live (collectively) in swarms. They need hives to protect them from cold, rain, and predators. They produce honey for their own use and to breed larva. Is that all? Clearly not. Otherwise we would not understand why they play a unique role in the complex system of life upon earth.

The most important activity of bees is pollination. That is to say, they have made life possible and sustainable for 200 million years. Bees produce an output of honey and wax (which has a yearly value in the USA alone of approximately 100 million dollars); but with the help of the bee-keepers, the global result of their activity can be estimated between 35 billion and 100 billion dollars. These figures correspond to the value of fruit and vegetable crops, and cereals and synthetic feed. Furthermore, when we estimate the value of pollination in regard to the preservation of nature and wilderness reserves, plus the indirect effects it carries with respect to the preservation of many species, the collateral value of bee activity could be appraised at somewhere between 350 and 1000 times the actual value of their marketable 'work'. These externalities can be either positive, as with the above example, or negative, when we think in terms of collateral damages.

Pollen Society The example of bees can be read literally. It makes sense and unfortunately it must be taken seriously and not as a mere image or a rhetorical device. But figuratively, pollination as applied to human society is also very instructive. To provide an example, let us substitute bees with human beings.

We can thus describe a society that has reached a high level of interactions in which positive externalities (as well as negative ones) have become dominant (Figures 1-3). Like the immersed part of the iceberg, multiple and multioriented interactions are producing a serious crisis in the fundamental basis of theoretical economics. Market-based analysis is lacking, as value cannot be correctly measured or assessed by a marketable output model that continues to exclude externalities.

What then corresponds to that of bee pollination in developed human societies? One answer would be: all the various modes of circulation of information, knowledge, affect, and care.

⁹ I am referring here to Bernard Mandeville, **The Fable of The Bees: or, Private Vices, Public Benefits**, of 1714. The poem 'The Grumbling Hive', included in this collection, was published nine years earlier.

Whether codified, implicit or non-marketable goods; an information-based society relies upon intangibles (immaterial) in an increasing proportion. In order to sustain and expand a complex system we must create new responses to unanswered questions. Creativity and innovation are characteristics of human civilization and culture; but the increase of intangibles has become hegemonic, reshaping the whole of society and economy in the wake of the diffusion of digitalized devices and the creation of networks of networks at a worldwide scope and on a global scale.

This *pollen society's* output can be measured only in its collective expressions. New techniques of fetching innovation and creativity through crowd sourcing and data mining on the Internet have opened up a new continent of wealth for capitalist valorization.

Economy of Contribution Generally, an economy that rests mainly on intangibles is characterized as a gift economy. However, such an economy remains rooted in the principles of the exchange of equivalents. And yet there are also systems that allow for the exchange to endure more than one cycle as in the case of monetary equivalents. For instance, Marcel Mauss's 'potlatch' mechanism, or the Japanese *on-giri*, which addresses obligation as moral debt, as studied by Ruth Benedict.¹⁰ Hence, we can identify an economy based on exchange without money, an equivalence of immateriality.

What has become very common today and greatly expanded by the Internet is the *peer-to-peer* manner of producing new content as studied, for example, by Michael Bauwens.¹¹ In such relationships measure is not based on reciprocal exchange between individuals, but individuals contribute (sometimes anonymously, as in Wikipedia) to a project on the basis of its interest and of the faith or the trust they have in the networks that host these exchanges. Developers and advocates of 'free software' have provided an excellent example of this economy of contribution.

The noosphere as such can provide criteria or motivations for an economy of contribution instead of the exchange of equivalent goods or goods of equal monetary value. Standard economics accepts only one motivation: the *libido sentiendi* or desire to consume more goods (maximization of utility). The economics of bureaucracy has made room for another motivation, the *libido dominandi*. The reward attained by the effort made to command someone else, or to force someone to do something. This form of coercion might well be considered as a new basis of noo-politics. An analysis of digital work on computers and activities in networks has shown that *libido ludendi* (the lust to play, acting for fun) and *libido sciendi* (the pleasure to solve a problem) are important motivations. However, it should also be noted that these same motivations are already present in the gift economy.

But we must also return here to reconsider the condition of the biosphere – or the reciprocal relation between the bio- and noo-spheres. That is to say the consequences of actions set on the keeping and preservation of the environment for our

descendants and for mankind in general, which represent a new polarity and an unconditional principle that distinguish the economy of contribution from the non-marketable gift economy.

There are numerous economic conditions that might be considered here concerning the respective situations of economy, such as industrial capitalism, the informal sector, the public economy, the economy of solidarity, the economy of cognitive capitalism, and the informal economy; however, for now let us dwell upon what we call 'cognitive capitalism.'

Cognitive Capitalism Cognitive capitalism, unlike industrial capitalism, has understood that a much greater value can be extracted on the side of pollination than in the field of production of marketable output. Using digital technologies – data mining, the mapping of information, traces on the real time of networking in search of information through search engines (Google), the purchase of books (Amazon), or social networks (Face Book) – cognitive capitalism has become a master in the capturing of positive externalities. Crowd sourcing is now a key factor in producing continuous innovation and organizational creativity and reactivity. Google has only 20,000 employees around the world, and yet 17 million 'click workers' per second are producing free information on the actual structure of the market and overtaking the old techniques of traditional marketing systems. As discussed above, with respect to social pollination, these new forms of cognitive capital allow for externalities to migrate from the periphery to the center where they have greater and greater effect.

Making accessible a wide range of services for free (web searching, e-mail, cartography, localization of most any form of information), Google has displaced the marketability through the meta-condition of any kind of marketable activity in a complex environment full of noise. The same trend can be observed within the low-cost industries (transport, tourism, alimentation). Capturing positive externalities from the activities of the multitude (much more diverse than the mass of industrial consumption or the crowds of political unrest) is only possible if hubs of pollination are yielded. One could speak of a flirtation between cognitive capitalism with communism.

Cognitive capitalism is more interested in implicit knowledge, in contextualization than in the old codification of intellectual property rights (copyrights, patents, brands) through which industrial capitalism and mercantilism (the two historical forms of capitalism) had solved the problem of the commoditization of intangibles. Hence the sprawling battle for control and enclosures of digital knowledge goods and the pirate role of Google when it is presented as a true perpetrator, like free software and the open source movement by the major players in the cultural industries (cinema, publishing houses, music), and informatics (Microsoft).

Such conceptions of enclosure with respect to the relation between ownership and property determine a new 'great transformation.' The *Great Transformation* that Karl Polanyi so well illuminated in his famous 1944 book of the same title had determined for 160 years (from 1815 to 1975)

¹⁰ See: Marcel Mauss, *The Gift: Forms and Functions of Exchange in Archaic Societies* (London: Routledge 1990 [1922]); and, Ruth Benedict, *The Chrysanthemum and the Sword: Patterns of Japanese Culture* (Cleveland: Meridian Books 1967 [1946]).

¹¹ Michael Bauwens refers to this as P2P, see his essays 'The Political Economy of Peer Production' and 'Peer to Peer and Human Evolution', both of which are widely accessible through the Internet. Bauwens' work is also often found held under the concept of noosphere.

the stable institutional conditions of the three fundamental commodities of the market: capital, labor, and money.¹² In each of these domains new fictitious commodities are rising: the conditions of appropriating the global activities of the multitudes, the lives and not only the work of wage earners; the value of capital that rests on the restored marketability of knowledge at a higher level than IPR (Intellectual property rights); and last but not least the validation of credit and immaterialized money on the basis of the continuous capture of intangibles such as trust and care. Including confidence (trust is but the financial counterpart of it), while care is the expression of intelligent attention paid to living beings, a sort of dedicated service, and the expression of singularities rather than mere universality of commodities. For example, the value of an iPod is not its material value, nor the price of each piece of music it contains, but the expression and result of a singular person's choice and taste.

Such new (great) transformations cannot but have deep repercussions and impacts on the conception of space (both the noosphere and the biosphere). This point will now be taken up in the second part of this paper.

II From Urban Crisis to New Trends in Digitalized and Networked Space

Main Features of the Crisis in Urban Space and Wild Cities The crisis of architecture is manifold. This paper began by alluding to a true crisis of Cartesian and Renaissance space, which was dominated by the perspective view, and human-oriented technology as the expression of the sovereignty of mankind over the earth becoming a mere *res extensa* – a projection of the certainty and assertive rhetoric of subjectivity. This trend has not been reversed by mid-twentieth-century modernism, but has been further triggered by the Industrial Revolution and the industrialization of construction material. The baroque rebellion against the classical and state order, the manifesto of romanticism testifying to the ruins of Renaissance humanities, and the acculturation of exotic and colonial inspiration show that this powerful movement of appropriation and serialization of space and cities is indeed contradicted. Yet it is only with critiques such as the post-modern period in architecture, postsocialism in politics, and postcolonialism in literature that we come to an understanding that deconstruction (both concrete and theoretical) damages the very heart of spatiality.

Ubiquity had long been a property of mind as localization was held as a characteristic par excellence of space. Through the disposition of things and monuments (as reflecting a dimension of the invisible or relying on the sacred dimension of life) we can say that ubiquity was implicitly suggested. But in more recent times, the focus has turned to the substance of space as tangible and unique. One can ask if this remains true today. Spatiality, it could be argued, was once horizontal and coextensive. The *abata* (place not to be tread upon) like the tomb of Oedipus at Colonus, the sanctuary of the Temple or the surrounding wall of

monasteries, or the Forbidden City – these were *dia*-spatial even when the memory of the place could be seen as synchronic. Order in *dispositio rerum* once followed a vertical order in value by a horizontal segregation in space. When vertical arrangement was permitted, it borrowed its economy from what we might refer to as an arborescent display.¹³

With the use of digital techniques, imitation and computational repetition of binary elements, the power of extension with respect to traditional space has been greatly increased (modern architecture in the age of the masses); and yet, at the same time, the virtual power of brain and intelligence has started to hybridize concerning the disposition of virtual bodies, or the increased perception due to digital prosthesis. Ubiquity, not as a metaphorical property of space culturally reconstructed by memory, but as a metonymic display of the body in its surroundings. If verticality has overcome the limits of horizontal space in order to control the transformation of people into masses (in slums, for instance, or the 4,000 inhabitants at La Courneuve, or the 12,000 employees in the Twin Towers), multiple diagonals seem to correspond much more to the cities and territories of networks.

Circle and square (like in the Temple of Heaven in Beijing) once mapped the swelling of population and empire. A reversed T square haunted Le Corbusier's drawings of Rio de la Plata and Buenos Aires,¹⁴ and the high rise competition to make the tallest of skyscrapers. In both cases we are in a Euclidian space. Any fourth dimension is mental, a hint, a co-lateral effect. Franck Ghery's Guggenheim of Bilbao is tackling architecture directly with non-Euclidian space, a rhizomatic and vital replication of forms.¹⁵

The complex coexistence of pieces of Euclidian space situated between a global arrhythmic fabric reflects the incorporation of the virtual through digital devices with respect to the way in which the brain works, communicates and lives.

Here we must take into account an important feature of the cognitive capitalist way of thinking: the transformation of the relation between political economy and ecology.

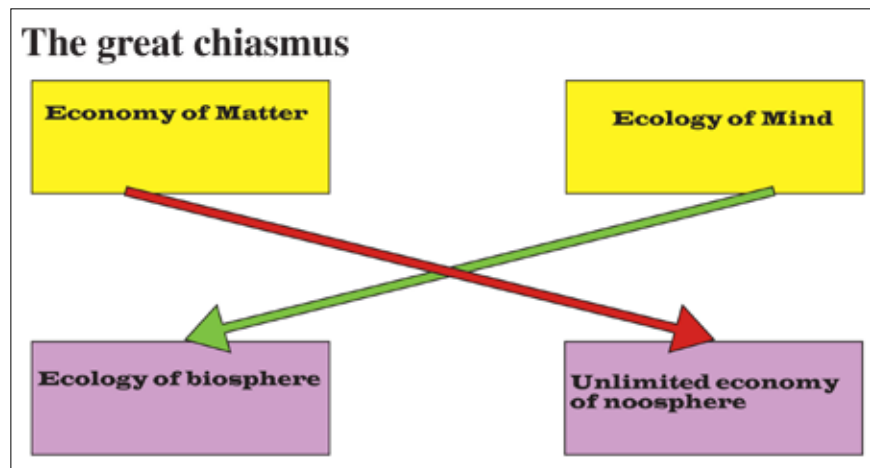
The Chiasmus of Political Economy and Ecology In the late 1960s, Gregory Bateson opposed the *ecology of mind* and the economics of the material sphere (needs, the growth in the supply of material goods). The noosphere, a terminology borrowed from Vladimir Vernadsky and Teilhard de Chardin, was dominated by the paradigm of the biosphere as the sum of ecosystems, whereas economics (the discipline) and economy (the object of the former) still used to belong to the paradigm of nature as a source of unlimited resources for human action, taking into account that capital and human labor only were rare. The introduction of finiteness and scarcity in the *res extensa* or *natura naturans* occurred in the Report of the Club of Rome in 1972. However, eco-

¹² Karl Polanyi, *The Great Transformation: The Political and Economic Origins of Our Time* (Boston: Beacon Press, 1957 [1944]).

¹³ Here I am referring, for instance, to the characteristics of the arboreal as made by Deleuze and Guattari: that from leaf to root and trunk, an arboreal structure implies that cutting at one point can interrupt life. Arborescent is unilateral, binary (for example, sap is distributed along a one-way channel), aborescent is complicated not complex.

¹⁴ See Arnoldo Rivkin's comments on the drawings of Le Corbusier, in: 'Buenos Aires, L'horizontal insigne,' *Babylone 4* (1985): 110-25.

¹⁵ Indeed one cannot directly oppose Le Corbusier and Gehry; however, the transgressing of vertical modern architecture of the later owes much to the Ronchamp Chapel of the former.



[4] The Great Chiasmus

nomic problems being prioritized based on the exhaustion of fragile and complex ecosystems up to the general threat for the biosphere as such, don't appear until the 1990s, with the warming effect of carbon driven growth on the climate. In the meantime, the digital revolution and extraordinary multiplication of interactions have opened an unlimited continent still largely unexplored as far as the growth of knowledge in both nanospace and brain studies.

This is what I have called the chiasmus of political economy and ecology: see Figure 4.

The Crisis of Urban Space The chiasmus of political economy and ecology allows us to reject the reductive choice between either a pro-economic growth, at any cost to the planet, and the no-growth stance. In *bee-economics*, or *ecolo-nomics*, the preservation of the biosphere becomes the unconditional principle to which knowledge must be subordinated in order to achieve solutions for a complex problem. From what we have learnt from these past 20 years, a strong mobilization of knowledge is necessary. Cognitive capitalism is not per se a solution to the ecologic issue; but it certainly brings us closer to biosphere protection than we could achieve with GM, Exxon, Total, or BP.

However, a closer examination of the crisis of urban space today reveals a rather severe diagnosis. Intensive urbanization and metropolitanization have been shaping and framing the planet on a world scale since the end of the eighteenth century. The actual enormity of their proportions (the China syndrome) still belongs to the ideology of the period of industrialization, as well as the shift of the active population from agriculture to industry and services. More than half of the total world population is now living in cities. Soon 75 per cent of the world's populace will live in highly urbanized conurbations. This is already creating pressure on the environment that is different and heavier than the traditional pressure of

populations that Malthus had in mind. In the Malthusian model, regulation of a stable equilibrium through preventive or curative checks is achieved by brutal adjustment in the human population. What we have had since 1798, when 'An Essay on Principle of Population' was first published, is rather an adjustment to biodiversity and the consumption of non-renewable resources.

Complex, Uneven and Unequal Space The accumulation of six billion people in increasingly larger cities has created serious problems, but they are not diriment issues as such. What creates a real crisis is the uneven quality of this accumulation so closely related to inequality.

The most striking feature of urbanization in big metropolises is a rupture in continuity between the inner cities and the suburbs. This process has been so well documented that we need not expound upon it here. However, two interesting characteristics deserve mention. On the one hand, this process of segmentation and definitive heterogeneity of urban space cannot be attributed to mere technical issues, like the nature of the buildings or the frequency and convenience of transportation means. What is at stake is a deliberate hindrance to the free mobility of migrants – be they internal or international (domestic or foreign). As shown in an earlier work, *Slavery and the Origins of the Wage System* (1998),¹⁶ control of mobility and restriction to free access have always represented a crucial point in the history of capitalism. Restricted access to land and housing within the boundaries of the cities and scarce access to formal employment have created an increasing gap between structured urban processes and informal employment and habitation. Hernando de Soto offers an acute exemplification of this condition as it pertains to Columbia.¹⁷

Sanctuarization of unspoiled, unpolluted land and housing reinforces this mechanism. It has greatly boosted inequalities, and this is not only occurring in so-called developing countries. Access to nature preserves becomes a privilege for inhabitants of city centers. In France for example, 80 per cent of the people live in suburbs, neither in the historical centers nor in real rural zones.

Numerous studies have shown how far and deep space discrimination of domains (from *favela* to condominium) has drawn visible or invisible walls between classes, while classes have supposedly melded into an indistinct sociological continuum. Modern urban space is now torn and slashed to such a point that its unity is increasingly problematic. Mainstream research has attributed such disaggregation to the fading of traditional communities and to the lack of social linkages within modern societies composed of individuals. However, such an explanation does not seem very convincing.

If we examine several episodes of the urban crisis, the red thread that ties them has something to do with the mobility of active populations. The riots in the suburbs of developed countries (from Watts in 1965 to Clichy in 2005) again reflects the old problem of integration in urban areas with respect to the descendants of rural immigrants and their authoritarian allocation to socially

¹⁶ Yann Moulier Boutang, *De l'esclavage au salariat, économie historique du salariat brisé* (Actuel Marx Confrontation, Paris: Presses Universitaires de France, 1998).

¹⁷ Hernando de Soto, *The Other Path: The Invisible Revolution in the Third World* (New York: Harpercollins, 1989).

undesirable jobs. Urban discrimination through ghettos for young descendants of immigrants is achieving the role once attributed to documenting permission of stay, of work for international immigrants or internal migrants (*hukou* in China) for their fathers or grandfathers.

Urban crisis also means that the art of making cities and towns is rapidly vanishing in the double, and often contradictory, dialectical confrontation of its components: the bottom-up, spontaneous and popular invention of housing and occupation of space on the one hand; the top-down method of planning on the other. Indeed roads, highways, metropolitan sports facilities, public buildings, commercial malls, as well as the distribution of water, electricity, and services can at certain times and places reach impressive achievements; but in most cases these urban developments have lost their organic fabric.

Urban metropolises are growing faster and faster, but this fantastic growth (see Chongqing or Mexico or São Paulo) is anything but what is known as 'development' in economic theory or the birth of cities in Medieval Europe.

Suburbs can be defined as non-cities where the political, economical and cultural powers rule from the outside (on a municipal or global scale). The French terminology *banlieue* condenses the whole meaning, including its depreciative value. Gentrification of some old popular districts or restoration of historical kernels for the tourist industries have but further enhanced the gap.

Safe financial activities and import/export (what Saskia Sassen referred to as the 'quaternary functions'), great cultural exhibitions and museums (as opposed to entertainment), and the traditional economic activities of old industrial capitalism have disappeared. Big factories, small firms, and harbors have been swept out of the cities. In the meantime the new productive labor (the 'creative class' of Richard Florida) as well as the *cognitariate* are poorly represented in the governance of the metropolises that still pertain to the old modern aristocracies through a highly sophisticated but nevertheless obsolete circuit of professional politicians, state and local administrations, and media. In this respect we might well wonder if we should not expect new municipal turmoil such as those that occurred in the European cities of the fourteenth century if this (lack of) representation were to be further combined with a deepening awareness of ecological crisis.

What is theoretically decisive for this two-fold crisis is that outer cities are not producing positive externalities and inner cities have not updated their software for evaluating these new positive externalities (this would provide an excellent economic definition of cities as urban economics precisely defines urban space specificity as a producer of positive externalities). Pollution and negative externalities are only deepening the aforementioned gaps with respect to urban scenarios of sociopolitical and economic disequilibrium.

Conclusion: Some Principles of Urban Space in a Society of Pollination

The End of the Tripartition of Space in Cities Some links can be underscored between ecological crisis and changes in the real productive basis of economy.¹⁸ Fordism installed a tripartition of time: the time of labor (in the factory or offices), the time of rest (to restore the working force), and the time of leisure (for social activities, mass consumption and entertainment). For the greater part of the population these three functions were performed in separate places. This tripartition could be displayed in a mono distribution (one centre for offices, headquarters, and government) or in a de-concentrated way as with Shinjuku in Tokyo or La Défense in Paris. Transport was therefore the key factor and the weak point is that pollution and traffic jams have revealed billions of working hours being lost each year. But one can notice that for several classes, such as the creative class, temporary workers in a 'pollen society', *cognitariate*, and marginal workers, this tripartition is no longer useful. The inventive force, unlike the working force and living force as direct productive forces, does not separate the times of labor, leisure and rest. Time for creation is *ubi-ware*, porous, depending highly on the gathering of metropolitan externalities. Unlike the Levitic, there is no time to dwell, to rest, to work, to live.

What is asked of urban facilities is to open a temporal space for permanent superposition of productive activities that can no longer be measured simply by the physical presence of offices. This new pressure toward redefining productive space (which could be a park, a museum, taking a coffee, your home) should separate smart projects from the mere repetition of vertical concentrations in downtown towers, or indefinite conurbation through hours of transport, or patrimonial and neo-Hausmannian condominium areas among the 'wild cities' where hordes of new settlers, dropouts, and children living on the street have ceased to represent only a marginal population.

There is a congruence between the ecologist critique of the waste of resources (energy, pollution, global warming) in private transportation and large scale public transportation and the new productive needs that can relocate work, leisure, and activities and dematerialize exchanges of information and encounters through digital devices.

The Golden Rule for Urban Space and Architecture in Cognitive Capitalism

The increasing importance of the submersed externalities, be they negative or positive, introduces a third criteria for building industries and creativity and innovation in the architectural sciences. So far, technical imperatives and financial considerations were the two primary controlling factors. It is now necessary to add a new principle that matches the one in economics with respect to the new great transformation and the rising of an economy of contribution through pollination and captured by digital devices.

It can be expressed as follows:

¹⁸ Yann Moulier Boutang, 'Habiter la mutation, Des ruines de la vieille économie politique au nouveau paysage de la ville des saviors,' *Les Cahiers de la Recherche Architecturale et Urbaine* 13 (2003): 11-28.

- Minimize negative externalities, either by producing less negative externalities, by solving more negatives externalities or by both.
- Maximize positive externalities, either by consuming less positive externalities than those produced, or by producing more positive externalities than those consumed.

The second great principle that should avoid the trap of patrimonial bias is found within the rising of intangibles. Let us recall that there are two types of intangibles: first, knowledge divided between explicit or codified contents (database, software, knowledge materialized in hardware and devices, patents, brands, and copyrights); second, implicit knowledge like apprenticeship, knowhow, cooperation, trust, and care. If the focus of cognitive capitalism is the production of intelligence (innovation and creativity), the second type of intangible is far more important than the first, which was the solution to the commoditization of knowledge goods that are similar to public goods or old commons. Priority given to this second type of intangible is the second golden rule for a renewal of urban space.

The third principle is driven by what we know of complexity, being that it cannot be managed based on an input/output matrix. When dealing with a complex system (and what can be more complex than the cities and composites of brains and bodies cooperating in digital networks of networks?), the third golden rule is that the outcome effects must prevail over the marketable output.

Any spatial arrangement must obey one global rule: it must foster human pollination and corallization. The survival of both bees and human beings depends on the social conditions of housing (of hives) and protection from the various forms of stress that have deeply damaged both the biosphere and the noosphere. The consequences for failing to protect the new commons of digital pollination can also be easily imagined. The list of causes of (literal) colony collapse disorder remains extensive; the list of causes of (figurative) human CCD is growing. The 'green new deal' in urban space is interconnected with the social 'new deal' of the past; and it is worth suggesting that revisiting modernism's *Athens Charter* with this new golden rule could prove fruitful.

* This paper was first presented at the International Symposium: Architecture in Mind: From Biopolitics to Noopolitics, DSD Trans Thinking the City series, in October 2008 at the Faculty of Architecture, Delft University of Technology. Thanks to Deborah Hauptmann and Warren Neidich for their invitation to Delft and comments.

A Specter is Haunting Globalization

Gabriel Rockhill

The concept of globalization imposes itself with such urgency today that its historical origin has been concealed. The word seems to describe an undeniable reality by encapsulating – thanks to a reckless desire for conceptual abbreviation – all of the new phenomena of our age, whether they are economic, political, social, cultural, or technological. Although the attempts to discern the precise characteristics of globalization are numerous, the debates around these nonetheless tend to obscure the historic origins of its conceptual and historiographical categories, as if forgetting the past – or at least a certain legacy – was the answer to understanding the present. However, this legacy refuses to lay dormant. As a *past* that *does not pass*, it continues to haunt discussions of current affairs like a specter that voluntary amnesia has been incapable of warding off, despite its relentless effort. Indeed, if this specter were brought to light, it would thwart the supposedly natural image of our world by a harsh confrontation with one of the unexpected sources of our contemporary political imaginary. This specter, the supposed adversary of globalization, is the specter of vulgar Marxism.¹

Without succumbing to the charms of prophetic hagiography, we should note in passing that Marx himself was by no means insensitive to the haunting of history, whether this haunting be forgotten or repressed by the worshippers of novelty, or the result of fledgling revolutionary movements that can only, at first, speak the language of their ancestors:

The tradition of all the dead generations weighs like a nightmare on the brain of the living. And just when they seem engaged in revolutionizing themselves and things, in creating something that has never yet existed, precisely in such periods of revolutionary crisis they anxiously conjure up the spirits of the past to their service and borrow from them names, battle cries and costumes in order to present the new scene of world history in this time-honored disguise and this borrowed language. Thus Luther donned the mask of the Apostle Paul, the Revolution of 1789 to 1814 draped itself alternately as the Roman republic and the Roman empire, and the Revolution of 1848 knew nothing better to do than to parody, now 1789, now the revolutionary tradition of 1793 to 1795. In like manner a beginner who has learnt a new language always translates it back into his mother tongue, but he has assimilated the spirit of the new language and can produce freely in it only when he moves in it without remembering the old and forgets in it his ancestral tongue.²

The tradition of dead generations – and, more precisely, the tradition of the generation supposedly buried by globalization – weighs no less on the minds of those who believed in a different end of history than the one announced by Marx.

¹ I will concentrate in this article on a widespread conception of Marxism, which is not necessarily corroborated by all of the writings by Karl Marx or the Marxist tradition.

² Karl Marx, **The Eighteenth Brumaire of Louis Bonaparte** (New York: International Publishers, 1963), 15–6, translation slightly modified. On the issue of haunting and even a certain 'hauntology,' see Jacques Derrida, **Specters of Marx: The State of the Debt, the Work of Mourning and the New International**, translated by Peggy Kamuf (New York: Routledge, 2006).

Globalization: Between Words and Things The general consensus is that globalization has created a more unified world with a single economic market, a network of new technologies, the proliferation of a more or less homogenous culture, and novel structures of governance. Such a process isn't only new, or at least relatively new, it is supposedly inevitable – in spite of setbacks – given the nature of its driving forces and the general course of history. Looming over our existence like the dominant trait of a profound *zeitgeist*, globalization allows us to resist its consequences only if we are already subject to its effects. *Novel, inevitable, almighty*: such is the force that is supposedly transforming our world from top to bottom.

And yet, there is no agreement on the precise definition or the exact date of so-called globalization. To take only a few examples, can we really talk about a global information and communication system when less than 30 per cent of the world's population has regular access to Internet outside of North America, Australia, and Europe?³ Can a rhizomatic system of air transportation mostly connecting major economic centers, airport hubs, and tourist attractions really be considered a global system of transportation, especially considering all of the necessary documents (passports, visas, and so forth) and the substantial financial resources required to use it? Are the archipelago of economic exchange⁴ and the very unequal development of the world signs of a *global village*?⁵ Are the rejection of the European 'constitution' and the presence of strong nationalist movements in European countries symptoms of a globalized age?⁶ And what about the drastic increase in the number of shanty towns since the end of the 1970s, which accounted for about a sixth of the global population at the beginning of the twenty-first century (921 million in 2001 according to *The Challenge of the Slums* report published by the United Nations) and represent regions of the world that are not only largely inaccessible to the globetrotters but also in some cases cut off from national and transnational governance?⁷ And lastly, how can we talk about the unification of the world when 'international' organizations such as the World Bank and the IMF are at least partially responsible for redistributing wealth from the poorest countries to the richest ones?⁸

The advocates of globalization would undoubtedly argue that these issues are only temporary slowdowns in the globalization process. Such a stance, rooted in a veritable historical faith and often founded on a theodicy capable of integrating all of history's evils into a grand eschatological narrative, could withstand the display of any series of empirical facts. It is therefore necessary to start by reminding ourselves that the notion of globalization is *purely relative*. Everything depends on the scale of analysis, the reference points and ultimately on the question: globalization *in relationship to what*? For some, the discovery of the 'New World' in the late fifteenth century would be an example of globalization, while for others

globalization only began with the invention of mass communication and the spread of so-called post-Fordist capitalism. And in a few decades it is highly probable that such characteristics will be replaced by others.⁹ There are no objective criteria that enable us to distinguish with precision true cases of globalization. And without objective criteria of analysis, the participants in the globalization debate invent their own criteria to demonstrate the pertinence of their own distinction between the global age and the pre-global era.

For example, let us take the following statement: 'today, as commerce [and] travel ... bring together diverse people, and their lifestyles are constantly being brought closer together through frequent communication, we see that certain national differences have diminished.' Are these signs of globalization? Isn't the overcoming of national boundaries by commerce, travel, and communication one of the characteristics of globalization? Yet, the author does not explicitly refer to the process of globalization, and for good cause: the word did not yet exist. Despite what one might think, this quote isn't randomly picked out of a recent newspaper, nor does it appear in one of the latest books devoted to the question of overcoming the nation-state. It dates from 1754, and its author is Jean-Jacques Rousseau.¹⁰

Does this mean that the reality of globalization precedes the invention of the term? This question touches on a fundamental philosophical problem that must be dealt with upfront: the relationship between words and things. There are two ideal-typical positions that are readily identifiable. The first – the *realist position* – is surely the dominant one. It consists in affirming that there is an autonomous world and that language is a system of communication enabling us to talk, correctly or incorrectly, about this world. In this case, globalization would indeed be a real historical phenomenon and the late emergence of the term would simply correspond to an intellectual step forward allowing us to talk more precisely and concisely about this reality. The second position,

3 <<http://www.internetworldstats.com>>, © 2001-2009, Miniwatts Marketing Group. The figures for each geographic region on 31 December 2008 were as follows: Africa (5,6%), Asia (17,2%), Europe (48,5%), Middle East (23,3%), North America (73,1%), Latin America/Caribbean (28,6%), Oceania/Australia (59,9%).

4 See **Globalization in Question**, eds. Paul Hirst and Grahame Thompson (Cambridge: Polity Press, 1999) and **La mondialisation au-delà des mythes**, ed. Serge Cordellier (Paris: La Découverte, 1997).

5 See David Harvey's conclusions in **A Brief History of Neoliberalism** (Oxford: Oxford University Press, 2005), 118-9.

6 See, for instance, Will Kymlicka's brief summary in 'The New Debate on Minority Rights (and Postscript)', in **Multiculturalism and Political Theory**, eds. Anthony Simon Laden and David Owen (Cambridge: Cambridge University Press, 2007), 26.

7 Mike Davis, 'Planet of Slums,' **New Left Review** 26 (March-April 2004).

8 On this point, see Joseph Stiglitz, **Globalization and Its Discontents** (New York: W.W. Norton & Company, 2002); David Harvey, **A Brief History of Neoliberalism**; and John Perkins, **Confessions of an Economic Hit Man** (New York: Plume, 2006).

9 When situating ourselves in relationship to time, the past should not be accorded an absolute privilege. The future should be, in my opinion, a constitutive dimension of history.

10 Jean-Jacques Rousseau, **Discours sur l'origine et les fondements de l'inégalité parmi les hommes/Discours sur les sciences et les arts** (Paris, Garnier-Flammarion, 1992), 190. J.G. Herder expressed a similar opinion in 1774 (see the bilingual edition, **Une autre philosophie de l'histoire/Auch eine Philosophie der Geschichte**, translated by Max Rouché (Paris: Aubier, 1964), 268-9.

which might be qualified as *lingua-centric*, denies the existence of an autonomous reality and asserts that it is language that delivers ‘the world’ to us. Far from being a real phenomenon, globalization would thus simply be a term in a system of signification, a differential marker in a network of intra-linguistic references.

We should jettison these two ideal-typical positions, founded on the opposition between language and reality, and ultimately on the dichotomy between humanity and the world (language often being conceived of as a human phenomenon). If an autonomous world existed independently from our practical, conceptual, perceptive, and discursive schemes (which seems highly probable), we would only have access to it through these schemes. This is not to say that the world is reducible to our apprehension of it or that we are free to see the world as we please. It means, rather, that the world only delivers itself to us as a world insofar as we are beings of the given world, with theoretico-practical dispositions and specific modes of experience. To cite one of Thomas Kuhn’s distinctions that I will return to later, I would say that we never have a direct experience of *stimuli* or raw definitive facts. The primary elements of our experience are *data*, which present themselves as the self-evident facts of *our world*. As far as language is concerned, we should not consider it to be a largely autonomous and all-encompassing system that structures the totality of our thoughts and experience. Language is a dynamic and historic practice that, far from being an autonomous element, is intertwined with social, political, economic, and other practices. Hence the choice is not between *globalization as a word* and *globalization as a thing*. Nor should one accept as such the question that structures a significant portion of the globalization debate: Is *a word* such as ‘globalization’ capable of describing *a thing* such as the current state of the world?¹¹ What needs to be pointed out is that the notion of globalization emerges from practices linked to a specific schematization of the world, practices that have, moreover, been effective insofar as they have helped produce ‘the thing’ supposedly described by the ‘the word.’

Marx’s Unexpected Recuperation By making the debate on globalization into a controversy regarding the relationship between *a word* and *a thing*, we promptly forget the historicity of the discursive, theoretical, and practical categories allowing us to apprehend or discuss the ‘historical real.’ In this respect, it is essential to recall that the emergence of the notion of globalization is very recent. Its origins date back to the 1950s and 1960s.¹² but it started to impose itself as one of the key concepts of our times in the 1980s.¹³ The number of articles in the *New York Times* on globalization can serve as an interesting barometer. Prior to 1970 there were no articles, and the statistics for the following decades are relatively revealing: 1 article in the 1970s, 172 articles in the 1980s, 911 articles in the 1990s, and 1,656 articles between 2000 and 2005.¹⁴ The results for other databases, such as *LexisNexis* or the archives of *The Washington Post* and the *Los*

Angeles Times, follow the same pattern. We could also cite the number of works indexed under the keyword ‘globalization’ in the Library of Congress, which confirm a similar tendency in the world of books: 1 book in the 1970s, 16 books in the 1980s, 1,080 in the 1990s and 6,258 between 2000 and 2005.¹⁵

Instead of simply being a neutral concept used – or not – to describe new realities (other terms such as *internationalization* or *international development* already existed), it is a practical concept rooted in a very specific historical and geopolitical conjuncture, marked notably by Ronald Reagan and Margaret Thatcher’s politicoeconomic project, as well as by other important actors on the political and economic stage such as Paul Volcker (former Chairman of the Federal Reserve), Augusto Pinochet and Deng Xiaoping. This project was perfectly summed up by Thatcher’s slogan: *There Is No Alternative* or *TINA*.¹⁶ This means two things at once: there is no *structural* alternative to the neoliberal economic system, and there is no *historical* alternative insofar as it is inscribed in the very destiny of this system to impose itself throughout the world. This obviously does not mean that every use of the concept of globalization is necessarily linked to the various metamorphoses of neoliberalism, but it is of the utmost importance to highlight the fact that the genealogy of this concept is directly tied to the reconfiguration of the geopolitical world since the 1970s. This reconfiguration was fuelled in the 1950s and 1960s by decolonization and later, in the 1990s, by the collapse of the Soviet Union. These two political events sometimes gave the impression that a world divided between imperial zones or ideological blocs¹⁷ was giving way to a more unified planet, in which the reign of the free market promised, via an implacable theodicy, *One market under God, indivisible, with Liberty and Justice for all*.¹⁸ In other words, the concept of globalization is not a purely descriptive concept used to index new historical phenomena. It is a con-

11 As we will see, the ‘hyperglobalizers’ and the ‘transformationalists’ say ‘yes’ and the ‘skeptics’ say ‘no.’

12 See René Dagorn, ‘Une brève histoire du mot “mondialisation”,’ in **Mondialisation: Les mots et les choses**, ed. GEMDEV (Paris, Editions Karthala, 1999), 189.

13 On this issue, see Roland Robertson, **Globalization: Social Theory and Global Culture** (London: Sage, 1992).

14 Search undertaken on 20 February 2009.

15 Search undertaken on 17 January 2010. Also see Frédéric Lebaron, **Le savant, le politique et la mondialisation** (Bellecombe-en-Bauges: Editions du Croquant, 2003), 7: “Globalization” [mondialisation] has become in a few years one of the key notions of the economic and social debate. It is in particular at the beginning of the 1990s that the use of it spreads significantly in France, in competition with the word “globalization” [globalisation], directly transposed from English.

16 Regarding this point, see Immanuel Wallerstein, ‘After Developmentalism and Globalization, What?’, **Social Forces** 3 (March 2005): 1263-78; Immanuel Wallerstein, **World-Systems Analysis: An Introduction** (Durham, NC: Duke University Press, 2004); and Ronaldo Munck, ‘Neoliberalism, Necessitarianism and Alternatives in Latin America: There Is No Alternative (TINA)?’, **Third World Quarterly** 3 (June 2003): 495-511.

17 On the purely ideological aspects of the Cold War, see Noam Chomsky, **Detering Democracy** (New York: Hill and Wang, 1991), particularly the first chapter, entitled ‘Cold War: Fact and Fancy.’

18 Michael Mann emphasizes the importance of these two geopolitical events in his article, ‘Has Globalization Ended the Rise and Rise of the Nation-State?’, in **The Global Transformations Reader**, eds. David Held and Anthony McGrew (Cambridge: Polity Press, 2003), particularly 138. Let us note in passing that the hackneyed slogans of a certain neoliberal discourse

cept linked – directly or indirectly – to a recent political imaginary and a new image of the world in which the expansion of the free market is supposed to go hand in hand with the spread of freedom in the ‘crusade of popular capitalism.’¹⁹ When I refer to globalization in what follows, I will therefore be focusing on the term’s historical center of gravity, without pretending to summarize all of its uses. And by *historical center of gravity* I mean the *linguistic practico-inert* of the term, that is, the residues of former linguistic practices that, in becoming inert, still inhabit the word and intervene in practices.²⁰ In short, the *practico-inert* of a term is *a set of effects that produces effects*.

