

Agency in the physical world

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Warning :

This is a research program, not a research result !

Expect more incomplete ideas and open questions than answers!



We decide

And this creates quite some tension with physics:

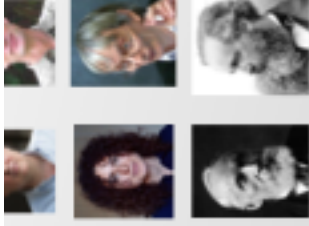
- Agency appears to defy both the determinism of classical mechanics and the probabilistic indeterminism of quantum mechanics.
- Agency is a time oriented process. Fundamental physics is not.
- We act on the basis of mental states, intentions, purposes (moral, selfish, epicurean, our whims ...). All entities hard to place in the physical world.
- Agency is a "first person perspective" decision.

An agency has a non-reducible role in



Agency plays a non-reductive role in:

- foundation of quantum theory according to Quantum Information, Qbism
- foundation of all physics according to Deutsch, Marletto
- paradigm in quantum information - many...
- foundation of thermodynamics according to Kelvin, Maxwell, ...



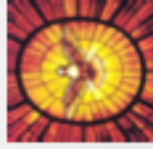
How is all this compatible with naturalism?

Is the agent secretly a true bona fide physical system ??

Working hypothesis

The agent is a physical system. These apparent contradictions can be solved.
This requires also some physics' insight.





Solutions I am not interested in

- There is something in reality which contradicts, or does not supervene on, physics (spirits, souls, gods, ...).
- There is some new physics outside known basic laws (like dark matter) needed to account for agency.
- Flatly call agency "an illusion", and talk it away.

Hence:

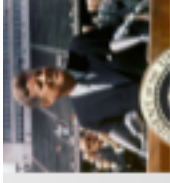
- Define agency as whatever happens in the cases we say somebody takes a decision.
- Correct formulation of the problem: ask what are we indicating when we concretely use a term, employ a concept, report in an experience ...
That is: **NOT** to assume our terminology to refer to metaphysical entities defined a priori, and then be puzzled about the fact that these entities are incoherent with what we know. (If we do so, we are building mental traps for ourselves.)



- My car has **decided** to break and let me on foot, right today that I needed to be at school on time for the first lecture of the course.
- The Rover on Mars has **decided** to temporarily shut itself down because it has **intentioned** some clouds it has **devised** a scheme of a possible incoming

sand storm.

- The child has **decided** to wake up early this morning.
- Apologies for my unpleasant words. I had **decided** not to criticise you, but then I lost my temper.
- Raise one arm. You **decide** which one, now.
- Kennedy **decided** to go for the Moon.
- I have suddenly **decided** to jump up and go for a run.



Agency

- Breaks simple physical evolution
- Is time oriented
- Involves intention
- Involves a first person perspective

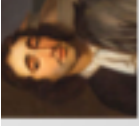


- Breaks simple physical evolution

→ Is the easiest.

- My car has **decided** to break and let me on foot, right today that I needed to be at school on time for the first lecture.

What is broken is not physical evolution per se, it is an approximate and incomplete account of physical evolution, that happens to be approximately good, up to the decision, or from the decision on.



Spinoza, Ethics, Appendix to Part I: "In the mind there is no absolute (that is, free) will; rather, the mind is caused to will this or that by a cause which is also caused by another, and this again by another, and so to infinity. ... Men think themselves free, because they are conscious of their choices and their desires, but are ignorant of the causes that incline them to want and to choose, and thus never give the faintest thought—even in their dreams!—to those causes."

A decision is a breaking of an approximation, an interference between levels of description.

To have a system to which we attribute "agency" we need an approximation broken at some point.

- Is time oriented

Easy in abstract. Very hard in practice.

The only source of past/future difference is thermodynamic entropy growth.

→ Hence the source of the time orientation in agency is thermodynamical. Nothing else can be.

