

# The Cunning of the Observable: Generalized Fourier Duality, the Hard Problem, and Natural Kinds of Psychopathology

Donald Mender\*

## Abstract

This paper argues that all attempts employing exclusively ontological or epistemological constructs from metaphysics to solve the Hard Problem of consciousness and its attendant Explanatory Gap have failed. An alternative solution, harnessing isomorphisms between axiologically allied notions of risk and agency on one hand and quantum measurement operators on the other hand, is proposed. In order to broaden rigorously the applicability of these isomorphisms beyond canonically conjugate observables, i. e. with an aim of engaging the full phenomenal range of the Hard Problem and Explanatory Gap while leaving inviolate the apparent causal completeness of physics, an “isoqualitative” distortion gauge with “extrinsic” curvature is introduced. Potential relevance of this theoretical construct to the sentient brain’s quasi-continuous “measurement” operations “in vivo” is demonstrated, and possible implications for a future “geometric” nosology of “deviant” consciousness are postulated.

**Key Words:** agency, explanatory gap, Fourier duality, hard problem, measurement, observable, operator, psychopathology, qualia, risk, stream of consciousness.

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## Introduction

Conventional metaphysics has assumed that solving Chalmers’ (1995, 1996) very real and vexing “Hard Problem” of consciousness entails, first and foremost, locating or building a bridge across the “Explanatory Gap” (Levine, 1993) between the epistemological domains of subject and object and/or between the ontological domains of mind and matter. In contrast, criticism (Dennett, 1996) of Chalmers and his allies has suggested that the Hard

Problem and Explanatory Gap are illusory concepts which should be ignored.

It will be argued here that the “illusions” of Chalmers and company in fact identify actual philosophical encumbrances which can be neither waived away by fiat nor effectively addressed under the weight of problematically excess baggage imposed by metaphysical constructs themselves. In particular, a case will be made that the epistemologies of subject and object and the ontologies of mind and matter, in aggregate comprising overelaborated assumptions underlying metaphysical formulations of both the Hard Problem and gap-bridging “solutions,” constitute obfuscating clutter endemically constraining pre-Kantian rationalism,

Corresponding author: Donald Mender, M. D., F. A. P. A.  
Professor of Psychiatry - L. U. de S. University  
Lugano, Switzerland.

Lecturer in Psychiatry - Yale University  
New Haven, CT, USA

e-mail: [donald.mender@yale.edu](mailto:donald.mender@yale.edu)

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British empiricism, pre-existential phenomenology, eliminative materialism, epiphenomenalist emergentism, property dualism, and computational functionalism. It will be demonstrated that the essential residues remaining after stripping away metaphysical embellishments weighing down these philosophical approaches are simply notions of quality and quantity.

Furthermore, it will be shown that effective discourse linking quality and quantity outside the metaphysical rubric of the above monistic and dualistic perspectives is tethered to the notion of practical agency, following the ethical arguments of Heidegger (1996) and Kant (1990, 1991) and that this approach surprisingly finds its most precise instantiation in the physics of quantum measurement. Specifically, latent yoking of quality and quantity in the active concept of a quantum observable operator offers, especially through Margenau's linguistic analysis of measurement, a formally specifiable yet non-metaphysically praxis-oriented means of bridging the Explanatory Gap to solve the Hard Problem operationally (Margenau, 1977).

Such yoking entails those sets of quantum observables whose members are mutually "incompatible," and among these incompatible sets of observables in standard quantum physics the involvement of not only quantity but also quality is most closely approximated by canonically conjugate observables. This paper, however, will attempt to move beyond the qualitative limitations of standard quantum physics and propose a gauge-like distortion operator through which all sets of psychophysical observables ("qualia") may be "warped" into effective alignment with canonically conjugate quantum observables. Design of the relevant distortion operator, by configuring a "gauge curvature" that is "extrinsic" to "non-psychological" systems, will avoid violating the apparent causal completeness of contemporary orthodox physics under ordinary experimental conditions. The result will serve to empower a psychological generalization of

physics yet "hide in plain sight" from conventional physics (Mender, 2013). This ability to hide will mediate the "cunning" of such generalized observables.