The best explanation of the part played by this concept (at least at the level of its historical center of gravity) in the construction of a new world image consists in underscoring the way in which it surreptitiously and paradoxically appropriated a set of deceased conceptual categories: those of vulgar Marxism. What I mean by this is a certain social idea of Marxism, which does not necessarily correspond to what Marx himself wrote.²¹ Let us begin by outlining these categories, and I will later explore specific examples. According to a widespread assumption, Marxism was refuted by history for at least three reasons: 1) it was founded on a reductive technico-economic determinism; 2) it offered a teleological conception of history in which the totality of the past was directed toward a single end, following a linear or dialectical trajectory of progress; 3) it held this teleological progress to be inevitable, like an organic process that historical actors would be incapable of stopping. The ‘factual’ refutation can also be summed up in three points: 1) technico-economic determinism failed because all capitalist societies did not produce communist revolutions; 2) history did not keep its promise insofar as its *telos* – the communist revolution as the harbinger of egalitarian society – actually produced totalitarian regimes that later collapsed at the feet of capitalist democracies; 3) the supposedly natural and inevitable evolution of history encountered significant resistance, including most notably from capitalism itself and from liberal democracies.

It is very interesting that the concept of globalization has enabled a rehabilitation of the three Marxist assumptions supposedly refuted by history (by replacing communism with popular capitalism). This means that 1) reductive technico-economic determinism has made a major comeback in the form of a Market – and the march of technologies – that imposes its laws in such a way that we have to follow them whether we like it or not;²² 2) the teleological conception of history has been reinvented, and the totality of the past is henceforth organized in a linear trajectory of technico-economic progress, leading to a sole and unique end: the freedom of free trade; and 3) the inevitable structure of history reappears as the unavoidable and supposedly natural spread of modern technology and the politicoeconomic system of neoliberalism. In short, whatever we might try to do, the totality of history is determined by an absolute law – the law of the market

and of technological progress – leading to an inevitable *telos*: *There Is No Alternative!* A specter is haunting the concept of globalization, the specter of the very same Marxism that was supposedly refuted again and again by history, and more precisely by the history of popular capitalism.

Jacques Rancière writes in *La haine de la démocratie*:

The main idea [*idée-force*] of the consensus is in effect that the global economic movement attests to a historical necessity to which we must adapt ourselves, and that the only ones capable of denying this are representatives of archaic interests and outmoded ideologies. Now this is also the idea that grounds their conviction and their science. They believe in progress. They had faith in the movement of history when it was leading to the worldwide socialist revolution. They still have faith now that it is leading to the global triumph of the market. It’s not their fault if history made a mistake.²³

According to a contradictory logic that could only delight true Marxists, it’s as if capitalism’s alleged victory has actually served as the ultimate vindication of Marxism! It’s as if what is so often perceived as the success of globalization is nothing short of the apotheosis of Marxist historical logic, or rather, a certain Marxist historical logic. The content may have changed, but only to better preserve the form! One might even be tempted to conclude that Marxism, of the most unrefined variety, actually won the Cold War: by withdrawing from the grand political spectacle of the confrontation of ideological blocs, it settled in the victors’ minds, weighing heavily on the brains of those who were trying so hard to repress or suppress it. Could the advocates of globalization actually be the best guardians of Marxism in the so-called post-Marxist era?

(‘democracy,’ ‘freedom,’ ‘equality,’ etcetera) should not make us lose sight – this is precisely one of their objectives – of the distance between proclaimed values and actual values.

19 This expression is borrowed from Margaret Thatcher’s speech at the Conservative Party Conference in 1986. Also see, on this point, the neoliberal manifesto, Milton Friedman’s *Capitalism and Freedom* (Chicago/London: University of Chicago Press, 1982), 9: ‘The kind of economic organization that provides economic freedom directly, namely, competitive capitalism, also promotes political freedom because it separates economic power from political power and in this way enables the one to offset the other.’

20 I’ve borrowed the term *practico-inert* from Jean-Paul Sartre’s *Critique de la raison dialectique*, vol. 1 (Paris: Editions Gallimard, 1960), although I’m not using it in the exact same sense.

21 This is unfortunately not the place to enter into the important debate – marked most notably by the positions staked out by Cornelius Castoriadis and Louis Althusser – on the relationship between Marx’s texts and the diverse social and historical practices that have tried to put them into practice.

22 In an important variation on this first thesis, Francis Fukuyama has proposed a merger between Marx and Hegel by linking economic determinism to what he calls the desire for recognition. This desire, the ‘motor of history,’ is what allows him to combine the evolution of the free market economy with the development of ‘liberal’ politics in a universal history of humanity, finally arriving at ‘the Promised Land’ (*The End of History and the Last Man* (New York: Avon Books, 1992), xix and xv). Also see his lecture, ‘The End of History Revisited,’ presented to the Long Now Foundation in San Francisco on 28 June 2007, where he affirms that science and technology constitute the engine of history, connected by a ‘drive shaft’ to economic development, which is then attached by a ‘loose set of connecting rods’ to politics, and finally by relatively weak links to culture:

http://fora.tv/2007/06/28/Francis_Fukuyama_End_Of_History_Revisited#%20.

23 Jacques Rancière, *La haine de la démocratie* (Paris: Editions La Fabrique, 2006), 94.

This paradox of the spectral persistence of Marxism is not just a simple conceptual contradiction that should be naïvely celebrated as the aporia of our era. It has dreadful concrete effects. By putting a new label – more precisely, a logo that is both sellable and profitable – on the historical logic of vulgar Marxism, globalization is capable of removing responsibility from political and economic actors, who cannot be blamed for the allegedly natural and desperately complex forces of the market.²⁴ Furthermore, it promotes citizens' passivity, since they are told so often that they cannot change their destiny that they end up believing it:

The repetitive mantra asserting that globalization is inevitable is the intelligent use of a discourse serving two political objectives. The first objective is as follows: if the decision makers believe in it, they are going to develop policies that will make this inevitability into a self-realizing prophesy. The second political objective consists in creating a climate of resignation in the population subjected to the structural flood of liberalization.²⁵

To sum up, the concept of globalization, at least in its historical center of gravity, reclaims supposedly defunct Marxist categories, in a historical conjuncture marked by the collapse of Soviet communism, in order to help create a new image of the world in which the inevitable spread of the politicoeconomic project of neoliberalism is linked to abolishing accountability for the historical actors at work behind this development and to the progressive infantilization of those subjected to it. Faced with such a conceptual genealogy, it is imperative to reject the realist position as well as the lingua-centric position. Far from being a purely descriptive term or a signifier in an autonomous system of signification, the notion of globalization is an *idée-force* (forceful key idea) of the last 30 years that – intertwined with political, social, technological, and economic practices – has played a fundamental role in the imposition of a new world image in which a determinist teleology dictates our destiny: we must follow the laws of the market! *There is no alternative ...*²⁶

And yet as I'm writing these lines, we are in the midst of such an intense economic crisis that the state has 'had to' intervene to save the banking system, if not the entire economy. Martin Wolf, the author of *Why Globalization Works* (2004) and a renowned columnist for the *Financial Times*, has declared the reappearance of another specter from the past: 'the ghost of John Maynard Keynes ... has returned to haunt us.'²⁷ In attaching the reduction of the economy to a moral narrative, whether it be Austrian (Mises and Hayek) or socialist, he categorically asserts: 'We are all Keynesians now.'²⁸ The journal *Esprit* refers to 'an ideological crash' of neoliberalism: 'We are all in favor of regulation now! Since September 15, the date when the bankruptcy of the American bank Lehman Brothers was announced, it is impossible to keep track of the number of positions, across all of the ideological

camp, in favor of the intervention of the state in the economy.'²⁹ Naomi Klein, to cite a final example, draws an analogy between the current crisis and the fall of the Berlin Wall by declaring that if the latter was the death knell of communism, then the former should be heard as the death knell of neoliberalism.³⁰

At the same time, it is important not to lose sight of how the neoliberal system works. As David Harvey has demonstrated, by drawing on Karl Polanyi's masterful work, the free market has never been incompatible with state intervention, and the management of crises is actually part of the neoliberal project. We therefore need to critically investigate how this crisis was presented and recall, for example, that president Bush kept repeating that the foundations of the economy were solid. Then suddenly, during the fateful month of September, as if faced with a more or less unexpected 'economic hurricane,' he asked for 700 billion dollars to avoid a severe economic meltdown. It was necessary to save the banks and companies that were *too big to fail*. This complex crisis needed a fast and extreme solution, starting with 350 billion dollars distributed by Treasury Secretary Henry Paulson, the former Chairman and Chief Executive Officer of Goldman Sachs.³¹ We should note in passing that this sort of crisis discourse recalls all of the exceptional measures put in place or intensified after 11 September 2001: the USA PATRIOT Act, the Military Commissions Act, illegal wiretappings, extraordinary rendition, the network of secret prisons, the redefinition of torture by the Office of Legal Council, etcetera.³² It is not by chance that this crisis occurred like a

²⁴ See Zygmunt Bauman, **Globalization: The Human Consequences** (New York: Columbia University Press, 1998), 59: 'The deepest meaning conveyed by the idea of globalization is that of the indeterminate, unruly and self-propelled character of world affairs; the absence of a centre, of a controlling desk, of a board of directors, of a managerial office.'

²⁵ Richard Sanders, cited in Lebaron, **Le savant, le politique et la mondialisation**, 5. Also see Ernesto Laclau and Chantal Mouffe, **Hegemony and Socialist Strategy** (London: Verso, 2001), xvi: 'Presented as driven exclusively by the information revolution, the forces of globalization are detached from their political dimensions and appear as a fate to which we all have to submit.'

²⁶ Contrary to the claims made by Jean-François Lyotard in 1979, our era is not marked by incredulity regarding meta-narratives. Although this is not the place to explore the details of the complex argument in **The Postmodern Condition** (I have done this elsewhere, in my book **Logique de l'histoire: Pour une analytique des pratiques philosophiques**), it is clear that globalization discourse resembles at many levels what Lyotard called a grand narrative: it is an eschatological discourse centered on an Idea of something to come that purports to establish a veridical historical narrative, animated by the totalizing meta-subject of economic freedom, in order to legitimate institutions and political practices.

²⁷ 'Keynes Offers Us the Best Way to Think about the Financial Crisis,' **Financial Times**, 23 December 2008, <http://www.ft.com/comment/columnists/martinwolf>.

²⁸ Ibid.

²⁹ Marc-Olivier Padis, 'Introduction. Entre néolibéralisme et régulation: l'Etat à la croisée des chemins,' **Esprit** 349 (November 2008), 7; 'Introduction. Entre néolibéralisme et régulation: l'Etat à la croisée des chemins,' 6.

³⁰ She made this claim in a lecture at the University of Chicago, which was broadcast on 6 October 2008 and is available on the website: http://www.democracynow.org/2008/10/6/naomi_klein.

³¹ I would like to highlight in passing a major event that was largely effaced – for good reason! – by the financial storm: the bill authorizing, on 24 September 2008, 612 billion dollars in military expenditures (see Chalmers Johnson, 'We Have the Bailout Money – We're Spending it on War,' **The Nation**, 29 September 2008).

³² In the long list of important sources on these events, see the following: the interviews con-

complex and uncontrollable natural phenomenon, whose severity was largely unexpected, for it is allied with the same historical logic that I outlined above. By naturalizing the economy and transforming it into an autonomous authority independent of the decisions made by specific agents, this historical logic promotes passive reactivity (we can only react to forces stronger than we are), the removal of responsibility and accountability (no one can be held responsible for natural phenomena), and historical shortsightedness (the situation is so critical that we must react quickly, without wasting time by debating distant causes).³³

Ideology and Political Imaginaries The specter of vulgar Marxism not only inhabits the historical logic of the globalization debate, but it is also behind the scenes of the debate itself, like the silent director of controversies. The ‘great globalization debate’ – to cite a text by David Held and Anthony McGrew – is structured by an opposition between the ‘globalists’ and the ‘skeptics,’ in other words between those who believe in the reality of globalization and those who call it into question.³⁴ A certain Marxist concept of ideology is at the heart of this opposition, as the choice imposed on the participants in this debate is founded on the dichotomy between reality and ideological illusion.³⁵ The globalists’ position is one of pure and simple realism: the concept of globalization reflects a historical reality. The skeptics’ position consists of interpreting the notion of globalization as an ideology whose purpose is to conceal the true nature of reality today.³⁶

In another text from the same period written with David Goldblatt and Jonathan Perraton, Held and McGrew offer a tripartite distinction to define the main positions in the globalization debate. The skeptical position is present once again, but the globalist position is divided into two distinct conceptions of globalization, identified respectively with the ‘transformationalists’ and the ‘hyperglobalizers.’ The latter believe that globalization is mainly an economic process that has led to a denationalization of the economy. Although they oppose the skeptics by affirming that globalization is a reality rather than an illusion, they tend to agree with them on three essential points: the economy is the determinant ‘in the last instance,’ history is linear and teleological, and historical development follows a more or less necessary trajectory.³⁷ Such tendencies show to what extent these two positions, at least in their ideal-typical forms, are perfectly inscribed in the historical logic described above, and most of the examples that they cite attest to the rehabilitation of vulgar Marxism in the discourse on globalization. The ‘transformationalists,’ whose manifesto is without a doubt Anthony Giddens’ *The Consequences of Modernity* (1990), break with economic determinism in the name of multicausal determinism by extending their analysis to political, industrial, informational, military, cultural, and ecological developments of globalization.³⁸ They also reject the teleological and inevitable structure of history by insisting on historical contingencies and the impossibility of knowing the end of history.

It is important to highlight two aspects of this tripartite division. First of all, ideology remains an essential dividing line between the globalists (‘hyperglobalizers’ and ‘transformationalists’) and the skeptics. Secondly, the split proposed by Giddens and his allies is only partial. The act of putting into question mono-causal determinism, teleology, and the inevitable structure of history is surely an important step forward. And Giddens’ multidimensional approach is as rich as his dialectic point of view and his holistic method. Yet, it is important to ask why the ‘transformationalists’ cling to the unifying conceptual category of globalization (as well as to the category of

ducted by Amy Goodman with Adrienne Kinne (13 May 2008), Mark Klein (7 July 2008) and James Bamford (14 October 2008) on the website <http://www.democracynow.org>; the documentary, ‘The Spy Factory,’ broadcast on PBS and available on their website <http://www.pbs.org/wgbh/nova/spyfactory/program.html>; the Amnesty International report ‘Below the Radar: Secret Flights to Torture and “Disappearance”’ (5 April 2006); the documentary ‘Outlawed’ on the website <http://www.witness.org>; two reports by the Council of Europe: ‘Allégations de détentions secrètes et de transferts interétatiques illégaux de détenus concernant des Etats membres du Conseil de l’Europe’ (12 June 2006) and ‘Détentions secrètes et transferts illégaux de détenus impliquant des Etats membres du Conseil de l’Europe’ (11 June 2007); Dana Priest, ‘Wrongful Imprisonment: Anatomy of a CIA Mistake,’ *Washington Post*, 4 December 2005; Congressional Research Service Report for Congress, ‘Renditions: Constraints Imposed by Laws on Torture,’ 12 October 2007; Richard Clarke, *Against All Enemies: Inside America’s War on Terror* (Florence, MA/Washington, DC: Free Press, 2004); Chisun Lee, ‘Bush’s Secret Counterterrorism Law Book – and the Demands to Release It,’ published 28 January 2009 on the website www.propublica.org.

³³ On this issue, I refer the reader to an extremely interesting article on Obama’s recovery plan that has the distinct advantage of calling into question **the naturalization of the economy**, that is the procedure by which the economy is transformed into an uncontrollable natural force that necessarily and inevitably follows its own proper laws: Michael Hudson, ‘Obama’s Awful Financial Recovery Plan,’ *Counterpunch*, 12 February 2009. Hudson foregrounds, moreover, the essential links between the contemporary financial situation and the history of economic and legislative decisions, recalling most notably the importance of the repeal of the Glass-Steagall Act in 1999, celebrated and embraced by Larry Summers, the former Secretary of the Treasury and the current Director of the National Economic Council (see ‘Clinton Signs Legislation Overhauling Bank Laws,’ *New York Times*, 13 November 1999).

³⁴ See **The Global Transformations Reader: An Introduction to the Globalisation Debate**, eds. David Held and Anthony McGrew (Cambridge: Polity Press, 2003). In taking Held and McGrew’s arguments as a point of departure, it is not my intention to criticize them or accept them as is. I am using them in a purely heuristic fashion without examining – this is not the place for such an undertaking – the limits of their approach or of their interpretations of various authors.

³⁵ This is only the framework of ideology within vulgar Marxism, and it corresponds more precisely to the representational conception of ideology (see Held and McGrew, **The Global Transformations Reader**, 4-6), which could be distinguished from the functionalist conception as well as the materialist conception of ideology.

³⁶ See Held and McGrew, **The Global Transformations Reader**, 5: ‘Frequently associated with this skeptical position is a strong attachment either to an essentially Marxist or to a realist ontology.’

³⁷ It is important to emphasize that it is a question of **tendencies** rather than **absolute principles**. It is worth reviewing, in this regard, all of the examples cited in the introduction to David Held, Anthony McGrew, David Goldblatt and Jonathan Perraton, **Global Transformations: Politics, Economics and Culture** (Stanford: Stanford University Press, 1999), particularly 3, 5, 7, 11-12.

³⁸ Giddens himself insists on the existence of four institutional dimensions of modernity: capitalism, industrialism, surveillance, and military power in **The Consequences of Modernity** (Stanford: Stanford University Press, 1990), 55-63. He affirms, moreover, that ‘modernity is inherently globalizing’ and presents four dimensions of globalization: the capitalist world economy, the nation-state system, the world military order and the industrial development of the planet, *ibid.*, 63, also see 64.

modernity, at least in Giddens' case). If there is no unified and linear historical process but a plurality of developments, each following its own rhythm, then why group them together under the single category of 'globalization'?³⁹ Why insist on the multidimensionality of reality and its opposing – if not contradictory – tendencies, if this multidimensionality is not diverse enough to escape the grip of a single word and concept (which, as we've seen, is far from being neutral, but rather functions as one of the slogans of the era marked by the collapse of Soviet communism)?⁴⁰ This short circuit between *a multiple object* and *a single term* reveals the extent to which the 'transformationalists' rely on realism, and it attests to their lack of critical distance in relation to forceful key ideas (*idées-forces*) like globalization or, in the case of Giddens, modernity and postmodernity.⁴¹ By resituating this position in relationship to the other two, we see that they ultimately represent – despite exceptions existing in all three camps – variants of a realist thesis: globalization is primarily an economic reality ('hyperglobalizers'), it is a multidimensional reality ('transformationalists'), it is an illusion hiding the true reality of our times ('skeptics').

In relation to this tripartite division, the reader might have the impression that I am staking out a position that could easily be inscribed in the skeptical framework: globalization does not in fact exist but is a powerful ideological construct that aims at hiding the expansion of neoliberalism. If that were the case, globalization would be an ideological illusion manipulated by malevolent powers trying to impose a false representation of the world in order to advance a questionable project. Such a thesis would be based, moreover, on a conception of ideology characterized by three traits: 1) ideology would be an intentional phenomenon insofar as it would be rooted in malicious motives and strategies of manipulation; 2) ideology would be an intellectual construction, for those using it as well as for those subject to it and those who try to resist it; and 3) ideology would be inscribed in an epistemological opposition between truth and falsity, as well as in an ontological dichotomy between reality and illusion. Intentional, intellectual, and structured by the opposition between reality and illusion, the ideology of globalization would be a mask imposed on the world by the ill-intentioned.⁴²

Such an understanding of globalization deserves to be considered in order to interpret and shed light on the flamboyant success of this fetishized notion. But it might also miss what is most essential. To clearly underscore the differences between the skeptical position presented by Held and McGrew, and my own position, I would like to propose the distinction between *ideology* and *political imaginary*. Unlike an ideology, or rather the notion of ideology described above, a political imaginary is a practical mode of intelligibility of politics, a vision of the world anchored in the practical sense of agents. Although intentional attempts at manipulation are possible, a political imaginary is more deeply constituted than ideology insofar as it refers to a set of practical dispositions acquired by participa-

tion in a social world.⁴³ Such dispositions are part of the common sense of individuals and groups, and they are not limited to the conceptual domain. A political imaginary also has a discursive, perceptive, normative and practical dimension. It is a way of being in the world, and that is why it is incompatible with the opposition between reality and illusion. The world is not on one side with ideological illusions on the other. There is a world-image interwoven with practical, discursive, and perceptive dispositions.⁴⁴

I would not deny that the concept of globalization can play an ideological role. On the contrary, it has certainly been mobilized for ideological ends. However, and this is the main point I would like to make, it is at the level of the political imaginary that the concept has truly taken root. Indeed, even those who ignore or openly reject neoliberal ideology, or those who recognize all of the damaging effects of globalization, can easily participate in the political imaginary of globalization. In this sense, the distance taken from a certain ideology does not necessarily amount to a break with the political imaginary in which it is rooted.

Hence, instead of taking a position in the globalization debate, we should rather take a position on this debate by breaking with the realism that underlies it and by resituating it in its historical conjuncture. To be more precise, it will be helpful to invoke Thomas Kuhn's distinction between *stimuli* and *data*. In a series of remarkable analyses, he has shown that we never have a direct experience of stimuli, or reality in its pure form. The primary elements of our experience are constituted by data. This does not mean, however, that we are free to choose or invent the world we would like, but rather that the world given to us can only be *our* world, the world of our data, because 'a given world, whether everyday or scientific, is not a world of stimuli.'⁴⁵ Regarding globalization, I would say that it is neither a unique or differentiated reality, nor a word simply constructing reality. As the history of the term shows, as well as its close ancestral proximity to diverse sociopoliti-

³⁹ See, for instance, Held et al., *Global Transformations*, 25-6.

⁴⁰ Giddens began working on *The Consequences of Modernity* (1990) in the spring of 1988. It is worth noting in passing that he asserts that globalization is 'a term which must have a key position in the lexicon of the social sciences' (*The Consequences of Modernity*, 52).

⁴¹ On this issue, see Justin Rosenberg's critique in *The Follies of Globalisation Theory* (London: Verso, 2002).

⁴² This is not the place to highlight the important differences between this conception of ideology and the understanding of ideology found in Marx's early writings. I refer the interested reader to the third chapter of Etienne Balibar's excellent book, *La philosophie de Marx* (Paris: Editions La Découverte, 2001) as well as to the key texts by Marx (and Engels) such as *The German Ideology*.

⁴³ Pierre Bourdieu demonstrated this aspect of what I am calling our political imaginary in 'Le mythe de la "mondialisation" et l'Etat social européen': 'This kind of symbolic drip feed that written and televisual reporting contributes to so steadily – to a large extent unconsciously, because the majority of people who repeat these utterances do it in good faith – produces profound effects. This is how, at the end of the day, neoliberalism presents itself under the appearance of inevitability,' *Contre-feux* (Paris: Editions Raisons d'Agir, 1998), 35. Also see his article with Loïc Wacquant, 'NewLiberalSpeak: Notes on the New Planetary Vulgate,' translated by David Macey, *Radical Philosophy* 105 (January-February 2001). This is a modified version of an article published in *Le monde diplomatique* in May 2000.

⁴⁴ On this issue, see Cornelius Castoriadis, *L'institution imaginaire de la société* (Paris: Editions du Seuil, 1975), 59.

⁴⁵ *The Essential Tension* (Chicago: The University of Chicago Press, 1977), 309.

cal and economic practices, the concept of globalization is a *datum* of our contemporary political imaginary. It is a fundamental dimension of a new world-image, which has been imposing itself with formidable vigor over the past 30 years.

Putting an End to a Globalizing Concept? Globalization, in our political imaginary, functions as a globalizing concept meant to summarize all of the economic, technological, political, social, and cultural phenomena of our times. Even the harshest critics of this commanding concept sometimes reproduce the political imaginary at the root of the positions that they call into question. How can we break with such a concept? Since it is not an ideology in the sense of a false representation, we cannot be satisfied with the simple appeal to the reality behind illusions by opposing *science* to *ideology*. Rather, we must dismantle ‘the given world,’ that is the common world produced by a world-image and inscribed in the practical common sense of our political imaginary.

For the purposes of this paper, I will point to three forms of critique of the contemporary political imaginary, which can act as so many strategies for breaking with ‘the given world.’⁴⁶ *Historical critique*, to begin with, consists in stepping back from the present in order to resituate it in a historical perspective. Instead of using the past to justify our own image of the present, we should try to take leave of ourselves and examine our present as if we were a historian, or better yet, an ethnologist, from a distant age. As in some of Jean Rouch’s films, we should undertake an ethnology of ourselves and an anthropology of the present by recognizing that our social practices are no less contingent than ‘distant’ social practices such as animism and pantheism. Such a perspective requires a *radical historicism*, a historicism that recognizes that *everything is historical*, including the most ‘natural’ elements of our thoughts, discourses, and practices. This was precisely one of the objectives in this essay. By retracing the history of the concept of globalization and its diverse links to the history of neoliberalism, as well as to the Marxist historical logic supposedly refuted by this history, I wanted to shed new light on our contemporary situation and on the historical logic of our political imaginary.⁴⁷

The second form of critique is *historiographical critique*, which directly dismantles the historical logic haunting the globalization discourse. It is interesting to note in this regard that we can find all of the necessary tools for a critique of economism, teleology, and historical inevitability in the Marxian and post-Marxist traditions.⁴⁸ For the sake of brevity, I’ll cite two poignant examples. In one of his most well known writings, ‘Marxism and Revolutionary Theory’ (1964–65), Cornelius Castoriadis attacked Marxist philosophy of history by calling into question technico-economic determinism, as well as the inevitable structure of historical teleology.⁴⁹

Such an understanding of history isolates the technological domain as an autonomous phenomenon with its own proper laws, whereas for Castoriadis: ‘No technological fact has an assignable meaning if it is isolated from the society where it is produced, and no technological fact imposes a univocal and inescapable meaning on the human activities it underlies.’⁵⁰ He calls into question, at the core of his critique, the reduction of the sphere of creation to a purely determined domain: ‘History can not be thought according to the determinist schema (nor can it be thought according to a simple ‘dialectical’ schema), because it is the domain of *creation*.’⁵¹ Making room for creation, and hence unpredictability, does not, however, mean falling prey to absolute relativism or descending into the abyss of an utterly incomprehensible history. Castoriadis refers, for example, to a non-spiritualist and non-materialist dialectic that ‘must dismiss the rationalist illusion and seriously accept the idea that the infinite and the indefinite exist, admit – without giving up on the work to be done – that every rational determination leaves a non-determined and non-rational residue, that the residue is just as essential as what was analyzed, that necessity and contingency are continually intertwined with one another.’⁵²

Let us take a second example. In *Hegemony and Socialist Strategy* (1985), Ernesto Laclau and Chantal Mouffe review the history of Marxism and its theoretico-practical consequences. While insisting on the diversity of the Marxist tradition, they highlight several failures of classical Marxism. It could not demonstrate, for instance, that socialism was the necessary consequence of the fall of capitalism. It is indeed impossible, they argue, to prove the existence of a link between socialism and the end of capitalism because history is not simply an objective process. They thereby reject Marxist historical determinism and insist, like Castoriadis, on the role played by subjectivity in historical processes. Moreover, classical Marxism reduces political subjects to ‘class subjects’ whereas democratic struggles are not necessarily limited to class issues. It tends to situate politics on an economic base despite the fact that politics is irreducible to economics. In short,

⁴⁶ We could also invoke **linguistic criticism** and what Herbert Marcuse described as the ‘linguistic therapy’ necessary to break with the common lexis that serves to maintain the status quo. See most notably **An Essay on Liberation** (Boston: Beacon Press, 1969).

⁴⁷ In order to develop this historical perspective, it would be necessary to juxtapose our world image with other, more or less incompatible, world images. On this issue, see the brief discussion of Anthony Pagden’s work in Pierre-Antoine Chardel and Gabriel Rockhill, ‘Avant-propos: Réflexions préliminaires sur les technologies de contrôle et les logiques contradictoires de l’histoire mondiale,’ in **Technologies de contrôle dans la mondialisation: Enjeux politiques, éthiques et esthétiques**, eds. P.-A. Chardel and G. Rockhill (Paris: Editions Kimé, 2009), 13–4.

⁴⁸ It is worth noting in passing that Friedrich Engels explicitly distanced himself (and Marx) from economism in his correspondence with Joseph Bloch in 1890.

⁴⁹ This article, published in **Socialisme ou Barbarie** between April 1964 and June 1965, was included in **L’Institution imaginaire de la société**. With different objectives, Hannah Arendt also called into question historical determinism and the idea that history is structured by laws or by regular movements such as dialectical movements. See **Between Past and Future** (New York: Penguin Books, 1968), 79.

⁵⁰ Cornelius Castoriadis, **L’Institution imaginaire de la société**, 34 (also see 25). Raymond Williams formulated a similar argument in **Television: Technology and Cultural Form** (New York: Routledge Classics, 2003).

⁵¹ Ibid., 65.

⁵² Ibid., 82.

their deconstructivist critique consists of rejecting historical determinism, economism, and the reduction of political subjectivity to a class issue. The underlying problem is what they call *essentialist apriorism* – a problem that extends well beyond Marxism – which consists of believing that privileged points of reference (the end of history, the economy, the class subject) escape from social struggles.

Although these various forms of critique are intertwined and related, we can nevertheless distinguish a third form: *economic and political critique*. To begin with, such a critique should evaluate globalization according to its own criteria. I will not get into the consequences of our allegedly common destiny, which have been well documented.⁵³ Instead, I will refer to an incisive critique that has the advantage of putting economic and political analysis in historical perspective. I have in mind Karl Polanyi's masterful work, *The Great Transformation*, in which he formulates and defends a brilliant critique of the historical creed of economic liberalism, that is the idea that the *laissez-faire* economy was a natural development, whereas the resistance to it was the result of deliberate and concerted action by the opponents of the free market. Breaking with orthodoxy, Polanyi shows the extent to which the establishment and preservation of the market system necessitates state intervention: 'as long as that system [the market system] is not established,' he writes in a passage that should make us reflect on the current financial crisis, 'economic liberals must and will unhesitatingly call for the intervention of the state in order to establish it, and once established, in order to maintain it.'⁵⁴ Furthermore, he demonstrates how the rejection of economic liberalism, far from being an anti-liberal conspiracy, cropped up as a spontaneous and generalized reaction arising from the threat posed by an autonomous economy to the social fabric. This threat comes from the principle novelty introduced by the historical emergence of the so-called 'self-regulating' market, in which man and nature become objects of commerce: 'Instead of economy being embedded in social relations, social relations are embedded in the economic system.'⁵⁵ Polanyi perfectly summarizes his attack on the orthodox vision of the history of the market economy by highlighting a dual paradox: 'While *laissez-faire* economy was the product of deliberate state action, subsequent restrictions on *laissez-faire* started in a spontaneous way. *Laissez-faire* was planned; planning was not.'⁵⁶

Such historical, historiographical, economic and political critiques provide us with the necessary tools to break with the globalizing concept of globalization, and thereby call into question the historical logic driving our contemporary political imaginary. By rehabilitating the Marxist historiography supposedly refuted by historical development, this logic of history establishes a formidable teleological determinism. It encourages the passivity of citizens in the face of the uncontrollable forces driving the inevitable natural course of history, while at the same time casting a shadow over those responsible for our 'common destiny.' It is

therefore necessary to recall that globalization is not an undeniable or inevitable fact, nor a deceptive illusion. It is a forceful key idea (*idée-force*) in a set of concrete practices that participate directly or indirectly in the construction of a world-image. Rooted in common sense, it is so powerful that it tends to dictate our future through an implicit theodicy. But, as we have seen, if we conclude from the alleged historical collapse of Marxism that *there is no alternative* to popular capitalism, the conclusion we draw perfectly inscribes itself in the same historical logic that was purportedly refuted by the history of popular capitalism! Ultimately, the only conclusion to draw is that *history is not destiny* since even the prophets, whether Marxist or globalist, are caught in the whirlwind of time.

Translated and adapted for this volume by Emily Rockhill and Gabriel Rockhill.

* This paper was originally published as 'Un spectre haunte le concept de mondialisation,' in *Technologies de contrôle dans la mondialisation: Enjeux politiques, éthiques et esthétiques*, eds. Pierre-Antoine Chardel and Gabriel Rockhill (Paris: Editions Kimé, 2009).

⁵³ See, for example, the accounts provided in Joseph Stiglitz, *Globalization and Its Discontents*; David Harvey, *A Brief History of Neoliberalism*; and David Harvey, *Spaces of Global Capitalism: Towards a Theory of Uneven Geographical Development* (London: Verso, 2006). Also see the detailed and captivating critique presented by John Perkins in *Confessions of an Economic Hit Man*.

⁵⁴ Karl Polanyi, *The Great Transformation* (Boston: Beacon Press, 1944), 149. This is why, as he adds in a passage that merits being highlighted in our day and age: 'The accusation of interventionism on the part of liberal writers is ... an empty slogan, implying the denunciation of one and the same set of actions according to whether they happen to approve of them or not. The only principle economic liberals can maintain without inconsistency is that of the self-regulating market, whether it involves them in interventions of not' (*The Great Transformation*, 149). On the relationship between the market economy and state intervention, also see *The Great Transformation*, 139 and 140: 'There was nothing natural about *laissez-faire*; free markets could never have come into being merely by allowing things to take their course'; 'The road to the free market was opened and kept open by an enormous increase in continuous, centrally organized and controlled interventionism.'

⁵⁵ *The Great Transformation*, 57. Regarding the role of economism in Polanyi's book, it is worth noting that rather than a simple economic determinism, he invokes an economic determinism deduced from his object of analysis, that is the economism proper to the era of *laissez-faire*.

⁵⁶ *The Great Transformation*, 141. Pierre Bourdieu's critique of globalization acts as an interesting echo to Polanyi's thesis: 'Economic "globalization" is not a mechanical effect of the laws of technology or the economy but the product of a policy implemented by a set of agents and institutions, and the result of the application of rules deliberately created for specific ends.' See *Firing Back: Against the Tyranny of the Market 2*, translated by Loïc Wacquant (London: Verso Books, 2003), 84, translation slightly modified/*Contre-feux 2: Pour un mouvement social européen* (Paris: Editions Raisons d'Agir, 2001), 95.

From a Politics of Nostalgia to a Politics of Change

Markus Miessen

Sometimes, one could argue, in order for democracy to emerge, democracy itself has to be avoided at all costs. In order to make decisions within any given collaborative structure, network, or institution, conflicts can ultimately only be overcome if someone assumes responsibility.

Gustav Metzger once said: ‘I relate my approach to homeopathy, which puts poison in the system in order to generate energy to defeat the weakness.’ The idea of homeopathy is that the offending organism will become more sensitive to the poison killing it before it kills the host. In this context, let us imagine a post-consensual practice, one that is no longer reliant on the often ill-defined modes of operating within politically complex and consensus-driven parties or given political constructs, but instead formulate a necessity to undo the innocence of participation.

We are currently experiencing a point of transition within participatory practices: within politics, within the Left, within spatial practices and – foremost – within architecture as its visible and most clearly defined product. Participation, both historically and in terms of political agency, is often being read through romantic notions of negotiation, inclusion and democratic decision-making. However, it is precisely this often-unquestioned mode of inclusion that is being used by populist politicians as a mode of campaigning for retail politics. Retail politics is crucial to the idea of noopolitics. Noopolitics is the way that sovereignty incorporates epistemological trajectories into build space in order to guide thinking and participation.¹ Participation is a guided tour through extended cognition in which sign posts or fields of signifiers of commodity culture are imbedded where they produce or interpolate communities through a process of calling-out-to.

In the world of mass intellectuality, it is the discursive that has appropriated the distribution of sensibility. This discursive is also the site through which we now have access to knowledge. It is this discursive practice that produces the new selective pressure on the production of mind. When the linguistic public becomes hydrated and overwhelmed with the obvious, the life of the mind is left with fewer tools to work with. Hence, it does not produce critical results as criticality is being challenged by the conception of majority. Arguably, in such register, democracy and participation lead to a form of weakness.

Let us instead imagine a conflictual reading of participation as a mode of practice, one that opposes the mindware of the democratic facilitator: one that has to assume, at times, non-physical conflict, productive friction and singular decision-making in order to produce frameworks for change. As a next step, let us challenge the idea that – in general – people have good intentions. Conventional models of participation are based on inclusion. They assume that inclusion goes hand in hand with a standard that is the democratic principle of everyone’s voice having an equal

¹ Thanks to Warren Neidich for this comment.

weight within egalitarian society. Usually, the simple fact that one proposes a structure or situation in which this bottom-up inclusion is being promoted, the political actor or agency proposing it will most likely be understood as a ‘good-doer’, social actor or even philanthropist. In the face of permanent crisis, both the Left and the Right have celebrated participation as the savior from all evil, an unquestioned form of soft politics in the way that Joseph Nye describes it: an instrument of power that attracts others to want what one wants to implement anyway.

But can we employ the idea of crisis to question our deepest assumptions? Should we rethink our values and devise new principles for action? Is the state of crisis, in Giorgio Agamben’s sense, provoking the recalibration of democratic values?

Let us imagine a conception of conflictual participation as a way to enter politics – proactively and consciously forcing us into existing power relations by intent – as opposed to a politically motivated model of participation, which tends to propose to let others contribute to the decision-making process. Hence, an idea of active versus passive politics. In active politics action produces a field of perceptions in transit. The act creates continuing changing fields of perception. In the passive notion one perceives and then responds. It makes us believe that we have democratic institutions, but instead our choices and subjectivity are sculpted by overwhelming power conditions that make us believe in a model of participation that is in fact non-participatory. The latter, we might think, is habitually stirred by the craving for political legitimization. The former may be of interest not out of disbelief of democratic principles per se, but out of sheer interest in critical and productive change.

One could argue that this model inhabits a certain opportunism. It challenges the widespread default that majority equals judiciousness, while arguing for a pro-active citizenship in which the individual outsider to a given inbred political structure can become a driving force for change: forcefully entering an existing discourse rather than opening it up to the floor. Remaining within the arena of ‘the democratic’, let us instead bastardize participation into a form of non-democratic practice, an opportunistic model of interventionism, in which interference is made possible due to the fact that one is no longer following existing protocols of internalized political struggle. Such a model is what I refer to as a Crossbench Practice.

Let us imagine this as an ongoing project. Let us begin now. As a first step, let us attempt to open up a new language of practice, a new field of operation, rather than confronting an existing one. Within this frame, let us unleash a series of experiments that shall be conducted over time. Each of those experiments shall

be directed toward the undoing of the innocence of participation. Some of them may be text-based, others set up as projects, yet again others as urban interventions or institutional models – small-scale local test grounds for change. Each one of those projects to come shall be understood as particles within a galactic model, in which planets are circulating around an empty void. This void may be loaded with a model for practice by the end of the experiment. The model may present and open questions neither hierarchically organized nor in a field, but in the form of a galaxy: a relational model that challenges political romanticism in order to open up the potentiality of a more diffused form of work.

My most recent research, titled *The Nightmare of Participation*, is the third component within a trilogy of work, which attempts to question existing notions of participatory practice, resulting from increasing gradients of political disillusionment: the first one simply questioned it (*Did Someone Say Participate? An Atlas of Spatial Practice*). The second one kicked it (*The Violence of Participation*). The third one proposes an alternative: the Crossbench Practitioner.²

What is being presented as a project in question is a theory of how to participate from outside existing power-structures – rather than inside-out. Where traditionally participation is understood as a bottom-up practice, the one being presented here sidesteps the democratic invitation process and enters the conversation mid-level, from the side, so to speak, exposing the often concealed dead end of participation: what is (are) the alternative(s) to conventional confrontation, based on the nostalgic notion of the barricade? How can one propose an alternative practice engaging in spatial projects dealing with social and political realities? What could such polyphonic practice potentially be? What is the mode of relevance of such work and does it always necessitate in ‘urgent relevance’? But let us not concentrate too much on the urgent as we might forget about what is important.