→ Hence there must exist an account of how the entropic breaking of time reversal invariance sustains agency's time asymmetry.

Can we find this account?

- ◆ Agency ↔ Fixed past/open future ↔ Memory ↔ Tracks ↔ Entropy gradient.

Tracks ↔ Entropy gradient : See Sean Carroll's talk.

Also: Reichenbach The Direction of Time 1938.

- ◆ Where does the entropy gradient come from?

From the past: the cosmological history of the universe

C.R. "Where was past low entropy", Entropy 2013,

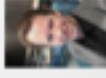
D. Wallace, "Gravity, entropy, and cosmology: In search of clarity," 2010

- ◆ Why was entropy low in the past? Mysterious. Perspectival?

→ Past low entropy is a property of a group of macroscopic variables, determined by the interactions of a system S with the rest of the universe

→ What is special is S, not the universe.

C.R. "Is the Time Arrow Perspectival?", in The Philosophy of Cosmology 2018



- Involve intention.

- ◆ How evolving naturally selected systems manage salient information

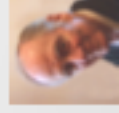
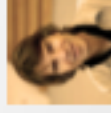
(correlations) between the self and the environment,

- C.R. Carlo Rovelli, "Meaning and Intentionality - Information + Evolution", in

"Wandering Towards a Goal", A. Aguirre, B. Foster and Z. Meralidis. 2009

- D. Wolpert at the FOXT 5th International Conference

- F. Dretske, Knowledge and the Flow of Information.



- ◆ Hence "to decide" is eminently a biological activity, or indirectly so.

■ Involves a first person perspective.

- ◆ What is the experience of other potential subjects?
- ◆ What is the experience of being ourselves a subject?



- ◆ The first is a **psychological problem** (humans are extremely social animals, constantly trying to anticipate what other humans will do next. They constantly simulate with their brain what other brains are likely doing. This is the source of the "What is like to be a bat?" question, nothing deeper.)
The question "What is like to be a bat?" is otherwise meaningless.

- ◆ The second is a **by-product to the first**. (We play the same game with ourselves. We identify ourselves as "like the others")

→ Consciousness of ourselves is a highly social product.





where I think resides
the origin of consciousness of oneself

I see the world, therefore the world,
I interact with other people, therefore other people,
I see other people making mistakes, therefore I question myself,
I question myself a lot, therefore I doubt,
I doubt, therefore I think,
I think, therefore I am !

"My mom loves me, therefore I am"





◆ What is a decision of other potential subjects?

→ Only the breaking of a certain approximation predicting their behaviour.
→ A behaviour of the subject governed by a possibly very complex internal physical evolution that admits a partial rational representation as mental states or rational deduction, on the basis of aim (possibly very indirectly) having value, ultimately, selected by evolution.