Normative criteria suggested by relativistic considerations applied to "cunning" qualia will be developed from the above model. These norms, building into the "gauge" of distorting operators the structure of complex quaternions and algebraic variants thereof, may serve as new demarcations for "natural kinds" of aberrant psychophysics with a conceptual foundation more systematically self-consistent than the ad hoc taxonomies of psychopathology currently in use by mental health professionals (Mender, 2010a).

### **The Failure of Metaphysics to Address the Hard Problem**

The apparent incommensurability of qualities and quantities first took on its metaphysically encumbered guise through the Rationalists at the start of modern philosophy, many centuries before Chalmers labeled that thorny issue as the "Hard Problem" of consciousness and Levine called it the "Explanatory Gap."

Descartes famously framed a historically seminal divide (Descartes, 1993) between qualitative experience and quantifiable material phenomena as an ontologically grounded "substance dualism", but soon thereafter it became clear that, for two different reasons, this Cartesian "solution" to the Hard Problem provided no plausible route for effectively bridging traffic in either direction between mental and material "stuff." First, the Cartesian framework did not in any way address the fact that the physics of the material world appears to be causally complete; hence Descartes' attempt to locate a pathway between mind and matter in the pineal gland was in principle doomed to failure by virtue of that somatic physical structure's causal containment within the material domain. Second, Descartes could not in any natural manner address the question of solipsism, which he himself had raised through the "radical doubt" of his paradigmatic fireside thought

experiment; Descartes' exit from the possibly hallucinatory isolation of his own metaphysically skeptical thinking into a wider external domain of "real" matter could only be guaranteed by the artifice of supernatural largesse, i. e. the "goodness" of God.

Leibniz (1990) attempted a different supernaturally rigged solution to the Hard Problem, and he gave it a name: "pre-established harmony." This gift from the Creator to "the best of all possible worlds" was supposed to guarantee that the perspectives of all mind-like "monads" in the universe, though themselves "windowless," would be divinely pre-programmed to reach quasi-public agreement concerning the perceived evolution of apparent material processes. Tricks used by Leibniz as diversions from any natural bridge across the Explanatory Gap differed in many details from those employed by Descartes, but their underlying supernatural subterfuge was similar: initial conditions set by Leibniz's cosmological sovereign served theologially to sweep the causal completeness of material physics under the metaphysical rug, while ostensible Panglossian "harmonies" papered over the problem of a solipsistic mind.

Spinoza (1992) tried an end run around substance dualism by recourse instead to "neutral monism". He asserted that there is only one kind of ontologically basic "stuff" but postulated that, to the limited sensorium of epistemologically finite human beings, this single substantial foundation may oscillate in appearance between two sorts of pseudo-substances: subjectively manifested mind and objectively manifested matter. Spinoza went further in additionally postulating infinitely many potential pseudo-substances, which humankind's restricted sensoria cannot apprehend but which are fully and exclusively accessible to God's omniscience without distortion. Hence, Spinoza, like his fellow Rationalists Descartes and Leibniz, played a supernatural card, in Spinoza's case by dismissing dualism as an artifact of human finitude and thus, in at least partial anticipation of Chalmers' recent critics,

portraying as mere illusions the Explanatory Gap between the causal completeness of material physics and the solipsistic prison of the individual mind. For Spinoza, these aspects of the Hard Problem were mirages, but he needed the fictive gimmick of a divine sensorium to sell that argument.

Some of the Empirical philosophers offered a few partial insights into the Hard Problem but finally as a group proved no more successful than the Rationalists in definitively bridging the Explanatory Gap.

Locke (1975) recognized that phenomena can be associated with two kinds of attributes, quantity and quality; however, he arbitrarily gave priority to one "primary" kind, quantity, ostensibly objective in nature, and demoted the other "secondary" kind, quality, which he linked with subjectivity, to a putatively derivative status. Locke's asymmetrical assignment of superior rank to ostensibly objective quantities over ostensibly subjective qualities did nothing to address the causal completeness of physics or the challenge of solipsism.

Berkeley's (1988) subjectively idealistic monism, postulating that the only "real" substance is mind and that matter has no existence independent of the psyche, was indeed able to remove the problem of causal completeness in physics by denying the substantiality of matter. However, solipsism was averted by Berkeley only through his reversion back to the Rationalists' well-worn theological sleight of hand; he secured epistemological solidity for matter by deeming it an "idea in the mind of God."