A substantiated mode of ‘scattered practice’ could put ‘life as practice’ into a format that uses as a starting point the will to act without mandate – this is not exactly participatory, but each is participating none the less, similar to the social contract fuelled by proactive willingness for change. Such self-initiated practice outside of those existing economies in which there is a clear distinction between client and service provider may enter and in fact produce an alien discourse or field of knowledge productively.

Spatial planning is often considered as the management of spatial conflicts. The city – and, indeed, the progressive institution – exist as social and spatial conflict zones, renegotiating their limits through constant transformation. To deal with conflicts, critical decision-making must evolve.

² See respectively: Markus Miessen, *The Nightmare of Participation (Crossbench Praxis as a Mode of Criticality)* (Berlin/New York: Sternberg Press, 2010); *Did Someone Say Participate, An Atlas of Spatial Practice*, eds. Miessen with Shumon Basar (Cambridge, MA: MIT Press, 2006); and *The Violence of Participation*, ed. Miessen (Berlin/New York: Sternberg Press, 2007).

Such decision-making is often pre-supposed as a process whose ultimate goal is that of consensus. Opposing the politics of consensus, critical spatial practice shall foster micro-political participation in the production of space and ask the question of how one can contribute to alien fields of knowledge, professions, or discourses from the point of view of 'space.' Like the original meaning of the Latin word *conflictus* (fight), spatial conflicts represent a clash of interests in using space. Spatial planning is often considered as the management of spatial conflicts. But who should do what, when, and how? The future spatial practitioner could arguably be understood as an outsider who – instead of trying to set up or sustain common denominators of consensus – enters existing situations or projects by deliberately instigating conflicts between often-delineated fields of knowledge.

To examine the role of the architect and the role of the contemporary institution, existing models of participation may be in need of revision, both in terms of the culture of consensus and the ethos of compromise. We may detect a need for actors operating from outside existing networks of expertise, leaving behind circles of common proficiency attempting to overlap with other post-disciplinary realities. Instead of aiming for synchronization, such models could be based on participation through critical distance and the conscious implementation of zones of conflict.

Within such zones, one could imagine the dismantling of existing situations for the benefit of being able to strategically isolate components that could be (mis) used to stir up friction. Such practice would help to understand the effects of political, economic, and social design components on space. Similar to the notion of homeopathy, one perpetrates conflict in order to test the system in regards to its possible reactions. Using the architect's expertise of mapping out fields of conflict, we may generate an archipelago of questions that seek to uncover the relevance of spatial and architectural expertise and how, in the remit of institutions, they can generate an alternative knowledge production.

Rather than delivering a recipe, we may lay out a field of potential departures that might allow us to understand what and how an architect can contribute to the questions at hand, tracing some of the above elements in order to create a selective and operational view. What makes an architect's approach to investigating a situation different from the default approaches of other fields of knowledge? What is the value of an Uninvited Outsider, a Crossbench Practitioner that is juxtaposed to a classical, market-driven consultancy methodology? Why the hell talk to architects in the first place?

Let us try to read the phenomenon of participation through a chain of variable spectacles, depending on the respective and diversified angles of observation. In

regard to political science, the core relevant arguments of Chantal Mouffe and Antonio Gramsci may be put in the context of and into conflict with the UK's New Labor model or indeed the even more consensus-driven Dutch Polder model. Within the larger remit of late twentieth-century philosophy, the writings of Jacques Rancière and Edward Said could be examined, most specifically *Representations of the Intellectual*,³ in which Said introduces the public role of the intellectual as outsider, as an amateur and disturber of the status quo. In his view, one task of the intellectual is the effort to break down stereotypes as well as the reductive categories that are limiting human thought and communication.⁴ Said speaks about intellectuals as figures whose public performance can neither be predicted nor reduced to a fixed dogma or party line. He clearly distinguishes between the notion of the intellectual and that of the insider: 'Insiders promote special interests, but intellectuals should be the ones to question patriotic nationalism, corporate thinking, and a sense of class, racial or gender privilege.'⁵ For Said, an ideal intellectual is one who works as an exile and marginal, as an amateur, and as the author of a language that tries to speak the truth to power, rather than an expert who provides objective advice for pay. This disinterested notion of what one could call the 'Uninvited Outsider' is, in the context of this book, the most relevant of Said's writing. It puts forward the claim that universality always comes hand in hand with taking a risk. There are no rules. There are 'no gods to be worshipped and looked to for unwavering guidance.'⁶ By questioning the default mode of operation, which clearly is that of the specialist, the insider, the one with an interested agenda, he talks of intellectuals as those who always speak to an audience and, by doing so, represent themselves to themselves. This mode of practice is based on the idea that one operates according to an idea that one has of one's practice, which brings with it the intellectual duty for independence from external pressures.

Learning from the Market In business terms, the concept and practice of the external consultant could be compared and mobilized as a useful example of what I would like to introduce as the 'Uninvited Outsider' or 'Crossbench Practitioner.'

If one was to investigate the phenomenon of criticality from the point of view of the market, things are pretty clear: criticality tends to merge through the margin, from the outside in, not from within the existing system itself. If a company or institution wants to change part of their structural organization, they are most likely attempting this not by mobilizing their internal forces, in other words their existing potential, but by inviting an outsider to critically reflect on what they are doing – to review, detect, and analyze the key processes, and, where needed, to propose a critical but productive alternative. Within an existing system, change is difficult to organize: for most actors within a given system, it is difficult to understand or predict the possible shortcomings of that system.

³ Edward Said, *Representations of the Intellectual (The 1993 Reith Lectures)* (New York: Random House, 1996).

⁴ Ibid., xi.

⁵ Ibid., xiii.

⁶ Ibid., xiv.

Culture is historic. It has historic registers and taboos that one can barely consciously relate to, a sense of intimidation to act, behave, and design the way we do things. A system tends to confirm existing paradigms, but rarely attempts to discover that which is beyond its safe and imaginable framework. Now, it is of course a case-specific question what this 'productive' alternative really means, and who it benefits. In the commercial business milieu, there are very different notions and practices of how this external agent can or will function. The two most interesting methods in the context of critical practice are the McKinsey model opposed to the Königswieser approach: an analytical opposed to an embedded model.⁷ Whereas McKinsey's analysis is based on a catalogue of experience, a knowledge management system, which has essentially been built up by McKinsey since the late 1930s, Königswieser is best known for what they call Complementary Consulting. This method is fundamentally different in that it enters the companies through long-term involvement. Such an alternative method beyond the analytical seeks a specificity that allows for a network approach regarding problem solving without formulas. Its intuitive rather than analytical set of soft protocols acknowledges the value of failure, non-linear thinking, and the notion of 'learning from.' Rather than prescribing solutions, it tries to enable them through processes of sustainable change, realizing that one cannot solve problems, but only tweak their performance. Instead of strategy planning, such a model promotes a redesign process of the structure that one is working in.

The analytical approach is arguably, in terms of critical re-design, likely to fail, as it tends to base the elements of change on the existing structure without asking the wider question. Or, as candidly noted by Arnab Chatterjee during a recent think-tank in Austria: 'If one asked a designer consultant and a McKinsey consultant to redesign a glass, there would be two fundamentally opposing reactions: the designer would look at the glass and think about a way in which it could physically be redesigned, in other words: aesthetically. The McKinsey consultant would look at the glass and think about it as a vessel for rehydration.' This of course poses a question as to the boundaries that one sets as well as permits. An iterative design process constantly goes through a series of reframing exercises, whereby the result is very unlikely to be within the original framework.

Now, if those processes of change can be stirred through a design toward conversations and productive communication, design in this context is understood as the re-ordering of affairs on a meta scale. Smart design decision-making is always based on dynamic variables and addresses and interacts with more than one layer and several variables at once. The network itself does not produce anything – what is crucial is the position within the network.

From Problem to Proposal Through a series of conversations with political theorist Chantal Mouffe, I have learned more about the understanding and outlining of problems than about possible solutions that one may propose. Mouffe is very good in outlining the problematic, but does not deliver any directly productive means to move forward. How can one deal critically with the conditions that one is surrounded by or investigating, but simultaneously turn it into a constructive and propositional discourse? In a corporate context, what Mouffe is doing would be called 'formulating the mess.' The mess, in this case, should be understood as the territory of investigation and action. One formulates the mess in order to convince oneself or others that things have to change. As a method or tool, it creates a common understanding of a problem, or – as Mouffe would phrase it – a joint space in which there is an agreement to disagree. For a consultant it means that one is preparing the ground, mapping the realities that one is dealing with, in order to develop alternatives. It denotes a stimulation of a circumstance in which there is a consensus about the existence of a bilateral conflict, which can – as a result – be dealt with in a productive way. In order to map this mess or field of conflict, it is important to observe and understand the rationale of the system, learn its history and watch how it performs. The mess, in this case, acts as a tool to design structures for the future, to become propositional.

Designing change takes time. Designing through playing out the conflicts that exist, and by inserting certain conflicts as productive triggers from the outside, is crucial. Consensual agreements within the early phases of the design process have to be avoided. In fact, the more room a design leaves for future conflicts to be played out, the more successful it will be in the long run. Such design would then embody the potential for those conflicts to always return to a productive mode. Sociocultural systems are self-evolving. Conflicts replace the distorted shared image by transparency. Individual stakeholders have a tendency to define problems free of context, relating them to solutions that are already known and in regards to a set of universal constraints such as time, money, and information. Within this register, deviations from the norm tend to be understood as threats. But a problem is most likely not an aggregate, but an independent and emergent property.

The Outsider should invest a healthy curiosity as a driving force for testing the performance of a given system, driven by an intuitive understanding of a situation. Critical practices and the challenging of conventional structures and truisms can emerge only from the actualities of praxis and the extrapolation of the feedback loops of the purely critical into the propositional, the applied.

Let us hope that this fictional but hopefully productive methodology will constitute evidence for the question at hand. The resulting material may constitute neither a historic survey nor a report

from the front lines of activism, but – at best – a self-generated concoction of diversified support structures to demystify romanticized participatory practices: a confined voice that allows us to differentiate the existing discourse further while stimulating an already heated debate. In fact, this may not even be a methodology but a nightmare. A nightmare with a productive end. It may neither be approved by academics nor possibly will it be read by commuters on the train. It will probably not enter the canon of history or be available in a public library. And precisely there may lie the transition point of opportunity: to produce a condition of politics by considering things before they exist – to speculate with force.

The perhaps autocratic model of participation that I will put up for discussion should not be understood as a blueprint for practice, but as a model of departure. It may start to create the necessary friction in order to both stir debate and move forward practice. If this experiment has only a single objective, it may be to develop a common understanding and starting point as to where we can start to disagree from: a theory of how to participate – without squinting at constituencies or voters, but instigating critical debate and (at best) change. There may be two arguments here, one polemical and the other conceptually constructive, both stirred by pragmatic optimism. At times developed through concrete situations and projects, which Simon Critchley would call ‘situated universality.’⁸

The reason for presenting all of the above is simple: an ongoing interest in the modes of production within corporate contexts vis-à-vis what one might call the cultural sphere, as an attempt to understand some of those processes and relate them to the context in which we operate. Architects, as well as many other players within the cultural milieu, can learn from this, of course, mostly in the sense of what ‘not’ to do. But there are also many interesting and useful examples as to the positions and roles that one can or should assume.

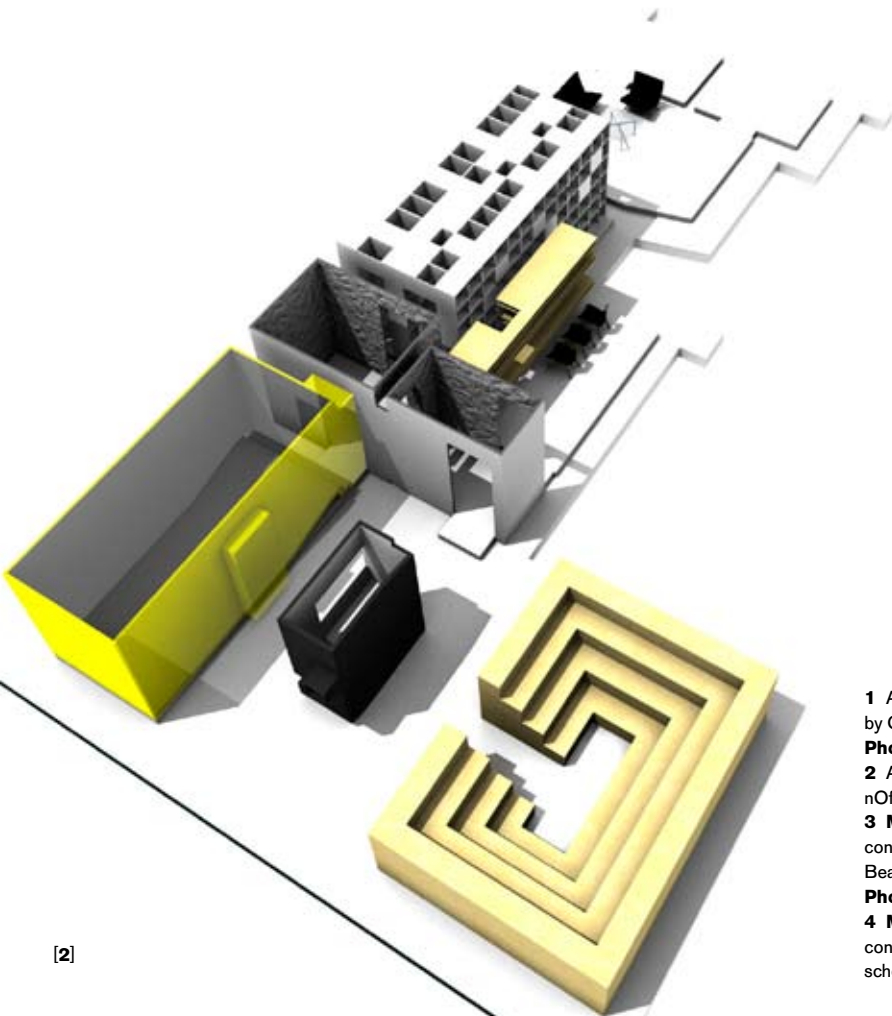
Approaching actual project work, we (as designers at nOffice), seek to explore the design of spaces, which allow different groups and social processes to operate within what we like to refer to as bastard typologies, propositional machines that produce conflictual spatial frameworks and choreographies, which can then be invaded by content: a backdrop, stage, and display, thus enabling various forms of usage and strands of narratives to merge and cross. Architecture should never be understood, imagined, or in fact constructed as subject, but object. It should perform its role like a table does for a writer. Some of the spaces we are working on are deliberately designed in order to cause friction. They allow for archipelagos of individual yet overlaid activities, which are specifically designed in order to tempt users to react or deal with the found situation and materials in sometimes curated, sometimes unforeseen and surprising ways. As architects, the world around us remains a challenge, since – within its framework – we are trying to

explore the thin line between producing content matter, while being – correctly or incorrectly – understood as service providers: delivering and enhancing the performance of spatial matters while trying to maintain a certain autonomy.

The red line that connects the politics of change, an understanding of a scattered practice, and the notion of the Crossbench Practitioner in relation to noopolitics is an interest in knowledge production through space: somewhere at the spatial crossbreed of content, conflict, and speculation.



[1]

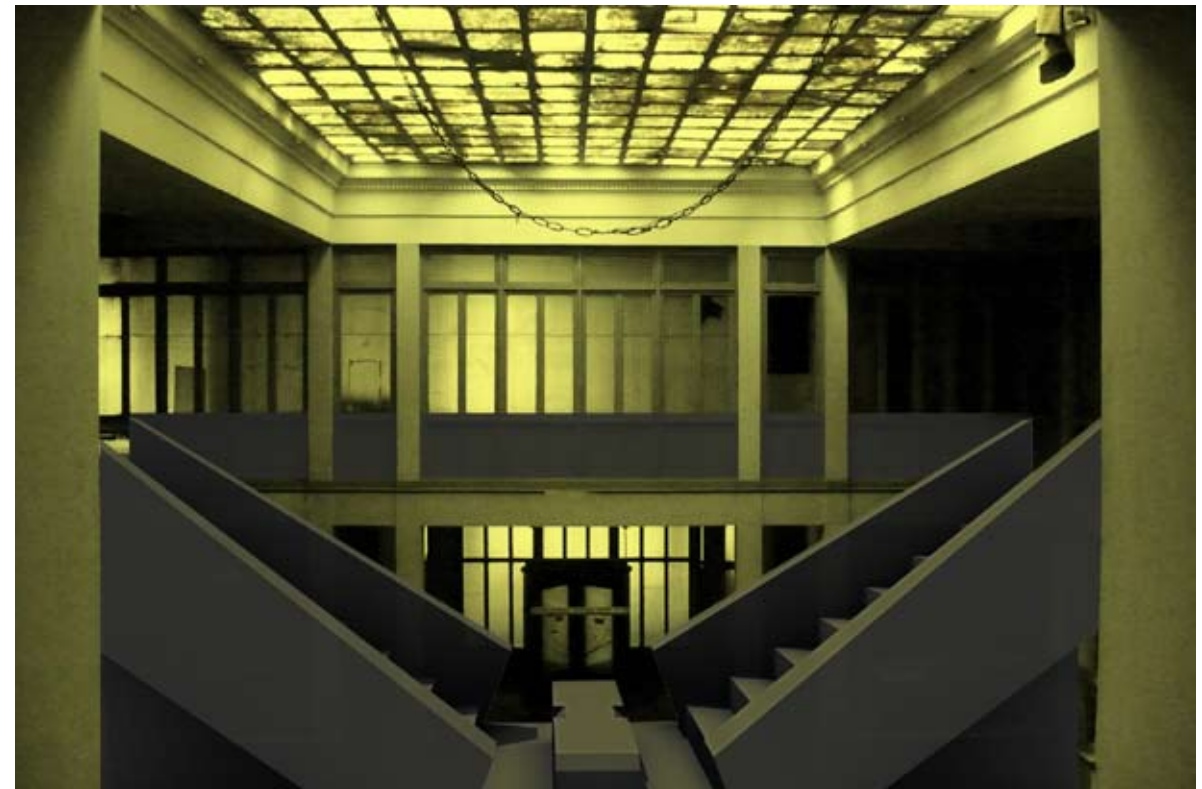


[2]

1 Archive Kabinett (Berlin, Germany) founded by Chiara Figone; design by nOffice.
Photo Credits: © Chiara Figone
2 Archive Kabinett, components; design by nOffice.
3 Manifesta 8 (Murcia, Spain), Backbench, conceived by Bassam el Baroni and Jeremy Beaudry; design by nOffice.
Photo Credits: © Pablo Ferao
4 Manifesta 8 (Murcia, Spain), Backbench contextualized, Murcia Post Office site, original scheme; design by nOffice.



[3]



[4]



[5, 6]



[7]



5, 6 Performa Hub, New York, commissioned by RoseLee Goldberg; design by nOffice.
Photo Credits: © Paula Court
7 The Violence of Participation, 2007
 Lyon Biennale, commissioned by Hans Ulrich

Obrist and Stephanie Moisdon; project conceived by Markus Miessen in collaboration with Ralf Pflugfelder; design by nOffice.
Photo Credits: © Markus Miessen

‘Exiting Language,’ Semiotic Systems and the Production of Subjectivity in Félix Guattari

Maurizio Lazzarato

The Production of Subjectivity We must enter the field of the subjective economy and no longer limit ourselves to the political economy.

The serial production and mass exporting of the white, conscious, adult male subject has always had as its correlate the subduing of the intensive multiplicities that elude all centralization and signifying arborescence. – Félix Guattari¹

In contemporary capitalism, subjectivity is the product of a global mass industry. For Guattari, it is even the primary and most important of capitalist productions, because it conditions the production of all other commodities. Subjectivity is a ‘key commodity’ whose ‘nature’ is composed, designed, and manufactured like a car, electricity, a washing machine.

Subjectivity, subjectification, subjectification process and subjection are concepts that keep returning in critical thought since the 1960s. But do we know precisely what they mean?

Félix Guattari, who has gone the farthest in problematizing subjectification processes, points out several pitfalls and obstacles to avoid when mapping out their component parts and modalities of production.

First, one must get around the structuralist pitfall that reduces subjectivity to the mere vector sum of signifying operations: ‘It is not true what the structuralists say; it is not the facts of language use nor even of communication that generate subjectivity. On some level, subjectivity is manufactured collectively just like energy, electricity or aluminum ...’² The second pitfall to avoid is that of phenomenology and psychoanalysis, which reduces ‘the facts of subjectivity to pulsions, affects, intrasubjective instances and intersubjective relations’ – also defined by Guattari as ‘intersubjective mush.’³

To foil the sociological pitfall, a double decentering must take place in relation to methodological individualism and holism. The subjectification or semiotization processes are centered neither on individual agents nor on collective (intersubjective) agents. The production of subjectivity involves expression machines that can just as easily be extra-human and extra-personal (systems that are machinic, economic, social, technological, and so forth) as they can be infra-human and infra-personal (systems of perception, memorization and idea production, sensibility, affect, etcetera). The singularization process of such machines exceeds just as much the ‘individual’ as it does the ‘social,’ as sociology understands these terms.

There is one last pitfall to get around, which Guattari calls the ‘infrastructures complex’: a material infrastructure that generates an ideological superstructure (Marxism), an instinctual infrastructure that generates the psyche, or still yet deep syntactical or linguistic structures that produce linguistic signifieds (contents).

¹ Félix Guattari, **L’inconscient machinique** (Paris: Editions Recherches, 1979), 177.

² Félix Guattari, **Les années d’hiver** (Paris: Les prairies ordinaires, 2009), 128.

³ Félix Guattari, **Chimères** 50 (2003): 23.

Our effort to get around the first of these pitfalls, structuralism, will by the same token foil the three others.

What Is Left of Structuralism: The Language Without the Structure

Structuralism is dead. But what actualized its paradigm, 'language,' is very much alive. And, most surprisingly, it is thriving particularly in the critical theory that developed in the 1980s and 1990s following the great theoretical innovations of the 1960s and 1970s that had mapped out escape routes from structuralism.

Language here does not have the systemic neutrality of structuralism. Critical thought politicized it radically, although in the end without ever relinquishing the logic that makes language the distinctive trait of man and therefore of politics.

In Paolo Virno, politics is not located in the use the speaker makes of language: language is intrinsically political by virtue of constituting an action or praxis that unfolds in public space. Politics is literally embodied in the fact of having language. In Jacques Rancière, logos is the measure and corroboration of the sole principle of politics: equality. Even the command, to be exerted successfully, presupposes a modicum of equality, the equality of logos. For subordinates to be able to understand and execute an order, they must share the language of whoever is issuing the order. Equality therefore is borne out in language. Judith Butler considers that her entire body of work is a furthering of Hannah Arendt's assertion that 'men become political beings as beings of language.' In that same vein, Giorgio Agamben establishes a tight relation between language and human nature, because 'alone among the living beings, in language [man] has put [his] own nature at stake.'⁴

The references here, critical and problematic as they may variously be, are first and foremost Aristotle and his double definition of man ('Of all living creatures only man possesses speech' and 'man is a political animal'), Hannah Arendt, and analytical philosophy. The latter is a starting point in both Virno and Butler for an analysis of the relation between words and power. In an attempt to get away from the reductionistic hypotheses inherited from Marxism that viewed it as a mere superstructure or ideological artifact, language is transformed along with its affects into the very origin of the social and society: 'The "social" ... is in fact constituted by a series of discursive acts and reconfigurations of a perceptive field.'⁵ In a dialectical reversal characteristic of this French philosopher (from the alienated spectator to the emancipated spectator ...), we are told that the social = one part discursive + one part sensible.

Some even view language and affects as not merely determining the object of the distribution of the sensible, as in Rancière (the bourgeoisie expressing itself through mastery of speech and 'educated senses,' while proletarians can only shout out and manifest their presence through 'raw senses'), but as new produc-

tive forces. For my cognitive capitalism friends, language(s) and affect(s) are the very nature of the new concept of work and the new concept of capital. Cognitive work mobilizes languages and affects, and cognitive capitalism captures and exploits these same languages and these same affects ...

This manner of apprehending language, even when defined through its political or its productive function, seems to me very much out of step with the nature and operation of subjectivity and enunciation in contemporary capitalism. All of these theories, despite their critical intent, keep us still and forever inside a 'logocentric' world, in which subjectivity and enunciation remain 'human, all too human.' In truth, with capitalism we have now long found ourselves in a 'machine-centric' world, in which the machines in question are not only technical in nature, but also scientific, social, theoretical, economic, aesthetic, immaterial, and so forth.

What does it mean that the capitalist universe is not logocentric but machine-centric? It means that statements are issued and received not by individuals, speakers and listeners – as in a communicative version of methodological individualism – but 'by complex assemblages of individuals, organs, material and social machines, of semiotic, mathematical and scientific machines,'⁶ of immaterial entities, mathematical, aesthetic idealities that constitute the true sites of enunciation. To process the complex semiotics of contemporary capitalism, which elude for a large part direct social control, machine-centric enunciation 'relies on non-human memories and procedures.'⁷

Midway through the 1960s, Pier Paolo Pasolini perceived most accurately this entry into a 'post-human world,' which in Italy was all the more dramatic given the country's linguistic 'backwardness.' The second industrial revolution brought about in the linguistic field a 'substitution of languages of infrastructures for languages of superstructures.'⁸ Throughout history, from Egyptian civilization through the first industrial revolution, 'the dominant linguistic models that unified society linguistically were the models of cultural superstructures' and intellectual elites (of law, literature, education, religion). Abruptly, with the transition from capitalism to neocapitalism that coincided with the transformation of the 'scientific spirit' into an 'integral application of science,' 'the languages of infrastructures, which is to say the languages of production, took over the linguistic guidance of society. That had never happened before.'⁹ The languages of 'production-consumption' produce a 'kind of destitution of speech, tied to the exhaustion of the humanistic

⁴ Editor's note: the author is here paraphrasing Agamben citing Aristotle: 'Among living beings, only man has language.... To have the sensation of the good and the bad and of the just and the unjust is what is proper to men as opposed to other living beings, and the community of these things makes dwelling and the city.' Aristotle, *Politics* (1253a, 10-18), in Giorgio Agamben, *Homo Sacer: Sovereign Power and Bare Life* (Stanford: Stanford University Press, 1988), 6.

⁵ 'Dissenting Words: A Conversation with Jacques Rancière,' Jacques Rancière and Davide Panagia, *Diacritics* (summer 2000): 113-26.

⁶ Félix Guattari, *Cartographies schizoanalytiques* (Paris: Galilée, 1989), 77.

⁷ Ibid.

⁸ Pier Paolo Pasolini, *Empirismo eretico* (Milan: Garzanti, 1972), 65.

⁹ Ibid., 65.

languages of the elites that to this day have been the guiding languages.¹⁰ The centers that create, work out, and unify language 'are no longer universities but private enterprises.'¹¹ The 'interregional and international' language of the future will be the 'signage' language of a 'world unified by industry and technocracy,' which is to say a 'communication of men no longer men.'

Guattari's work furthers and expands Pasolini's brilliant analyses. His key concept of a-signifying semiotics specifies the nature and function of these 'languages of infrastructures,' and the concept of the machine profoundly renews the thinking of 'technology.' In order to map out the machine-centric semiotics and modes of subjectification and enunciation, it is necessary to follow Guattari in 'exiting language' by means of a double decentering: detaching subjectivity from the subject, the individual and even the human; while taking care not to turn the unique power of enunciation into the exclusive domain of human subjectivity.

Guattari sees no reason at all to deny living and material assemblages the equivalent of a-subjectivity, a-'for-itself' (which he will call proto-subjectivity or modular subjectivity or partial subjectivity) as well as a power of enunciation (or proto-enunciation). He refuses to grant human subjectivity an 'existential status of exception' and he invites us to accept that there are instances other than consciousness and sensibility that crystallize sites of subjectification and function as nodes or vectors of enunciation. The massive antinomy between subject and machine is put into question, as Guattari extends autopoietic power (the power of self-production that immanently secretes its own rules and modalities of expression, which Francisco Varela reserves for living machines alone) to all machines.

In capitalism and in Guattari's theory, the creative function meets an identical fate. Languages as such enjoy no particular creative privilege. To the contrary: their structuration by the signifying machine 'can impede or deny semiotic proliferation, and it is often up to non-linguistic components to generate ruptures and dominant significations' and to function as vectors of subjectification. 'Throughout the history of life and iconic systems such as art, throughout the history of humanity, genetic codes have been at least as creative as linguistic systems.'¹² Subjectivity, creation and enunciation are vector sum assemblages of human, infra-human and extra-human factors. Among those, human factors do not play a leading role, especially in the machine-centric world of contemporary capitalism in which it is languages of infrastructures that play, semiotically, the guiding role.

The Different Semiotic Systems

At the outset of an assemblage of enunciation, one finds neither the verb, nor the subject, nor the system, nor the syntax, but rather components of semiotization, of subjectification, consensualization, diagrammatisms and abstract machinisms. – Félix Guattari¹³

Any sign, in terms of its expressiveness, is equivalent to another sign: any hierarchy between signs is unjust and unjustifiable. – Pier Paolo Pasolini¹⁴

Instead of making language the site of corroboration of equality, instead of considering it implicitly political as the manifestation of the publicness of action, or instead of making it into new productive force, Guattari suggests we 'exit language' and work towards a semiotic theory beyond the semiotics of the human. In a capitalism organized around and on the basis of machine-centric semiotics (Pasolini's 'languages of infrastructures'), language is merely 'a particular instance, in no way privileged, of the operation of a general semiotics' which must account for the operation both of signifying speech and of the aesthetic, technical-scientific and social sign machines.

In Guattari's theory, semiotic systems are at once modes of operation and production of subjectivity, and modes of operation and production of the real. There is no qualitative difference between sign flows and material flows, there is no separation and rupture but indeed continuity between the sign and the real. Guattari distinguishes between different semiotic systems that are no longer measured and hierarchized on the basis of human language: 'natural' a-semiotic encodings (crystalline systems and *jdna*, for example); signifying semiologies that encompass symbolic (or pre-signifying) semiologies and semiologies of signification; and a-signifying (or post-signifying) semiologies.

In natural encodings, expression is not autonomous. There is no differentiation between, say, a biological, chemical, or nuclear stratum and a semiotic stratum organized in an autonomous syntax. And between the nuclear, molecular, chemical, and biological strata, there is no relation of expression, interpretation, reference, or signification. Creativity and innovation occur without a significative referent in representation and consciousness.

By contrast, symbolic semiologies, semiologies of signification, and a-signifying semiotics are characterized by the formation of strata of expression, reference, or signification that acquire autonomy. Such strata constitute what Guattari calls a sign machine. Signifying semiologies set strata of expression into play. Symbolic semiologies operate from a multiplicity ('n') of strata or substances of expression ('gestural, ritualistic, verbal, productive, bodily, musical, and so forth'), whereas semiologies of signification articulate only two strata (signifier/signified).

The comparison between symbolic semiologies and semiologies of signification, which runs throughout Guattari's body of work, allows us to understand the rupture and innovations introduced by capitalism. Symbolic semiologies are modalities of expression of archaic societies (or territorialized collective assemblages), but their 'trans-individual, polyvocal, animist' and multi-referential operation is also found in madness, childhood, artistic creation, and creation period, as well as in the passions of love or politics.

¹⁰ Ibid., 199.

¹¹ Ibid., 18.

¹² Guattari, *L'inconscient machinique*, 223.

¹³ Ibid., 45.

¹⁴ Pasolini, *Empirismo eretico*.

In archaic societies, the different semiotic strata (artistic, religious, linguistic, economic, bodily, musical, and so forth) do not maintain relations of dependence or hierarchy with one another as they do in linguistic theories. It is not because 'the signs of society can be interpreted integrally by those of language,' as Benveniste contends, that language is by inference superior to all other semiotic systems.¹⁵ Every stratum of expression retains its own consistency and its own autonomy. The translatability of different semiotic systems is not accomplished through a formalization of expression (the signifier) that seizes power over other semiotic systems, but by a social assemblage (the tribe, the community) that instead wards off the manifestation of a single signifying substance, of a signifying synthesis, of a system that hierarchizes and subordinates other modalities of expression – as structuralism later would.

Capitalism, unlike the territorialized assemblages of archaic societies, needs in order to function to establish translatability, equivalence, comparability, but also centralization among the various semiotic systems (economic, scientific, linguistic, bodily) that express local and heterogeneous relations of power and desire.

Words and sentences take on a meaning only within a particular enunciation, a specific syntax, a local micro-political situation. Bakhtin argues that each of us lives every day through a multiplicity of heterogeneous languages: the languages we speak in the family, at work, with friends, with God, with our bosses, and so on. The despotic assertion of any general language (national or international), by subjecting those local languages and dialects to a genuine form of internal colonization, lays the groundwork and sets the stage for the establishment of economic and social power.

It is not only the economic sphere that is given to such generalized promiscuity. Quite the contrary: comparison, quantification and value exchange require as their precondition significations that do not vary across time and space. Translatability, equivalence/comparability, centralization, and invariance of signification are indispensable to the social division of labor and to the capitalization of activities and semiotic systems that express themselves through them.

In contemporary capitalism, this semiotic politics is at work on individuals from birth. Semiotic initiation is the earliest 'labor,' prior to any other; Guattari literally compares it to the activity of industrial apprentices.

The child learns not only how to speak a mother tongue, but also the codes of getting around the street, a certain complex relation to machines, to electricity, and so on ... and these different codes must be fitted into the social codes of power. This feature of generalized promiscuity between semiotic systems is essential to the capitalist economy ... Initiation to capital involves in the first place this semiotic initiation to the different codes of translatability and to their corresponding systems of invariance.¹⁶

This analysis would yield Guattari's brilliant definition of capitalism as 'semiotic operator,' as the 'integral' of semiotic systems expressing heterogeneous relations and activities. Such an integration is political prior to being semiotic.

The establishment of invariants and stable relations of equivalence and translatability between semiotic systems is organized by a formalized sign machine structured within what Guattari calls the semiotic triangle: 'reference/denotation, signification, representation.'

Denotation sets up a bi-univocal relation between the sign and the designated thing (referential function), whereas in symbolic semiotics that relation is floating, indistinct, uncertain, 'self-doubting.' Expression loses the natural polyvocality and multireferentiality it carries in symbolic semologies, and begins to designate in an exclusive and univocal manner. The effect is to drain and impoverish both subjectivity and the world. In certain 'primitive languages,' the simple shift of an accent can alter meanings and even switch words. Reference, by tethering the sign to its referent, denotes a reality that becomes the 'only' and 'unique' reality, the dominant reality. Whereas in archaic societies realities are multiple: every semiotic system (religious, social, magical, animal, animistic) expresses a heterogeneous world. This reducing of uncertainty, of floating, multivalence and multireferentiality, the reducing of 'the heterogeneous, the mixed, the indistinct, the dissymetrical' in order to promote the 'pure,' the invariant and the specialized culminates in the mathematical theory of information, whose problem is precisely the invariance of its transmission. The standardizing of language eliminates as best it can all intensities and affects that are not univocally assignable, not guaranteed by an invariant denotation and invariant significations.

In order to neutralize any polyvocality and multidimensionality in expression and to reduce all floating and uncertainty, significations are encoded directly by a linguistic machine that intercrosses a syntagmatic axis (significance) and a paradigmatic axis (interpretance) so as to make signification 'automatic' and thus stable.¹⁷ The governing of our behaviors requires that significations (man, woman, worker, boss, etcetera) be solidly established, defining the functions and limits of our actions, and delineating our roles within the social division of labor. Along the syntagmatic axis, words are organized according to a pre-established 'grammatical,' 'article + noun + verb' order. But this kind of grammatical assemblage is not enough, as it could yield a sentence that is correctly constructed but lacks meaning: 'the toaster dances.' Hence the need to select words along the paradigmatic axis to secure (semantic) meaning. The crossing of these two axes sets up not a universal modality of expression, but a veritable war machine that structures, polices, and clamps down significations. In archaic societies, by contrast, 'a symbol interprets another symbol which in turn interprets a third one, and so on and so forth. There is no terminal signifier stalling the process whose meaning would be locked in a dictionary, no rigorous grammatical rules of syntagmatic concatenation constricting the sequence.'¹⁸

¹⁵ Émile Benveniste, 'The semiology of language,' *Semiotica* 1 (1981): 5-24.

¹⁶ Félix Guattari, *La révolution moléculaire* (Paris: Editions Recherches, 1977), 178.

¹⁷ The concepts of syntagmatic and paradigmatic axes are developed more thoroughly in an upcoming book by the author.

¹⁸ Guattari, *L'inconscient machinique*, 67.

The third term of the semiotic triangle, representation, divides up the world into a mental world or symbolic world (a world of images, representative icons, and symbols) and a 'denoted real.' The sign does not refer directly to reality, it is no longer directly connected to a referent. To be semiotically effective, the sign must now be mediated by the symbolic order; it must always go through the signifying machine. As a result, representation makes signs 'impotent' because they do not work pragmatically upon the 'real,' they do not transform it directly. They require the mediation of consciousness and representation and the subject. The comparison with archaic societies exposes the separation that takes place in capitalism between production and representation, between the signifier and the real. For 'archaic peoples,' sign flows are as much of a reality as are material flows. There is no separation between semiotic production and material production, because signs carry through into the real and vice-versa.

Primitive peoples are *realistic*, not mystical. The imaginary and the symbolic are real. No backworld. Everything extends into everything. No break-separation. Bambara does not imitate, does not use metaphors, does not index. Its dance and its mask are wholly rich signs which are at the same time representation and production. One does not watch the performance, powerless. It is itself, collectively, the show, the spectator, the stage, the dog, and so forth. It transforms by means of expression, as a sign that is connected to reality. Or rather a sign such that there is no break between a reality, an imaginary mediated by a symbolic order. No break between gesture, speech, writing, music, dance, war, men, gods, the sexes, etcetera.¹⁹

The closure of semiotics of signification within a world of 'pure signifi-ance,' which Guattari dubs the 'impotentizing' of the sign, made it very difficult for structuralism and analytical philosophy to properly problematize the pragmatics and 'existential function' of signs and expression.

The acknowledgment that discursive links have, in addition to their denotative and signifying function, a pragmatic function of bringing-into-existence, of existential crystallization, of transformation that is real not merely symbolic, came very late and very inadequately with the theory of the performative. In the performative, the relation between 'words and things' is pragmatic and no longer only semantic-denotative. Language does not only describe, denote or name reality: 'things are done with words.' But it is linguistic formalization alone that seems to produce 'actions,' as though power relations were generated by language itself. With the semiotic triangle, everything seems to become logicized and formalized.

Significations seem to be produced logically by linguistic formalizations, by structures of language itself, when in fact they are secreted by micro-political power relations. Dominant significations (identity, gender, occupation, national-

ity, and so on) which are so difficult to elude (individually through madness, childhood, alcohol, drugs, creation, the passion of love, or collectively through political action) are produced at the crossing of a double formalization: the linguistic signifying machine automatizes behaviors, interpretations, and the responses desired by the system; while the power formation secretes its signifieds.

