

Quantum-Everted Meta-Scientific Lensing as an Arbiter of the Hard Problem

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ABSTRACT

A specific modification of metascientific epistemological standards is developed for the purpose of assessing the putative applicability of quantum mechanics to a physical understanding of consciousness. Formal properties of this epistemic alteration are summarized in a virtual construct called the quantum-everted meta-scientific (QuEMS) lens. The feasibility of programming a digital approximation of the QuEMS Lens, inputting well accepted data from mainstream neurocognitive research, and inferring from output the relevance of quantum constructs is proposed.

Key Words: covering law, cunning of the observable, decoherence, eversion, geisteswissenschaften, hard problem, metascience, OrchOR, refutation, thermofield, web of belief

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Charles Percy Snow's notion of a pervasive gap between "two cultures", the "natural" sciences and the humanities, in 20th century modernity has persisted into 21st century post-modernity with new twists. *Naturwissenschaft* as the natural science originally cited by Snow appeared in its classical incarnation to be at least quantitatively well formalized, while *geisteswissenschaften* was regarded, in alliance with the humanities even when empirically pursued, as more qualitative and vague. However, recent perspectives have moved the "natural" sciences by way of quantum "weirdness" into the category of an ontological mystery, while the "human" sciences lately have invested more and more of their principle efforts in the quantifiably formal exactitude apparently promised by experimental neurocognitive

research, molecular-behavioral *evo-devo*, and similar enterprises.

It is indeed increasingly recognized that lack of consensus regarding any comprehensive ontological interpretation of quantum mechanics leaves the underlying metaphysical grounding of formally quantifiable physical phenomena a mystery. Yet it appears just as true that, within the framework of ontology, finding a clear scientific address for qualitative human experience, which Chalmers (1995) has appropriately dubbed *The Hard Problem of Consciousness*, remains refractory to formally quantitative research methods and thus, like quantum physics, metaphysically mysterious. Hence, today's version of Snow's "two cultures" separates physics and the human "sciences" in terms of the respective ontological domains of metaphysical mysteries that they represent, but a window of possible unity is also revealed in the fact that *both* quantum physics and the qualitatively subjective residue of humanism are ontologically opaque to current scientific epistemologies.

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Over the last few decades the desire to build a bridge across what had previously been conceived as an ontologically i. e. substance-dualistically framed gap between the two cultures of natural and human sciences has led some to seize upon the apparently mysterious ontologies of both quantum physics and subjective human experience as indices of a possible link between these different but perhaps finally converging domains of C. P. Snow's "two cultures." Yet to date no firm experimental evidence of a non-trivial role for hypothesized quantum-neurocognitive processes such as "orchestrated objective reduction" (Penrose, 1994) and "thermofield neurodynamics" (Globus, 2003; Jibu and Yasue, 1995; Vitiello, 2001) in the material aspects of macroscopically emergent brain functioning central to consciousness has been confirmed, and thermodynamic objections (Tegmark, 2000) to a non-trivially "quantum brain" empirically verifiable at molecular and larger scales remain thorny problems for those advocating an equivalence of quantum neurophysics and conscious experience.

Is there a way to rule out the notion that "mind is the quantum brain?" This paper proposes a *gedankenexperiment* constructing and utilizing an epistemically counter-quantum filter, perhaps more evocatively called a virtual "quantum-everted lens," whereby quantum epistemology might be "cancelled" in the service of sorting through and dispensing with the question of a non-trivially quantum basis for the mind/brain nexus. If the view of established empirical data sets through that novel virtual epistemic lens were to demonstrate an illusory absence of quantum effects in its filtered distortion of subatomic physics generally, then we would be justified in concluding that the lens works as designed. If the virtual lens-eye view, which should similarly distort previously established macroscopic data sets regarding the sentient brain, were to yield a picture of neurocognition proceeding, like virtually lens-filtered subatomic particles, as a classical mechanism, then we could conclude that quantum effects are nontrivially relevant to the physical organ of consciousness. However, if virtual "counter-quantum" lens "refractions" were to manifest apparent empirical phenomena in the sentient brain deviating from those of classical mechanisms, then we would be forced to conclude that consciousness entails non-quantum processes either of a purely classical nature or

inexplicable in terms of not only classically pre-quantum but also quantum physics. Different kinds of counter-quantum-lensed deviations demonstrated by "refracted" sentient brain findings might thereafter be parsed as specific predictors indicating whether classical or "mysteriously" non-quantum/non-classical processes should be pursued as explanations.