Hume's (1975) radical empiricism threw overboard all ontological references to substances of any kind, either mental, physical, or neutral. In this context, his atomic characterization of perceptions avoided the question of a solipsistically private mind. However, Hume's thinking also sacrificed any sound foundation for principles of causality, which he concluded has no basis whatsoever in reason but is a mere artifact of "habit." Thus causation was displaced by Hume into the domain of putatively unsupportable irrationality and moved from an objective to a subjective

status with no regard for the stubborn persistence of causal completeness in physics as a formal discipline.

### **Agency as a Bridge Across the Explanatory Gap**

Trajectories charted by the Rationalists and Empiricists of early modern Western philosophy all coalesced by the dawn of the 19th century in the work of Kant, who at last comprehensively confronted their accumulated flaws. Kant demonstrated that proofs of God's existence are untenable, that the pure reason of the Rationalists cannot lead us from the subjective domain of phenomena to an understanding of the objectively noumenal "thing in itself," and that empirical experience provides no better guide in this quest than does pure reason (Kant, 1990). However, Kant argued that a route to noumenal objectivity beyond both phenomenological subjectivity and the Humean bounds of causal conundra is in fact available: the map of that journey is extrapolation of individual ethical agency's own "practical reason" to all other possible agents. Kant also argued cogently that this abstract map, i. e. the moral logics of the variously formulated "categorical imperative," would not alone suffice in constituting the journey; a universalized deduction of one's own theoretical duty must, without regard to potentially unpleasant consequences, be concretely translated into tangible practice if there is to be authentic movement past subjective phenomena toward contact with the noumenon (Kant, 1997).

Kant's turn to agency in bridging what Levine subsequently called the Explanatory Gap initiated a radical turn away from metaphysics. In the discourse of Kant, mind and matter, subject and object, and indeed all value-neutral considerations of ontological substance and of epistemological access, i.e. of metaphysical nouns, became subordinated to verbs connected with the axiological freight of volitional agency. The existential phenomenology of Heidegger, building on the ideas of Kierkegaard and inspiring the writings of Sartre, augmented this Kantian subordination of nouns to verbs by

grounding all experience in practical engagement with the world, amidst which agents find themselves "already thrown," and inextricably linking the authenticity of praxis with the intuition of active risk-taking (Heidegger, 1996; Kierkegaard, 1983; Sartre, 1986).

A centrally constructive role for agency and risk has not figured into most other Western philosophical thinking about what is now called the Hard Problem. Schopenhauer, writing soon after Kant, saw willful agency as a perennially blinding, destructive task master rather than the midwife of authentic action (Schopenhauer, 1969). Hegel's (2003) objective idealism buried both agency and risk under the deterministic weight of his historical dialectic, whose materialistic inversion was not liberated from chains of determinism by the political camouflage of Marx's merely exhortatory rhetoric regarding free praxis (Marx, 1992).

During the 20th century, Husserl, author of a pre-existential phenomenology attempting to link subject and object via value-free semanticity, desiccated agency and risk through the methodically mechanical design of his "epoche" (Husserl, 1977). Eliminative materialists (Churchland, 1986) and logical behaviorists (Ryle, 1949), claiming that mind is legitimately comprehensible only in terms of its measurable mechanisms, and emergentists, arguing that mind's supervenient (Davidson, 1980) properties emerge from and depend on yet cannot be causally turned back upon the physics of matter, have shared an inability to explain exactly how agency differs from deterministic and random causality; emergent epiphenomenism in particular has failed to explain how agency might reach down to influence an object such as a purposefully moving hand or a brain-encoding gene undergoing natural selection toward phenotypic sentience. Most recently property dualists like Chalmers (1995, 1996) himself, harking back through dual aspect ontology to Spinoza's epistemology and through panpsychism to Spinoza's pantheism, have in the absence of recourse to Spinoza's risky leap of "God-intoxicated" faith

effectively ignored agency, while functionalists (Fodor, 1975), positing in the ontological middle ground of mental "software" their own transformation of Spinoza's neutral monism, have straightjacketed any wiggle room for agency within an immaterially mechanistic concept of algorithmically determined causation.