Suppose I come into the room wearing a long gown: in itself it means nothing, if I am doing it to show that I am a transvestite it does mean something; but if, say, a conference of clergy is taking place, then it will have quite a different meaning. In a mental hospital, it could be interpreted differently again: 'He's not too well today – wearing a dress again.' In other words for a man to wear a skirt means one thing if he is a judge or a priest, another if he is a lunatic, yet another if he is a transvestite. Signification is always inseparable from the power position.²⁰

Whereas in archaic societies the referent of symbolic semiotics is the group, the collective assemblage, the community, in semiologies of signification the referent is the individuated subject (and his double, the transcendental subject), the empty subject withdrawn into himself, cut off from the assemblages and the connections that constitute him.

Individualization lodges and takes root right within language itself through a process Guattari calls 'personologization.' The normalizing power of language lies in 'linguistic Oedipalization,' whose objective it is to formalize the subjectification 'of statements according to an abstract encoding of the I – you – he type which 'provides speakers with a shared system of personal references'.²¹ Mirroring linguistic personologization (I – you – he) is a personologization of psychic instances (ego – super-ego – it).²² In Lacan's unconscious, structured like a language, the normalizing power of psychoanalysis converges with the normalizing power of signifying semiotics. Intensities both infra-personal (relational, affective, emotional, desiring, existential, 'where you don't know if you are man, woman, dog, plant or anything at all, where one no longer knows who is who, who is speaking to whom') and extra-personal (those of the big economic, linguistic, social machines, etcetera) are forced back onto this double personologization, linguistic and psychic.

These days, the inclusive disjunctive syntheses of archaic societies ('I am jaguar') are only found in the mad, poets, artists and children ('I is an other'). The linguistic signifying machine

¹⁹ Seminar remark by Félix Guattari attributed and translated by Angela Melitopoulos and Maurizio Lazzarato, 'Machinic Animism,' in **Animism**, ed. Anselm Franke (Berlin/New York: Lukas & Sternberg, 2010), 54.

²⁰ Félix Guattari, **La révolution moléculaire** (Paris: Editions Recherches, 1977), 308. Translated by Rosemary Sheed, **Molecular Revolution: Psychiatry and Politics** (London: Penguin, 1984), 169-70).

²¹ Ibid., 257 (translation: 93). [Translator's note: contains a passage attributed by Guattari to Emile Benveniste, in **Problèmes de linguistique générale**, Paris: Gallimard, 1966].

²² 'Personological: an adjective to qualify the molar relations in the subjective order. The accent placed on the role of persons, on the role of identities, of identifications characterizes the theoretical conceptions of psychoanalysis. The psychoanalytic Oedipus brings into play persons, typical personages; reduces the intensities, projects the molecular level of investments onto a 'personological theater'. From Félix Guattari, **Les années d'hiver** (Paris: Les prairies ordinaires, 2009), 295. [Translator's note: a near-identical passage appears in the glossary of **Molecular Revolution**, 290; Rosemary Sheed's translation from that volume is used here, with the exception of the word 'molar' replacing 'motor']

performs and imposes ‘exclusive disjunctions’ (you are a man, you are a woman ...) that block becomings (becoming-animal, -imperceptible, -machine), because all it knows are identities defined by dominant significations (man, woman, child, animal, etcetera) and specialized functions (workers, bosses, students ...). Inclusive disjunctive syntheses are beaten back by the structure of the modern signifying machine, which concentrates the entirety of subjectivity and expressiveness onto man and reduces the other (nature, objects, and the cosmos) to the status of object.

A-Signifying Semiotics But Guattari’s true and most ground-breaking innovation was the notion of a-signifying semiotics. These semiotics would both play a central and decisive role in capitalism and create the conditions for its political critique.

A-signifying semiotics are the semiotics of mathematics, stock quotes, money, business and national accounting, computer languages, the functions and equations of science; but they are also the semiotics of music, art, and so on. Stock indices, unemployment insurance statistics, the functions of science and computer languages do not make speeches, they do not represent anything (speeches can of course be produced, but separately). They function by powering and amplifying the assemblages in which these semiotics are at work. The European Central Bank raises its discount rate by 1 per cent: tens of thousands of ‘projects’ go up in smoke for lack of credit. Real estate prices collapse, as with the subprimes in the United States: thousands of households are no longer able to pay back their debt. The national health insurance shows a deficit: ‘social spending’ is slashed.

In a-signifying semiotics, sign flows work directly on material flows. They are not powerless as in signifying semiotics, because their semiotic performance does not depend on the mediation of signification, denotation, and representation. Here, by contrast, the functions of denotation and signification subside. A-signifying semiotics operate regardless of whether they signify something to someone. Instead of referring to other signs, signs work directly upon the real: computer language signs drive a technical machine such as the computer; monetary signs drive the economic machine; mathematical equation signs help build a bridge or a building; and so on and so forth. A-signifying semiotics (mathematical functions, computer programs, etcetera) ‘participate directly in the process of generating their object, whereas an advertising image only provides an extrinsic representation of it (meaning it produces subjectivity instead).’²³

We are no longer in the pre-signifying regime of polyvocal expression, which mingles and transversalizes the semiotics of dance, song, speech, etcetera; nor in the signifying regime in which every sign refers to another sign by means of representation, consciousness, and the subject. A-signifying semiotics do not involve a return to territorialized assemblages, they refer us instead to assemblages ‘in which man is no longer paramount.’ With a-signifying semiotics, ‘we exit the

semiotic register.’ Strictly speaking, it is no longer a matter of signs, as the distinction made by linguistics between sign and referent loses in relevance. In theoretical physics, ‘no one today demands positive proof of the existence of a particle – so long as it can be made to function without any contradiction in the totality of theoretical semiotics... Only when an extrinsic, experimental effect brings the semiotic system into operation does hindsight question the existence of the particle.’²⁴ A relation of a new kind is established between sign and referent. Signs do not represent or refer to an already constituted ‘dominant’ reality. Rather, they simulate and pre-produce a reality that is not yet there, that is there only virtually. Existence is not already given, it is a stake in the theoretical-experimental assemblages of physics and in the artistic-experimental, political-experimental assemblages of other fields.

Guattari distinguishes the impotentized signs of signifying semiotics from the operative, pragmatic, diagrammatic signs of a-signifying semiotics, by calling the latter ‘signs of power’ or ‘sign-points.’ They come equipped with a long history, as art and religion were the first to produce them: ‘The Shamanic invocation, the sign-writing of the geomancer are in themselves direct symbols of power. They mark the importation into nature of signs of power ...’²⁵

A-signifying semiotics are also called diagrammatic. The concept is drawn from Pierce’s classification of signs. For Pierce, diagrammatic semiotics include images and diagrams (diagrams he also calls ‘relational icons,’ for example the graphical representations of temperature curves). Guattari, for his part, groups images together with symbolic semiotics. Diagrams have an operational function, because they reproduce far more accurately than images ‘the functional articulations of a system.’ Diagrammatic signs act instead and in the place of things themselves. With diagrammatic semiotics, instead of a simple representation we may encounter a simulation, a pre-production, a transduction. Diagrammatic functions perform inscriptions that are not exclusively representational, but operative. Signs produce redundancies that are not significative, but machinic. By doing their work short of the threshold of representation, signs and things assemble ‘independently of the subjective “holds” placed on them by individuated agents of enunciation.’²⁶

Mixed Semiotic Systems

A subjective fact is always generated by an assemblage of heterogeneous semiotic layers.

– Félix Guattari

If for analytical purposes various semiotic systems can be distinguished, modalities of expression are always the vector sums of ‘mixed semiotic systems’ – simultaneously signifying, symbolic, and a-signifying. The operation of the stock market, of a medium such as film or of ‘human subjectivity’ can be described as an assemblage of semiotic systems in which linguistic, cognitive, and com-

²³ Guattari, *Les années d’hiver*, 294.

²⁴ Guattari, *La révolution moléculaire*, 244 (translation: 84).

²⁵ Ibid., 324 (translation: 127).

²⁶ Ibid., 282.

municative semiotics play a minor, subordinate role in relation to a-signifying and symbolic semiotics.

Finance is the epitome of diagrammatic semiotics. In it, signs function instead and in the place of the 'objects' to which they refer; they form a reality as objective as the real economy; and they intervene in the operational nodes of the stock-pricing system but also work directly on the real economy. On a trading floor, all one sees are diagrams and computer-generated curves (sign flows) that show upward and downward price fluctuations (real flows). But even at this level several different semiotic systems are mobilized. There are 'impotentized' signs that merely depict price histories; but there are also 'power signs,' 'particle-signs,' and 'sign-points' that simulate, anticipate and generate the prices – that is to say: diagrammatic signs that transform the 'real.' The flows of diagrammatic signs work directly upon real flows. Unlike with the referential function, what is established is not a single reality but a multiplicity of heterogeneous ones: the reality of the 'real' economy, the reality of anticipations on that economy, the reality of already set stock quotes, but also the reality of anticipations of upward or downward fluctuations. 'Stock market' is a reference to more than a single reality.

The expressive nucleus of the 'human subjectivity' of the trader, the shareholder and the institution lies in price differentials (upward and downward) determined by diagrams and machines. These differentials function as nodes of subjectification, in which human subjectivity (or better still: components of subjectivity, such as comprehension, memory, attention, perception, and so on) assembles with machinic proto-subjectivity. Decisions and choices are driven by vectors of subjectification produced by a machine (the stock market, with its semiotic flows, its partial subjectivities, its material flows) and a singularity (stock quotes), to speak like Guattari.

But what kind of subjectivity and what semiotic systems are mobilized by these sites of subjectification determined by diagrams and singularities? It is first and foremost symbolic semiotics that crystallize and give social substance to the decisions, transforming the 'singularity' of a trader's choice and decision into a 'quantity,' a market price.

Conventions theory and cognitive capitalism theory account for the subjective behaviors that help set asset prices by assuming mimetic behavior among actors. The intersubjectivity of the mimetic relation is seen to supersede the individualism of *Homo economicus*. But this attempt to move beyond the 'standard rationality' of economics, where the individual subject is the sovereign master of his own choices, remains very hesitant and inexact. Even without sharing any of the philosophical theory that inspires such a notion of financial behavior as mimetic, it should be pointed out that for its creator, René Girard, emulation means emulation of desire. One does not imitate the modes of being, the ideas or the 'cognitive basis' of the 'other:' what one imitates is desire. And if mimetic

operation means emulating desire, its formation and its diffusion/circulation cannot be explained by communication, nor by information, nor by language, nor by cognition: because it is precisely the communicative, informational, linguistic, and cognitive model that is undone by affects.

'Mimetic rationality' is not linguistic-cognitive. Far from it, since affect invalidates the speaker/listener's enunciative dichotomy. 'Affect sticks to subjectivity' – but just as much to the subjectivity of the enunciator as to that of the addressee. Spinoza, Guattari suggests, had perfectly pinpointed this transitive character of affect: 'it is impossible to conceive of a being together affected with a certain emotion without being affected ourselves with a like emotion. Affect is therefore essentially a pre-personal category which takes root "prior to" the circumspection of identities, and which manifests by transferences whose origins and destinations cannot be tracked.'²⁷ In some place there is a downward trend, in another there is an upward trend, much in the same way that 'mana' circulates in animistic societies. Communication proceeds through contagion not cognition.

Guattari always points out that affect remains 'indistinct, atmospheric,' meaning it is not based on systems of distinctive oppositions as is the linguistic, communicative, or cognitive model. It is therefore very reductive to want to explain mimetic behavior by means of linguistic, communicative, or cognitive rationality. Signifying semiologies and discursive, ideological, and cognitive activities come next: their sole function is to control the deterritorialization and desubjectification brought about by diagrammatic semiotics and symbolic semiologies. The individual subject, his sovereignty, and his rational behaviors (as well as intersubjectivity, which should in fact found the critique of the subject) are completely annihilated by the real operation of the stock market. But they are then promptly reconstructed, as neo-archaisms, by signifying and cognitive semiologies. The signifying semiologies of economic theory, media, and experts create the properly 'ideological' belief that it really is the individual subject who is acting (and who must be remunerated accordingly), that the market truly is the best means to determine prices based on individual choices, etcetera. The 'ideological force' of signifying semiologies lies not in the fact that it might be preventing us from thinking or that it is simply manipulating our brain, but in its ability to bring about a mutation of subjectivity. Finance's signifying semiologies express the new values and the new lifestyles of neoliberalism. What is at stake is not the ideological content of neoliberalism, but the 'existential' affirmation of a lifestyle, of a world view, and so forth. The operation of ideology, when it is effective, is not ideological but existential.

The Mixed Semiotics of the 'Human' Human subjectivity as well always expresses itself through mixed semiotics. In the last years of his life, Guattari often referred to Daniel Stern's book *The Interpersonal World of the Infant*²⁸ in order to map out the semiotic, affective, and existen-

²⁷ Félix Guattari, 'Ritournelles et affects existentiels,' *Chimères* 7 (15 September 1987): 1.

²⁸ Daniel Stern, *The Interpersonal World of the Infant* (New York: Basic Books, 2000).

tial components that combine to produce subjectivity. In 'human subjectivity,' three types of modalities of semiotization can be distinguished: a-signifying (vitality affects), symbolic (categorical affects), and signifying.

The Emergent Self and A-Signifying Semiotics Daniel Stern shows that before the acquisition of language, infants are actively building up modalities of perception, communication, experience and apprehending of the world and others through semiotizations that are extremely rich and differentiated. Stern distinguishes between three 'senses of self' (the sense of an emerging self, the sense of a core self, the sense of an intersubjective self) that precede the 'sense of a verbal self.' "Sense of self does not mean, in either of the three cases, 'concept of,' 'knowledge of,' or 'awareness of,'²⁹ as these experiences are not mediated by language, consciousness, and representation. For Guattari, the different senses of self preceding the linguistic sense of self are not at all stages in the Freudian sense, but 'levels of subjectification,' nonverbal sites and vectors of subjectification that manifest throughout life alongside speech and consciousness (and indeed make these possible). These three primary senses of self are expressed through mixed a-signifying and symbolic semiotics.

Between birth and two months of age, the infant experiences the 'genesis' of 'emergent relatedness' and of a self that Stern also calls the 'emergent sense of self.' This happens in three ways: amodal perception, categorical affects, and vitality affects. Intensities, temporal figures, rhythm, and movement are elements common to any sensory modality; the infant identifies them easily and later transposes them into other modalities.

The abstract and amodal features of experiences are apprehended through the action of two different affects: categorical affects, which express anger, surprise, joy, sadness, and so forth; and vitality affects, which express changes of state and thresholds of intensity in the ways of feeling. Vitality affects are 'captured by dynamic, kinetic terms, such as "surging", "fading away", "fleeting", "explosive", "crescendo", "decrecendo", "bursting", "drawn out", and so on.'³⁰ According to Stern, dance, music, but also the duration of video and filmic images are the realities that best convey those intensities, those 'ways of feeling.'

This global and subjective world, in which there are no divisions yet between subject and object, and where the self and others are indistinguishable and communication proceeds by contagion, 'is and remains the fundamental domain of human subjectivity,' according to both Stern and Guattari. It operates outside of consciousness and constitutes the 'matrix' (Stern), the 'existential nucleus' (Guattari) of the experiences 'from which thoughts and perceived forms and identifiable acts and verbalized feelings will later arise.'³¹ Finally, it constitutes the fundamental reservoir that can be dipped into for all of creative experience and artistic experimentation. All learning and all creative acts draw upon this emergent sense of self. 'This domain of experience remains active in the formative

process of each of the other domains of sense of self' and during the subsequent processes of creativity and learning.

The Sense of a 'Core Self,' the Sense of a 'Subjective Sense,' and Symbolic Semiotics

The sense of a 'core self' (self versus other and self with other) is the experience of self and other as 'entities of physical presence, action, affect, and continuity.'³² This sense of a core self rests upon 'many interpersonal capacities.' It is not always a cognitive construction (it works outside of consciousness), but rather an integration founded on experience and 'memory without words' that will form the basis of all of the more complex senses of self.

The sense of a 'subjective self' emerges when the infant discovers he has a 'mind,' that others do too, and that experiences, contents, affects, emotions are shareable (or not shareable) and can be communicated (still without the intervention of words, since language is not yet there). Self and other are no longer only core entities of physical presence, action, affect, and continuity, but entities with 'subjective mental states.' How does one enter into relation with the subjective experience of others and share their affects without using words? Through a 'transitivist, transindividual' subjectivity, to speak like Guattari and Simondon. Between nine and twelve months, the infant is able to attune his 'mental states' such as 'joint attention,' 'intentions,' and 'affective states.'³³ Vitality and categorical affects are the material of this attunement and this sharing, both of which presuppose a 'shared framework' of meaning and of 'preverbal' means of communication (gestures, postures, facial expressions, vocal expressions) and form a public space of its very own kind. Affects, on the one hand, which remain 'the predominant mode and substance of communications with the mother' and others, and on the other hand gestures, postures, actions, and nonverbal vocalizations are 'the most immediate origins of language use' and the proto-linguistic conditions for its emergence and acquisition.

The Sense of a 'Verbal Self' and Signifying Semiotics The fourth sense of self, the verbal sense of self, probes *disjunction* and *junction*, *gaps* and *complementarities* between the verbal and preverbal dimensions of subjectivity, between a-signifying, symbolic semiotics and signifying semiologies. That is because the emergence of language causes a split between experience as it is 'lived' and as it is 'represented.'

If linguistic significations do make it easier to share our experiences with others, they can also make certain parts of those very experiences inaccessible to others and to ourselves. The nonverbal and global dimension of experience can perfectly well coexist with the dimension that has been converted into words, as the verbal enriches and develops lived (affective) experience harmoniously. But lived experience can also be fractured and poorly rendered by language, and forced underground (repression). It is the adult's words 'Look, that yellow light from the sun' that specify,

²⁹ Ibid., 71.

³⁰ Ibid., 54.

³¹ Ibid., 67.

³² Ibid., 27, 91.

³³ Ibid., 125-33.

separate, and fracture an infant's amodal experience of a ray of sun. 'The paradox that language can evoke experience that transcends words is perhaps the highest tribute to the power of language. But those are words in poetic usage. The words in our daily lives more often do the opposite and either fracture amodal global experience or send it underground.'³⁴

The three preverbal senses of self are not stages to reach and then move on from, along the way to forming the verbal self. They remain autonomous and independent centers of semiotic and subjective 'production' that continue to operate in parallel, with their own 'autonomy' and their own semiotics.

The discursive and the non-discursive are respectively the molar and the molecular of enunciation and subjectivity. This is not to demean language and signifying semiotics, but – counter to what linguistics and analytic philosophy do – about inhabiting a space between the cognitive dimension and the pathic dimension of experience.

The Mixed Semiotics of Film

We go to the movies to suspend our usual modes of communication for a while.
– Félix Guattari

Mixed semiotics also operate in film. Guattari offers a precise inventory of the semiotics at work there:

- the phonic fabric of expression, which relates to spoken language (signifying semiology);
- the non-phonic sound fabric which relates to instrumental music (a-signifying semiotics);
- the visual fabric which relates to painting (a semiotics that is both symbolic and a-signifying);
- the gestures and movements of the human body, etcetera (symbolic semiologies);
- the durations, movements, ruptures in space and time, intervals, sequences, and so on, which constitute a-semiotic 'intensities.'

Film does not set into play two components of expression (signifier/signified), but, like archaic societies, 'n' components: images, sounds, words spoken and written (subtitling), movements, postures, colors, rhythms, and so on. Depending on which component prevails, different modalities of reading and watching a film are possible. A film 'can be seen through its colors or rhythms, it can be seen through its images, through the sequence of generated affects, and there is absolutely no univocal, necessary, or motivated relation between a signifying chain and its signified contents.'

Film, whose effectiveness derives firstly from its use of a-signifying and symbolic semiotics ('sequences and internal movements of visual figures, colors, sounds, rhythms, features of faciality, words'), has stood historically for the possi-

bility of exceeding signifying semiologies, of exceeding personological individuations, of opening up becomings that were not already inscribed in dominant significations. Film also offers us a textbook example of how the signifying machine intervenes. On the one hand, it neutralizes, orders, and normalizes the assemblage of symbolic and a-signifying semiotics that threaten to overwhelm dominant significations. On the other hand, once the film industry realizes what it stands to gain, it capitalizes on these very same a-signifying and symbolic semiotics.

Film images cannot be directly encoded, policed, and framed by the syntagmatic and paradigmatic double axis that guarantees the relative stability and invariance of significations, as is the case with semiologies of signification. With film, aspects of pre-signifying semiotics can resurface in a post-signifying world. As in archaic societies, images (symbolic semiotics) and intensities, movements, intervals, temporalities, speeds (a-signifying semiotics) reintroduce some indistinctness, some uncertainty, some wavering in denotation and signification. Expression once again becomes polyvocal, multidimensional and multireferential. 'The semiotic components of film keep shifting in relation to one another, never settling or stabilizing in some deep syntax of latent contents, or in transformational systems that yield manifest contents back on the surface.'³⁵

The intensities, movements, and durations of filmic images can also produce desubjectification and disindividuation effects, much like drugs, dreaming, passionate feeling, creation, or delirium; and they can strip the subject of his own identity and social functions. Film suspends perception and the usual coordinates of vision. The sensory-motor system begins to fail, as images and movements no longer depend on an object or my brain but are produced automatically by a machinic assemblage. The editing disturbs the connecting links between situations, images, and ordinary movements by removing us to different clusters of space and time. If only for a short instant, film is able to make us 'orphan, single, amnesiac, unconscious and eternal,' leaving behind the social division of labor that assigns us a role, a function, a signification.

But instead of exceeding dominant subjectifications, filmic images can also chain us to them. They are merely sites of subjectification. As sites and vectors of subjectification, all they can do is activate, initiate and open up processes of heterogenesis (productions of both heterogeneity and processual genesis). The consistency and constitution of such a heterogeneity depends upon the intervention of a multiplicity of forces and apparatuses. It depends, ultimately, upon a politics and upon an aesthetics.

The aesthetic-political battle, won by the cultural industry without taking any prisoners, was played out around this site of heterogeneity. The cultural industry worked to neutralize and smother it from the outset, by introducing signifiers and references of familialism and personologization. The realignment of film's multireferential and polysemic semiotics along dominant

³⁴ Ibid., 176-77.

³⁵ Guattari, *La révolution moléculaire*, 233.

values and the governing of the 'dream monster' and its irrational elements were accomplished by exploiting symbolic semiologies and a-signifying semiotics and forcing them back onto the models of capitalist subjectivity. Commercial cinema is 'unquestionably familialist, oedipal and reactionary... Its mission is to inculcate the models required by mass consumption.'³⁶ While it may fail in establishing invariant and stable significations, it does produce exemplary and palpable models of subjectivity. In that production, it functions as a 'mass psychoanalysis' which, like the latter, seeks to normalize intensities, hierarchize semiotics, and hem them inside the individuated subject. Film works deep inside subjectivity, able to provide it with identities and behavioral models by capitalizing on a-signifying and symbolic semiotics. The workings of film on the unconscious are even deeper than psychoanalysis, because its unconscious, 'filled with Indians, cops and gangsters' (that is to say a non-oedipal unconscious, flush with the world around us) and the arsenal of semiotic means it implements 'connect directly with the processes of semiotization of the viewer.'³⁷ The workings of cinema and television have nothing to do with ideology,³⁸ because they are not mediated by reflexive consciousness and representation.

This paper was translated for this volume by Eric Anglès.

* This text belongs to a project aimed at expanding the concept of 'noo-politics' by drawing on the work of Félix Guattari.

³⁷ Ibid.

³⁸ One of the most puzzling books advocating a return to the 'theories of ideology' is Gayatri Chakravorty Spivak's **Can the Subaltern Speak?**. Puzzling because I have never read such a concentration of misconceptions, blunders and misinterpretations around the thought of Deleuze/Guattari and Foucault. There are assertions (such as the following: 'In the Foucault-Deleuze conversation, the issue seems to be that there is no representation, no signifier (Is it to be presumed that the signifier has already been dispatched? There is, then, no sign-structure operating experience, and thus might one lay semiotics to rest?')' that require several readings to truly believe one's eyes. According to the French publisher, this book amounted to 'a true editorial phenomenon.' It remains a mystery how such 'interpretations' could trigger any kind of debate.

Space of Flows and Space of Places versus Hybrid Space Today, media networks are influencing and interacting with ‘real’ places. The emerging space of digital information-communication networks is modifying not only our physical environment but the social, economic, and cultural organization of our societies in general. Information-communication technology (ICT) is radically changing the way we live, interact and perceive our world.

Politics, economics, warfare, culture are increasingly taking place in the spaces of information-communication, of media networks. Manuel Castells describes in his book *The Rise of the Network Society* the immense impact ICT developments will have on our society. According to Castells the ‘space of flows,’ these spaces of information-communication, media networks transform and shape the ‘space of places,’ our physical environments. Castells – having a background in urban sociology – juxtaposes these space of flows of information and communication, of services and capital, against the space of places, the local urban space.¹

Interesting as it is to consider urban/architectural space and the space of information-communications networks as competing, even mutually exclusive frameworks of social interaction, it will be more fruitful to recognize the emerging interweaving of physical space and informational space and the fusions of analog space and digital networks. The term ‘hybrid space’ stands for this combination and fusion of media and physical space. Hybrid space is the product of alliances between physical objects and information-communication networks, between architectural and media space.

More interesting than the juxtaposition and polarization, than the distinction in media networks and urban places, is the interplay of media and urban space. The concept of hybrid space sees the physical environment in the context of and in correlation with the networks which it belongs to and interacts with. This distinguishes the hybrid space approach from the methodology which urban sociologist Castells introduced with his notion of the space of flows.

Hybrid Space We can find fusions of analog and digital space, the so-called ‘hybrid’ networked spaces all around us. Such different environments as the trading floor of the stock exchange or the (dance) club with its disc-jockeys and video-jockeys are both hybrid spaces.

Examples of hybrid space can be found everywhere in our daily lives. With mobile telephony in urban open spaces, private and public space intermingles. Mobile devices with, for example, Augmented Reality applications superimpose media information layers on our physical environments. In monitored environments cameras keep watch over open urban areas. We are increasingly dealing today with these fuzzy mixes of the analog and the digital, as for instance with miniaturized digital communication devices integrated in wearables such as watches or safety coats.

More examples can be found in our private environments, as our homes become ‘smart’ and our cars become networked spaces with, among other things, GPS navigation. ‘Intelligent’ home

¹ Manuel Castells, *The Rise of the Network Society* (Cambridge, MA: Blackwell Publishers, 1996), 376-428.

devices such as refrigerators networked via your personal portable information-communication system will in the near future tell you that you don't have any milk left and, if you don't want to teleshop, your car will guide you to the next shop where you can buy milk. Networked wallpaper, carpets and doors, as integral elements of the system of the 'smart' house, will recognize the inhabitants of the house and process the patterns of their habits. 'Intelligent,' networked materials and objects will be everywhere.

Physical space and objects should not be looked at in isolation. Instead, they should be considered in the context of and in relation to the networked systems to which they belong. We therefore focus on the hybrid ambivalent spaces, both analogue and digital, virtual and material, local and global, tactile and abstract, in which we live and interact.

Hybrid as a Paradigm But there is more. The hybrid space approach also focuses on methodologies to clarify and develop the fusion of media space and physical space in an integrative way. Considering these combined media and physical spaces in their layering and stratifications, in their changing densities and discontinuities, leads to a spatial concept with a high level of hybridity – reflecting a cultural shift away from a mindset based on clear-cut categories toward a flexible approach based on intermixtures, on interconnections and networks.

'Hybrid' is an ancient Greek word. In the times of the Aristotelian categories, the notion of the hybrid, the crossbreed, had a negative connotation. Today the notion of the hybrid is everywhere. Hybridization is becoming an increasingly important issue in the cultural field. Look at the attention paid to world literature; think of the 2008 Nobel Prize for Literature. The new production and communication tool of the networked computer provides a common working instrument for a broad range of creative professions, paving the way for a series of hybrid professional fields. Today, you have hybrid businesses, hybrid securities, hybrid cars, hybrid plastics, hybrid plants, hybrid pigs ...

The clear-cut antinomy and the excluding logics of Castells' space of flows versus space of places does not correspond to the crossbreed character of the hybrid space all around us – in all its variations of combined physical space and media networks. While Castells' space of flows would be placeless – thus continuous – the hybrid space approach considers our environment in its fluctuating connectivity to a multiplicity of media networks, in its changing densities of layered communication spaces.

Inversions of Privacy The contemporary hybrid urban realities require a more differentiated approach that considers their changes in densities and strat-

ifications. In this context traditional spatial categories, such as private space versus public space are dissolving. Today one can observe an 'inversion of privacy' as public and private environments become intermingled in the fusion of media and 'real' space. We see this in the hybrid spaces of the publicly broadcast (inverted) privacies of reality TV or the 'Big Brothers' and in the explosion of social media, in the media presence of war intruding into our living rooms and in the islands of private (communication) space of mobile telephony within public urban space.

In his phenomenological analysis of lived space, *La poétique de l'espace* (1958), the French philosopher Gaston Bachelard develops a 'dialectics of inside and outside,' contrasting the intimate felicitous space, the comforting private enclosure, with the space of the 'outside.' According to Bachelard, '[the house] is an instrument with which to confront the cosmos.'² Architecture provides, in a dynamic interplay between an active mind and its surrounding space, such structures for organizing our experiences and fantasies, helping us construct (us in) our world.

The notion of a 'privy chamber,' emerging in English literature of the seventeenth century, describes not only the new private physical spaces but also the introduction of the corridor layout; which in the English interiors of the seventeenth century enabled the development of the 'private quarters.' 'Privy chamber' is used also metaphorically for the 'soul.' 'Privy chamber' is the container of (private) identity. Within the traditional – bourgeois – concept of privacy, identity is based on private individuality. As John Lucaks writes 'Domesticity, privacy, comfort, the concept of the home and of the family ... are, literally, principal achievements of the Bourgeois Age.'³

The changes concerning privacy described above are influencing the way we form our identity today. The formally exclusive and contrasting concepts of 'inside versus outside,' of private versus public space, are intermingling and blurring. This will have implications on the constructions of subjectivity and on the concepts of identity.

Identity and Density In the last year of the twentieth century, 'Big Brother' (with its networked container), the notorious 'reality-soap' was first launched in Holland and was cloned and copied all over the planet. What in the meantime, with Reality TVs proliferation, is an everyday reality, was then new. 'Big Brother' shocked; and was discussed all over the media, from the popular talk shows to the scholarly journals ('Is this the End of Our Civilization?').

What shocked in 'Big Brother' was the broadcasting (the inverting) of privacy. What shocked was that the participants of the soap defined their identity not in the 'privy chamber' but in the public networked character of the broadcasting-container. The ENDEMOL soap was an interactive environment (the television public had democratic rights, influencing developments). The captives in the container/networks witnessed their existence in the 'Real Virtuality'⁴ of the media

² Gaston Bachelard, *The Poetics of Space* (Boston: Beacon Press, 1969), 46.

³ John Lucaks, 'The Bourgeois Interior,' *American Scholar*, 4 (Autumn 1970): 620-1.

⁴ Castells, *The Rise of the Network Society*, 327-75.

presence. They witnessed their identity within the 'identities' of the (communication) channels.

In the same year, 1999, a big campaign was launched in Holland: on most billboards in major or minor cities, men and women, youngsters and the elderly – the average Dutch person – were declaring '*ik ben* Ben.' This was not the mass expression of an identity crisis, but an advertising campaign for the introduction of the new GSM company called 'Ben,' targeting the public at large. The advertising slogan was based on a simple play on words, *ben* meaning in Dutch 'I am' and 'Ben' being a common male name as well as the name of the mobile phone company.

But what makes this slogan such an interesting expression of our times is its definition of identity (I am: *Ik ben*) as connectivity ('Ben' being the network provider). The identity of the urbanite being defined as the density of the (super-imposed media/'real') communication spaces.

In February 2000 it was announced: '*Ik Ben een jaar.*'

Communication Model/Circuitry This advertising slogan expresses in a very direct way nothing other than a new view of subjectivity and identity of our 'social networking' times. Vilém Flusser (1920-1991), the philosopher of communication, would write:

The new image of man looks roughly like this: we have to imagine a network of interhuman relations, a 'field of intersubjective relations'. The strands of this web must be conceived as channels through which information (ideas, feelings, intentions and knowledge, etc.) flows. These strands get temporarily knotted and form what we call 'human subjects'. The totality of the threads constitutes the concrete sphere of life and the knots are abstract extrapolations... The density of the webs of interhuman relations differs from place to place within the network. The greater the density, the more 'concrete' the relations. These dense points form wave troughs in the field ... The wave troughs exert an 'attractive' force on the surrounding field (pulling it into their gravitational field) so that more and more interhuman relations are drawn in from the periphery... These wave troughs shall be called 'cities'.⁵

Such a communication model for understanding and developing space implies a 'topological thinking,' a thinking in (spatial) relations and not in geometries. In the words of Vilém Flusser:

In order to understand such a city at all, one must give up the geographical in favour of topological conceptual categories, an undertaking which is not to be underestimated. One should not think of the city as a geographically deter-

mined object (like a hill near a river, for example), but as a bend, twist or a curvature in the intersubjective field of relations.⁶

According to Flusser, this 'topological thinking,' thinking in (spatial) relations and not in geometries, implies that 'the architect no longer designs objects, but relationships... Instead of thinking geometrically, the architect must design networks of equations.'⁷

This networked hybrid cityscape is part of our contemporary urban condition. In Flusser's (ontological) vision, the new city would be:

A place in which 'we' reciprocally identify ourselves as 'I' and 'you,' a place in which 'identity' and 'difference' define each other. That is not only a question of distribution, but also of circuitry. Such a city presupposes an optimal distribution of interpersonal relationships in which 'others' become fellow human beings, 'neighbours'. It also presupposes multi-directional traffic in the cable of interpersonal relationships, not in one-way bundles as in the case of television transmissions, but responsive as in the telephone network. These are technical questions, which have to be resolved by urbanists and architects.⁸

Flusser describes the city in terms of this communicative model: 'Geographically, the city will therefore take in the entire globe, but topologically, it will remain, for the time being, a barely noticeable curvature in the wider field of human relations. The majority of interpersonal relationships will lie outside it (in contemporary civilisations).'⁹ Hence, the plexus of interpersonal relationships lies in other communication systems outside the urban setting, such as the media networks. The physical cityscape is therefore only a particular instance of communication space. It has to be developed by an integrative approach, which addresses both urban and media spaces of social interaction.

Placing the issue in a general model of communication as Flusser does, allows the urban discourse to be shifted from the morphological level of a formal ('geographical') description of the fragmented cityscape to a 'topological' understanding of the relations and networks that pervade it. Here the term 'urban' describes an overlapping and heterodyning of communication spaces and networks, a heterodyning of interpersonal relationships and dialogue.

Soft Urbanism In architecture's role of defining and materializing the spaces for social interaction, designing the relationship between the physical and digital public domain is becom-

⁵ Vilém Flusser, 'Die Stadt als Wellental in der Bilderflut,' in: Vilém Flusser, **Nachgeschichten. Essays, Vorträge, Glossen**, ed. Volker Rapsch (Düsseldorf: Bollmann Verlag, 1990); English translation 'The City as a Wave-trough in the Flood of Images,' **ARCH+** 111 (March 1992), 84.

⁶ Vilém Flusser, **Vom Subjekt zum Projekt. Menschwerdung** (Frankfurt a/Main: Fischer Verlag, 1998), 53; first published in Mannheim: Bollmann Verlag, 1994.

⁷ Vilém Flusser, 'Entwurf von Relationen' (interview), **ARCH+** 111 (March 1992): 49.

⁸ Flusser, 'The City as a Wave-trough in the Flood of Images,' 84.

⁹ Flusser, **Vom Subjekt zum Projekt. Menschwerdung**, 57.

ing more and more of a challenge: investigating the relation and interconnection of the 'soft' city with its finite material counterpart, the living environment, speculating about interfaces between the 'virtual' and the material (urban) world and designing hybrid (analog-digital) communicational spaces.

Soft Urbanism is a new interdisciplinary field of design and planning, researching the transformations of architectural-urban space of the emerging 'information-communication age,' exploring the dynamic interaction of urbanism and the space of mass media and communication networks.

Soft Urbanism's interventions follow a 'network logic.' Soft Urbanism is not about determining places and fixed physical objects (as with traditional urbanism), but about creating frameworks for processes of self-organization. Soft Urbanism not only intervenes in the realm of infrastructure, it adopts its concept and follows its paradigm.

'Soft' strategies are 'bottom-up' strategies: rather than defining first the global result of the interaction and then determining the necessary relation between the elements in order to produce that interaction (which would be a top-down approach), simple rules for a set of independent elements are developed and what emerges from the interaction of these elements is aleatory. According to biological models, these fields of interaction of plural forces serve as a reservoir for the selection processes needed for the urban social transformations. Soft Urbanism brings an inherently flexible approach by expanding the possibilities of social interaction and opening new paths of urban development.

Idesity Within these new hybrid ('real' and media) landscapes, these interconnected networks, traditional categories for analyzing space are becoming obsolete. The new field combining urbanism, architecture, and design with information-communication networks and media spaces that is emerging requires new tools and new research categories in order to develop the new hybrid network urbanities.

Today, not only the polarity between private and public space is disintegrating. In the contradictory dynamics of today's urban environment with its antithetical tendencies of concentration and decentralization, of functional mix and segregation, traditional terms of spatial distinction lose their validity. In this fragmented urban landscape, categories like 'center' versus 'periphery,' 'landscape' versus 'city,' and 'functional zoning' (such as living, working, and recreation), are becoming obsolete.

To help us understand this fusion, this superimposition and the interaction of media and 'real' urban spaces, we introduced in 1999 – within the framework of our survey 'The Use of Space in the Information/Communication Age – Process-

ing the Unplannable' of the think-tank of the Dutch government Infodrome¹⁰ – a new term: 'idesity.' Idesity does not differentiate between information-communication networks and urban/architectural environments. It thereby offers an integrated model for dealing with hybrid space in the information-communication age.

It is a composite term, combining the word 'density' – of real (urban) and 'virtual' (media) communication spaces (density of connections) – and the word 'identity.' Idesity integrates the concept of 'density' (density of connections, density of physical and digital infrastructure, density of communication-spaces, etcetera) with the concept of 'identity' (image policies, urban brands, and so forth). Idesity addresses therefore the logics of today's expanding economy of attention.

It can, for example, help in understanding the processes of spatial segregation and distinction between urban fragments that have qualities of 'global' performance and that can be seen as part of a 'global urban condition,' such as airports or front office locations, and those other, sometimes neighboring (parts of) cities that lose in relevance and disappear from (global) mental maps. It can therefore be implemented as an operative tool to steer the processes of urban development.

But it is not a mere summation of the concepts of 'density' and 'identity.' It is instead a fusion, as it inverts 'identity,' linking it to communication, 'identity' being defined by connectivity.

Therefore, it does not just address the 'clear-cut identity, the particularity, the individuality of the traditional places or sites' but also the layered idensities of the *non-lieux* (non-places)¹¹ of today's generic cities, which are to be found especially in the realms of mobility and consumption (airports, hotels, shopping malls, motorway rest areas, and so forth). It does not refer only to object-qualities but describes a field of superimposed (communication) spaces: the branded space of the chain store, the symbolic space of the traditional building the shop is located in, the media space of mobile augmented reality applications integrating teleshopping ...

