

COMMENTARY

Wavelike Coherence and CPT Invariance: Sesames of the Paranormal

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Abstract — While agreeing fully with Rauscher and Targ's recent claim in this journal that today's physics paradigm accommodates the "paranormal," I see no necessity to "complexify" the Poincaré-Minkowski spacetime scheme. I have recently argued in *Foundations of Physics* that reversible causal zigzagging à la Feynman plus the wavelike Born-Jordan probability rules imply straightaway the paranormal phenomenology.

From a brief conversation I had with an important theoretical physicist: He: "I am inclined to believe in telepathy." I: "This has probably more to do with physics than with psychology." He: "yes."

—Albert Einstein

Two thought-provoking papers appeared recently in this journal: "Where Do We File Flying Saucers?" by Evans (2001) and "The Speed of Thought" by Rauscher and Targ (2001). In the first one *flying saucers* exemplify any sort of recorded anomaly: in the second one *the speed of thought* stands for anomalous distant knowledge in space or time.

Evans' examples evidence that the recorded "empirical reality" is far less solid than we Westerners tend to believe. Philosophers have pondered upon this, but it is good that a professional archivist makes clear that the statement is not academic.

Rauscher and Targ stress that paranormal distant knowledge in space or in (past or future) time is well established by serious investigation, and they produce useful references. They also stress that (notwithstanding "rationalistic" prejudices) arguments in favor of the paranormal can easily be drawn from the relativistic and the quantal paradigms. This I have recently claimed also in *Foundations of Physics* (Costa de Beauregard, 2001).

The relativistic *space-time equivalence* and the quantal *wavelike probability* scheme are scientific revolutions of the "first magnitude" — still more so when united in a Lorentz and CPT invariant formalism.

The Born-Jordan probability scheme is radically new, notwithstanding occasional claims (Landé, 1973; Frohner, 1998) adducing interesting but not compelling remarks. So it seems that, as in the days when Cardano, Pascal and Fermat extracted by inductive reasoning the classical probability rules from the phenomenology of chance games, today we must accept Born's inductive extraction of the wavelike probability calculus from the quantum phenomenology.

Bell's theorem emphasizes the radicality of the change from classical to quantum chance rules, as did in its days the Veltmann-Potier theorem for the transition from first to second order ether drift effects. This I would stress more emphatically than did Rauscher and Targ: "I see no necessity to 'complexify' the Minkowski space-time scheme in order to accommodate the paranormal" (Costa de Beauregard, 2001); zigzagging causation a la Feynman plus CPT invariance suffices.

1. CPT Reversible Telegraphing and Zigzagging Causation

Consider the Hermitian reversibility $\langle \phi | \psi \rangle = \langle \psi | \phi \rangle^*$ of a *transition amplitude*, that is the *correlation amplitude* between two Dirac (1947) *representations*. These can be timelike distant, a *preparation* and a *measurement* termed *retro-preparation* by Hoekzema (1992), or spacelike distant (Costa de Beauregard, 1983) as *paired EPR retro-preparations* or inversely as *paired interfering preparations*. In all three cases the *stochastic correlation* is tantamount to a *reversibly telegraphed information*; so the fact is that the Born-Jordan computation recipes turn the probability scheme into the code of an *information transmitting telegraph*. CPT reversibility of the code is concisely expressed via Hermitian symmetry: in an x, y, z, ct picture, PT exchanges *bra* and *ket* and C goes to the conjugate.

So, the *quantum mechanical telegraph* emits (prepares, codes) and receives (measures, decodes) Dirac *representations*. Pictured as a Feynman graph, the web *correlating* the pre- and the retro-preparations is not only Lorentz and CPT invariant but also *topologically invariant*. As all pre- and retro-preparations are thus *in mutual touch a la Minkowski* throughout spacetime, telepathy, pre- and retro-cognition are naturally implied without any need of a "complexification." *Zigzagging causation* or, in Cramer's (1986) wording, *transaction* suffices.

2. Bayesian Reversal and Aristotle's Knowledge-Organization Symmetry

Not only the decoding or cognitive, but also the coding or kinetic form of the paranormal is implied in the relativistic quantum formalism. *Information* is, according to Aristotle, a twin-faced concept: *gain in knowledge, organizing power*. Cybernetics updates this, where *coding impresses organization* and *decoding expresses knowledge*. Of course *elementary level coding is psychokinesis, the turning of a concept into a realization*; one must not be misled by the *factlike* (Mehlberg, 1961) appeal to amplification—the drawing of negentropy from the Universal Fall. Already Carnot's heat engine did this, but its driver had to open or shut taps.

Bayes' *reversibility* of conditionals formalizes at one stroke the two Aristotelian symmetries: the *efficient-final* cause one and the *knowledge-organization* one. The grammatically symmetric joint probability of correlated occurrences, concisely written (Costa de Beauregard, 1993) as

$$|A\rangle.\langle B|\equiv|B\rangle.\langle A| = |A\rangle\langle AB| = |AB\rangle\langle B|, \quad (e1)$$

expresses action-reaction *reciprocity* if the correlation is spacelike, *efficient-final* cause symmetry if it is timelike. By definition an essentially probabilistic physics likens statistical correlation to interaction, that is to causation. This horrifies Jaynes (1989) as implying psychokinesis.

3. Decoherence Discards the Paranormal

What has been said survives the Born-Jordan revolution, but something momentous steps in: Realism a la *Cardano-Pascal-Fermat* evaporates—and decoherence rescues it not.

Born likens the probability (of manifestation of the) particle to the intensity of the wave. But amplitudes, not intensities add up physically; they superpose each other and *interfere*. So, the Born-Jordan computation rules proclaim a scientific revolution. The whole paradoxical phenomenology of non-separability follows: reality no more is self-sustaining; it becomes an agreed upon realization.

All this stems from the cross, interference terms, present in the transition probability $\langle\phi|\psi\rangle = |\langle\phi|\psi\rangle|^2$. If mathematical "reality" is thus recovered, *nonseparability* steps in via the *interfering* terms.

So, what is physically recovered is the semblance of a reality. D'Espagnat's (1995) "empirical reality" only is one out of many possible realizations—the one selected by the sort of measurement that has been decided. Elementary level postselection thus amounts to psychokinesis, fixing by will a Bayesian final prior. This Wigner (1967) states tongue in cheek, Wheeler (1984) implies via "delayed choice" examples, and Jaynes (1989) anathemizes.

Today many very professional discussions devoted to decoherence show in detail how the phase relations get in fact lost in the type of experiment considered. But *evidencing* the how is *not* at all explaining the why; in Kuhn's wording this just is "normal science."

Only a paradigmatic change can state what is lost by discarding the phase relations. These, reversibly telegraphed throughout spacetime, connect the preparing and the retroparing physicists—and beyond them all feeling and willing beings.

So what decoherence discards is the paranormal. Far from being "irrational," the paranormal is postulated by today's physics.

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