### **Risk, Agency, and Quantum Measurement**

Yet, while non-existential post-Kantian philosophy of mind has in many regrettably important ways retreated backward toward pre-Kantian metaphysics and away from the centrality of non-deterministic agency in confronting the Hard Problem and bridging the Explanatory Gap, physics has advanced in a quasi-Heideggerian direction, eschewing the "common sense" of classical metaphysics while embracing both active agency and indeterminate risk in the metrically instrumental yoking of qualities and quantities.

Pre-quantum physics began this advance through Bridgeman's "operationalist" proposal that physical theories are no more than compressed summaries of aggregated experimental procedures (Losee, 2001). Something close to this idea was later asserted by the mathematician Bronowski when he wrote that physical laws always entail active verbs; those laws are never merely predicative statements of identity but necessarily describe or predict what will happen when something is done to a system (Bronowski, 1977).

Before the advent of quantum mechanics, characterizations of classical physics along the lines advocated by operationalism could be debated. However, after the quantum paradigm attained dominance over antecedent classical laws, which came to be seen as a limiting case of quantum principles, the active nature of the physical observable could scarcely be doubted any longer. This change ensued by virtue of a formal contrast between mathematical expressions denoting classical versus quantum observables.

Observables could be captured by the pre-quantum physics of Newton and later Hamilton as variables in an equation. For example, the classical observable "momentum" could be expressed through the quantitatively unconstrained component variables  $p_x$ ,  $p_y$ , and  $p_z$  in relevant equations, and these variables might each then assume in particular cases some specific quantitative amount of the germane "quality," dimensionalized as a component measurement of momentum. The role of the observables "possessed" by the applicable equations was conceived quasi-linguistically as that of an object-noun playing no active role in influencing the numerical outcome of an experimental measurement but rather only passively defining the qualitative dimensionality of the target observable being quantitatively measured.

Quantum mechanical observables, however, must be expressed not as variables in equations but as operators on functions. Each quantum operator has an active role in impressing upon its corresponding function the quantitative stamp of the observable "quality" latent within that particular operation of physical measurement and can constrain a priori the range of observable magnitudes read out in the resulting measurement. Hence, as Margenau (1977) has pointed out, a quantum operator serves more as a "verb" than as an object-noun within embedding mathematical "sentences." It is important to note that one does not need to introduce into this grammatical analysis any ontologically freighted reification of a subject-noun along the lines controversially suggested by Von Neumann and Wigner, who debatably inferred that the originator of quantum measurement must be a conscious mind (Albert, 1992; Mender, 2010b). Grammatical necessity (Margenau, 1977; Schneider, 2005) dictates only that, in the operator-verb form of a quantum observable, active practical agency, not necessarily emanating from the metaphysical baggage of a quasi-Cartesian mental substance, is entailed.

The "verb" that is a quantum operator defines the qualitative

dimensionality of a relevant measurement much as the "object-noun" that is a classical observable variable does; however, the quantum operator-verb, unlike the classically observable object-noun, acts in two uniquely non-classical ways to influence the quantitative outcomes of measurement (Albert, 1992; Coughland and Dodd, 1991). First, quantum measurements "collapse" the physical objects, represented in terms of probability amplitudes by so-called wavefunctions, on which the observable operators act; the effect is concretely quantitative yet also completely non-deterministic, selecting one element at random for post-collapse survival among all the superposed components of the pre-collapse wavefunction. Second, some combinations of quantum observables engender such collapses in ways that are mutually "incompatible"; that is, if one of two incompatible observables is measured with a particular degree of precision, then the exactitude with which the other observable in that mutually incompatible set can be simultaneously measured will be commensurately degraded. Both the first and second above-mentioned distinctly post-classical quantum influences of observable operators on quantitative aspects of measurement outcomes entail irreducible uncertainty, mathematically echoing Heidegger's phenomenologically expressed notion of the practical risk inseparable from authentic existential engagement.

### **Psychophysically Gauged Expansion of Canonical Conjugation**

Mutually incompatible observable operators display mutual algebraic relations that are "non-commutative"; that is, changing from AB to BA the order of operators A and B alters the value of their multiplicative product. Only some sets of observable operators, such as those together operationalizing position and momentum observables, but not others, such as such as those together operationalizing position and time observables, are incompatible; compatible quantum observable operator sets, like those drawn from among all classical

observable variables but unlike those of incompatible quantum observable operators, impose no mutual limits on the precision with which both operators in any set can be measured (Albert, 1992; Coughland and Dodd, 1991).