This new term is implemented to describe and analyze the communication spaces of the coming 'network society,' a society not so much based on the traditional, relatively static structures of belonging in the family, the corporation or the state, but on flexible, dynamic, ever-changing networks of exchange and communication. It carries therefore the discussion on the urban from the morphological level of a formal description of the network patterns of the 'network city' to a more

10 Our survey was published online on the websites of Infodrome (2000), of 'DISP-Plus' of ETH Zürich (2001), of the Center for Urban Research of New York University (2001), of the Technical University of Athens/Greece (2002), of the Global Development Research Centre/'GDRC' (2003), of the magazine **Space and Culture: International Journal of Social Spaces** (Ottawa, 2004), of the 'Sociology/Social Science discussion forum – University of Abertay Dundee' (UK, 2004), of **planum – the european journal of planning** (2004). Our survey was also published in Dutch as 'Ruimtegebruik in het informatie-communicatietijperk. Verwerking van het onplanbare' on the website of Infodrome (2000), in the book **De burger als spin in het web. Essays over het verdwijnen van plaats en afstand in de informatiesamenleving**, ed. Rick van der Ploeg (former Dutch State Secretary of Culture) (The Hague, 2001), and in a summary form in the book **Controle nemen of geven – een politieke agenda voor de informatiesamenleving**, ed. Rick van der Ploeg (The Hague, 2001).

11 Marc Augé, **Non-Lieux** (Paris: Éditions du Seuil, 1992).

integrated structural understanding of the networks of spaces for social communication.

The term idensity is a conceptual tool for researching and developing (social) space in the information-communication age.

Hybridnet The web and the emerging mobile Internet have been powerful forces of change in the last decades. They have radically changed the way we live and interact. This hybridization of the urban will be accelerated in the coming years with the emergence of mobile technologies that can sense and react to what is happening in the surrounding physical space. Mobile Augmented Reality as an example, which is now beginning to enter the mass market, will be a dramatic step in this evolution. With it the physical world itself is becoming the interface, as media layers of information are projected over the physical environment. Augmented Reality technology allows mobile phones to capture images of objects from the physical environment and superimpose them with metadata. Augmented Reality is just one layer, a technique, for creating a hybrid net that integrates digital networks into physical objects, into the environment and its organisms.

Commercial applications for Augmented Reality (Layar, Wikitube) are already supported by mobile devices such as i-Phones and Android phones. For the most part, these technological developments are commercially driven. Google™ – who lately announced a turn in its business strategy towards mobile media (see the ‘Mobile first!’ statement of Google’s CEO Eric Schmidt in February 2010) – has been mapping cities to create an infrastructure for posting advertisements with the help of Augmented Reality applications.

Supported by mobile Augmented Reality technologies a series of media information and communication layers are superimposed over physical space. This will enhance spatial complexity and transform the concepts that frame our perception and construct our world. The need for an increasingly higher level of understanding of and interacting with complex dynamic systems will have impact on our mental skills.

Agents and Agency A whole new set of navigational techniques and tools will be needed to steer us through this stratified complex hybrid space. Semi-intelligent systems will filter and select information from the exploding information multiplicity. Personalized, customized software agents will interactively form our selective spatial perception and guide us through the complexities of the hybrid city.

In our age of information overload, human attention is a scarce commodity. The intelligent agents that guide our interest and focus our concentration are decisive

forces in the so-called ‘economy of attention.’ By what logic do these intelligent agents operate?

The hierarchies and choices defined by Google™ search-machine algorithms are heavily influenced by the commercial logics of Internet marketing. Another intelligent agent function of Google™ identifies groups of people connected to their consumption preferences and patterns in order to post personalized advertisements. A next well known example, Amazon, uses software agents that make book suggestions based on our previous purchases, sparing us the creative experience of unexpected discovery.

Today most of us are willing to pass on private information and relinquish control just for the sake of a convenient application. This makes the (economically very attractive) marketing service of long-term data mining possible. These data-mining tools track our physical and emotional movements, our wishes and desires – to use the gained information for developing economically relevant transaction activities.

This tracking and tracing of our Internet searches and real-time movements – of the media and physical links and connections we make – has a different character to real-time monitoring for real-time threats, such as terror. Nevertheless, our search profile, that enable software agents to guide us through information complexity, can with a small step – by linking, for example, our Internet-ID to passport information – turn into a tag that labels us and our activities (within space).

The conditioning traditionally given by parents, implanting their children with their norms, wishes, and visions, continued by teachers and other socialization agencies, has long been supplemented by media environments. Software agents extend this task with so-called ‘indirect management.’ The information landscapes are not just passive environments to be explored by active users. Information spaces are formative environments. Within human computer interaction not only the users manipulate data – the software agents manipulate the users as well.

This distilling and editing of information by software agents is driven by economic determinates. This ‘monitoring’ makes it possible to guide our proclivities towards purchasable commodities. Our interests and wishes are transformed into economically relevant ‘needs,’ interactively developing us as consumers. Software agents will increasingly support us by filtering information and selecting items ‘we are interested in,’ by customizing information. The consumer is taken care of – but what are the agencies involved in our interests as citizens?



[1]

1 'BUILD YOUR OWN PAVILION: a flexible mobile exhibition platform':

The exhibition pavilion 'Winter-worm Summer Herb' consists of triangular plywood plates sown together with the help of cable binders. At a very low cost and low technology construction the pavilion is also a flexible mobile structure that can be very easily disassembled, transported, reassembled and sown together again, adjusting to the size of the site and the local requirements. It was first presented at the waterfront promenade of Hong Kong within the framework of the Hong Kong & Shenzhen Bi-city Biennale of Urbanism and Architecture 2009-2010. After the closing of the Biennale the pavilion was set up at the Hong Kong Jockey Club Creative Arts Centre (March-April 2010) and at the Kwai Tsing Theatre in Hong Kong (May 2010), to travel afterwards as a mobile exhibition space around mainland China.

2 'BUILD YOUR OWN PAVILION: a flexible mobile exhibition platform'

Curator: Andrew Lam, MOST

Build your own pavilion as a flexible platform for community education:

Videos on urban issues are projected on the triangular crystalline structure of the pavilion's



[2]

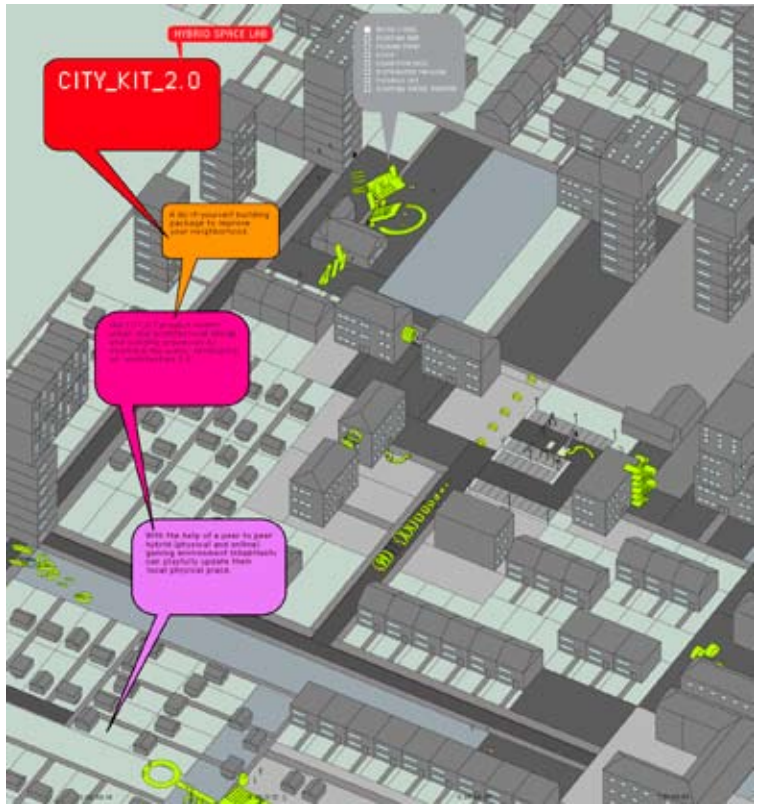
interior. The pavilion, as a mobile and flexible platform, transgresses boundaries, infecting its urban surroundings by moving to a series of different locations for community education.

Photo Credits: Andy Tam

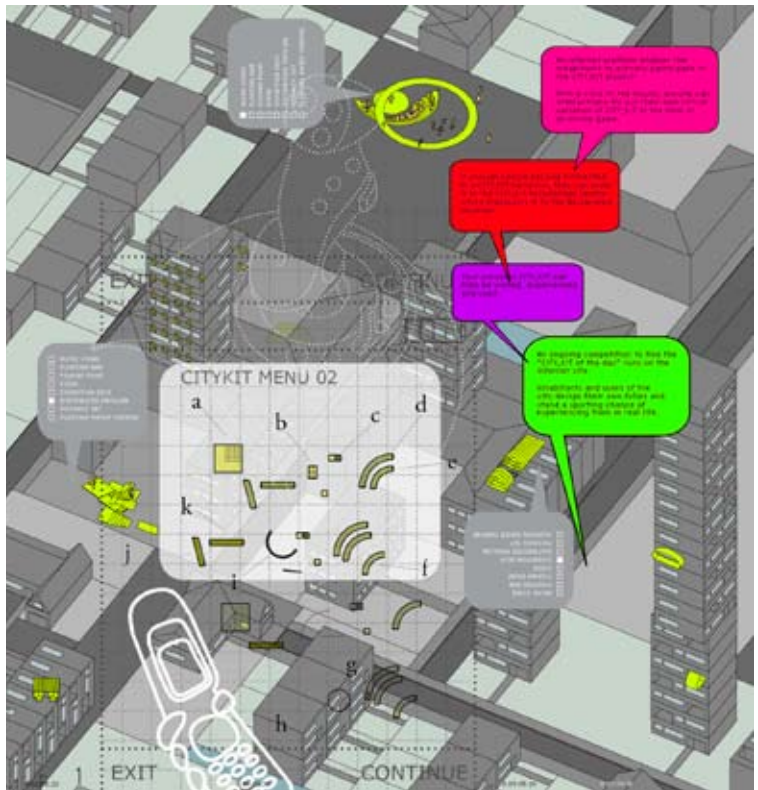
3 'CITY_KIT do-it-yourself urban building package to improve your neighborhood': Inverts urban/architectural design and building processes by involving the users, developing an 'architecture 2.0'. With the help of a peer to peer hybrid (physical and online) gaming environment inhabitants can playfully update their local physical place. CITY_KIT provides simple modular building components that fit into containers which can be transported to specific spots in the cityscape. This mobile urban furniture can be assembled in all sorts of ways to make micro stages, bars, exhibition decks, pavilions, picnic sets, cabins, relaxation decks, roofs... or other – still undiscovered – imaginative compositions. As an open modular system, CITY_KIT is meant for creative use.

4 CITY_KIT hybrid, combined computer and urban, game: An Internet platform enables the inhabitants to actively participate in the project: Anyone can interactively try out their own virtual variation of CITY_KIT in the form of an online game. If enough people become interested in a CITY_KIT variation, they can order it at the CITY_KIT Assemblage Centre, which transports it to the designated location. Your personal CITY_KIT can then be visited, experienced and used.

CITY_KIT was developed for social housing estates in Hong Kong and for Zuidas Amsterdam. It superimposes temporary occupations and new layers of meaning on mono-causally developed territories and enables new appropriations of space. It serves the functional reprogramming and the symbolic recoding of existing spaces.



[3]



[4]



[5]



[6]

5 PMUI (Public Media Urban Interfaces) – Hybrid space notations: is an alternative scenario for the interplay of mass media in order to reinforce the function of public urban space. This project develops a hybrid urban network-space, a fusion of media space and urban space. It emphasises the role of the public in an increasingly privatised society and occupies the vacuum in between the local and the global.

6 PMUI Soft Urbanism notions of Process: This project represents a prototype for the new interdisciplinary field of design of Soft Urbanism. Soft Urbanism researches the transformations of architectural/urban space of the emerging 'information/communication age' and explores the dynamic interaction of urbanism and the space of mass media and communication networks.

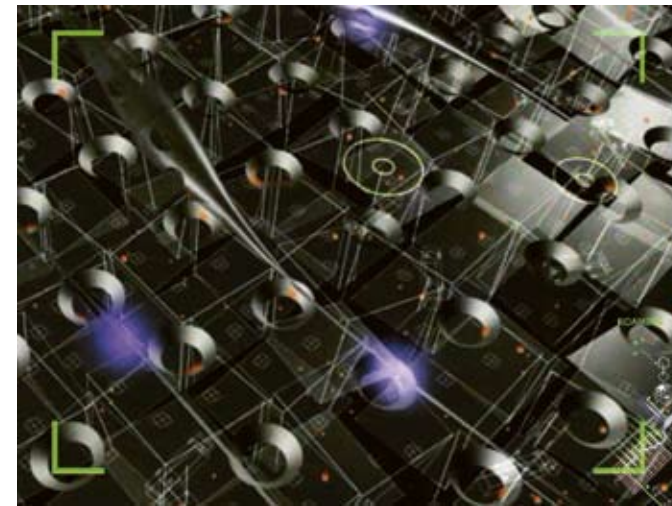
7 PMUI Close-up of hybrid, combined urban/architectural and media, space: The local-

based public 'tele-feeder' facility (at your neighborhood's launderette), the primary unit of Public Media Urban Interfaces, enables the public to produce messages and to narrow-broadcast and receive them in a dynamic communication environment. Creating a locally-based dynamic media network from the bottom up, local events can be accelerated and reinforced to temporarily invade the global media space.

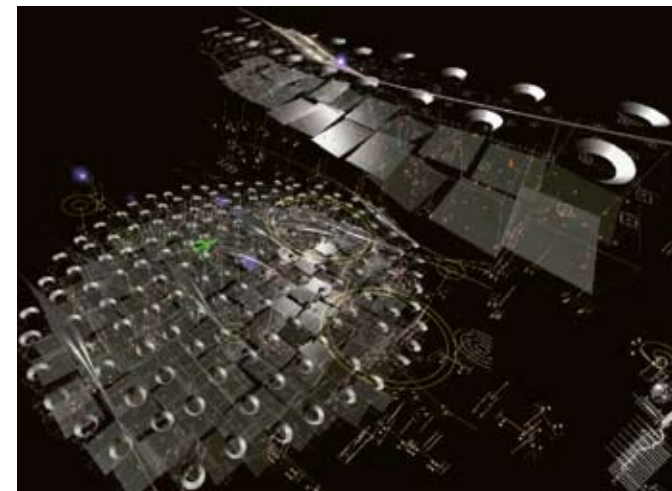
8 PMUI Dynamic model of the combined urban and media communication processes: A demo project, exploiting London's urban tensions and structure unfolds strategies and visualises aspects of these investigations, confronting a working hypothesis with the idiosyncrasies of a specific urban situation. 128 feeder houses distributed evenly over the sprawling London towns and interconnected by means of a digital network supply 8 Bridge Clubs located on the Thames with a continuous

stream of (non-)events.

9 PMUI Fusing the hammer with Micky: The publicly distributed 'Air Time for All' Smart Card allows you to produce and narrow/broadcast and also gives you the opportunity to adopt a message (not your own) by giving it extra Air Time. At the 'tele-feeder' facility in the neighbourhood, you will find the necessary programming facilities to make your program and the means to monitor it as it goes on the air. You can also accelerate messages (not your own) by giving them extra broadcasting time with the help of the special Smart-Card. And as a message gains strength, its chances of reaching a much larger audience increase, reaching more feeder houses and neighbourhoods, a Bridge Club, the city or even the whole country, Europe and the rest of the world. 'Replacing the right to vote, a right to narrow/broadcast is established.'



[7]



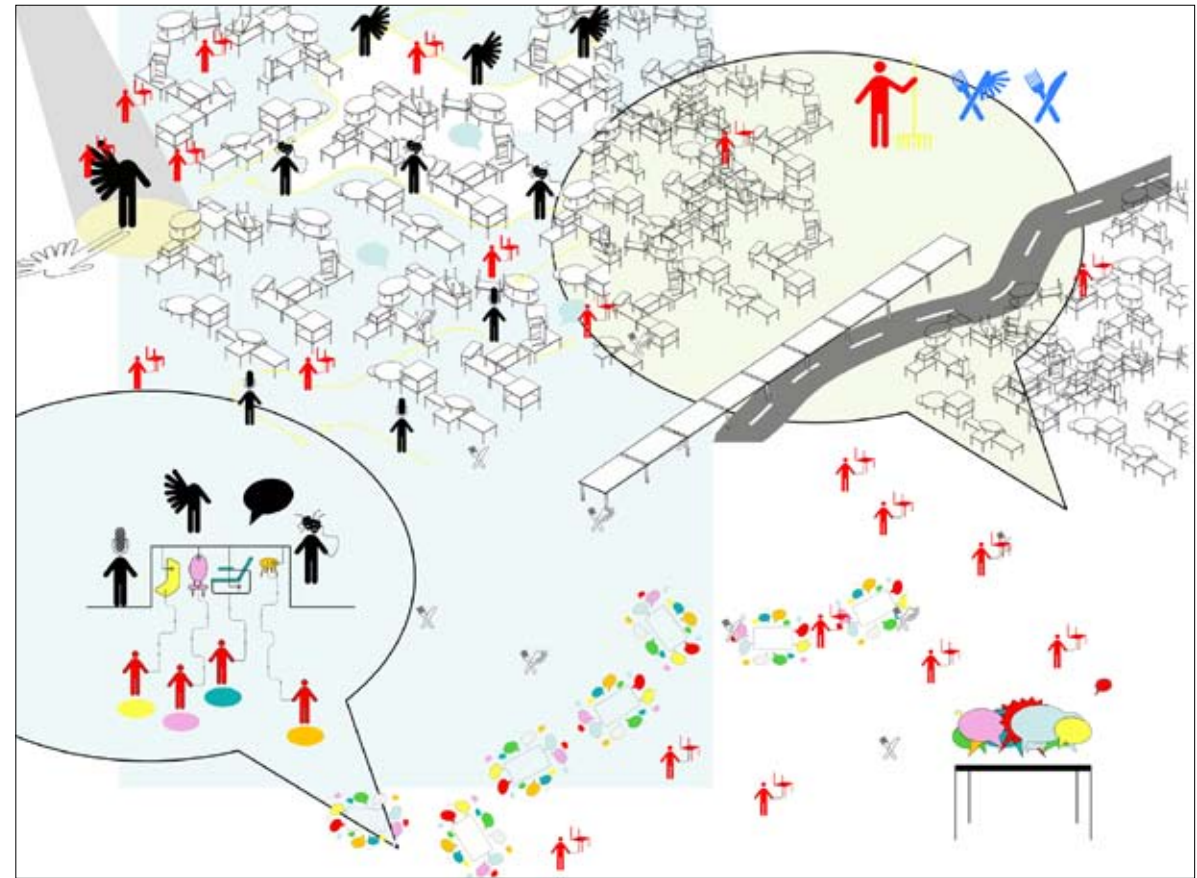
[8]



[9]



[10]



[11]

10 'SUBCITY: a Big Urban Game for the Cultural Capital of Europe RUHR.2010': The Ruhr region in Germany has been defined by its underground, its sub-city. In this mining area the seams were the determining factors. Industrialisation and hence urbanisation were literally based on these subterranean layers. As an ex-mining area, the Ruhr Valley region is conscious of its sub-layers as the foundation and the driver of its development. Nevertheless, the underground connotations are ambiguous. Forgotten mining galleries, inaccessible tunnels and groundwater lakes populate the deeper layers. The information on these underground structures reverberates with disasters from the past, the peril of the void and the threat of water. The SubCity game deals with the sub-layers of the city. The SubCity game, played on mobile devices, reinterprets and recodes the communal urban substratum,

recreating the deep layers of the cityscape. You can dig virtual tunnels and galleries, develop and revitalise an urban underground and live there with their avatars and dreams. You can together recreate and transform the underground systems, weaving a solid tissue of dreams under the city network.

11 'wir ESSEN FÜR DAS RUHRGEBIET' (We're eating for the Ruhr Region) is a German play of words on the slogan that the Cultural Capital RUHR.2010 used in the early stages of its application 'ESSEN FÜR DAS RUHRGEBIET' ([the city of] Essen for the Ruhr Region). We added a 'wir' ('we') and proposed that urban dinners be held simultaneously throughout the Ruhr Valley on one summer evening. On the longest day of the year urban dinners are to be organized by and for the neighbourhood residents and visitors, by and for the users of the city. The many dif-

ferent cooking cultures, reflecting the multi-cultural character of this ex-industrial region with its strong immigrant population, fuse and combine to create a new hybrid cuisine. The urban dinners, as an 'inverted event' is, above all, an impulse for developing the bottom-up networks of the Ruhr Region. This event should be decentralized during the run-up year to the Cultural Capital. The tables should be laid in derelict space throughout the region, the wasteland of the cityscape. Theatrical and musical ensembles and other cultural groups from the region should roam around on that evening, following routes from table to table along the cityscape and performing small artistic intermezzos. At exactly the same moment, throughout the whole of the Ruhr Valley, a million voices joins in a toast: 'wir ESSEN FÜR DAS RUHRGEBIET'!

From Noopower to Neuropower: How Mind Becomes Matter

Warren Neidich

Primary Conditions: The Emancipation of the Pluripotentia

In the societies of control, power relations come to be expressed through the action at a distance of one mind on another, through the brain's power to affect and become affected, which is mediated and enriched by technology. – Maurizio Lazzarato¹

The implications of this statement go to the very core of the biopolitical questions that I would like to address in what follows. I will develop three lines of thought. First, in the transition from the disciplinary society to the society of control and onward to what Lazzarato refers to as 'noo-politics,' the focus of power and the technology at its disposal are not directed toward the materiality of the body, but, instead, its psychic life, particularly its memories and attention.² Important for reasons to be explained later, I will concentrate my discussion upon 'working memory.' As we will see memory is not the end of a process of retrieval but just the beginning. Memories are accessed and utilized to build a plan for future decisions and action.³ This working memory is closely linked to the functions of the frontal lobes of the brain that play a crucial role in organizing these memories into temporal sequences that allow the human animal to enact behaviors in order to obtain future goals. This then is a related focus of this book; to understand the ways in which power has shifted its administrative focus, bypassing the senses to act upon the properties of the frontal cortex to intervene in its future plans. Secondly, I would like to extend this idea of noo-politics to include a new focus of sovereignty: that of neural plasticity itself and its potential as a generator of fields of difference. I am referring to this as 'neuropower,' especially when it administers the pluripotential of neuroplasticity in the *curating* of a homogenous people both in the present and future.⁴ The noopolitical has an important role to play in this process as it arbitrates in the very process of attention which activates memory circuits in the end stabilizing neural networks. Furthermore, this neuroplasticity is now molded according to the new social, political, economic, and psychic conditions produced by post-Fordist deregulation, especially as it operates upon a 'delimited' workplace defined today by 'the sharing of linguistic and cognitive habits' occurring in a deterritorialized

1 Maurizio Lazzarato, 'The Concepts of Life and the Living in the Societies of Control,' in **Deleuze and the Social**, eds. Martin Fuglsang and Bent Meier Sorensen (Edinburgh: Edinburgh University Press, 2006), 186.

2 Ibid., 186. The Modulation of memory would thus be the most important function of noo-politics.

3 Elkhonon Goldberg, **The Executive Brain, Frontal Lobes and the Civilized Mind**, (New York: Oxford University Press, 2001), 72.

In most real-life situations we store and recall information not for the sake of recall itself, but as a prerequisite for solving a problem at hand. Here recall is a means to an end not the end. Furthermore, and this is particularly important, certain memories are accessed and retrieved not in response to an external command coming from someone else, but in response to an internally generated need. Instead of being told what to recall, I myself have to decide, which information is useful to me in the context of my ongoing activities at that moment.

4 Warren Neidich, 'Neuropower,' **Atlántica Magazine of Art and Thought** 48-49 (2009); Freek Lemma, Lia Gangitano and Sven-Olaf Wallenstein, **Warren Neidich: Lost between the Extensivity/Intensivity Exchange** (Eindhoven: Onomatopée, 2009); Warren Neidich, 'The Neurobiopolitics of Global Consciousness,' in **Sarai Reader 2006: Turbulence** (Delhi: The Director Centre for the Study of Developing Societies, 2006), 222-36; Warren Neidich, **Blow-up: Photography, Cinema and the Brain** (Los Angeles: DAP, 2003).

time/space continuum that ‘guarantees its readiness adaptability, etc., in reacting to innovation.’⁵ As we will see shortly this ability of tertiary economies to react to and embrace change is ‘also dependent’ upon its close relationship to the activities of the frontal lobe.⁶ New labor, like other cultural formations, such as Internet and social networks, is both a reflection and product of the evolution of machinic intelligence; one that by its prevalence and its intense power, especially over visual culture, but auditory and haptic cultures as well, becomes an important modifier of neurobiologic architecture especially its firmware embedded in synaptic connections and axon-dendrite circuitry and dynamic state variables encoded in the firing rates of neurons. The conditions of neuropower and its process of subjectivization are cognizant of these changes and have shifted their focus toward this ontogenic process. This text will elucidate the ways and means that sovereignty has insinuated its own extended cognitive apparatuses as epistemological agents and trajectories into the cultural habitus in order to call out to the multiplicity. This shift, delineated by a change of focus from the body to the brain and mind, especially its pluripotentiality, is described as neuropower, keeping in mind that the brain is part of the body and its malleability can be reflected in, for instance, body posturing. As Michael Hardt and Antonio Negri have pointed out, there is another side to biopower.⁷ The role of art production as a means to counterbalance and challenge this power of the sovereign in the age of neoliberal global capitalism will form the subtext of what follows. Artistic practice, through its direct and indirect effect on the cultural field especially rerouting its memory and attention, can also activate the pluripotential of the neuroplasticity but with different results. In its most utopian guise it can emancipate the virtual contingencies locked up in the pluripotentiality of the pre-individual, itself a result of the tremendous variation of the neurobiologic substrate, sculpting inter-subjective difference and heterogeneity. For the purposes here I will elucidate the form of this emancipation through an exposition of the way that noise music, using the example of John Cage’s now famous, *4’33”*, has influenced the tastes of a generalized contemporary music appreciation.

Virtuosity and Materialism At this point, a digression to further analyze the evolving conditions of new labor and their implications for the ontogeny of the machinery of the brain and mind is necessary. Paolo Virno, arguing in *A Grammar of the Multitude* in view of Hannah Arendt and Karl Marx, suggests that in the information economy, the communicative act itself acts as an attractor repositioning political action, labor, and intellectual reflection closer to one another.

Let us consider carefully what defines the activity of virtuosos, of performing artists. First of all, theirs is an activity which finds its own fulfillment ... in itself, without objectifying itself into an end product, without settling into a

‘finished product,’ or into an object which would survive the performance. Secondly, it is an activity which requires the presence of others, which exists only in the presence of an audience.⁸

Furthermore, ‘I will maintain in particular, that the world of so-called post-Fordist labor has absorbed into itself many of the typical characteristics of political action: and that this fusion between politics and labor constitutes a decisive physiognomic trait of the contemporary multitude.’⁹ This reference to physiognomy is interesting in two respects. First, it underscores the multitudes recognizable faciality, and, secondly, owing to the sophisticated technologies at hand, sovereignty is today able to judge the multitude. Beginning with Aristotle’s *Nicomachean Ethics*, Virno delineates the differences between what he refers to as labor (or poesis) and political action (praxis) through the idea of virtuosity distinguishing the former from the latter by the production of an object, in the case of poesis, and the lack of one, in the case of praxis. In praxis the purpose of the action is found in the action itself. Later, expanding his argument through Marx’s discussions in ‘Results of the Immediate Process of Production’ and ‘Theories of Surplus Value,’ he describes two kinds of intellectual labor.¹⁰ Firstly, he characterizes a form that produces products of mental activity like books and paintings as well as instances in which the products and acts of producing them are inseparable from the act itself. Secondly, he specifies labor as the virtuosic performance leaving no real product or trace. Here, he includes pianists, dancers, orators, teachers, and even butlers. Yet, unless that speaker is speaking to himself or herself, an act considered somewhat odd and demented when it addresses no one yet occurs in the context of others and which is therefore deflected by possible recipients as non-sense, or self-reflexive when it is part of a singular and lone rehearsal, his or her speech finds a receptor-listener. This is essential to recent theories of mind referring as they do to our ability to form insights into what other people are thinking in order to anticipate their behavior. Deception is an important attribute of such a theory in which the deceiver manipulates the mental states of another person in order to later exploit them. When that listener is not one but many, every speech act finds, creates, or produces an audience. This need for an audience or a social mind as a roving, wet, mutable organic interface, where the inscription of the oral history/memory of that performance is inscribed in both the static and dynamic conditions of the material brain, figures as the central key to what follows. The virtuoso performance does in fact produce a material change, and can therefore leave a trace as mental sculptures and architectures. The production of such traces shape the essences of neoliberal capitalism and new labor.

5 Paolo Virno, *A Grammar of the Multitude*, translated by Isabella Bertolotti, James Cascaito and Andrea Casson (New York: Semiotext(e), 2004), 41.

6 ‘When the task (saying an appropriate verb to a visually presented noun) was first introduced, the blood flow level in the frontal lobes reached its highest level. As the subjects’ familiarization with the task increased, frontal lobe involvement all but disappeared.’ Goldberg, *The Executive Brain*, 69.

7 ‘The general right to control its own movement is the multitude’s ultimate demand for global citizenship. This demand is radical insofar as it challenges the fundamental apparatus of imperial control over the production and life of the multitude. Global citizenship is the multitude’s power to reappropriate control over space and thus to design the new cartography.’ Michael Hardt and Antonio Negri, *Empire* (Cambridge, MA: Harvard University Press, 2000), 400.

8 Virno, *A Grammar of the Multitude*, 52.

9 Ibid., 50.

10 Ibid., 56.

When the agency of this neoliberalism focuses directly on the conditions of cognition in all its variety, a set of conditions arise that I shall refer to as neoliberal cognitive capitalism. I argue that the essence of new labor acting in concert with the political, social, and cultural habitus with which it interacts, produces new forms of neural efficiency, both local and global, micro and molar, occurring in the circuitry of the brain.

The Whatever of Neuropower Although the expression neuropower and its link to neoliberal global capitalism to produce neoliberal cognitive capitalism is a rather recent phenomena, their roots can be traced to earlier times and epochs. Agamben alludes to the conditions of neuropower when discussing Aristotle's *De Anima*. In a comparison between an architect and a child, he states that the architect has the potential to build as the poet has the potential to write poems. He or she has the knowledge and can also decide not to make a work but instead to maintain that potential in an unused state. On the other hand, the child differs, as it has a generic form of potentiality. The child must 'suffer an alteration (a becoming other) through learning.'¹¹ It is this alteration that is the essence of the administration of the pluripotentiality of the nervous system. In its desire to create a people who share similar cultural and linguistic traits, the child's neuroplasticity must be curated and in doing so the child's possibility to become another or many is inhibited. Previously this process of alteration was done at the level of the senses and, as I will argue later, through the production and administration of the conditions of what Jacques Rancière refers to as the distribution of the sensible to which the senses are coupled. Through the action of the police, or through the apparatus of policing, this distribution is stabilized, and the agency of governing and administering becomes dislocated from, for instance, its courts of law, to the distribution itself. This is not to admit that the courts of law are no longer necessary but to understand them anew as part of a complex field of administrative apparatuses. The normalizing effect of the ways and means whereby the sensory environment is structured regulates those that move within it in accord with its sensory, perceptual, and cognitive apparatuses. It is an ontogenetic and developmental process. In the case of the child, the mediating efforts of the parents, communicated as a series of performances, first to the child as actions such as pointing and later through language, create the cognitive structures and mental routines with which it will think about itself and the world.

The new tools of neuropower no longer address simply the conditions of the sensory world and the perceiving static or mobile subject, but, instead, directly engage with those parts of the brain that are responsible for planning and making future decisions. I am referring to the prefrontal cortex and frontal lobe, which are located in the anterior and superior part of the brain. The new top-down strategies being developed join the historic bottom-up strategy to engage the whole mind in its entirety in the present the future. We might say, in fact, that

noopolitics directly engages a bottom-up strategy producing local changes in, for instance, the primary cortical areas that, through long-term connections and dynamic synchronous oscillations, inadvertently affect higher cognitive areas like the frontal cortex where abstractions about the world are formed and implemented. This is especially interesting when one considers that the maturing of the brain begins in the primary cortices and continues into the late teens in the frontal cortex. Noopolitics relationship to sensibility is defined as a passive tele-visual like process and concerns seduced attention leading to passive tele-visual memory. Neuropower has shifted this engagement of the subject to one that is now active and mobile under the umbrella condition of what is referred to as top-down processing, whereupon it operates directly on the higher cortical functions of, chiefly, the forebrain with its prognosticating functions and, secondarily, affects incoming data from the bottom-up pathways. 'In Haken's system of synergetics, emergence through self-organization has two directions. The upward direction is the local-to-global causation, through which novel dynamics emerge. The downward direction is a global-to-local determination, whereby a global order parameter "enslaves" the constituents and effectively governs local interactions ... There is no supervisor or agent that causes order; the system is self organized.'¹² It is with these tools that the multitude, which Thomas Hobbes had felt unmanageable, can now in fact be regulated. But as we noted above, biopower has another side, whereby, its new forms, for instance those producing Empire, constitute new conditions of resistance as well. This is also true of neuropower. I will leave this discussion for the latter part of this text.

The Distribution and Redistribution of the Sensible Even though spontaneous brain activity emerges without an external force, for a brain to be useful it should adapt to the outside world. The brain has to be calibrated to the metrics of the environment it lives in, and its internal connections should be modified accordingly. If the statistical features of the environment reflect one particular constellation, the evolving brain should be able to adapt its internal structure so that its dynamics can predict most effectively the consequences of the external perturbation forces. A great deal of this adaptive modification for each individual brain (its smartness) comes from interactions with con-specifics, that is, other brains.¹³

Jacques Rancière, in *The Politics of Aesthetics*, describes the 'distribution of the sensible' or *le partage du sensible* as the 'implicit law governing the sensible order that parcels out places and forms of participation in a common world by first establishing the modes of perception within which these are inscribed.'¹⁴ Implicit in this statement is that sovereignty, the entity, whether absolute or popular, local or global, that has jurisdiction over a territory or group of people, produces a system of perceptual facts that are regulated and, in turn, regulate its constituents as perceptual bodies

11 Giorgio Agamben, **Potentialities: Collected Essays in Philosophy**, translated by Daniel Heller-Roazen (Stanford, Stanford University Press, 1999).

12 Gyorgy Buzsáki, **Rhythms of the Brain** (Oxford/New York: Oxford University Press, 2006), 15. This terminology is not unlike that found in a cultural studies textbook describing the conditions of global commerce or new forms of colonization.

13 Virno, **A Grammar of the Multitude**, 23.

14 Jacques Rancière, **The Politics of Aesthetics**, translated by Gabriel Rockhill (London: Continuum Press, 2004), 85.

molding them into a concrete and uniform entity.¹⁵ Rancière also includes times and forms of activity in this distribution.¹⁶ In the end, who sees or hears what or decides to move through what spaces in time designates either their inclusion or exclusion. For instance, those who can afford slow dial-up Internet service versus those who can afford fast DSL wide bandwidth service will determine what some individuals can know and what others cannot, as well as who may or may not have access to simultaneous and multiplicitous time, responding and negotiating complex digital relations in collapsed spaces within existent global networks. Furthermore, Rancière understands the important position aesthetics plays in the production of this distribution and its redistribution, because aesthetics has much to say on what is sensed. Utilizing the classic ideas of Kant's aesthetics as a system of a priori forms determining what presents itself to sense experience, he sees it in a political sense as a form of experience that must be controlled through governmental agency and for which art has a destabilizing effect. 'The aesthetic regime of art puts this entire system of norms into question by abolishing the dichotomous structure of mimesis in the name of a contradictory identification ... It thereby provokes a transformation in the distribution of the sensible established by the representative regime ...'¹⁷

In agreement with Rancière, I will discuss how artists and architects, utilizing their own histories of production, spaces of presentation, apparatus, methods, and materials, create an alternative distribution of the sensible, a redistribution of sensibility that has implications for noopower and neuropower. This redistribution occurs in the organization of stable matter in the form of the positioning of objects, as well as in the dynamic conditions they produce from the pathways for ambulation to regimes of visual attention. Through a nebulous cloud of abstract knowledge that circulates in and around these material essences, formed as they are by the multiplicity of stories attached to them, they create the metaconditions of their reception. From the story of their making to their constant redefinition in historical trajectories as metaphors in transhistorical mythologies and then to their current use in branding networks, object meanings play important roles as mediators of a distribution of the insensible as well. How light are these objective and vital essences and how nimble are they in dynamic trajectories that link one metahistory to another: as meaning itself jumps great divides on the waves of cultural contexts to bind meanings together into assemblages and link what was formerly non-assimilable to grand narratives. These entities then have the potential to produce unseen and immaterial linkages that tether cultural logics to temporal structures both in the world and in the brain that must comprehend them. The dynamic patterns in the man-made milieu, in their material and immaterial agencies, find counterparts in dynamic neural architectures, such as oscillatory potentials and assigned temporal signatures, which must code and understand these dynamic conditions.

Even though spontaneous brain activity emerges without an external force, for a brain to be useful it should adapt to the outside world. The brain has to be calibrated to the metrics of the environment it lives in, and its internal connections should be modified accordingly. If the statistical features of the environment reflect one particular constellation, the evolving brain should be able to adapt its internal structure so that its dynamics can predict most effectively the consequences of the external perturbation forces.¹⁸

From Noopower to Neuropower In order to address the first question of this text, I would like to begin with a quote from Maurizio Lazzarato, a second generation 'Operaist,' who recognized this new biopolitical dimension as defined by such terms as 'mass intellectuality,' 'immaterial labor,' and 'general intellect.' These concepts are recontextualized in terms of the new nature of productive labor and its living development in society.

