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The dynamics of Einstein separability.

Abstract

Are cognizance and consciousness innate to our brain-minds, or the effect of a negative environmental feedback loop? We argue the latter case.

Introduction

Science as a rationalist enterprise leaves no room for personal belief. Its truth (or truth-likeness, Karl Popper would say [1]) lies in the correspondence of mathematical theory to physical result.

We intend to show that unified spacetime does not imply a mutually exclusive internal or external consciousness, and Einstein separability [2] is physically real. We aim for a complete field theory description of consciousness, perhaps first articulated by David Bohm as *implicate* and *explicate* order. [3]

Realism is local

The Bohm-Hiley nonlocal interpretation preserves the classical notion that particles do possess a position and momentum independent of the observer, albeit with nonlocal mathematics.

Basil Hiley masterfully explained it:

"*The model we discuss in the early chapters of the UU* is based on exactly the same mathematics as SQM†, so its predictions are identical the SQM. Our aim was to show that you can avoid the 'paradoxes' of the standard interpretation simply holding on to the idea that a particle (electron, proton atom etc.) does have a simultaneous position and momentum at all times. By using a term that appears in the real part of the Schrödinger eqn. and calling it the 'quantum potential' enables us to find a paradox free and consistent interpretation. By keeping these two notions working together, we actually are able to explain Bohr's original notion of 'wholeness'. By that I mean that we can understand better this quotation I take directly from Bohr: '...implies the impossibility of any sharp separation between the behaviour of atomic objects and the*

* *The Undivided Universe*
† Standard Quantum Model

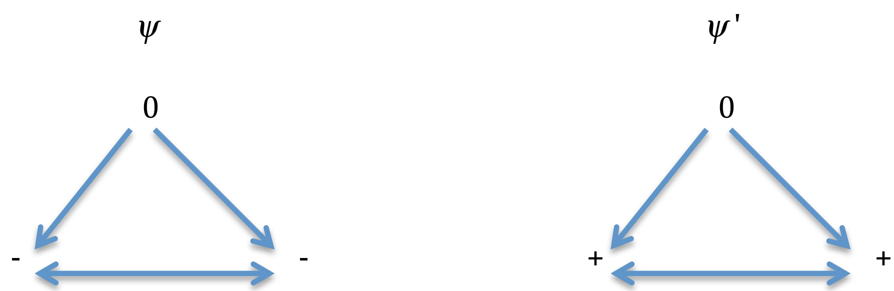
interaction with the measuring instruments which serve to define the conditions under which the phenomena appear.' from Bohr's 'Atomic Physics and Human Knowledge' p. 39." [4]

Einstein introduced the idea of non-rigid transformations, limiting the domain-preserving Lorentz transformation to those regions of spacetime where time plays a minimal role, i.e., where space is Euclidean, which is almost everywhere—those regions of the old and the cold.

He brought 'almost everywhere' to the very rim of reality, that boundaryless boundary where lives a field of heat and particles. "*The law of heat conduction is represented as a local relation (differential equation), which embraces all special cases of the conduction of heat. The temperature is here a simple example of the concept of field. This is a quantity (or a complex of quantities), which is a function of the co-ordinates and the time.*" [5]

The function is nonlocal

Suppose three coordinates define a minimum 3-dimension field. Suppose we call it a complex of quantities equivalent to a mass point. For the sake of symmetry, there must exist two such fields, $\langle \psi | \psi' \rangle$, that vary in time as a function of the coordinates, yet only self-interact.



Neither self-interacting case separately is physical. What do the interactive fields tell us?

They tell us that the observer is never neutral; he/she belongs to a set in which he/she has a role—a binary choice.

When point observers are assigned parity, continuity is restored by pair anti-correlation. **-+-+-+.** Every pair is partnered in—and wed to—a 3 dimension manifold, with zero net charge.

To maintain observer participation, time is compelled to be the nonlinear component of spacetime—the change agent, conveyor of information on changes in system state. [6] In the aggregate, the system will appear to change very little, though small-scale changes in short time intervals are random and rapid. [7] [8] [9] [10] It is no puzzle, then, to see more interaction at measure zero (Wheeler: "*The boundary of a boundary is zero*") and less as measure approaches infinity.

Philosophers Jeffry Bub and Itamar Pitowsky make the point, *"... there is no dynamical explanation for the definite occurrence of a particular measurement outcome, as opposed to other possible measurement outcomes in a quantum measurement process—the occurrence is constrained by the kinematic probabilistic correlations encoded in the projective geometry of Hilbert space, and only by these correlations."* [11]

The Hilbert space is demonstrably nonlocal, however. The Minkowski space is local—if special relativity is true—by the integrated reverse-sign function.

The authors give a corollary to the information loss theorem: *"... No complete dynamical (i.e., unitary) account of the state transition in a measurement process is possible in quantum mechanics, in general.*

Proof. Any measurement can be part of an informationally complete set, so any measurement must lead to an irreversible (hence non-unitary) change in the quantum state of the measured system."

In the realm of the very old and the very cold, however, it should come as no surprise that the cosmic temperature is more than 2.5K and less than 3.0K, in absolute Kelvin units.[‡]

If the number is not background dependent—if the spacetime field oscillates between two of its coordinates as a function of time, and four of its coordinates as a function of completeness—a half oscillation in one direction is a full contraction in another. (LIGO results bear this out. [12]) So a full oscillation accounts for two full contractions. We therefore recover the inverse-square law of gravity and radiation field influences.