Creating a quantum-everted "lens," though physically impossible through an exact classical instantiation in digital hardware, may nevertheless be approximately achievable at least in the conceptual context of a methodological thought experiment via a meta-Kuhnian leap, whereby the very truth-objectifying epistemology of science as we now find it consensually embraced might undergo both a quantum-formal expansion and a meta-Bayesian eversion. We could most accurately yet succinctly dub the desired *gedanken*-result a "QuEMS (quantum-everted meta-scientific) lens" insofar as it would be required to exchange the quantum-epistemic antipodes of subjective "agency" (measuring operator) and extended "object" (wavefunction).

One might start the project of constructing the QuEMS lens by identifying those standardized methods of practice consensually deemed proper scientific research shaping the collectively epistemological, i. e., Kuhnian delimitations of organized scientific "industry" even in its purest and most abstract exploratory modes. It is arguable that the philosophical structure of all ostensibly scientific epistemologies in circulation today, including not only meta-frameworks for neurocognitive and molecular versions of "human" sciences but even those meta-paradigms by which quantum physics is framed as science, are based, through the computationally digital foundation of contemporary research production, upon analogies to classically mechanistic physical science. So, for example, Hempel's (1965) "covering law" model of hypothetico-deductive scientific inference (law + antecedent conditions = particular predictions) is a quasi-syllogistic analogy to Newtonian mechanics invoking differential equations, their initial/boundary conditions, and their solutions. So, for example, Quine's (1951) meta-science entails an implicit potential-like analogy to Hamilton's reformulation of Newton's mechanics and an isomorphic computational network-like analogy to Gibbs's statistical mechanics, insofar as Quinean epistemology posits conventionalist-enabling "splay" in the critical determinacy of any



experimental “disproof” against which compensatory degrees of freedom may commensurately permit adjusted assumptions of theories whose nodal addresses “neighbor” a tested hypothesis on some non-fractally landscaped, i.e., non-self-referently networked “web of beliefs” generally accepted by a Kuhn-normal mainstream consensus of theoreticians. So, for example, Occam’s razor demanding the simplest explanation of any experimental finding points toward an analogy with the extremal principles of least time in classical wave transmission and least action in the classical Lagrangian functional. And so, for example, Popper’s (1959) model of conjectures and refutations involves an explicit analogy to the Darwinian mechanisms of proliferative variation (conjectures) and natural selection (experimental refutations). It is possible, then, to ask: how specifically might today’s classically shaped meta-scientific conceptual structure, configured through analogies to science rooted in pre-quantum physics, be enhanced by building quantum-expanded meta-structures into the very bedrock of new epistemological pragmatics for both the natural and human sciences to map out a lens which may then be everted for the purposes heretofore outlined?

A specific blueprint for quantum-expanded eversion of the above classical meta-scientific models might proceed as follows:

First, consider an expansion of experimental “reason” into superpositional form and a quantum eversion of such 2-valued non-distributive logic by antipodal displacement of applied superposition from extended objects of measurement to quantum-everted assaying agencies of measurement. Let an experiment testing the relative truth or falsity of a new heterodox hypothesis in comparison to an older orthodox “null” hypothesis follow a path which we may regard as a Lagrangian-analogous functional involving the difference between the orthodoxy framed as conceptually potential-like and the heterodoxy framed as conceptually kinetic-like; one would expect the classically mutual exclusivity of the null and heterodox hypothesis to evolve in a manner that conserves their unitarily Hamiltonian-like total probabilistic truth value. Instead of understanding the experimental process as leading in binary fashion to an either verifying or refuting outcome for the heterodoxy relative to the null hypothesis, we can set up three possible relative truth-valued

outcomes--true, false, and anti-false--and with them a wavefunction converging in a space yielding real probability amplitudes ranging from -1 for anti-falsehood through 0 for truth to 1 for falsehood. This wave-like representation will render the experiment neither a classically nor quantum-“reduced” single Popperian pathway but instead an uncollapsed superposition, analogous to a sum over histories, with the extremum among Lagrangian-like analogies to functionals constituting the “most critical” experimental process possessing a maximal algorithmic depth consistent with Occam’s razor and also analogous to a “simplest” Feynman diagram with the fewest vertices; “detours” representing experimental “paths” progressively more out of phase with respect to the extremum will be superposed as less and less reliable indices of truth or refutation and will incorporate more and more obfuscatingly complex virtual processes.