In order not to name such different things with the same word, one could define the new relations of power which take memory and its conatus (attention) as their object ... noo-politics. Noo-politics (the ensemble of the techniques of control) is exercised on the brain. It involves above all attention, and is aimed at the control of memory and its virtual power.¹⁹

Agreeing with Foucault, but using a poststructuralist scrim, he still believes that sovereignty is interested in exercising its power by neutralizing difference with repetition in order to reduce the power of variation (the difference that makes a difference) by subordinating it to reproduction. The function of the training of bodies is to prevent the bifurcation, to eradicate any possibility of variation, any unpredictability, from action, conduct, and behavior. In the field of the society of control, conversely, the body is coerced though unseen and sublime mediated agents like radio waves and cinematic images that have no boundaries and enter the eye directly as invisible energy to administer consciousness. The unruly body/mind of the multitude in all of its possibilities must also be constrained and contained in the wide-open spaces of the world picture/movie/web. As such the new and more sophisticated technologies of the control of the mental at a distance are instituted. Today, radio waves have been replaced by software agents that produce Google profiles and the like. As we will see, the place of these bifurcations, variations, and unpredictability can also be found in the condition of the brain at birth that is, on one hand, a set of a priori genetic adaptations that allow for a minimal of survival and, on the other, consists of a stochastic, variable and overabundant, exuberant nervous system ready to be pruned, stimulated, and activated by the conditions of the environment, both natural and cultural. Repetition and constancy are powerful tools of this neural sculpting and are part of the institutional tools communicated first through

15 Gabriel Rockhill, 'Introduction,' in Rancière, **The Politics of Aesthetics**, 1.

16 Rancière, **The Politics of Aesthetics**, 12.

17 Rockhill, 'Introduction,' **The Politics of Aesthetics**, 4.

18 Buzsáki, **Rhythms of the Brain**, 15.

19 Lazzarato, 'The Concepts of Life and the Living in the Societies of Control,' 186.

the empathic gaze and nurturing touch of the parents as agents of understanding that shape this difference into a form of regularity.²⁰

Paolo Virno sees the aspirations of neoliberal capitalism as vigilantly looking for new territorial markets and the potentials locked in the conditions of the nascent brain and mind with its limited/unlimited potential, its dynamis, as the next continent to discover and conquer. What might the future man or woman be, or how could they be produced? For the true conditions of the dynamis are most importantly found in the conditions of the production of the body-brain-mind-world axis. First, in the constantly mutating conditions of the urban cultural environment, especially those produced by modernism with its appetite for the new and the subsequent postmodernist inclination toward folded time and space. Then, as a response, these adaptive changes are first recorded and quickly emblazoned as patterns of neural connectivity – static and dynamic, hierarchical and non-hierarchical – in the forming brain. For as we progress up the evolutionary ladder, we find more and more of the brain, especially what are referred to as its association cortex, susceptible to the conditions of change and mutability. Peter R. Huttenlocher eloquently puts it this way.

While neural plasticity probably exists in the nervous systems of all species, it appears to be most marked in specific regions of human cerebral cortex, in areas that subserve the so-called higher cortical functions, including language, mathematical ability, musical ability and 'executive functions.' Regions of the cerebral cortex that subserve voluntary motor activity and primary sensory functions, such as visual and auditory information processing, appear to be less malleable.²¹

Key to what follows is a delineation of this special attribute of neuroplasticity along with the concomitant fast expansion of the frontal lobe and parieto-temporal areas that allowed humans to adopt to a plethora of natural and culturally induced environmental contexts in the end contributing to their evolution as *Homo sapiens*.²² New histories for the production of the mind through differential sampling of the pre-individual are located not only intra-personally, in the life of that person, but are shared as the inter-personal social mind as well.²³ Enlisting the communicative industries, pharmaceutical corporations, military-industrial complexes, and the scientific community, sovereignty has produced sophisticated machine-ic assemblages to organize the distribution of the sensible to confer with the new conditions of the general intellect and the mind modes it produces that are free-floating and no longer anchored to singular and equivalent objects. I refer to this as cognitive ergonomics, because the contingencies of real and 'potential space' of the cognitive apparatus of the brain, its neural plasticity, have been elaborated to meet the demands of the constructed hegemonic social/cultural dynamis with a maximum of efficiency.²⁴

Cultural Difference and the Sampling of Neural Biodiversity

The most extensive modification to take place in human brain evolution – the disproportionate expansion of the cerebral cortex, and specifically of the prefrontal cortex – reflects the evolutionary adaptation to this intensive working memory processing demand imposed by symbol learning. So the very nature of symbolic reference, and its unusual cognitive demands when compared to non-symbolic forms of reference, is a selection force working on those neurological resources most critical to supporting it. In the context of a society heavily dependent on symbol use—as is any conceivable human society, but no nonhuman societies—brains would have been under intense selection to adapt to these needs.... This, then, is a case of selection pressure affecting the evolution of a biological substrate (the brain) and yet which is imposed, not by the physical environment, but ultimately from a purely semiotic realm.²⁵

'From the perspective of distributed cognition, this sort of individual learning is seen as the propagation of a particular sort of pattern through a community. Cultural practices assemble agencies into working assemblages and put the assemblages to work. Some of these assemblages may be entirely contained in an individual, and some may span several individuals and material artifacts.'²⁶

Today more than ever, it is culture that has replaced nature as the primary force of epigenesis. Epigenesis is defined as the means by which the unfolding of the genetically prescribed formation of the brain experiences alteration by its interaction with the environment. When one considers brain function in this context, the term neural plasticity is used. Neural plasticity refers to the ability of the components of neurons, their axons, dendrites, and synapses, plus their extended forms as neural network systems, to be modified by experience. The neurobiologist Marcus Jacobson defined neural plasticity as a process through which the nervous system adjusts to changes in the internal and external milieu. Adjustments in the internal milieu can occur after brain injuries. For instance, a child is able to recover the function of language production and reception after trauma or stroke to the left language hemisphere of the brain. The right hemisphere, not normally an active part of that system, is capable of being modified so as to assume these language functions with little deficit if the onset of left hemisphere dysfunction occurs at an early enough age. Adjustments can also occur in response to changes in the external milieu. The heterochronous unfolding of the genetically determined neurobiological time table creates what are called critical periods of development in which certain regions and systems of the neurobiological substrate are extremely sensitive to the conditions of, for example, the linguistic-cultural milieu that predispose

20 Bruce Wexler, **Brain and Culture** (Cambridge, MA: MIT Press, 2006), 102.

21 Peter R. Huttenlocher, **Neural Plasticity** (Cambridge, MA: Harvard University Press, 2002), 5.

22 Jean-Pierre Changeux, 'Genes, Brains, and Culture: From Monkey to Human,' in Stanislas Dehaene et al., **From Monkey Brain to Human Brain: A Fyssen Foundation Symposium** (Cambridge, MA: MIT Press, 2005), 83.

23 Virno, **A Grammar of the Multitude**, 79.

24 Warren Neidich, **Blow-up: Photography, Cinema and the Brain**.

25 Terrance Deacon, 'Multilevel Selection and Language Evolution,' in **Evolution and Learning: The Baldwin Effect Reconsidered**, eds. Bruce H. Weber and David J. Depew (Cambridge, MA: MIT Press, 2003).

26 Edwin Hutchins, 'Distributed Cognition, IEBS Distributed Cognition,' **Shifter** 16 (April 2010): 5.

it to language acquisition during a particular time window. And therein lies the bigger question of which language will be acquired of the 6,700 in the world that the child's brain has the potential to learn. Which one is actually learned depends upon the close coupling of the child's brain-mind to his or her linguistic field.²⁷ As we will see in what follows, this condition of neural plasticity will be key in understanding the rapprochement of Rancière's distribution of the sensible and its concomitant regulation of the pluripotentiality of the brain's neural plasticity. I will argue that the 'Institutional Stabilization' of the distribution of sensibility, crucial to policing that field and defining the new conditions of power, fulfills the necessary conditions to restrict the potential heterogeneity implicit in the pluripotent character of the neurobiological substrate resulting in the production of a people. When we focus our attention on the microcultural context of the work place and understand it as a form of restricted distribution of sensibility, as a controlled space and model to perceive in action, we begin to understand its historical effect on neuromodulation.²⁸

As we advance historically from primary economies of extraction to those described as secondary, involved with manufacturing, to those involved in services defined as tertiary, we also move through different assemblages of sensational fields.²⁹ When the conditions of the information economy predominate, as they do in northern European countries and the USA, and the emergent forms of general intelligence that result are expressed as conditions of networked and distributed systems defined as intensive, as opposed to extensive, the possibility for intensive neural sculpting is great. Let us look deeper into the reasons why.³⁰

Two conditions have implications for how we might understand the idea of general intelligence. In the 'Fragments on Machines' (1858), Marx understands the idea of general intelligence as 'a machine intelligence.' In the transition from artisanship to mechanized production of the assembly line, the unitary consciousness necessary for the crafting of the unique object is now linearly distributed throughout an assemblage of laborers who function in concert to produce the replicated and equivalent object now reproduced ad infinitum. This is extensive labor as it produces a similar product over and over again. The laborer is simply a cog in the wheel of production and is subsumed by the machine as simply a series of human mental linkages between the machine's mechanical organs.

But once adopted into the production process of capital, the means of labor passes through different metamorphoses, whose culmination is the machine, or rather, an automatic system of machinery (system of machinery: the automatic one is merely its most complete, most adequate form, and alone transforms machinery into a system), set in motion by an automaton, a moving power that moves itself; this automaton consisting of numerous mechanical and intellectual organs, so that the workers themselves are cast merely as its conscious linkages.³¹

Their labor, fetishized into a series of partial acts that together produce the object and the machine, binds all their minds together diachronously and synchronously. Together, as a single entity, they produce similar objects as long as the machine functions correctly. However things can go wrong as comically dramatized in Charlie Chaplin's *Modern Times* (1936), where, while working on an assembly line, he becomes accidentally consumed by the machine. In the transition to a post-Fordist condition, this assemblage of individuals along with new forms of architecture, break up and are dispersed horizontally, distributed across multiple times and spaces bringing about products that are singular and unique. The reflective machine intelligence is therefore of a different kind; it is intensive. Today, the general intelligence – the machines and apparatuses that bind people together and the social processes thus engendered – are invisible, non-hierarchical, and distributed. The information thus generated reflects the conditions of this production. Hence, the collectivity of the human intellect is ultimately also evident in the machine, in Marx's words:

... are organs of the human brain, created by the human hand; the power of knowledge objectified. The development of fixed capital indicates to what degree general social knowledge has become a direct force of production, and to what degree, hence, the conditions of the process of social life itself have come under the control of the general intellect and been transformed in accordance with it. To what degree the powers of social production have been produced, not only in the form of knowledge, but also as immediate organs of social practice, of the real life process.³²

As we will see in the age of information and mass intellectuality, it is, in fact, the form of information itself that sculpts neural plasticity. General intelligence here is then defined as the information produced by these mutating conditions of labor available to any population. As we saw earlier, extensive and intensive labor produces very different kinds of information, and it is this

27 Marcus Jacobson, *Developmental Neurobiology* (New York: Plenum Press, 1991), 26.

28 Alva Noë, *Action in Perception* (Cambridge, MA: Bradford Book, MIT Press, 2004), 1.

29 Alexander R. Luria, *Cognitive Development: Its Cultural and Social Foundations* (Cambridge, MA: Harvard University Press, 1976), 3. The following passage is particularly relevant: 'It seems surprising that the science of psychology has avoided the idea that many mental processes are social and historical in origin, or that important manifestations of human consciousness have been directly shaped by the basic practices of human activity and the actual forms of culture.'

30 How different is the distribution of the sensibility characteristic of extensive versus intensive culture? Intensive culture is defined by multiplicitous, non-linear, rhizomatic processes, immaterial labor as a virtuoso performance, the conditions of the social brain best illustrated by the folded, complex diagram containing degenerative information and hubs through which diverse streams of information can be temporarily assimilated. It is most characteristic of tertiary economies of which the information society is the product. Extensive culture on the other hand is defined here as a set of conditions that have been formed according to a different set of coordinates and logics like linearity, Euclidean geometries, the narrative, and reproducibility. It is characterized by arbor-like flow charts in which connections between points of a map are stable and intransient creating crystallized information structures that are equivalent.

31 <http://www.marxists.org/archive/marx/works/1857/grundrisse/ch13.htm> page 692. Passage from the *Grundrisse* quoted in Gerald Raunig, 'A Few Fragments on Machines,' <http://transform.eipcp.net/transversal/1106/raunig/en>.

32 Ibid., 3.

information, especially in its intensive form, that creates the conditions of neuro-modulation.³³ These conditions of distributed information are powerful attractors that can act as forceful regulators of attention and memory, thus constituting sites of noopower.³⁴ This noopower is what forms the basis for neuropower in which the brain's neural plasticity and its pluripotentiality to become, are the sites of power's interrogation. It is in this context that the sculpting of the neural plasticity, through assemblages of trajectories of attention, subsumed in the regulatory patterns of built space, with its implicit temporality and representational and presentational rationality, can occur. Whereas noopower concerns people perceiving in the present moment, a kind of primary animal consciousness, neuropower concerns the production of people in the future. What they 'could' become.

In the conditions of intensive culture, the representation of an object as something real and equivalent is substituted by its branded value whereby its nature is determined by the stories that orbit around and through it the relations those stories form with other stories orbiting other objects to create the complex non-equivalent conditions of its brand equity. The crunchy edible matter in a box of cereal is not what creates its value, rather it arises from the way that the information on the box design excites a concomitant 'considered' neural architecture sculpted over time by a complex assemblage of previously designed contexts that the individual has experienced before in which other cereal boxes played a role and into which this new box is substituted. The cereal box is reinstalled ad infinitum into a system of recategorical memory that creates an active site for its infinite retrieval in the mind's eye of both real and imaginary. Rather than linear equivalence that organized and delineated the ecology of objects in an artisan economy and began to dissolve in a Fordist one, what defines the post-Fordist landscape of cultural objects is a nonlinear condition of value that is formulated by conditions of communicative labor as it functions along the distribution channels of media and hypermedia. As we will see shortly, general intelligence according to the model I would like to develop is a condition of the ratio between the apparatus of cognitive capital and cultural capital. Different cultural contexts allow different expressions of each thus having implications for the production of a people or multiplicity.

The Cognitive Captial/Cultural Capital Ratio Cognitive capital here is defined as that 'information distribution and production system' centered around knowledge and utilized by sovereignty and the conditions of the administration of normalcy which produces a system of homogenized thinking. Cultural capital was first designated by Pierre Bourdieu, but it operates here in the context of the ways and means through which artists using their own materials, practices, histories, apparatuses, critiques, performances, spaces, and non-spaces produce objects, non-objects, and activities that, when assembled in the cultural landscape, mutate the conditions of that landscape and produce resistant paradigms, or, as we shall see, abnormal epistemologic trajectories. It is at the intersection of

these mutating conditions expressed as a resultant cultural referendum that the brain and mind are hailed by different attention concoctions activating different neurologic toolboxes. The 'Global Workspace Theory' elaborated by Stanislas Dehaene and Claire Seargent is a case in point.

The global neuronal workspace theory tries to account for these essential properties by emphasizing the role of long-distance reciprocal connections among brain areas. According to this theory, conscious processing crucially involves a set of neurons, the 'workspace' neurons, which can work in synergy through long-distance reciprocal connections. Those neurons, which can access information, maintain it online, and make it available to virtually any other process, although particularly numerous in frontal-parietal areas, are distributed throughout the brain, thus constituting 'global workspace.' This state of global availability is, according to the theory, just what is to be conscious of a piece of information ... The particular set of workspace neurons involved in this mutual amplification process at a given time, would code for the current conspicuous content, and would delineate the possibilities of conscious manipulation, intentional actions and reports.³⁵

According to this theory, only a single representation can be processed sufficiently by the workspace at any time leading to its being conscious whilst the other competing stimulations remain implicit or unconscious.³⁶ Thus the relationship between cognitive capitalism and cultural capitalism, as it influences, first, the conditions for cultural attention – what is culturally important – and, subsequently, through activating specific conscious representations, as in the global neuronal workspace, has implications for what the brain and mind will remember and therefore how the brain itself will be formed. One might say that in the transition from Neoliberal Global Capitalism to Neoliberal Cognitive Capitalism a reordering of the cultural landscape occurs in which an intensification of selective stimuli (as opposed to others) results in making certain stimuli more user-friendly to the global workspace apparatus. Cognitive ergonomics as an institutional apparatus then becomes the set of rules through which the cultural landscape is modified to fit the conditions of the epigenetically revealed cognitive apparatus. This, I would like to suggest, has implications for the production of the history of thought itself.

The neuronal recycling hypothesis provides us with the next step in this logical process and is an important key as to how long term changes might occur in the presence of sustained cultural niches. Cultural acquisitions like, for instance, reading (don't forget writing and reading are a fairly new abilities occurring in Mesopotamia approximately 3,500 BC), must find their neuronal niche, defined here as a set of already exiting neuronal circuits which have functions that can be easily adapted to the newly required function and are sufficiently plastic, thereby able to change if

33 Gilles Deleuze, **Francis Bacon and the Logics of Sensation**, translated by Daniel W. Smith (London: Continuum Press, 2003), 102.

34 Maurizio Lazzarato, 'The Concepts of Life and the Living in the Societies of Control,' 186.

35 Claire Seargent and Stanislas Dehaene, 'Neural processes underlying conscious perception. Experimental findings and a global neuronal workspace framework,' **Journal of Physiology Paris** 98 (2004): 379, 380.

36 Ibid., 381.

need be.³⁷ At the crossroads of competition and cooperation expressed by this ratio, the brain and mind are formed.

Neural Constructivist-Neural Darwinism: Sculpting the Brain and I Don't Mean Like Rodin

There were leaders who knew better, who would have liked to deal. But they were trapped. Conservative talkers on Fox and talk radio had whipped the Republican voting base into such a frenzy that deal-making was rendered impossible. How do you negotiate with somebody who wants to murder your grandmother? Or – more exactly – with somebody whom your voters have been persuaded to believe wants to murder their grandmother? I've been on a soapbox for months now about the harm that our overheated talk is doing to us. Yes it mobilizes supporters – but by mobilizing them with hysterical accusations and pseudo-information, overheated talk has made it impossible for representatives to represent and elected leaders to lead ...³⁸

But how is the development of brain and mind linked to the history of objects, abstract knowledge, and to the production of the subject in the context of neoliberal capitalism with its emphasis on immaterial labor and knowledge industries? In order to formulate a theory of resistance, one must address the conditions of this all-pervasive system. In what follows, I would like to use ideas emanating from three sources. First, I shall engage the theory of neuronal group selection as formulated by Gerald Edelman to discuss the conditions of neuronal sculpting.³⁹ Secondly, the theory of neural constructivism, formulated by Steven R. Quartz and Terrence J. Sejnowski, will be essential in understanding the process of complexification.⁴⁰ I shall argue that these ideas, often considered contradictory, can be understood as complementary. Finally, I would like to pay tribute to the earlier theories of Jean-Pierre Changeux who laid the foundation for the comprehension of what is to come.⁴¹

Edelman's theory and that of Quartz and Sejnowski ask a basic question: What are the determinants of postnatal neural development? Is it, as neural Darwinism would suggest, an unfolding of a prescribed neurobiological process, in which a stochastic exuberant growth of neural elements is followed by a period of pruning and regression that through a Darwinian survival-of-the-fittest regime becomes sculpted by various environmental contingencies into a finely tuned sensorial-perceptual-cognitive machine? This theory has the benefit of parsimony and mimics in certain ways the concrete genetic and immunological systems already in place. According to Quartz and Sejnowski, the weakness of this theory lies in its dependence on the notion of prespecification, as this theory necessitates that, for instance, the network must build in the problem domain a priori. But the world that human beings live in is constantly changing and, even though neural Darwinism might work in a laboratory where all the conditions can be specified,

the real world is in flux. Neural constructivism proposes that instead of simply a regression of neural elements, development is rather 'a progressive increase in the structures underlying representational complexity' and these changes depend on an 'interaction with a structured environment to guide development.'⁴² Furthermore 'dendritic development fulfills important requirements for a non-stationary learning mechanism, suggesting how dendritic development under the influence of environmentally derived activity conforms to cognitive schemes for the construction of mental representations.'⁴³ In other words, in a changing cultural environment, such as one defined now by intensive rather than extensive milieus, a constructivist organized brain can be modified according to the mutating conditions it confronts with a concomitant mutation of itself. For our argument here, components of each theory will help us elucidate how nature or designed space might play an important role in the production of the neural architecture to be used in thought.

As we saw above, while neural Darwinism uses Darwinian paradigms of selection in the face of niche contingencies, neural constructivism recounts the ways and means by which age related cognitive improvements are the result of neural networks becoming increasingly interconnected, functionally more specialized, and sometimes progressively complex through the brain's relationship with the stimulating conditions of complex representational matrices of, for instance, the manmade built milieu. In this way neural constructivism is more Bergsonian. Firstly, evolution does not follow a single lone pathway, and its directions are not always with purpose. Thus, it remains inventive even in its adaptations.⁴⁴ Secondly, it is not always a movement forward in one direction but represents a process of diversification and sometimes disorder.

No doubt there is progress, if progress means a continual advance in the general direction determined by a first impulsion; but this progress is accomplished only on the two or three great lines of evolution on which forms ever more and more complex, ever more and more high, appear; between these lines run a crowd of minor paths in which, on the contrary, deviations, arrests, and set-backs, are multiplied.⁴⁵

37 Stanislas Dehaene and Laurent Cohen, 'Cultural Recycling of Cortical Maps,' **Neuron Review** 56 (October 2007): 384-385. The neuronal recycling hypothesis consists of the following postulates: 1. Human Brain organization is subject to strong anatomical and connectional constraints inherited from evolution. Organized neural maps are present early on in infancy and bias subsequent learning. 2. Cultural acquisitions (e.g., reading) must find their 'neuronal niche,' a set of circuits that are sufficiently close to the required function and sufficiently plastic as to reorient a significant fraction of their neural resources to this novel use. 3. As cortical territories dedicated to evolutionary older functions are invaded by novel cultural objects their prior organization is never entirely erased. Thus prior neural constraints exert powerful influence on cultural acquisition and adult organization.

38 Tobin Harshaw, 'Can "No" Revive the Republicans,' **New York Times**, 26 March 2010.

39 Gerald Edelman, **The Remembered Present** (New York: Basic Books Inc., 1989).

40 Steven R. Quartz and Terrence J. Sejnowski, 'The Neural Basis of Cognitive Development: A Constructivist Manifesto,' **Brain Sciences** (2004), 1997.

41 Jean-Pierre Changeux and Stanislas Dehaene, 'Neuronal Models of Cognitive Functions,' **Cognition** 33/1-2 (November 1989): 63-109.

42 Quartz and Sejnowski, 'The Neural Basis of Cognitive Development,' 6.

43 Ibid.

44 Henri Bergson, **Creative Evolution**, translated by Arthur Mitchell (New York: Dover, 1998), 102.

45 Ibid., 104.

In this regard it is essential to remember the contribution of Francisco Varela, particularly his idea of enactive embodied cognition based as it is on the ideas of affordances, diversity, and natural drift. These are essential to our understanding of the means through which the mutating conditions of culture at the margins migrate centrally.⁴⁶

For our purposes here, both theories and perhaps the two together operate well as a heuristic model, and, in addition, one compatible with the poststructuralist theoretical model I would like to elucidate. Cultural conditions are evolving, and they produce veracity and verification. The subunits of culture may evolve together or separately and these bound and synchronized cultural conditions produce and sculpt conditions of mind and brain to which they become coupled. These assemblages or props are historically derived and are embedded in the distributions of sensibility as cognitive gestalts hybridized to planned trajectories of thought. Along with the sculpted internal cognitive loops to which they are coupled, the cultural external circuit component completes the organic-inorganic assembled network. But like memory it is non-representational and re-categorical. These then are the building blocks of a complex field of such loops. When these loops are tethered together a hundred or thousand-fold and, as a result of their proximity and overlap form assemblages, their dynamic and emergent intensive conditions begin to be realized.

Neural Darwinism and neural constructivism in the end rely on the conditions of epigenesis, and, in this case, a cultural epigenesis, to produce or sculpt the neurobiological substrate into the neurobiological architecture to change the skin of brain into the flesh of mind.

Plastic human brains may nonetheless learn to factor the operation and information-bearing role of such external props and artifacts deep into their own problem-solving routines, creating hybrid cognitive circuits that are themselves the physical mechanisms underlying specific problem-solving performances. We thus come to what is arguably the most radical contemporary take on the potential cognitive role of nonbiological props and structures: the idea that, under certain conditions, such props and structures might count as proper parts of extended cognitive processes.⁴⁷

As you will see, I view neural selectionism as the dominating force early on and neural constructivism more important later, keeping in mind that Darwinian forces may still play a role. All agree that a phenomenon of excessive growth of neurons in the early years of life is characteristically followed by a reactionary depletion. Neural constructivism attempts to account for what happens thereafter.⁴⁸

The theory of neuronal group selection, the hallmark of neural Darwinism, is made up of three components. Simply stated there is the primary repertoire that is a product of developmental selection, the secondary repertoire that is produced

by experiential selection and reentry which stabilizes and elaborates upon the secondary repertoire. I will cover developmental and experiential selection now, leaving reentry for later.

This primary repertoire describes the condition of the initial variability of the anatomy of the brain at birth that is produced by a process called developmental selection. First, it relates to the variation that results from the combination of the DNA contributed by the father's sperm and the mother's egg as two very diverse genetic heritages. Secondly, it relates to the history of the species itself in its evolutionary journey and the conditions of the genes that reflect that history. Finally, it is the result of events that take place during the pregnancy. For example, the effects of smoking, drinking or cocaine use on the condition of the developing fetus's brain are well known. The combined effect of these three processes is the production of the neurobiologic common from which the brain-mind emerges through its engagement with culture. Although the primary repertoire is to a certain degree pre-specified by genetic programs, which produce the heterochronic events of its neural development, it also contains within itself tremendous amounts of variation and diversity. Variation that is a result the evolutionary experiments leading to the human nervous system that are still subsumed in the human genome and which under certain environmental stresses can become expressed. It is the degree of its variation in its primordial and plastic state that makes the primary repertoire relatively unspecified and to which 'stochastic' conditions of a changing cultural milieu can hail. I would like to call attention to the primary repertoire as the site of what is referred to as neural biodiversity and what I would like to refer to as the neurobiologic common or neurozoon. The Neurozoon embodies the full extent of the possibilities that a human brain can become and contains within itself all the evolutionary steps, some of which are now suppressed and not expressed at the level of the chromosome, that make up its ontogenesis. The Neurozoon awaits the moment of its unfolding not as a nativist series of heterochronous events emblazoned in the codon of the genome *a priori*, but rather as an unfolding or becoming in the context of designed culture. This Neurozoon emerges as a subset of the Zoe, which is then sampled to become the neurobios. The neurobios is the secondary repertoire with all the political implications contained therein.

'Biodiversity is a composite term used to embrace the variety of types, forms, spatial arrangements, processes, and interactions of biological systems at all scales and levels of organization from genes to species to ecosystems, along with the evolutionary history that led to their existence.'⁴⁹ Neural biodiversity by analogy is first of all a species-specific condition that delineates the specific *a priori* variability of neural elements, including their physical and chemical idiosyncrasies, and the neurobiological apparatus that allow for the neuroplastic potentiality to express itself. It is a condition of the evolutionary history of that species and contains therein its complete his-

46 Francisco J. Varela and Evan T. Thompson, **The Embodied Mind: Cognitive Science and Human Experience** (Cambridge, MA: MIT Press, 1991).

47 Andy Clark, **Supersizing the Mind** (Oxford: Oxford University Press, 2008), 68.

48 Quartz and Sejnowski, 'The Neural Basis of Cognitive Development.' See section 3.3 in the abridged edition of their essay in this volume.

49 Robert J. Scholes et al., 'Toward a Global Biodiversity Observing System,' **Science**, 321 (2008): 1044.

tory of neurobiological adaptations that were required in its ascendance as/to that species. Evolution is not the precise knife carving of an organism into a finely adapted machine. It sculpts grotesque figures more like Jonathan Meese's *Metabolism: No Zen in the Bronx, You Atomic Human Toy* (2008), or paints feverishly, as in William De Kooning's *Woman* (1949). Both works depict bodies that are not formed perfectly, but contain many imperfections yet are still discernable as figures and, as a result, elicit multiple readings. They are parabolic forms. Evolution sculpts variations, but it maintains a pool of variation for its 'other' self-fulfilling prophecies.

I would like to contend that neuropower is in fact directed toward this neural biodiversity, attempting to limit its potential. In other words, just as global biodiversity is currently under siege by various factors affecting the conditions of global capitalism, including pollution, over-fishing, and the encroachment of habitat, effecting as it does the diversity of flora and fauna, so too do other conditions of this same world system strangle difference to produce a homogenization of the cultural field and limit epigenetic neural biodiversity. Neoliberal cognitive capitalism is a subset of neoliberal global capitalism and provides the precise mechanisms for this process of specified differentiation. For instance, it is feared that in a century, half of the 6,700 languages now active on our earth will disappear. Furthermore, design culture affects not only the early depletions and pruning of neural arborizations in the manner of a topiarist who clips the branches of thick bushes to produce wonderful fantastic shapes but also choreographs and guides the regrowth of the branches along prescribed pathways to produce specific shapes and forms. Neural Darwinism would be the topiarist while neural constructivism would be the choreographer. Further on, I will show how the homogenization of the cultural field by such conditions of the global economy as the International Style, franchise architecture, and computer generated designed architecture, restricts variation and, as a result, produces a crisis of neural network diversification leading to a crisis of the imagination. Therefore, neuropower is not simply about past evolutionary history but about its future history.

The secondary repertoire is a result of epigenesis and neural plasticity during a process called experiential selection. The term repertoire often relates to musical performance and designates the full scope of a performer's abilities. In fact, Gerald Edelman, one of the founders of neural Darwinism, is himself a musician. The obvious connection to new labor as a virtuoso performance and its association with a number of possible activities that link labor and politics and which have repercussions for the material of memory interests us here.⁵⁰ Neuropower posits that the virtuoso performance does in fact leave a materialist residue. Rather than the industrially formed products characteristic of secondary economies, performances leave lingering memory traces, which have the potential to mutate the conditions of the neurobiologic architecture.

A neural constructivist account could also make this argument. However, instead of resulting from a regression and deletion of neural elements, the secondary repertoire in this account is the result of a productive complexification and intensification. Epigenesis refers to the process by which the environment affects the patterns of stimulation and communication in the neurons and neural networks of the primary repertoire. Hebbian theory, which states that neurons that fire together wire together preferentially, is operative in the primary repertoire where spontaneous electrical activity stimulates genetically prescribed a priori networks.⁵¹ In the secondary repertoire such electrical activity is joined by that which is generated by objects and object relations in the world, both real and abstract, and, in the case of our world, the conditions of information and its distribution as dynamic codes in the real-imaginary-virtual interface.

The probability that neurons synchronize their responses both within a particular area and across areas should reflect some of the Gestalt criteria used for perceptual grouping ... Individual cells must be able to change rapidly the partners with which they synchronize their responses if stimulus configurations change and require new associations ... If more than one object is present in a scene, several distinct assemblies should form. Cells belonging to the same assembly should exhibit synchronous response episodes whereas no consistent temporal relations should exist between the discharges of neurons belonging to different assemblies.⁵²

In an intensive culture it is these dynamic codes that have become most important. Hebbian dynamics and neural Darwinism state that those neurons most intensely stimulated develop firing potentials that are selectively reinforcing whereas those not as stimulated undergo a process termed apoptosis and die out or manage to form connections with networks that are favored. Consequently, in the battle for limited neural space the stimulated neurons and their networked condition replace those that have receded. It is not a difficult intuitive leap to understand how branding and other tools of the global economy could create new gestalt relationships necessary to stimulate cell assemblies.

The development of ocular dominance columns of layer IV of the primary visual cortex is a case in point. Ocular dominance columns, anatomical structures that appear like columns in microscopic examination, are found in the visual cortex and are anatomically defined regions of input from one eye or both eyes.⁵³ They contain a number of different cell types that utilize different strategies for the processing of visual information like simple, complex, and hypercomplex

50 Virno, *A Grammar of the Multitude*, 70.

51 http://en.wikipedia.org/wiki/Hebbian_theory. 'Hebbian theory concerns how neurons might connect themselves to become engrams ... If the inputs to a system cause the same pattern of activity to occur repeatedly, the set of active elements constituting that pattern will become increasingly strongly interassociated. That is, each element will tend to turn on every other element and (with negative weights) to turn off the elements that do not form part of the pattern. To put it another way, the pattern as a whole will become 'auto-associated'. We may call a learned (auto-associated) pattern an engram.'

52 Wolf Singer, 'Coherence as an Organizing Principle of Cortical Functions,' in **Selectionism and the Brain**, eds. Olaf Sporns and Giulio Tononi (San Diego: Academic Press, 1994), 158.

53 Semir M. Zeki, 'Cells Responding to Changing Image Size and Disparity in the Cortex of the Rhesus Monkey,' *Journal of Physiology* 242 (1974): 827.

cells, which all roughly share a common visual field.⁵⁴ As a unit, they are important in processing visual information and are driven by one eye or the other. In experiments by Hubel and Weisel, enucleation of one or the other eye created disruptions in the normal columnar structure with those neural elements coding for the non-enucleated eye displacing those cells formerly driven by the now enucleated eye. 'As Antoni and Stryker note, two hypothesis regarding their development have been suggested. One, conforming to selectionism, emphasizes two phases in the right eye development: a period of exuberant growth followed by selective axonal pruning. The other, more constructivist, hypothesis emphasizes the general expansion of axon collaterals alongside selective pruning.'⁵⁵ This theory promotes neural development as a system that is said to be regressive and subtractive. Neural constructivism interprets this Hebbian mechanism as favorably exciting those neurons most apt to be stimulated, thus promoting their further development and producing increased synaptic numbers and dendritic spines. Where 'representational features of the cortex are built from the dynamic interaction between neural growth mechanisms and environmentally derived neural activity ... this growth is a progressive increase in the representational properties of the cortex.'⁵⁶

These mechanisms are important in understanding the brain's development, but most essential for our purposes here is the transformation of an immature neurobiological substrate into a finely tuned environmentally and contextually driven machine. What then is the effect of living in a networked society with the Internet, cell phones, Facebook, and Twitter? We are all spending more and more time in linked environments and these linked social anatomies are finding expression in the modifications of designed built space. The Alishan Tourist Routes of Reiser and Umemoto, Toyo Ito's Taichung Metroplitan Opera House and The Island City Central Park Gringrin, and Zaha Hadid's Hungerburg Funicular are cases in point. How then do these new spatial and temporal contingencies effect experiential selection? What then of the perceptual and cognitive habits, which they elaborate? Although we have defined the primary repertoire and the secondary repertoire separately, they are part of the same overlapping and interdependent process. The genetic instructions continue to unfold throughout life, in particular in the context of learning, the critical period for language learning, for example, and this learning changes the conditions of the brain itself. Learning a language changes the conditions of interacting with the world and thereby changes the brain's selection of material relevant to attention. What we pay attention to greatly informs what we learn and what neural networks will be activated and amplified.

Unlike natural selection in evolution, which occurs as a result of differential reproduction, experiential selection comes about through differential amplification of certain neuronal populations. Those neurons, neural networks, and distributed neural mappings that are most frequently and intensely stimulated by, for

instance, advertised toys that appear and reappear in real and televised environments or movie stars whose images adorn multiple platforms synchronously on billboards, lap tops, movie screens, and televisions, will develop more efficient firing patterns or become progressively more phase locked – synchronously tethered together – giving them selective advantage over those that are not. Let us examine this relationship more deeply.

Branding and Networks Recently an image of a Pepsi Cola can occurred recurrently all over New York City on billboards of different sizes placed strategically for maximum visibility. The advertisement, not surprisingly, was effectively designed for maximum and rapid perception by both a pedestrian and auto-driving public. (Traffic jams slow automobile traffic to a crawl.) The color and design of the advertisement interestingly used strategies first found in the pop paintings of Andy Warhol, Roy Lichtenstein, and Robert Indiana. The advertisement was designed with a specific local context in mind in which other products advertised within the same visual milieu reverberated together producing a network of stimulation. Just like fashion, advertising is also subject to stylistic conceits and whether on purpose or not advertisements generally jive together. For instance in the past few years there has been a return to the imagery of the sixties with its rebellious content 'popping up' everywhere in commercials. In other words, the advertisement itself and its relation to other similarly designed advertisements in combination produced a cumulative intense effect upon the viewer. Such individual forms and their combined effect in the network where they are embedded produce correlated learning resulting in temporal coincidence at pre- and post-synaptic membranes in local and global cortical mappings that strengthen synapses in the brain. Furthermore, this advertisement occurred on multiple platforms distributed repeatedly on television screens and computer laptops throughout the planet simultaneously. As members of the planet earth, we are stimulated by global franchised sensations without national boundaries. National mindedness becomes transnational consciousness. These new contingencies provide the new affordances of the planetary urban environment, to use a Gibsonian term. Those neurons that code for these newly engineered affordances are coupled with these repetitive, intense stimuli and are therefore more apt to be favored over other neurons and neuronal networks in future encounters with those stimuli. In fact, these conditions of neoliberal capitalism make future encounters probable!

These stimuli can also be grouped together into larger ensembles of stimulation that are persistently aligned in the environment and thus are always coded together as a form of cultural mappings. Pop art created and still creates reverberations in not only in painting but in design, fashion, film, and architecture. Andy Warhol's factory was a creative facility that produced paintings and films but also elaborated styles and forms of behavior that corroborated with those occurring in the culture as a whole. Thus discovering the Velvet Underground and holding court

54 Charles Robert Noback et al., *The Human Nervous System: Structure and Function* (Totowa, NJ: Humana Press Inc., 2005), 340.

55 Quartz and Sejnowski, 'The Neural Basis of Cognitive Development,' 17.

56 Ibid., abstract.

with other art star dignitaries at Maxes Kansas City created non-linear informational trajectories that found other lives in newspaper and magazine articles elaborating the events occurring therein. In other words, cultural mappings are intensive, delineated by a multiplicity of immanent social, historical, psychological, economic, and psychic relations that are collaged together forming a superstructure through which they can produce new conditions for understanding. Today, architecture and designed space, understood as both the physical conditions of built space and the immaterial virtual spaces of the Internet, house and support these elaborate amalgamations tethering them to learned activity trajectories, whether they are in the form of walking, driving or surfing the web. Through practice of these routines and internalization they form the habits of organized thinking itself.

There is an ecological logic to the forms of immanent distributions that are produced. Branded environments are one such example where through corporate agreements NIKE shoes, Post® Grape-Nuts, Hertz® Rent-a-Car, airberlin, and Sony Music Entertainment are bound together in the commercial landscape of billboards and airline magazines. (Cultural binding may share similarities to binding in the brain.⁵⁷) The institutional understanding and sovereignty for which it does its bidding is empowered by this network of cultural signifiers.⁵⁸ What Paul Virilio had formerly referred to in the representational and extensive era as phatic signifiers today become fields of phatic signifiers embedded in the intensive logics of emerging meaning produced by the new apparatus of global culture.

Each brand is made up of its brand equity and its marginalities, both positive and negative, that together compete with other assemblages for the attention of the market place.⁵⁹ Brand equity is explicit; it is a real entity that can be quantified based on market studies, while marginalities are implicit and in the process of becoming.

Marginalities can become explicit under certain conditions. Vans shoes® were originally just leisure shoes to be worn all day. Their appropriation by skateboarders and their resultant popularity could never have been imagined. This skateboarding identity was originally external to its brand equity as a leisure shoe. As a result of a burgeoning cultural mutation taking place in Southern California that embraced and extended its explicit value that its brand equity grew. This became explicit when they were advertised as skateboarding shoes.