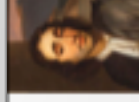


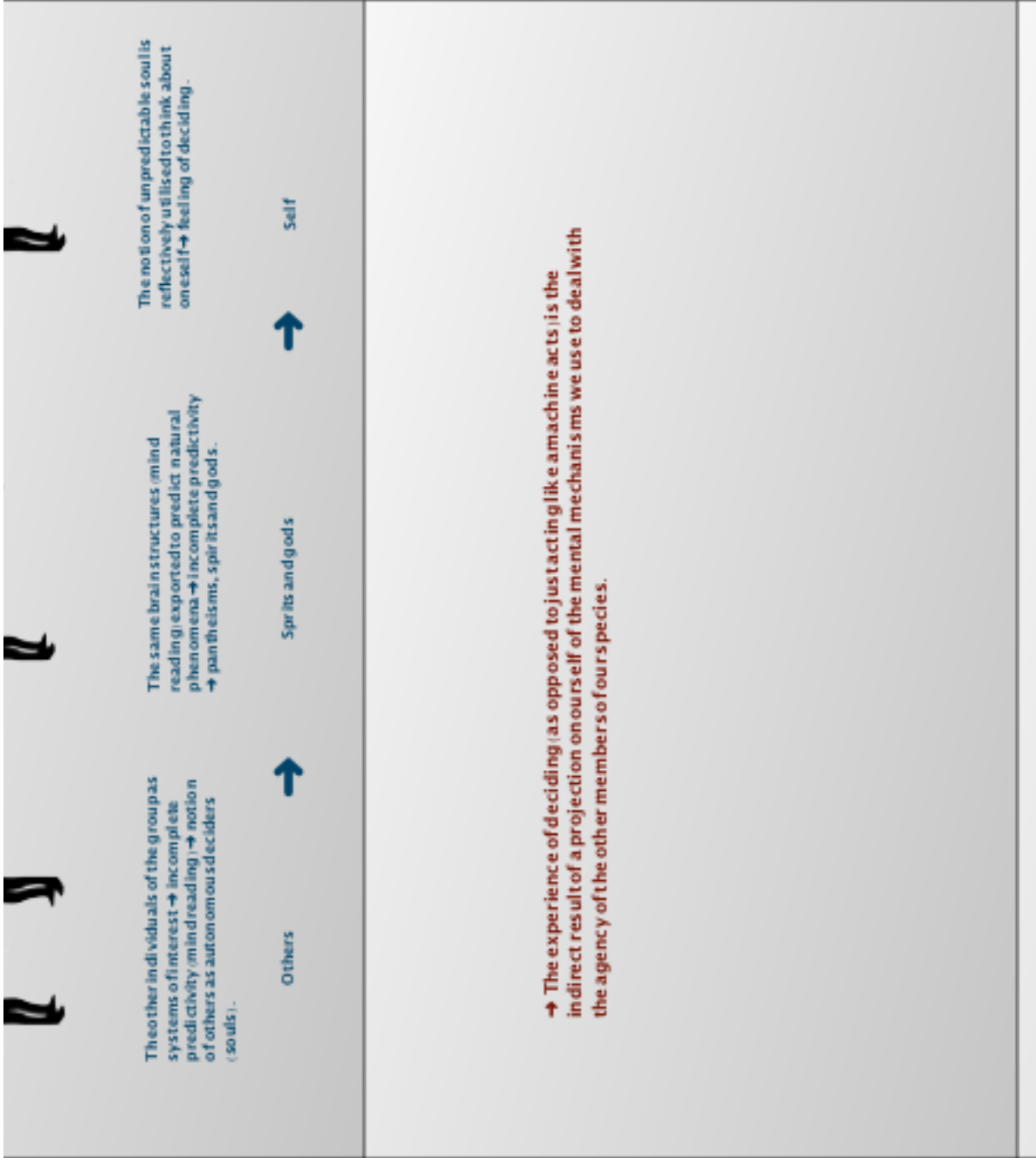
◆ What is the feeling of deciding, in a decision taken by ourselves as a subject?

→ A sign of the incompleteness of our own auto-representation (Spinoza): the body has (obviously) incomplete homeostatic self-control (Damasio).
→ The result of a projection on ourselves of the mental mechanisms we use to deal with the agency of the other members of our species.






→ Diachronic genesis of the intuition of self as an autonomous subject of decision





To understand agency in physical terms, we need

- A separation of descriptions like macroscopic versus microscopic. ✓ 
- An initial low-entropy that prompts time irreversibility (mysterious, perspective?). ✓
- An account on how initial entropy leads to the widely available free energy on Earth (Wallace, CR). ✓
- A story about how tracks form from entropy gradient (Reichenbach, Carroll). 
- A physical account of how evolution gives rise to what we call purpose (Drake, Shannon+Darwin) ✓
- An account of information elaborating systems evolved to be such that the future depends on the information stored. (Missing) 
- An account of the psychology of the experience of deciding. 