Next, to formulate a meta-eversion of measurement and the uncertainty principle, one must consider that a kind of double self-reference is involved in the relevant concrete non-everted quantum physics. First, quantum measurement entails Fourier-dual skew symmetry by which either incompatible observable adapted from classical Poisson brackets in first quantization is the Fourier transform of its canonical conjugate; this mirror Fourier inter-transformability is reflexively self-referent. Second, formal implications issue from second quantization’s uncertainty relations between phase and the number of particles created and annihilated; that number in path-integrated sums over histories entails self-interactions and their implicit self-reference. Toward the goals of expanding meta-hypotheses into doubly self-referent form and quantum-everting the relevant non-zero commutator logic by antipodal displacement from the structure of experimental observables as quantum agencies to inter-theoretically “Quine-webbed” architectures as “inside-out” quantum objects, let the Quinean web assume the form of a “Quine-potential” landscape and then take on the attributes of a quantized gauge field. This gauge should compensate, via adjustments of theories “nearby” the Quinean web’s nodal address of a tested (heterodox vs.) null hypothesis, for experimentally non-critical phase deviations from the extremal “functional” of the pertinent critical experiment; the gauge will generate a corrective “kicking back” of non-



critical phase departure into alignment with the extremum. Since a minimal algorithmic depth as in Occams's razor is defined for this superpositional model in contrast with Chaitin's (1975) proscription of a digital definition for generic randomness, and since analogies to increasingly requisite corrective shifts of phases at increasing levels of Feynman-diagrammatic virtualized complexity are postulated, uncertainty relations dictated by non-zero second quantization commutators analogous to incompatibilities of phases versus Feynman-diagrammed numbers of created/annihilated particles should apply. Hence, one can rule out that within a ubiquitously divergent Quine-potential landscape any regions will be differentiable, continuous or even discontinuously discontinuous; instead the landscape will be such that "tangent" spaces are undefinable, and the usual gauge field requirement of local symmetry will give way to skew symmetry relevant to a dual-fractalization of the Quinean "manifold" in a fashion analogous to quantum reframing of classical observables as non-zero measurement commutators expressing uncertainty relations among incompatible operators. A fractal-dual enrichment of the Quinean gauge landscape may then be invoked to develop a model of Popperian "wave function collapse" from which there precipitates, in this abstract epistemological context distinct from the concrete context of an instantiated physical quantum system, not physically observable outcomes per se but a degree of decoherently "collapsed" trade-off between the "sharpness" of arbitrarily valued phase-consonant "proximity" and the "sharpness" of creation/annihilation-plural "distance" relative to the critical-experimental extremum of reliability.

It might be theoretically possible to program digitally an approximation of the above-outlined QuEMS lens and then input into the resulting application raw data already widely accepted as "confirmed" by mainstream protocols hewing to classically analogous meta-scientific standards of epistemology. QuEMS-lensed

outputs "indicating" non-anomalously classical physical behavior of subatomic particles and also non-anomalously classical behavior of sentient brain phenomena would provide support for further development of quantum approaches to the Hard Problem. QuEMS-lensed outputs "indicating" non-anomalously classical physical behavior of subatomic particles but also anomalously non-classical behavior of sentient brain phenomena would suggest a need to abandon quantum interrogations of the Hard Problem and instead pursue, depending on the type of anomaly manifested by QuEMS refraction, classical or "other" alternative paradigms. One possible "alternative" means of further investigating any neurocognitive anomalies uncovered by QuEMS lensing might involve formal vehicles for the "*cunning of the observable*" (Mender, 2013a; 2013b).

References

- Chaitin G. Randomness and Mathematical Proof. *Scientific American* 1975; 232:5:47-52.
- Chalmers D. Facing up to the problem of consciousness. *J Consciousness Studies* 1995; 2:3:200-219.
- Globus G. *Quantum closures and disclosures*. Amsterdam: John Benjamins, 2003.
- Hempel C. *Aspects of Scientific Explanation*. New York: The Free Press, 1965.
- Jibu M, Yasue K. *Quantum brain dynamics and consciousness*. Amsterdam: John Benjamins, 1995.
- Mender D. The implicit possibility of dualism in quantum probabilistic cognitive modeling: a commentary on the work of Pothos and Busemeyer. *Behavioral and Brain Sciences* 2013a; 36:3:298-299.
- Mender D. The cunning of the observable: generalized Fourier duality, the hard problem, and natural kinds of psychopathology. *Quantum Biosystems* 2013b; 5:2:43-53.
- Penrose R. *Shadows of the mind*. Oxford: Oxford University Press, 1994.
- Popper K. *The Logic of Scientific Discovery*. New York: Basic Books, 1959.
- Quine W V O. Two dogmas of empiricism. *Phil Rev* 1951; 60:20-43.
- Tegmark M. The importance of quantum decoherence in brain processes. *Phys Rev* 2000; E61:4194-206.
- Vitiello G. *My Double Unveiled: the dissipative quantum model of the brain*. Amsterdam: John Benjamins, 2001.