A new type of customer boosted the company's fortunes in the early 1970s. The skateboarding craze, an outgrowth of California's surfing culture, provided an opportunity for Van Doren to prove its flexibility. When skateboarders began requesting new colors and patterns, the company responded by offering the Era, a red-and-blue shoe designed by professional skateboarders. Vans quickly became the skateboard shoe of choice, beginning the company's

long, and devoted, association with the sport. Many more color combinations and patterns were added in the 1970s. A new style, the slip-on, was introduced in 1979, and it became the rage of southern California.⁶⁰

Its brand equity continued to expand exponentially embracing more and more cultural marginalities that existed first at the periphery of its associational network and later emigrated toward the center of its brand meaning. In 1979, Vans association with skateboarding broadened its network through its association with, for instance, California style and life style, counterculture, and youth culture. This trend was further accentuated as Vans slip-ons gained international attention and appeal when they were worn by Sean Penn in 1982's iconic youth film *Fast Times at Ridgemont High*. Today those relationships have intensified and become more complex. The company is currently a subsidiary of an international company called VF corporation, which owns brands like Lee®, Wrangler®, The North Face, Gitano, Nautica®, Intima Cherry and Rustler®, to name a few. Its products are produced globally. A perusal of the Vans' website reveals that the brand forms a hub of remarkably diverse cultural relations. First of all, the original shoe line of three styles has now increased to a product line of 173. The classic line has been supplemented by a custom shoe line, as the company develops its brand to encompass the competitive professionalization of the sport with its star potential as well as satisfying the recent trend in marketing unique one-of-a-kind products (which also occurs in such custom publishing ventures as Lulu). The company no longer just makes shoes, but a whole host of other products such as backpacks, beach towels, shorts, gloves, eye glasses, travel bags, as well as watches and media products such as the film *Dogtown and the Z-Boys* (2001), now available on DVD on its website. Its website has global representation, and one can log on to different national sites, each sculpted to the specific tastes of countries such as Mexico, Argentina, the UK, France, the Czech Republic, as well as Japan, Korea, and New Zealand, to name a few. In 2010 the company will sponsor a touring concert called the 'Vans Warped Tour' featuring well-known bands and traveling to twenty-five cities nationwide. They are cosponsoring the tour with other companies like AT&T™ and Verizon to form linked branding. They are also teaming up with *Concrete Wave* magazine for its 'Concrete Wave Passport Program.'⁶¹ Thus, as the company grew, it expanded according to the new proclivities of the global marketplace and the Vans shoe became undeniably linked to a plethora of other relations that on the surface seemed far away from a foot in a particular shoe. The physical shoe, a product of the secondary economy of real objects, made in the real world, and having equipotential exchange value, is now incorporated in the diagrammatic logic of the tertiary economy of information and branding where its value is tethered to the degree of attention it can accrue and hold so as to translate into its market share.

57 Giulio Tononi, 'Reentry and Cortical Integration,' in *Selections in the Brain*, 129.

58 Dehaene and Cohen, 'Cultural Recycling of Cortical Maps.'

59 Positive marginalities increase the brand equity by increasing the number of possible cultural and neuronal relations that are activated and activate the network that it defines and is the center of its constitution. Negative marginalities decrease brand equity by the opposite effect.

60 <http://www.fundinguniverse.com/company-histories/Vans-Inc-Company-History.html>.

61 <http://www.vanswarpedtour.com/warpedtour/news.asp>.

In postindustrial societies, attention has become a more valuable currency than the kind you store in bank accounts. The importance of linking products to celebrity culture and sponsoring rock music tours is a case in point. The problems for business people lie in both sides of the attention equation: how to get and hold the attention of consumers, stockholders, potential employees, and the like and how to parcel out their own attention in the face of overwhelming options. People and companies that do this, succeed. The rest fail. Understanding and managing attention is now the single most important determinant of business success. Welcome to the attention economy.⁶²

Attention in tertiary economies is free floating and light. It moves along intensive distribution maps that are folded upon themselves in four dimensions. It is not crystallized and hierarchical although hierarchies are folded inside it. Attention is no longer captured but is rather a relational condition of information flowing through a place of confluent and related information at a particular moment in what is referred to as a hub, like a cloverleaf that connects many intersecting interstate highways. Attention no longer concerns a vanishing point in the Albertian perspective of a Renaissance painting. And it is no longer a place where the contingencies of a picture come together in what has been referred to as a 'punctum.' Attention arises in the flow of repeatedly distributed information that produces ever more defined traces out of the myriad of sensorial possibilities. As a result of the web logics of new labor, attention is multiplicitous, singular, unstable, and rhizomatic in the information economy.

The skateboard craze was a cultural phenomena that created selective pressures manifested as the desire to own and wear the shoe coupled with a broad array of ever increasing marginalities. The power of the brand and the attention it generated toward the shoe resulted from the size and shape of the map of that network, the brand equity/marginality complex, and the infinite array of relations contained therein. The power of the brand was not a result of the overriding administration of it from without, but from the relations that were generated inside it by the microconditions of its own substructure. The distribution of the sensible in the information society is the metacondition of these competing local brand equities, their competition for attention, and their relationship to the broader molar attention economy with which they interact. Each molar economy allows for different dispositions of attention to express themselves. The context is not equipotential, and some brands operate more effectively in certain environments than in others. The same might be said for political climates. Abortion rights advocates are able to voice their cause more effectively on FOX News or during conservative administrations. As such the nation for better or worse pays more attention. Of course, money and expenditure trump context; such is the case of political advertisements during local and national campaigns.

We might conjecture that a theory of marginalities possibly provides a new model for how neural networks in the brain gain traction. It potentially provides

a clue for how art, by creating and linking unforeseen relations between implicit and isolated marginalities to brand equity, perhaps mutates the reception of that entity thus altering its meaning. It might, by creating contrasting and altered meanings, provide the conditions of resistance that are adversarial to the power of institutions that administer the neuroplasticity of the brain and want to contain meaning. After the initial effulgent explosion of neural elements in the early days of postnatal development and the consequent sculpting and subtraction as a result of epigenesis that is the hallmark of the theory of neural Darwinsim, the consequent complexification of neural elements, networks, and maps might in fact be the result of a process similar to what we discovered operating in the cultural milieu. Just as we saw how marginalities migrated from the periphery of significance, far away from their brand equity, toward their central axis of denotation where they became important influences, neural networks might be tethered together through organized and stochastic relations to other neural networks and maps that they originally had no relation to at all. In the case of Vans, the accidental coincidence of skateboard culture led to a clothing and media empire in which the brand became extended to encompass shoes, shirts, DVDs, sports contests, and concerts. A recent limited edition run features vintage album art from such music innovators as the Sex Pistols. This is interesting in two regards. It matches two culture-bending iconoclasts in one brand. Hearing about this venture, seeing the shoes in the store, seeing celebrities wearing these shoes, and seeing them on posters corroborate their effect in cultural networks. Each time one of these alternative representations is perceived it causes reverberations in cultural and neural memory circuits directly and indirectly. Because of the phenomena of 'overlapping networks,' stimulation in one system leads to stimulation in another, the degree depending on the intensity of the stimulation and the closeness to the original pattern. Obviously, linkages to the Sex Pistols will cause intense attention and stimulation. Neural marginalities might also exist first as codes for culturally contrived elements that populate any intensive circuitry of meaning. As the brain codes for those conditions of the man-made milieu, so to would its changing patterns of excitation and inhibition mimic those occurring therein. Neural marginalities could be explicit or implicit. As the neural architecture becomes more and more complicated and complex, those neural elements that may not have played a role in a particular response repertoire, because they existed far outside the main route of the excitation pattern, may over time become part of the organizational complex and thus influence the overall energy distribution. This could have implications for later sculpting. We must remember that the degree of neural plasticity trans-cerebrally is not equal with primary cortices reaching their maximum plasticity early on while more associational cortices mature much later with the frontal cortex maintaining much plasticity until the late teens.

Perhaps a theory of marginality might be more operational later on. When understanding the brain as organized according to the intensive logics of the information society characterized by

new labor, one that is not hierarchically and arboreally arranged but rather chaotic and rhizomatic, then this theory becomes even more tenacious. We will discuss this more later but for now we can say the network configurations of the real/imaginary/virtual interface in the world today, produce similar arrangements of neural network configurations in the brain-mind. Intensive networks create an intensive brain; perhaps not in the stable configurations of its material elements, its dendritic spines, axons, and synapses, but in the restructuring of its dynamic potentialities. The conditions of cultural intensity integrate dynamic flows according to folded rhizomatic distributions of attention that these branded environments are instrumental in producing. Already existing oscillatory potentials, important for the production of the dynamic environment of the brain and its default state, each with their own character to transmit different kinds and bits of information internally, are piggybacked by the dynamic gestalts and rhythms at play in the cultural environment and with which branded equities are imbricated. It is these dynamic potentialities, as they are phase locked in ensembles synchronously, that create intense branded networks and are the focus of institutional administration. They are highly engineered with the brain's capabilities in mind and distributed over and over again in culture. It is this intensity and repetition that creates their attentive power and makes them a powerful tool in the hands of the state apparatus. These couple to networks in the brain-mind that first pay attention to them and then memorize them as a result of registering them preferentially, in the end having effects on the overall development of the architecture of the brain-mind. In the competition for neural space during critical periods of development, neural networks selected by these branded environments will out-compete those that are not selected, which either wither away or are incorporated in other assemblages where they can continue to play a role and be stimulated. Intensive networks can transmit more information than hierarchical assemblages and circuits because they are degenerative. As such they are more powerful sculptors of neuroplasticity.

Branded networks work directly and indirectly on the child's mind, which is especially malleable. Directly through sophisticated marketing techniques in which advertisements specifically engineered to target the child's mind are transmitted cross-culturally during Saturday morning cartoons as well as in the store windows of shopping malls and tethered to McDonald's Family Pack Cartons. (Remember that cultural sculpting has not yet taken place so that cross-culturally the differences are not as yet formed. For instance, black and white children play together without incidence until they are taught racism.) These specially designed advertisements are analogous to 'babyese,' in which parents prolong and exaggerate certain key phonetic distinctions coupled to the child's immature brain. The same holds true of childhood advertisements. Their bright colors, fantastic talking cartoon animals, and 'babyese' wording, which the child already knows from Saturday morning cartoon programs, create an indistinguishable set of signifiers in a

child who is as yet unable to distinguish him- or herself from others. This is where the society of control really begins in the inside/outside of the child's mind.

Still, there is another way that the conditions of capitalism are transmitted to the child – indirectly through the parents. Neuropower focuses on the planning and attention capacities of the frontal lobe. Adults assist children in the routines of their daily life that are beyond the capabilities of their immature brain. At first, through such activities as pointing, adults are indispensable in the early process of learning. Later, when these activities involve planned action, for instance, parents extend their children's abilities by acting and operating as agents of their frontal lobe.⁶³ This coupling of adult and child is a necessary condition of the early neural sculpting of neuropower. The parent functions at the service of institutional understanding, acting as its agent of neuromodulation. Nevertheless, perhaps in the future with more sophisticated computer interfaces and software agents, the parent won't necessarily serve as the surrogate forebrain. Andy Clark's *Mindware* suggests as much.

Imagine that you begin using the web at age 4. Dedicated software agents track and adapt to your emerging interests and random explorations. They then help direct your attention to new ideas, web pages and products. Over the next 70 years you and your software agents are locked in a complex dance of coevolutionary change and learning, each influencing and being influenced by, the other. In such a case, in a very real sense, the software entities look less like part of your problem-solving environment than part of you. The intelligent system that now confronts the wider world is biological-you-plus-the-software-agents. These external bundles of code are contributing rather like the various subpersonal cognitive functions active in your brain.⁶⁴

Time Never Won or Never Lost A third tenet of the theory of neuronal group selection is called reentry. Reentry is defined as the recurrent parallel exchange of neural signals between neuronal groups or maps taking place at many different levels of brain organization: locally within populations of neurons, within a single brain area, and across brain areas. The importance of reentry as a mechanism of neural integration has been realized. The anatomically distinct areas of the brain, the primary sensory areas like the visual cortex as well as the more modern associative cortices consist of distinct areas that code for different information.⁶⁵ For instance, the research of Semir Zeki and others has shown that the visual cortex is made up of functionally segregated areas that code for specific attributes like the form and color of a visual object and that they are linked by what are referred to as cortico-cortical and thalamo-cortical connections, because they connect regions of the visual cortex together and the thalamus, a sub-cortical structure, to the cortex.

In some ways each of these areas sample and produce maps of the world based on their specific

63 Wexler, *Brain and Culture*, 108-9.

64 Andy Clark, *Mindware* (Oxford: Oxford University Press, 2001), 115.

65 Tononi, 'Reentry and Cortical Integration,' 129.

biased apparatus. For instance, area V₄ of the occipital cortex samples the world according to color, that is its cells are wavelength selective, while those of V₅ are motion selective.⁶⁶ But we don't see the world as disjointed patterns of color and motion but rather as a seamless whole. Why is this? It is through reentry that these disparate regions are linked together in register producing an integrated picture/image. Referred to as binding, these different registers are bound together. We also know through experience that several such sensory areas can work together. When eating an apple you are using taste, smell, and vision as well as coordinating various tactile and motor repertoires, as the apple is adjusted to bring it in register with the mouth and tongue. Reentry is one way that these maps are integrated together. Superimposed on these primary areas are meta-representations coded for in association areas and linked to corresponding areas of other parts of the brain such as the frontal lobe, hippocampus, cingulate gyrus, and so on. Eating an apple is a planned event that rehearses other already registered memories of former interactions with the apple and the satiation of hunger, and so forth and so on. Reentry also plays a role in binding these regions as global mappings, as it refers to the whole brain activated at the same time. "This suggests a close relationship between consciousness and binding. It seems that only those results of the numerous computational processes that have been bound successfully will enter consciousness simultaneously. This notion also establishes a close link between consciousness, short-term memory and attention."⁶⁷

An understanding of binding may be a key to phenomenological immersion – the feeling that when you are reading a book, watching a movie, or actively engaged in a virtual reality program, that you are actually taking part in the action of the movie, book, or virtual reality program. Binding is not a process only occurring in the brain but in the world of objects, their relationships, and, today in the abstract real relations that now capture our attention in the informational economy. Binding in the brain is not a constantly elaborated phenomenon, but one that is immanent. Neoliberal cognitive capitalism, through the elaboration of a set of epistemological trajectories, creates fields of bound signifiers in the form of brand alliances that call out to the brain-mind of its subjects producing, as we shall see shortly, synchronous discharges in the neurobiological architectures that are its correlates.

Architectures tuned to specific dispositions are sculpted upon this neuroplasticity. A social group or culture can share these dispositions. This process may result in the formation of a people who share similar perceptual and cognitive ideas about the world. Thus, intra-cerebral binding that occurs underneath the skull, within the boundaries of local maps, and those occurring throughout the brain as global maps can be 'extended' beyond the brain/skull to engage as inter-cerebral binding in the social context. Thomas Metzinger, alluding to the work of Antonio Damasio, notes:

We mentally represent ourselves as representational systems, in phenomenological real-time. This ability turned us into thinkers of thoughts and readers of minds, and it allowed biological evolution to explode into cultural evolution. The Ego is an extremely useful instrument—one that has helped us understand one another through empathy and mind reading. Finally, by allowing us to externalize our minds through cooperation and culture, the Ego, has enabled us to form complex societies.⁶⁸

The epistemological apparatuses embedded in culture facilitate these conditions of mind reading and other-mind knowledge. It is to these apparatuses that the contemporary sovereign directs its attention in the production of a unified people. As we will see later on, art and architecture can facilitate this process as well as subvert it.

Brainweb: Hierarchical vs. Distributed Networks On the other hand, the mixing of times in the media, within the same channel of communication and at the choice of the viewer/inter actor, creates a temporal collage, where not only genres are mixed, but their timing becomes synchronous in a flat horizon, with no beginning, no end, no sequence. The timelessness of multimedia's hypertext is a decisive feature of our culture, shaping the minds and memories of children educated in the new cultural context.⁶⁹

Neural assemblies provide a conceptual framework for the integration of distributed neural activity. For our purposes, neural assemblies will be defined as distributed local networks of neurons transiently linked by reciprocal dynamic connections. A useful analogy is found in World Wide Web systems such as BitTorrent™, in which geographically distant computers briefly transfer data to each other within transient assemblies that are formed on a static network of hardwired connections.⁷⁰

There are two basic theories to the solution to the problem of integration in the brain. The first model is based on a hierarchical model in which there is a progressive increase in the specificity of the neurons as you move from the peripheral to the more central areas. Diverse processing streams achieve confluence at higher hierarchical layers finally reaching what is referred to as a master area. Such a master area has 'not' been found, although feed-forward convergence is an important anatomical feature of the cortex. An alternate model, which has broad implications for our understanding of the brain as a multiplicity, is the reentrant model of integration. The two main tenets of this theory are that neurons work together in 'neuronal groups' or local collectives and that they correlate their activity through reentry.⁷¹ Importantly, reentry is not feedback, because unlike feedback, which occurs along a single fixed loop made up of recursive connections that contain

66 Semir Zeki, ed., *A Vision of the Brain* (New York: Blackwell, 1993), 126.

67 Thomas Metzinger, *The Ego Tunnel* (New York: Basic Books, 2009), 67.

68 Ibid.

69 Manuel Castells, *The Rise of the Network Society* (New York: Blackwell, 2000), 492.

70 Francisco Varela et al., 'The Brainweb: Phase Synchronization and Large-Scale Integration,' *Neuroscience* 2 (April, 2001): 229-39.

71 Gerald M. Edelman and Giulio Tononi, *Consciousness, How Matter Becomes Imagination* (London: Penguin Books, 2000), 85.

previous instructions for control and correction like a thermostat, it occurs across multiple parallel pathways, which are not pre-specified. Like feedback, reentry can occur locally and globally; however, reentry is ongoing, correlating signals from many areas into synchronized events. Reentry is like an orchestra minus a conductor. The 26-piece orchestra Orpheus performs without a conductor without difficulty and with surprising results.

Yet, despite these mercurial qualities, Orpheus has earned a reputation for performances that are not only enthusiastic and fresh, but which are often as well shaped and finely polished as many a more firmly established, conducted orchestra. On the surface, it would seem that fashioning orchestral performances without the guiding hand of a conductor should present both technical and interpretive problems, particularly in the post-Classic literature. But the success Orpheus has enjoyed raises several questions: Is a conductor really necessary? Or, conversely, can a musical interpretation be established by committee?⁷²

Reentry is linked to the theory of neuronal group selection as it tethers and stimulates recurring and grouped disparate maps together according to repeated and regular internal or externalized stimulation. The more times that map is stimulated, the greater the efficiency of the flow of energy through that system. Many different combinations of neurons and neural groups can produce a similar response. This property is called degeneracy and describes the way that 'many different patterns of neural architecture are functionally equivalent.'⁷³ Degenerative networks in the brain describe functional equivalence despite structural difference, which means that a form of behavior can be elicited by a varied number of network configurations. It can protect the individual from traumatic insult in some situations, since alternative networks in a degenerative assemblage can be utilized to perform the same action using a different pathway. Nevertheless, it also means that one network can play different roles. In other words, neural networks can be isofunctional in some contexts and non-isofunctional in others. Complex environments are more degenerate. They have the possibility to create more kinds of patterns and configurations and, therefore, sculpt more degenerative brains, which can call on many more combinations of different and flexible networks for a given cognitive task. Degeneracy is an important component of the theory of marginalities, because it provides a mechanism through which formerly non-linked networks might join ongoing ones in schemas of participation. This might in fact create the potential for more creative minds.

Analogous to the conditions discussed earlier between brand equity and externality, the efficiency of a map is related not only to the strength of its relevance to the inciting stimulus, the original conditions of its formation and repetitive stimulation, but also to its potential to indirectly participate, along with its

fellow neuronal, synaptic, and dendritic components, in other maps. As a result of these multiple conditions of stimulation and firing, it develops neural efficiencies that give it an advantage over those not so stimulated in the competition for neural space in the brains anatomy during experiential selection. A neural-synaptic-dendritic selective potential depends not only on how it was initially formed but also by the 'alliances' it was able to form with other networks during the course of the history of its own plasticity. (Plasticity seen here as ontogenic.) 'In the visual system model ... entire cortical states and all of the cooperative interactions that lead to their establishment can be selected during reinforcement. This results in synaptic changes in many different pathways, including some whose involvement in the task at hand may not be immediately obvious.'⁷⁴

Just as in economic systems, analogous but different network dynamics are operational in neural systems. When electrical discharges in different regions occur together and in register, one says that they are phase locked and synchronous. Synchrony and neural integration are properties of localized brain regions like the visual cortex, resulting in local binding, or when occurring throughout the brain disparate areas discharge together in large-scale synchronizations in global mappings.⁷⁵

A global mapping is thus a dynamic structure containing multiple reentrant local maps (both motor and sensory) that interact with nonmapped regions, such as those of the brain stem, basal ganglia, hippocampus, and parts of the cerebellum ... Within a global mapping long-term changes in synaptic strengths tend to favor the mutual reentrant activity of those groups whose activity has been correlated across different maps during past behavior.⁷⁶

Global mappings are intensive. Metastable coordination dynamics, which express the relation of multiple local tendencies nested in a global cortical condition, more accurately describes the temporal conditions of neural processing than older theories of simple linear phase dynamics, which only defined the relations of local areas to each other. Important for our discussion here is that 'metastability, by reducing the strong hierarchical coupling between the parts of a complex system while allowing them to retain their individuality, leads to a looser, more secure, more flexible form of functioning that promotes the creation of information.'⁷⁷ As opposed to other theories of phase dynamics such as multistable and monostable regimes, metastable coordination dynamics elucidate William James' famous description of the stream of consciousness as a series of perchings, or integrative tendencies, and flights, or segregative tendencies. Put another way, the former is important in the summoning and creating of thoughts while the latter allows one to be released from a thought in order to smoothly move on to another.⁷⁸ But the word perching implies that

72 Allan Kozinn, 'An Orchestra that needs no Conductor,' **New York Times**, 19 May 1982, Arts Section.

73 Gerald M. Edelman and Joseph A. Gally, 'Degeneracy and complexity in biological systems,' **PNAS** 24 (November 2001): 13763-8.

74 Giulio Tononi, 'Reentry and Cortical Integration,' 144.

75 Varela et al., 'The Brainweb: Phase Synchronization and Large-Scale Integration.'

76 Edelman and Gally, 'Degeneracy and complexity,' 95.

77 J.A. Scott Kelso, 'An Essay on Understanding the Mind,' **Ecological Psychology** 20/2 (2008): 194.

78 Ibid., 200.

the bird, and by analogy the brain and mind, is never ‘really’ resting or committed to a set of thoughts, perceptions, or feelings, but is always simultaneously stationary and ready to move on without committing to either. Consciousness, by this definition, is fluid rather than phase locked and as such more accurately accounts for the seamlessness and continuity of the world.

The experiential world is a mélange of different temporal possibilities in which local activities take place in broader dynamic systems. It is not simply a stable system of dialectic contrasts, but instead a multitudinous flow of creative contingencies in transition as a few excerpts from the chapter ‘Seen from the Window’ of Henri Lefebvre’s book *Rhythmanalysis* will illustrate.

Towards the right, below, a traffic light. On red, cars at a standstill, the pedestrians cross, feeble murmurings, footsteps, confused voices. One does not chatter while crossing a dangerous junction under the threat of wild cats and elephants ready to charge forward, taxis, buses, lorries, various cars. Hence the relative silence in this crowd ... Therefore the people produce completely different noises when the cars stop: feet and words. From right to left and back again. And on the pavements along the perpendicular street. At the green light, steps and words stop. A second silence and then it’s the rush, the starting up of tens of cars, the rhythms of the old bangers speeding up as quickly as possible... The harmony between what one sees and what one hears (from the window) is remarkable. Strict concordance ... Two-minute intervals. Amidst the fury of the cars, the pedestrians cluster together, a clot here, a lump over there; grey dominates, with multicoloured flecks, and these heaps break apart for the race ahead. Hard rhythms: alternations of silence and outburst, time both broken and accentuated, striking he who takes to listening from his window, which astonishes him more than the disparate movements of the crowds.⁷⁹

Neither is time linear, going from one point to another as in a differential equation, but rather it exists simultaneously and diachronically in multiple planes that intersect in an infinite array of possibilities. It is a topologic surface containing infinite combinations of folded time ready to be discovered.

Other, less lively, slower rhythms superimpose themselves on this inexorable rhythm ... the flows and conglomerations succeed one another: they get fatter or thinner but always agglomerate at the corners in order subsequently to clear a path, tangle and disentangle themselves amongst the cars ... The linear, which is to say, in short, succession, consists of journeys to and fro: it combines with the cyclical the movements of long intervals. The cyclical is social organization manifesting itself.⁸⁰

by these evolving temporal conditions. The term ‘evolving’ is key here. As we have already suggested the appreciation of time is ontogenic. We use only a small portion of the possible conditions of time. Our sense of time is restricted, on the one hand, by our own anatomies, what Edelman has called our values, and, on the other hand, by the machines we build to use it and the philosophies we have invented to contemplate it. Artistic experiments like futurism and cubism, in the early part of the twentieth century, and minimalism, kinetic art, pop art and intermedia performance-based art, later on, opened up and made concrete these other temporalities. Art has emancipated time. A metastable paradigm of brain rhythms allows for this complex developmental nature of the appreciation of time. Our understanding and use of time can open up beyond its present day usage because of the malleability of the dynamic conditions of neural functioning, which is able to respond to its novel elaborate constancies, for instance, in built space, and to form meaning from its inconsistencies as well. Let us here retreat to some concrete examples.

Art-Power At the beginning of this essay, I mentioned that like biopower, neuropower was instituted according to two simultaneous processes. Much of this essay concerned the institutional administration of the neuroplastic potential. This normalization of difference is the first process. Cultural creatives, in all their many forms as visual artists, poets, dancers, musicians, cinematographers, and so on, have the ability to play a role in the production of resistant regimes of visibility, for one, which can compete for the brain-mind’s attention leading to reactions and effects in the molding of the neuroplastic potential. The power of art is to create or recognize marginalities in cultural milieus and bring them forth, creating disparate and competitive networks in cultural potentials that can affect the brain’s neural potential. Artists, in the most utopian sense of the word, using their own materials, practices, histories, critiques, spaces, and apparatuses create alternative distributions of sensibility or redistributions of sensibility that call out to different populations of neurons and neural maps, potentially producing different neurobiological architectures. Some examples are necessary to make this tangible.

Think here for a moment about the relationship between Mozart’s *Sonata for Two Pianos in D Major* made famous as producing the ‘Mozart effect’ and that of noise, free music or improvisation. In 1993, Gordon Shaw and a graduate student, Frances Rausher, showed that listening to the first ten minutes of this composition produced an increased ability for spatial temporal reasoning.⁸¹ He later states as a conclusion that the ‘symmetry operations that we are born with and that are enhanced through experience form the basis of higher brain function.’⁸² Finally, ‘perhaps the cortex’s response to music is the Rosetta Stone for the code or internal language of higher brain function.’⁸³ Even so, Shaw and company are forgetting an important consideration. We don’t

79 Henri Lefebvre, *Rhythmanalysis*, translated by Gerald Moore and Stuart Elden (New York: Continuum Press, 2004), 28-9.

80 Ibid., 30.

81 F.H. Raucher, G.L. Shaw and K.N. Ky, ‘Music and Spatial Task Performance,’ *Nature* 365 (1993): 611.

82 Gordon L. Shaw, *Keeping Mozart in Mind* (San Diego: Elsevier Academic Press, 2000), xxii.

83 Ibid., 108.

know how first audiences responded to this music. Maybe instead of music it initially sounded like noise. Perhaps the first audiences who listened to this work by Mozart responded in a similar way as audience responding to Beethoven's Fifth Symphony for the first time.

As chronicled in Nikolas Slonimsky's perversely wonderful *Lexicon of Musical Invective*, even the most comfortable and cherished staples of our current repertoire, including Brahms, Chopin, Debussy and Tchaikovsky, had been condemned by contemporary esthetes in the very same way. Even Beethoven's Fifth Symphony, now the most popular classical work of all, was damned as 'odious meowing' – and not music – decades after its premiere.⁸⁴

Like modernist observers experiencing the postmodern space of the Bonaventure Hotel or the scandalous reception of Marcel Duchamp's *Fountain* (1917) in the exhibition Society of Independent Artists of the same year, earlier audiences listening to Beethoven's Fifth Symphony for the first time had not developed the perceptual habits to understand and integrate its rhythms and melodies.

These works of art were sublime and beyond the sensing capabilities of their neurobiologic apparatuses.⁸⁵ But what does this have to say about noise or free music or improvisation? Rather than enlisting circuits already on hand or parasitizing already existing cerebral rhythms, noise and its bedfellows, improvisation and free music, operate, in fact, in an attempt to delink themselves from these already present patterns, creating instead resistances and emancipatory gestures. Anthony Isles, quoting Edwin Prevost, focuses on the crucial condition of improvisation and free music with particular attention to leading jazz musicians such as Ornette Coleman. Examining how they come into being and how they are made, he notes that instead of practicing a written score and matching it, 'musicians train, developing their musical capacities through a process of "de-skilling" and "re-skilling." What these musicians are developing ... (is) the ability and attention necessary to be able to respond to their co-players, to a situation and to an evolving musical time/space.'⁸⁶ Each instrument plays its own score adapted to its own proclivities and idiosyncrasies. This idea of learning to pay attention to a set of gestures occurring in time, an anatomy of signs in a confined social space in which nothing is sure, produces ruptures and asynchronies. How different is the following quote to what we heard above from Gordon L. Shaw, 'And this musical space relates to another musical time, freed from the score and freed from repetition, by neither having a set time nor tempo allotted, improvised music breaks with linear cumulative time and narrative historicization.'⁸⁷ One might then ask is the question: How does noise and improvisation become sensible? Referring to Csaba Toth in the same collection of texts, he refers to noise 'as the other side of music and everything outside the discipline, literally encompasses what hasn't been discovered as music yet.'⁸⁸

What was it like for an audience to first hear a John Cage performance? 4'33" (pronounced 'Four minutes, thirty-three seconds,' or, as the composer himself referred to it, 'Four, thirty-three') is a three-movement composition by the American avant-garde composer. It was composed in 1952 for any instrument (or combination of instruments), and the score instructs the performer not to play the instrument during the entire duration of the piece throughout the three movements (the first being thirty seconds, the second being two minutes and twenty-three seconds, and the third being one minute and forty seconds). For those not familiar with this work a description of its first performance by pianist David Tudor will lay the framework. First setting himself at the piano he opened the keyboard lid and sat silently for thirty seconds. He then closed the lid and the quickly reopened it. There he sat motionless for a full two minutes and twenty-three seconds. He then closed and opened the lid one more time, sitting silently for one minute and forty seconds. Finally he closed the lid a last time and walked off the stage.

Although commonly perceived as 'four minutes thirty-three seconds of silence,' the piece actually consists of the sounds of the environment that the listeners hear while it is performed. Over the years, 4'33" became Cage's most famous and most controversial composition.⁸⁹ The piece pushes the listeners outside the presumed concert and the usual regime of attention, to listen instead to the pure ambient sounds outside marginalities that linger on the periphery like a collective unconscious: a pencil dropping, the breathing and coughing of others, one's own heartbeat as a result of one's own intimidation. These personal sounds become the musical score. More importantly, this work follows in Cage's overall investigation of time. This work, by stripping the music of its musical score and laying bare its temporal underbelly, conflates time. Time is stretched and without its musical bearing the audiences appreciation of time is disrupted.

Moreover, for anyone going to a concert by John Cage or listening to hardcore noise in a venue like Staalplaat in Berlin's Neukölln district, there is a learning curve and, as such, much disagreement in the general population as to its merit. What at first sounds dissonant and totally non-sensical becomes understandable. According to Gyorgy Buzsáki, 'what makes music fundamentally different from (white) noise for the observer is that music has temporal patterns that are tuned to the brain's ability to detect them because it is another brain that generates these patterns.'⁹⁰ But noise as well as free music and improvisation are not for everyone, even though another human brain has made it. Do these changing musical tastes imply a more subtle and flexible dynamic organization, one that, for instance, coordination dynamics and a metastable theory of neural processing, when superimposed upon a subpopulation with an unabated neural plasticity, might make possible? Are these differences in the degree of neural plastic potential analogous to the differences we find in inter-individual 'cognitive reserve' in which people with similar degrees of severity of neurodegenerative disease manifest the degree of dementia with considerable variability? I have already discussed the considerable variability between individuals both in their anatomy and brain wave

84 <http://www.classicalnotes.net/columns/silence.html>.

85 I refer to this as the neurobiologic sublime.

86 Anthony Isles, 'Introduction: Noise and Capitalism,' *Kritika* 02 (2009): 14.

87 Ibid.

88 Ibid.

89 <http://en.wikipedia.org/wiki/4'33>.

90 Buzsáki, *Rhythms of the Brain*.

patterns both in the primary and secondary repertoires. The appreciation of noise and improvisation was initially for a select and sampled population, one that is continuing to enlarge and contaminate the tastes of a larger more general population becoming more and more 'the' preferred form of music now listened to. Many individuals pay money to go see bands play, visit venues where they can be found, and buy and exchange CDs or MP3 audio by their favorite artists even though it is hard to hear any noise music on popular mainstream radio or MTV. Certain artists like John Wiese in his recent album *Circle Snare* are breaking this pattern and adapting noise and mixing it with punk to engage mainstream audiences. Perhaps noise, more than simply a form of resistant experience, coheres to a population of brains whose perceptual habits have been formed according to a different perceptual logic, one based on an immanent field of dissonant patterns that linger in the pluripotential cultural field as disjointed externalities orbiting small foci of meaning but have yet to join the contemporary cultural zeitgeist. Just as the brain uses miniscule portions of its temporal potential, culture's underutilized potentiality is the cause of its constant shifting and mutability.

Perhaps those who are the first to appreciate noise music are a group of individuals who prefer dissonant and distressed aesthetics, like those marching to a different drummer, who prefer to cross a grassy knoll diagonally rather than follow the man-made stone pathway. Or perhaps our culture has itself tuned its pattern recognition toward the images and sounds of interactive medias, photographic-video hybrid apparatuses that create typologies of topologies of disconnected patterns produced by images of incomplete bodies appropriated by the fashion industry to capture a younger generation's attention as they are assembled as billboards framing public spaces. Patterns that are implicitly activated in the slow motion, uncoordinated falling of a recently checked hockey player, replayed over and over again on cable TV screens or monitors at sport bars or in the particulate diffusion of spectacular light seen in the explosion of a building videotaped and then edited in After Effects CS-5 as action, stop action QuickTime movie downloaded on YouTube or even played in reverse! On the other hand, home video programs on laptops like Final Cut Pro and iMovie allow everyone to be a filmmaker. Everyone is an artist, as the technologies have made once difficult skills easier and widely available. Most radical filmmaking techniques and gestures, like the montaged effects found in such movies as Dziga Vertov's *Kino-Eye* (1924), are commonplace motifs of MTV-type music videos made by amateurs found on YouTube as well as being incorporated into more corporate structures like the special effects and fast-feed-forward editing found on ESPN or the foregrounding of trucage and special effects in movies like *Time Code* (2000) wherein the screen is divided in four to depict different stories unfolding simultaneously.

Special effects have overwhelmed other aspects of film and TV, such as plot and character, driving viewers into movie theaters as the tremendous success of *Avatar* (2009) and *Inception* (2010) would suggest. These methodologies are

directed toward a new generation of viewers who have incorporated the resulting new temporalities of the fast cut and reverse motion of the moving image into their cognitive regimes. Such cognitive regimes constitute what Pierre Bordieu refers to as *habitus*: a unique synthesis of one's genetic endowment, circumstances of birth and upbringing, and subjective experience of the social and cultural environment in which one has grown up.⁹¹ Are these then the new dynamic cultural signifiers determined by Hollywood, the attention attractors for a new generation? Perhaps it is an anesthetics of decay and destabilization that is now drifting through a population of psychic vampires hungry for new forms of sensuality and entertainment.

Perception in Action In the past 50 years, classical theories of experimental psychology, cognitive psychology, cognitive science and cognitive neuroscience, which viewed perception as a passive stimulus driven device that reacts to sensory information and copies pre-specific information to create meaning, has given way to one that is more active and adaptive. (Many, like J.J. Gibson, never accepted this idea.) The earlier model depended on the hierarchical system that organized space and time extensively and was believed to deliver and produce an internal world model that was a representation of a stable and context invariant external environment. As we saw above, perception is built from tiny bits that are assembled into more and more complex entities as one moves up the hierarchy.

A new model called situatedness has been applied to a much more adaptive and action oriented system.⁹² Situatedness assumes that cognition is not built on context invariant models, but instead must adapt itself to the continually changing environment – that of the moving subject imposing himself or herself on a nervous system in action. Cognitive functions are now being appreciated more in terms of top-down strategies rather than bottom-up strategies of classic neuroscience, although bottom-up strategies are still understood as playing an important role. This top-down strategy has shifted the concept of perception away from reflex driven systems of reactivity to one that is expectation driven, derived from previous experience. As Wolf Singer understands it:

These indicated that synchronized oscillatory activity is not only stimulus driven but does occur across widely distributed networks of interconnected cortical areas in anticipation of an attention demanding discrimination task. This observation led to the hypothesis that self-generated oscillatory activity in the beta and gamma frequency range could be a correlate of an executive subsystems required for the execution of the anticipated task.⁹³

This new shift toward expectation has implications for models of neural systems in the information age because perception is now 'dominated' by intrinsic factors such as attention, memory, and expectation.

91 Jean-Pierre Changeux, *The Physiology of Truth* (Cambridge, MA: Harvard University Press, 2004), 208.

92 Andreas K. Engel et al., 'Dynamic Predictions: Oscillations and Synchrony in Top-Down Processing,' *Nature Reviews Neuroscience* 2 (October, 2001): 704.

93 Wolf Singer, 'Binding by Synchrony,' *Scholarpedia* 2 (2007). See also: http://www.scholarpedia.org/article/binding_by_synchrony.

The data reviewed indicate that top-down processing is in many instances, associated with modulation of the temporal structure of both ongoing and stimulus evoked activity. In a wider sense, top-down influences can be defined as intrinsic sources of contextual modulation of neural processing. Obviously, top-down factors include the activity of systems involved in goal definition, action planning, working memory and selective attention.⁹⁴

These top-down influences are the very substrates that neuropower is addressing.

Phaticity, its field of attention-grabbing images and contingent underlying means of production, are no longer 'only' focused on bottom-up processing but on top-down processing as well. Temporal binding operates on these top-down systems, since correlated discharges are much more effective in producing saliency than non-correlated discharges. In fact, repeated synchronization, the binding that results from top-down influences, might have a similar effect on neural distributions as those induced by repeatedly stimulated and synchronized bottom-up stimuli.

A parsimonious explanation would suggest this: they might sculpt neurons according to their repetitive logics. Importantly, these top-down functionally integrated networks synchronize spatially remote cortical areas that are distributed throughout the cortex and subcortical structures. In other words, the frontal lobes do not receive input from the outside world directly but only indirectly through inputs from other parts of the brain that do in fact interact with it directly.