The most fundamental characteristic of spacetime is separability, a distinction between left and right. Not space alone, nor time alone, but spacetime is physically real—and only the physically real is separable.

Einstein, in discussing radiation with Max Planck among others (*Development of our Conception of the Nature and Constitution of Radiation*) said:

"One should not think that radiation consists of quanta that do not interact with each other; this would be impossible for an explanation of the interference phenomena. I think of a quantum as a singularity, surrounded by a large vector field. With a large number of quanta a vector field can be composed that differs little from the one we presume for radiation. I can imagine that when the radiation hits a boundary there occurs a separation of the quanta by processes at the boundary, say according to the phase of the resulting field at which the quanta reach the separating surface. The equations for the resulting field would differ little from those of the previous theory." [13]

This being so, one wonders if there is a minimum interaction—a simple harmonic oscillation—at which the limit disappears; i.e., where the system comes to equilibrium.

For this, we appeal to quantum least action:

$$S = \int_{t_1}^{t_2} \mathcal{L}\,(x_i v_i)\,dt$$

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‡ We believe that it's no coincidence that the Tsirelson bound, $2\sqrt{2}$, falls closely within this range. The complete 4-coordinate system is subject to reversibility, and therefore cannot reach a locally observable endpoint on the classical measurement interval $[0,\infty)$.

We say 'quantum least action' using Einstein's definition for quantum—what this equation says is that the field interaction depends on the energy content of the system in an arbitrary interval of time.

Gifted physicist and teacher Richard Feynman lectured, "*Now, I would like to explain why it is true that there are differential laws when there is a least action principle of this kind",* [14] and proceeds to explain that there is a minimum path in every time interval. *"In the case of light, when we put blocks in the way so that the photons could not test all the paths, we found that they couldn't figure out which way to go, and we had the phenomenon of diffraction*."

Compare photons to neutrinos. If massless photons cannot tell which way to go—a beam of light is the straightest line in physics—how much less disoriented is a particle with the slightest mass, and highest speed, that we know? Are there conditions under which neutrino diffraction is a coherent interaction? Are there conditions, in fact, under which neutrinos diffract?

We find that quantum gravity is interactive with consciousness via negative feedback:

<u>A neutrino experiment to test quantum gravity</u>

A neutrino beam is focused on a point in a superthin, supercooled, superconductive material in a pool of liquid nitrogen. We expect the beam should displace and disrupt the superconductivity, resulting in a chaotic wave event, by quantum mechanical decoherence.

If the beam instead produces a soliton [15], we should have demonstrated a role for the spacetime field. To prove it a soliton, we focus another neutrino beam on a nearby point; the waves should pass through each other without interference. If there are numerous points of impact on the surface, all passing through each other, it should appear as a unitary wave, without momentum decay, just a larger replica of itself, an accumulation of energy proportional to the neutrino energy input. (So long as it stays under the temperature threshold for decoherence.)

Feynman had a dramatic classroom demonstration of momentum decay—putting his own face at risk by launching a heavy ball on a pendulum and standing in the way of the return motion. That function is expected to continue to equilibrium; our system of neutrino beam and superconducting surface keeps the system in a perpetual nonequilibrium state. Deprived of the ability to choose a vector orientation, a displaced particle cooperates with superconducting particles in every direction of the field—and takes energy stored in spacetime itself, as dilated time potential. Absorption events at the surface become energy, to be released by a heat bath emission event on contact—contact in which *the emission-absorption boundary is zero-separated.*

Kevin Brown wrote in his marvelous collection of essays *Reflections on Relativity*,

"*This image of a photon as a single unified event with a coordinated emission and absorption seems unsatisfactory to many people, partly because it doesn't allow for the concept of a 'free photon', i.e., a photon that was never emitted and is never absorbed. However, it's worth remembering that we have no direct experience of 'free photons', nor of any 'free particles', because ultimately all our experience is comprised of completed interactions. (Whether this extends to gravitational interactions is an open question.)*" [16]

The universe is bathed in neutrino radiation—we are assured a nonlinear dynamic in perpetuity as the function of an input that keeps the system in a nonequilibrium state, below the heat threshold that leads to equilibrium.

This also works in reverse—as feedback to the system that subsumes equilibrium states, [17] which explains gravity as a one-way interaction, a universal negative feedback system.

"With a large number of quanta a vector field can be composed that differs little from the one we presume for radiation."

The electromagnetic field, as well as the gravitational field, exerts an infinite influence. The fields have infinite phases of interference from zero to infinity $[0,\infty)$, and every point of 4-dimension expanding space is the point of origin.

Taking infinity as a growth rate, and infinitesimal as a decay rate—there is, by existence, an absolute zero growth rate and an absolute zero decay rate meeting in the same point. This argues that matter has no intrinsic properties. Charge, momentum, mass come from the dynamic interaction of chiral spacetime fields at any scale.

The interactive potential for neutrinos—with tiny mass and speed near that of light—should show us the exact moment the world becomes classical. It's a magnitude of infinity closer than we have thus far imagined.

For all my grandchildren, who will see the world closer than ever before.

References

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