Therefore, they can influence and modulate incoming data from widely diffused bottom-up streams determining, for one, saliency. Saliency is important for memory and future attention and is related to phaticity. Just as we now experience fields of phaticity in which multiple engineered images and iconographies compete for our attention, we also have maps of saliency in which data packaged together by multiple regions of the brain put asterisks on incoming information bundling it for increased recognition or access to the global workspace. With time salient bundles become linked together in working memory. The coupling of phaticity to saliency is of key importance to the administration of power in tertiary attentional economies. As a result of this coupling phaticity has a direct link to salient concoctions in working memory. As a result of multiple synchronizations between the two, the phatic image can have direct access to the future prognosticating capabilities of working memory and can incite it on its own. Phatic fields form their own templates through the power of the emergence of both explicit and implicit cooperative linkages. In contemporary market driven mass consumer society these templates call out to the brain and mind and form the new epistemological templates. When these templates are organized in time according to the logics of mental pathways they become epistemological trajectories. We now

begin to fully understand the importance of parents acting as institutional agents in the early instruction of their children whose forebrains have not yet fully developed. The ability to prognosticate also must be learned. The signs and symptoms imbedded in designed space that are necessary for correct future decisions, the epistemological templates and trajectories just mentioned, must be first paid attention to singularly and then as groups after which they can be memorized on their way to forming cognitive habits. This has implications for the development of the neural circuitry that must in future occasions operate on its own to make decisions when the parents are no longer available. The specter of the state has therefore left an impression upon the gyri and sulci of the brain before the child has had a chance to make decisions on its own.

Neuropower is directed toward these top-down influences and can therefore trump noopolitics. As I have shown above, Neuropower, as an administrative technique, today depends on distributed networks that make up our global informational economy. It is that distributed system of cultural intensive logics that has been coupled to the proclivities of the brain. It is not that extensivity is gone and has been replaced by intensive culture or non-hierarchical processing has won the day. They exist side by side. What I am implying is that as our cultural disposition slipped toward a more intensive one, those apparatuses in the brain best suited for its interpretation were frequently enlisted. Such is the case with the information society of mass intellectuality where abstract knowledge and prognostication of future results has become more and more important. The forebrain, the brain center that forms our goal-directed habits, is contingent on connections it makes with areas all over the brain and therefore requires distributed networks to do its work. Neuropower and the institutional understanding for whom it does its bidding is directing its attention directly to areas of the frontal and prefrontal cortex as well as related and contiguous structures involved in decision making like the cingulate gyrus.⁹⁶

In a post-Fordist view of labor there is recognition of the centrality of (an ever increasing intellectualized) living labor within production. In today's large reconstructed company, a worker's labor increasingly involves, at various levels, an ability to choose among different alternatives, and, thus, he or she has a degree of responsibility regarding decision-making. Neuropower directs its attention at these new conditions of the worker's role and the neurobiological centers that direct attention and choice. It does not act alone. It is assembled upon the *dispositifs* that preceded it: those of the disciplinary society, the society of control and noo-politics.

A new field called consumer neuroscience or neural marketing has adapted the tools of neuro-

94 Engel et al., 'Dynamic Predictions,' 714.

95 Ibid.

96 Michael Platt and Camillo Padoa-Schioppa, 'Neuronal Representations of Value,' in **Neuroeconomics: Decision Making and the Brain**, eds. Paul W. Glimcher, Colin F. Camerer, Ernst Fehr and Russel A. Poldrack (London: Academic Press, 2009), 442. The following passage is particularly relevant: 'In this chapter, we review the current understanding of the neural processes that construct representations of biologically-relevant value, translate these valuation signals into behavioral decisions, and update representations of value upon which future decisions are made. These results are largely derived from studies where the activity of single neurons is recorded in monkeys making choices. Our review will focus in particular on three brain regions-the orbitofrontal cortex (OFC), the lateral intraparietal area (LIP), and the posterior cingulate cortex (CGp). Value representations differ substantially in these brain areas, suggesting that distinct representation of value may contribute to distinct decision processes.'

science to evaluate and determine the response of consumers to product choices.⁹⁷ Although in its infancy, research into consumer proclivities and its connection to the goals of neoliberal global capitalism in which the social, political, historical, psychological, and economic conditions that define culture are bound could have a radical effect on the nature of the multiplicity. Individual freedom could be at risk in a world in which powerful new tools like After Effects, 3-D modeling, surround sound and radical editing procedures produce incredibly intense photographic and cinematic visual images and feelings, now joined together with new powerful tools to probe the brain and see its reactions. Additionally, these tools link to what I am referring to as epistemological trajectories in such phenomena as built space. Epistemological trajectories are extended processes that originate in the decision making processes of the brain that find their analogies as immanent concretions of meaning in space and time embedded in the world milieu that call out to the brain and mind to direct its contemplations along congruent pathways. This argument extends the idea of endo-colonization whereby the military-industrial complex inverts its exteriorized desire machine from one in which conquest of other people is substituted for conquest of one's own.⁹⁸ Here, beyond the de-realization of the perceptual faculties in which time and space are simulated and duplicated with hypermedia, the cognitive apparatus links such a mutated real to a sculpted neurobiologic architecture by directly affecting neuroplasticity. This is one side of the story of the agency of neuropower. But just as the term biopower expresses both a threat to individuality and a possibility for new forms of resistance, so too does neuropower. "This may explain the common thread running through much of avant-garde practice as being a struggle toward changes in perception; a struggle of the "affective classes" who attempted and attempt, by practices aimed at "deautomatizing perception," to reformat the "instincts."⁹⁹

It is against this backdrop that art and architecture, cognizant of the conditions of this dynamic circumstance of neuropower, utilizing their own histories, procedures, technologies, and materials, sample other temporalities imbedded in the pluripotential condition of the time environment to produce an alternative experiential dynamic re-distribution of the sensible. I would like to make the claim that in a world in which police action is directed, as Rancière says, at the maintenance of the conditions of the distribution of the sensible, art and architecture in their disruption of this dynamic regime of sensibility create a state of emergency and in some cases a state of exception. How does this happen? As we have seen in the case of John Cage's work, noise music, and art in its most powerful sense decouples or uncouples the spatial and dynamic contingencies utilized by the institutional understanding. First, the potential for new temporal dynamic coupling through the agency of a theory like metastable coordination dynamics allows for changes, instituted for instance in visual culture, to gain tenacity in the internal dynamics of the brain of those who are able to first comprehend and

understand it. Coupling and uncoupling could be seen now as learning different configurations of perchings or changing the time the bird or brain mind sits in a particular mind space before alighting again.

There are subpopulations within the general population who have innate neurobiological dispositions, since the nervous system has a tremendous intra-species variability at birth, that make them more sensitive to certain naturally and culturally produced patterns. Secondly, through the process of destabilizing institutional spatial/temporal continuities, consistent harmonies may be made discordant and discordant sounds may appear melodious to those who are making them. They are singular productions that may constitute a local affect of like-minded participating singularities. As such either might produce new forms of attentive sensibility or fields of sensibility in the case of branding cooperatives to be tethered to existing institutionally provoked oscillatory patterns already operational in the brain. The struggle for artistic and architectural relevance and importance is all the time being subdued by institutional conditions that attempt to mollify the intensity of artistic expression through its incorporation into generalized market forces or pop culture without critique. In other words, institutional networks try to weaken art power and try to normalize it. We have already mentioned noise and improvisational bending of the aural landscape, and we might further say in relation to situationism that psychogeography, *détournement*, and the *dérive*, along with queer, feminist, and postcolonial sensibilities, among others, create different apparatuses and discursive fields whereby general intelligence accesses them.

Cultural capitalism allows for certain individuals to sample alternative distributions of sensibility and produce a common understanding in ways very different than those proscribed by the institutional understanding acting in accordance with the rule of law. This was explained above in terms of the new distressed and modified images found on the Internet, which have become a kind of emblem or icon for a new generation of Internet viewers. This is the essence of what I would like to refer to as the 'theory of epochal sculpting.' There are generational differences that, as a result of the conflicting and dissonant paradigms that exist between the one taught to them by their parents, which reflects the past cultural milieu, and the one generated by the contemporary cultural sphere with its implicit cultural trajectories resulting from new technologies, forms of music, neo-avant-garde visual displays, poetic voices, forms of social networking and psychological dispositions and so forth, provoke changing distributions of the sensible and insensible. (The insensible acts as an invisible force giving structure to the sensible.) Different distributions have different kinds of hubs and points of distribution. Extensive grid-like distributions call out to the body-mind and interact with the neural plasticity in a very different way than intensive topologic distributions. The object, real thingness, and the abstract real operate very differently in these two conditions. Why is this important? These very different spatial and temporal logics produce very different subpopulations of subjects. For instance, those that feel comfortable surfing

97 Carl Senior and Nick Lee, 'Editorial: A Manifesto for Neuromarketing Science,' *Journal of Consumer Behavior* 4-5 (July 2008): 263-71.

98 Paul Virilio, *Pure War*, translated by Mark Polizzotti (New York: Semiotext(e), 1998).

99 Howard Slater, 'Prisoners of the Earth Come Out: Notes Towards War at the Membrane', in 'Noise and Capitalism,' eds., Mattin Iles and Anthony Iles (Donosita: Arteleku Audiolab *Kritika* series, 2009).

the web and being tattooed and those that do not. These differences are generational. The signs and symbols of one subpopulation can be very different to that of the other, and as we have seen over and over again in this text, this can have implications for both neuro-modulation and neuro-mutation, such that the cognitive dispositions of one generation could be very different than the other. What is perceptible and understood by one group is considered sublime by another. Consider here how difficult it was for an older generation to develop the habits and skill to feel comfortable with computer technology. Fredric Jameson's work on postmodernism illuminates this in terms of contemporary architecture. He contends that the perception of a postmodern space or object will have to await the production of a new generation of perceivers who have learned the new habits of perception necessary to its understanding. For those whose perceptual habits were learned in a modernist environment such an understanding is impossible.¹⁰⁰

What are the political ramifications of this? If we are to believe Rancière, the role of government today is not so much to police the laws of a people, but instead to police and maintain the distribution of sensibility. Once maintained and stabilized, governing will fall into place. Neuropower extends this argument to include the regulation of the insensible abstract logics of a perception in motion occurring in the decision making processes in the brain that the new apparatuses of neoliberal cognitive capitalism like neuro-marketing can adjudicate. The police's role is to monitor changes in that distribution, and by preserving it, thereby sustain the status quo of the population. What then of the effects of a mutation of the built space carried out by conceptual artists of a new generation? Will a police system raised and neurobiologically cultivated by modernist spaces have the cognitive tools to monitor and survey a postmodern generated distribution of spaces and times? Or more recently, how would a police system whose cognitive applications have been configured by the post-modern logics of the past 50 years address a recently made modernist object that for all practical purposes appears like those made in the 1930s, but whose meaning for a select group of cultural savvy is a response to the digital age? How can they police that object which on the surface appears like something they know, but which reflects a whole set of contingencies bound up in its abstract real which makes it signify something complete different even radical? Might then this redistribution or some other occurring at some other time, in fact, be sublime to those in power to police, being as it is beyond the perceptual and cognitive capacity of the surveyor as a form of the 'neurobiological sublime'?

New forms of art, new spaces, and new temporalities may exist beyond the police's ability to perceive and cognate them. It therefore goes unnoticed by those regulating the spatial and temporal order. They may not see it as a threat or may not perceive or understand it at all. As such, it may continue to fester, transform, and metamorphose the conditions of the visual, auditory, and cultural order without notice. Thus providing a temporal window for resistance in which these

changes remain under the radar of the policing agency and thus might have the implicit power to sculpt a very different subject. When extreme aesthetic drift occurs, paradigm shifts also occur. This process comes to a point, when in fact the governing bodies do recognize a change and send out an alarm that reverberates throughout the institutional networks. But it's too late and the population is now different. It has been transformed by an alternative system of individuation. A different form of the pre-individual has been sampled creating a non-passive subject. These contemporary populations have the potential to create even greater changes in the distribution of the sensible and a state of emergency ensues in the distribution. Aesthetically blind police can no longer be depended on to maintain order. As George Schwab states in his forward to Carl Schmidt's *Political Theology*, 'In short, "the exception" said Schmidt, "is that which can not be subsumed."¹⁰¹ A state of suspension of government ensues, and a state of exception is produced. In this hypothetical narrative, the power of art can produce what he calls a state of exception. Importantly:

The exception can be more important to it than the rule, not because of a romantic irony for the paradox, but because the seriousness of an insight goes deeper than the clear generalizations inferred from what was ordinarily repeats itself. The exception is more interesting than the rule. It confirms not only the rule but also its existence, which derives only from the exception. In the exception the power of real life breaks through the crust of a mechanism that has become torpid by repetition.¹⁰²

100 Fredric Jameson, *Postmodernism, or The Cultural Logic of Late Capitalism*, (Durham: Duke University Press, 1991), 38.

101 Carl Schmidt, *Political Theology: Four Chapters on the Concept of Sovereignty* [1922], translated by George D. Schwab (Chicago: University of Chicago Press, 2005), xliii.

102 Ibid., 15.

Contributors Biographies

Andreas Angelidakis Andreas Angelidakis is an architect who likes mountains and clouds and websites as much as buildings and trees, furniture, people and art. He maintains an experimental practice in Athens, Greece, a studio involved in building, designing and speculating about the contemporary ecosystem of life between screens and landscapes.



Lisa Blackman and Janet Harbord Lisa Blackman is a Reader in the Department of Media and Communications, Goldsmiths, University of London, UK. She is the new editor of the journal **Body & Society** (Sage) and a co-editor of the new journal **Subjectivity** (Palgrave). She has written three books: **Hearing Voices: Embodiment and Experience** (2001); **Mass Hysteria: Critical Psychology and Media Studies** (with V. Walkerdine, 2001); and **The Body: The Key Concepts** (2008). She is currently finishing a manuscript, **Im/material Bodies: Affect, Relationality and the Problem of Personality** to be published with Sage (2011).

Janet Harbord is a Reader in Film and Screen Cultures in the Department of Media and Communications, Goldsmiths, University of London, UK. She is the author of three books: **Film Cultures** (2002); **The Evolution of Film** (2007), and **Chris Marker: La Jete** (2009). She is currently working on a book project on Transmission: the arts and practices of sending by technical means.



Ina Blom Ina Blom is Professor at the Institute of Philosophy, Classics, History of Art and Ideas at the University of Oslo. Her fields of research and teaching are modernism/avant-garde studies and contemporary art and aesthetics, with a particular focus on media art practices and media aesthetics. Her recent books are: **On the Style Site. Art, Sociality and Television Culture** (2007); **The Postal Performance of Ray Johnson** (2003) and **Joseph Beuys** (2001).



Yann Moulier Boutang Yann Boutang is a Professor in Economics, University of Technology, Compiègne, France; a Visiting Professor of Economics, Ecole Nationale Supérieure d'Architecture Paris Malaquais; and an Associate Professor of Humanities, Ecole Supérieure d'Art et de Design de Saint-Etienne. Since 1973 his research has included critical analysis of labor in contemporary Marxism, with particular focus on the Italian Operaist and Autonomia movements. He has taken part in the publication of the posthumous works of Louis Althusser with the IMEC, see: **Louis Althusser: The Future Lasts Forever** (with O. Corpet, 1993). Professor Boutang is an expert in the areas of capitalism, cognitive capitalism, and labor and migration policy. He is Chief Editor of the Journal **Multitudes** (Paris).



Felicity Callard and Daniel Margulies Felicity Callard, PhD, has disciplinary expertise in the history and living present of psychiatry and in cultural theory. She is currently a research fellow in the NIHR Biomedical Research Centre for Mental Health (South London & Maudsley NHS Foundation Trust/Institute of Psychiatry, King's College London), where she collaborates with translational researchers in mental health. One strand of her research focuses on how appropriations and flows of concepts occur in this current moment of

cross-disciplinary exchange between the neurosciences, social sciences and humanities.

Daniel S. Margulies, PhD, has disciplinary expertise in functional neuroimaging of the brain 'at rest.' He is currently a post-doctoral research fellow at the Mind & Brain Institute of Humboldt University and the Max Planck Institute for Human Cognition and Brain Sciences, investigating functional neuroanatomy and how individual patterns of behavior relate to the organization of large-scale brain networks. Before neuroscience, he studied philosophy and literature, and continues to explore intersections of neuroscience with the arts and psychoanalysis.



Suparna Choudhury, Lukas Ebensperger and Jan Slaby Suparna Choudhury is a Minerva Junior Professor at the Max Planck Institute for History of Science in Berlin, Germany, and Associated Researcher at the Berlin School of Mind and Brain. She is currently investigating the development of brain-based theories of adolescence through cognitive neuroscience and their functions in contemporary culture. She has a background in cultural psychiatry and cognitive neuroscience: her postdoctoral research at the Division of Social and Transcultural Psychiatry, McGill University focused on cultural constructions of the brain and her PhD in Cognitive Neuroscience was based on social cognitive development during adolescence at University College London. Jointly with Jan Slaby she founded the Critical Neuroscience initiative.

Lukas Ebensberger holds a degree in Cognitive Science from the University of Osnabrück, Germany, and is currently based at the Institute of Cultural Studies at Humboldt University in Berlin. His work focuses on themes in the intersections and tensions between the natural and social sciences with a special emphasis on neuroscience and its influence on public and scientific discourse. His main fields of interest include ontology, hermeneutics and the history and philosophy of technology and science, and the influence of science and technology on human self-understanding.

Jan Slaby is an Assistant Professor of Philosophy, Philipps-University Marburg, Germany. His working area is theoretical philosophy, with a focus on phenomenology, theories of emotion and feeling, personhood, philosophical anthropology and philosophy of science. He studied Philosophy, Sociology, and English Literature at the Humboldt University in Berlin; his PhD in philosophy was completed in 2006 at the University of Osnabrück with a thesis on emotions, personhood and intentionality (published as **Gefühl und Weltbezug** with mentis, Paderborn, in 2008). After obtaining his doctorate he worked as a PostDoc researcher in the interdisciplinary project 'Animal Emotion-ale. Emotions as the Missing Link Between Cognition and Action' (funded by the Volkswagen Foundation, Germany), based at the Institute for Cognitive Science at the University of Osnabrück. Jointly with Suparna Choudhury he founded the Critical Neuroscience initiative.



Jordan Crandall Jordan Crandall is Associate Professor in Visual Arts, University of California San Diego. He is a media artist and theorist based in Los Angeles. His most recent video installation **_ Hotel_** (2009) probes into the realms of extreme intimacy, where techniques of control combine with techniques of the self. He is cur-

rently developing a new visual philosophical project called _Gatherings_, which works across the life sciences, the social sciences, the digital humanities, urban design and architecture. He is the founding editor of the new journal **Version**.

Elie During

Elie During is Associate Professor at the University of Paris – Ouest Nanterre, Philosophy Department. He also teaches at the Ecole nationale des beaux-arts (Paris). He has recently published a critical edition of Henri Bergson's **Durée et Simultanéité [Duration and Simultaneity]** (2009), to be followed by a study of the Bergson-Einstein controversy: **Bergson et Einstein: la querelle de la relativité [Bergson and Einstein: The Quarrel of Relativity]** (forthcoming). Other publications include **La Science et l'hypothèse: Poincaré [Science and Hypothesis: Poincaré]** (2001); **In actu: de l'expérimental de l'art [In actu: Concerning the Experimental in Art]** (co-authored, 2009); **Faux Raccords [Jump Cuts]** (2010); as well as a number of articles on contemporary philosophy (Deleuze, Rancière, Badiou). His current research focuses on the varieties of space-time experience in science, the arts and the city.

Keller Easterling

Keller Easterling is an architect and writer from New York City. Her book **Enduring Innocence: Global Architecture and its Political Masquerades** (2005) researches familiar spatial products that have landed in difficult or hyperbolic political situations around the world. A previous book, **Organization Space: Landscapes, Highways and Houses in America** (1999), applies network theory to a discussion of American infrastructure and development formats. A forthcoming book, **Extrastatecraft**, examines global infrastructure networks as a medium of polity. Easterling has lectured and published widely in the USA and internationally. Her research and design work has been most recently exhibited at the Storefront for Art and Architecture in New York, the Rotterdam Biennale, and the Architectural League. She has also published web installations including: Extrastatecraft, Wildcards: A Game of Orgman and Highline: Plotting NYC. Easterling is a Professor at Yale University.

Boris Groys

Boris Groys is Professor of Philosophy and Aesthetics at the Hochschule für Gestaltung in Karlsruhe, Germany and is Global Professor in Aesthetics, Art History, and Media Theory at New York University. Groys is an expert on late-Soviet postmodern art and literature, and on the Russian avant-garde. Since 1994, he served as curator and organizer of numerous international art exhibitions and conferences. As an artist, Groys develops film and video installations, such as **The Art Judgement Show** (2001), and **Iconoclastic Delights** (2002). In 2008, he created an installation of three video-collages combining theoretical texts with film fragments: **Thinking in Loop: Three videos on iconoclasm, ritual and immortality** (ZKM). His recent books include: **Ilya Kabakov: The Man Who Flew into Space from His Apartment** (2006); and **Art Power** (2008).

Patrick Healy

Patrick Healy is Senior Lecturer, Delft School of Design, Delft University of Technology. After completion of studies in Philosophy and later Sociology and Near Eastern Languages, Pontifical University Maynooth, University College Dublin, Patrick Healy has been engaged in writing, research and teaching, mainly in the area of aesthetics and contemporary art. His recent publications include works on aesthetics, the philosophy of science and artists biographies, including a broad range of other activities associated with his work as Professor of Interdisciplinary research for the Free International University, Amsterdam, appointed 1997. His recent publications include: **The Model and its Architecture** (2008) and **Images of Knowledge** (2005). With Deborah Hauptmann he has carried out a translation of Bergson, **Quid Aristotles de loco senserit**, completed this year and awaiting publication. This is the first complete translation into English of Bergson's thesis work for the Sorbonne.

Deborah Hauptmann

Deborah Hauptmann is director of the Delft School of Design, Delft University of Technology where she is Associate Professor in Architecture Theory. Hauptmann lectures internationally and contributes regularly to conferences as a moderator. Her recent work includes: **Cities in Transition** (ed. 2001); **The Body in Architecture** (ed. 2006); 'Problematicizing the Virtual: On Lefebvre and the Urban Problematic,' in **Visualizing the Invisible** (2006); 'A Cosmopolitan View on Thinking and Being-in-Common,' in **The Foreign and the Domestic in Architecture** (2007); and the forward to **Writing and Seeing Architecture: Christian de Portzamparc and Philippe Sollers** (2008). She is currently working on a manuscript on the notion of space in the work of Henri Bergson which includes a definitive English translation of Bergson's 1889 **Quid Aristoteles De Loco Senserit** [On Aristotle's Conception of Place], which she has produced with her colleague, Patrick Healy.

Scott Kelso

Scott Kelso holds the Glenwood and Martha Creech Chair in Science at Florida Atlantic University in Boca Raton and is Professor of Psychology, Biological Sciences and Biomedical Science. He is also Visiting Professor of Computational Neuroscience in the Intelligent Systems Research Centre at the University of Ulster's Magee Campus in Londonderry, Northern Ireland. In 1985 Kelso founded the Center for Complex Systems and Brain Sciences, the first such interdisciplinary field in the USA. Kelso's research combines advanced brain imaging and behavioral methods to understand how human beings (and human brains) – individually and together – coordinate behavior on multiple levels (from cellular to social) for multiple functions. He is considered an originator of Coordination Dynamics, a theoretical and empirical framework that seeks to identify the laws, principles, and mechanisms underlying the complex dynamical behavior of living things. His most recent books include: **Dynamic Patterns: the Self-Organization of Brain and Behavior** (1995); **Coordination Dynamics** (with V. K. Jirsa, 2004); and **The Complementary Nature** (with D.A. Engström, 2006). Kelso is the Founding Editor of a book series **Understanding Complex Systems** (Springer Verlag) which now has over 50 volumes.

Maurizio Lazzarato

Maurizio Lazzarato is a sociologist and writer, based in Paris. He is a member of the editorial board of **Multitudes**. Among his recent publications are: **Videofilosofia. La percezione del tempo nel postfordismo** (Manifestolibri, 1997); **Lavoro immateriale. Forme di vita e produzione di soggettività** (Ombre Corta, 1997); **La politica dell'evento** (Rubbetino, 2004) **Les révolutions du capitalisme** (Empêcheurs de Penser en Rond, 2004), **Puissances de l'invention. La Psychologie économique de Gabriel Tarde contre l'économie politique** (Les empêcheurs de penser en rond, 2002); and **Le nouveau partage du sensible. L'expérimentation politique aujourd'hui** (Editions Amsterdam, 2009).

Markus Miessen

Markus Miessen is an architect, writer and consultant. In 2002, he set up **Studio Miessen**, a collaborative agency for spatial practice and cultural inquiry, and in 2007 was founding partner of the architecture practice **nOffice**. In various collaborations, Miessen has published books such as **The Nightmare of Participation** (2010); **Institution Building – Artists, Curators, Architects in the Struggle for Institutional Space** (2009); **When Economies Become Form** (2009); **East Coast Europe** (2008); **The Violence of Participation** (2007); **With/Without –Spatial Products, Practices and Politics in the Middle East** (2007); and **Did Someone Say Participate?** (2006). His work has been exhibited and published widely, including at the Lyon, Venice, Shenzhen, Manifesta and Performa Biennials. Miessen has taught internationally at institutions such as the Architectural Association, the Berlage Institute, Columbia and MIT. He has consulted the Slovenian Government, the European Kunsthalle, the Serpentine Gallery and the Swiss think tank WIRE. In 2008, he founded the Winter School Middle East. Miessen is a Harvard fellow, a PhD candidate at Goldsmiths, and a Professor for Architecture and Curatorial Practice at the Hochschule für Gestaltung, Karlsruhe. nOffice is currently working on projects for Manifesta 8, Archive Cabinet, Merve Verlag, SKOR, and Hans Ulrich Obrist archive, among others.

Warren Neidich

Warren Neidich is an artist, writer and organizer, based in Berlin and New York. He is a founding editor of the **Journal of Neuroaesthetics** (1997-2009) and Artbrbrain.org, and a visiting Scholar at the Delft School of Design (since 2009). Neidich organized the first conference on Neuroaesthetics at Goldsmiths College where he was Artist in Residence in 2005. He is author of **Blow-up: Photography, Cinema and the Brain** (2003). His recent book **Lost Between the Extensivity/Intensivity Exchange** (Onomatopée, 2009) includes his performative lectures performed at IASPIS, Stockholm entitled 'Some Cursory Comments on the Nature of My Wall Drawing.' After studying photography and psychology Dr. Neidich went on to become a research fellow in Neurobiology at California Institute of Technology in the laboratory of Nobel Prize Recipient and Neurobiologist Roger Sperry. He studied medicine and then did a residency in ophthalmology at Tulane University Medical Center, New Orleans. Louisiana. He retired from his post as Clinical Instructor at New York Eye and Ear Hospital in 1993 to pursue his artistic and theoretical practice full time.

John Protevi

John Protevi is Professor of French Studies at Louisiana State University in Baton Rouge, Louisiana. He received a PhD in Philosophy from Loyola University of Chicago in 1990, with a dissertation under the direction of John Sallis. His recent publications include: **Political Physics: Deleuze, Derrida and the Body Politic** (2001); **Deleuze and Geophilosophy: A Guide and Glossary** (co-author with Mark Bonta, 2004). In addition, he is editor of **A Dictionary of Continental Philosophy** (Yale, 2006). He is a founding editor of the book series New Directions in Philosophy and Cognitive Science with Palgrave Macmillan. His latest book is **Political Affect: Connecting the Social and the Somatic** (Minnesota, 2009).

Andrej Radman

Andrej Radman is Assistant Professor of Architecture, Delft School of Design, Delft University of Technology, where he has taught design and theory courses since 2004. In 2008 he joined the teaching and research staff of the Delft School of Design (DSD) as Assistant Professor of Architecture. Radman continues to practice architecture and has won a number of awards from national competitions together with architect Igor Vrbaneč, including the Croatian Association of Architects Annual Award for the most accomplished housing architecture in Croatia in 2002, for the design of a family residence in Zagreb. He has designed for the architectural offices of APZ and AP-92 in Zagreb and Korteknie Stuhlmacher Architects in Rotterdam. Radman's doctoral research focuses on J.J. Gibson's ecological approach to perception based on the complementarities of the perceiver and the environment.

Philippe Rahm

Philippe Rahm Architects, Paris. Philippe Rahm, born in 1967 studied at the Federal Polytechnic Schools of Lausanne and Zurich. He obtained his degree in architecture in 1993. He currently works in Paris (France). In 2002, he was chosen to represent Switzerland at the 8th Architecture Biennale in Venice and is one of the 20 manifesto architects of Aaron Betsky's 2008 Architectural Biennale Venice. In 2009, he was a nominee for the Ordos Prize in China and in 2008 he was in the top-ten ranking of the International Chernikov Prize in Moscow. In 2007, he had a personal exhibition at the Canadian Centre for Architecture in Montreal. He has participated in a number of exhibitions worldwide (Archilab 2000, SF-MoMA 2001, CCA Kitakyushu 2004, Frac Centre, Orléans, Centre Pompidou, Beaubourg 2003-2006 and 2007, Manifesta 7, 2008, Louisiana museum, Denmark, 2009). Philippe Rahm was a resident at the Villa Medici in Rome (2000). He was Head-Master of Diploma Unit 13 at the AA School in London in 2005-2006, Visiting professor in Mendrisio Academy of Architecture in Switzerland in 2004 and 2005, at the ETH Lausanne in 2006 and 2007, and he is currently a Guest Professor at the Royal School of Architecture of Copenhagen. He is working on several private and public projects in France, Poland, England, Italy, and Germany. He has lectured widely, including at Cooper Union NY, Harvard School of Design, UCLA and Princeton.

John Rajchman

John Rajchman is a philosopher working in the areas of art history, architecture, and continental philosophy. He is an Adjunct Professor

and Director of Modern Art MA Programs in the Department of Art History and Archaeology at Columbia University. He has previously taught at Princeton University, MIT, Collège International de Philosophie in Paris, and The Cooper Union, among others. Recent publications include: **The Deleuze Connections** (2000) and **Rendre la terre légère** (2005). He is a Contributing Editor for **Artforum** and is on the board of **Critical Space**.

Patricia Reed

Patricia Reed is an artist who completed her BFA from Concordia University, Montreal. Since then she has participated in the research and residency programs of the Centre for Contemporary Art Kitakyushu, Japan, CCA Jeleni, Prague, Czech Republic, Akademie Schloss Solitude, Stuttgart, and The Banff Centre for the Arts, Canada. Calling her practice **Aesthetic Management**, Reed operates between various roles within the art field, allowing for a partaking in different modes of production including artistic, curatorial, and textual forms of dissemination. Recent and forthcoming projects include: **Secret Publicity**, Canada; **They go round and round**, 0047 Projects, Oslo; **ev+a Matters**, Limerick Art Gallery, Ireland; **First Nations/Second Nature**, Audain Gallery, Vancouver; and **Territories of the In/Human**, Württembergischer Kunstverein, Stuttgart. As a writer, Reed has contributed texts to the following publications: **Shifter Magazine**, **Fillip**, **Art Papers**, **C Magazine**, **Neue Review** and **Framework: The Finnish Art Review**. She lives and works in Berlin.

Gabriel Rockhill

Gabriel Rockhill is Assistant Professor of Philosophy, Villanova University & Centre Parisien d'Etudes Critiques, Director of the Atelier de Théorie Critique at the Centre Parisien d'Etudes Critiques and the Collège International de Philosophie. He is the author of **Logique de l'histoire: Pour une analytique des pratiques philosophiques** (2010) and is currently completing a manuscript for Les Editions du Sandre on the role of radical historicism in rethinking the relationship between art and politics. He co-edited and contributed to **Critique et subversion dans la pensée contemporaine américaine: Dialogues** (2010); **Jacques Rancière: History, Politics, Aesthetics** (2009); and **Technologies de contrôle dans la mondialisation: Enjeux politiques, éthiques et esthétiques** (2009). He also edited and translated Jacques Rancière's **The Politics of Aesthetics** (2004).

Terry Sejnowski and Steven R. Quartz

Terrence Sejnowski is an Investigator with the Howard Hughes Medical Institute and is the Francis Crick Professor at The Salk Institute for Biological Studies where he directs the Computational Neurobiology Laboratory. He is also Professor of Biological Sciences and Adjunct Professor in the Departments of Neurosciences, Psychology, Cognitive Science, and Computer Science and Engineering at the University of California, San Diego, where he is Director of the Institute for Neural Computation. He served on the faculty of Johns Hopkins University and was a Wiersma Visiting Professor of Neurobiology and a Sherman Fairchild Distinguished Scholar at Caltech. The long-range goal of Dr. Sejnowski's laboratory is to understand the computational resources of brains and to build linking principles

from brain to behavior using computational models. This goal is being pursued with a combination of theoretical and experimental approaches at several levels of investigation ranging from the bio-physical level to the systems level. His papers are widely published and his recent publications include: **Toward Brain-Computer Interfacing** (co-authored 2007); **New Directions in Statistical Signal Processing** (co-authored 2006); **Liars, Lovers, and Heroes: What the New Brain Science Reveals About How We Become Who We Are** (co-authored with Steen Quartz, 2003)

Steven R. Quartz, PhD, is director of the Social Cognitive Neuroscience Laboratory at the California Institute of Technology and an Associate Professor in the Division of Humanities and Social Sciences and the Computation and Neural Systems Program. He was a fellow of the Sloan Center for Theoretical Neurobiology at the Salk Institute and a recipient of the National Science Foundation's CAREER award, its most prestigious award for young faculty. Hi research uses advances and methods in neuroscience to probe fundamental problems of mind, ranging from how the mind emerges from the developing brain to how we make decisions, from individual decision-making under uncertainty to moral decision making. His publishes regularly in the journal **Science** and he is coauthor (with Terrence Sejnowski) of **Liars, Lovers, and Heroes: What the New Brain Science Reveals About How We Become Who We Are** (2003).

Elizabeth Sikiaridi and Frans Vogelaar

Professor Elizabeth Sikiaridi and Professor Frans Vogelaar are partners at Hybrid Space Lab, Berlin/Amsterdam, an r&d and design practice focusing on the hybrid fields that are emerging through the combination and fusion of environments, objects and services in the information/communication age. In 1998 Frans Vogelaar founded at the Academy of Media Arts Cologne the first Department of Hybrid Space worldwide. Their work has been presented at international congresses and exhibitions and has been published internationally: Austria, Belgium, Canada, China, Czech Republic, Denmark, Germany, Greece, Finland, France, Italy, Latvia, Lithuania, Pakistan, Poland, Portugal, Oman (upcoming in 2010), Singapore, South Korea (upcoming in 2010), Switzerland, Spain, the Netherlands, Turkey, UK, and USA.

Paolo Virno

Paolo Virno is a philosopher who lives in Rome and teaches at the University of Calabria. His research specializes in political philosophy, linguistics and mass media. He was politically active as a member of the Italian political group **Potere Operaio** during the 1970s, where he was imprisoned for three years before being acquitted. He is a contributor of the philosophical review **Forme di vita**. Among his recent publications are: **Virtuosismo y revolución: La acción política en la era del desencanto** (2003); **Esercizi di esodo** (2002); **Quando il verbo si fa carne. Linguaggio e natura umana** (2003); **A Grammar of the Multitude: For an Analysis of Contemporary Forms of Life** (2004); **Motto di spirito e azione innovativa** (2005); and **Multitude: Between Innovation and Negation** (2008).

Sven-Olav Wallenstein

Sven-Olav Wallenstein is Professor of Philosophy & Aesthetics, University College Södertörn and Professor of Architectural Theory at the Royal Institute of Technology, Stockholm. Wallenstein teaches Philosophy at the University College of Södertörn and Architectural Theory at the Royal Institute of Technology. He is the editor-in-chief of **SITE** (www.sitemagazine.net), the author of several books and essays on contemporary art, philosophy, and aesthetics, and the translator of works by Kant, Frege, Husserl, Heidegger, Levinas, Derrida and Deleuze. Recent books include: **Bildstrider: Föreläsningar om estetisk teori** (Image Wars: Lectures on Aesthetic Theory, 2001); **Den sista bilden: det moderna måleriets kriser och förvandlingar** (The Last Image: Crises and Transformations of Modern Painting, 2002); **Den moderna arkitekturens filosofier** (The Philosophies of Modern Architecture, 2004), **The Silence of Mies** (2008); **Biopolitics and the Emergence of Modern Architecture** (2009); as well as Swedish translations of Immanuel Kant's **Critique of Judgement** (2003), Gilles Deleuze's **The Fold: Leibniz and the Baroque** (2004).

Bruce Wexler

Bruce Wexler is Professor of Psychiatry, Yale University, School of Medicine and Director of the Neurocognitive Research Laboratory, Connecticut Mental Health Center. He received his BA degree Magna Cum Laude from Harvard College, medical training at Albert Einstein College of Medicine and Psychiatry training at Yale. He also studied psychiatry at Anna Freud's clinic in Hampstead and neurology at the Institute of Neurology, Queen's Square, London. He has published over 100 scientific research papers and serves on expert panels and grant review committees for the National Institute of Mental Health. In one component of his scientific research, Professor Wexler uses brain imaging and measures of cognition and social cognition to identify distinct subtypes of schizophrenia. In the other component, he has been a world leader in developing computerized brain 'exercises' to treat the cognitive dysfunctions associated with schizophrenia by promoting activity-dependent enhancement of underfunctioning neurocognitive systems. His scholarly book **Brain and Culture; Neurobiology, Ideology and Social Change** (2006) presents new ideas about the relationship between people and their environments. Based on ideas in this book, Professor Wexler founded the organization 'A Different Future' to help promote Israeli/Palestinian peace.

Charles T. Wolfe

Charles Wolfe is an ARC Research Fellow in the Unit for History and Philosophy of Science, University of Sydney (and in 2011 a Mellon Fellow at the Centre for Philosophy of Science, University of Pittsburgh) working chiefly in the history and philosophy of the life sciences, in the early modern period and in contemporary thought. He has edited volumes on materialism, monsters, the body and empiricism in early modern science (**The Body as Object and Instrument of Knowledge**, Springer 2010), and on the concept of organism (forthcoming); his essays cover topics including materialist perspectives on dreams, laughter, and molecules; constitutive ontology and phantom limb syndrome; the animal economy, automata, determinism and embodiment; Locke, La Mettrie, Diderot and Sade. His current project is a book on the history of vitalism.

Credits

Delft School of Design Series on Architecture and Urbanism
Series Editor Arie Graafland

Editorial Board
K. Michael Hayes (Harvard University, USA)
Ákos Moravánszky (ETH Zürich, Switzerland)
Michael Müller (Bremen University, Germany)
Frank R. Werner (University of Wuppertal, Germany)
Gerd Zimmermann (Bauhaus University, Germany)

Also published in this series:
1 Crossover. Architecture Urbanism Technology
ISBN 978 90 6450 609 3
2 The Body in Architecture
ISBN 978 90 6450 568 3
3 De-/signing the Urban. Technogenesis and the urban image
ISBN 978 90 6450 611 6
4 The Model and its Architecture
ISBN 978 90 6450 684 0
5 Urban Asymmetries. Studies and projects on neoliberal urbanization
ISBN 978 90 6450 724 3 (to be published in 2011)

6 Cognitive Architecture. From biopolitics to noopolitics
Editors Deborah Hauptmann, Warren Neidich
Text editing D'Laine Camp
Book design by Piet Gerards Ontwerpers
(Piet Gerards and Maud van Rossum), Amsterdam
Printed by DeckersSnoeck, Antwerp

On the cover: Virgil Grotfeldt, 'Fantastic Garden', 2002,
coal dust and acrylic on paper, superimposed on Stephen J. Dvorak,
'Competition drawing', 1985, ink on paper.

©2010 The authors / 010 Publishers, Rotterdam
www.010.nl

ISBN 978 90 6450 725 0