Among the sets of quantum operators whose members are mutually incompatible is a subset with special characteristics. This very particular sub-category is comprised of the canonically conjugate observables, whose interrelations display the property of Fourier duality. Fourier-dual observables are each other's Fourier-transforms, a reciprocal relationship exhibiting a form of invariance known as skew-symmetry or antisymmetry, whereby exchange of a function's arguments reverses the sign of the function's value. Fourier-dual reciprocity between canonically conjugate observables harks back to their pre-quantum derivation in the "Poisson brackets" employed by Hamilton's reformulation of Newtonian physics, but Fourier-duality assumes the active post-classical significance inherent in observable operators uniquely through the outcomes of quantum measurement: for any two canonically conjugate quantum operators C and D, a "sharp" statistical distribution of measured values for C imposes the stamp of a sinusoidally varying probability amplitude upon D, and visa versa (Albert, 1992; Coughland and Dodd, 1991; Penrose, 2005).

The above Fourier-duality between canonically conjugate quantum observables is a potentially significant connection whose symmetry can be psychophysically exploited through quantum agency in addressing Chalmers' Hard Problem and bridging Levine's Explanatory Gap. A reason to focus on this specific incision point of psychophysical exploitability is that qualities implicit in canonically conjugate quantum observables, as opposed to other sets of mutually incompatible quantum operators like particle number and wave phase, may be understood through their pre-quantum origins to derive from classically dynamical intuitions of qualitative experience, i. e. observable

"energy" from experienced effort, observable "time" from experienced duration, observable "position" from experienced location, and observable "momentum" from experienced inertia.

It is also true, however, that the exceedingly limited list of qualities which can be considered canonically conjugate by no means exhausts the possibilities of qualitative experience, insofar as the product of elements (e. g. energy X time, momentum X position) within any set of canonically conjugate observable qualities must have the dimensionality of "action" (Margenau, 1977), i.e. of Planck's constant at the foundation of quantum physics. In contrast to this qualitative constraint on canonically conjugate observables, subjective experience in general can include any "quale" from a salty taste to a crimson hue to the feeling of maternal love to the excitement of scientific discovery. All such supposedly "non-physical" experiential "qualia" may theoretically be assigned quantitative ranges of observable numerical intensity values in a pre-quantum manner, as was actually attempted empirically by the classical psychophysicists Weber and Fechner (Mender, 1994); a statistical (Kroger, 2005) interpretation of quale intensity may even be amenable to mathematical modeling by the linear superpositionality of ersatz "psychological" wave functions, as has recently been suggested by Pothos and Busemeyer (2013). However, except for those subsets of experienced qualia approximating canonically conjugate quantum observables, i. e. yielding products with the physical dimensionality of "action," no "psychophysically" quantified qualities may be assumed ad hoc to interrelate either non-commutatively or in Fourier-dual fashion.

It therefore appears potentially productive to try pushing back the formal constraints of quantum mechanics at the "incision point" of canonically conjugate quantum observables by constructing a gauge-like (Georgi, 1981; Icke, 1995; Mender, 1994; t'Hooft, 1980; Weyl, 1952) qualitative distortion operator, through which a wider range--perhaps all sets--of possible psychophysical observables might

be "warped" into effective "isoquality" with "action" as a product dimension. It would be expected that in one limiting special case, applicable to canonically conjugate observables themselves, the effect of this warping operator must vanish, while for other sets of "qualia" commensurately non-negligible distortion is required. It also seems vital that the architecture of the relevant distortion operator should conform to the requirement that orthodox quantum mechanics, under those conditions ordinarily assayed by experimental physicists, not violate the apparent causal completeness of conventional physics, and thus the qualitative "warping" should be configured with a "gauge" curvature that is "extrinsic" to "psychologically irrelevant" preparations of physical systems in the laboratory (Mender, 2013). The hoped for goal of all these requirements is a psychophysically serviceable generalization of Fourier-dual noncommutation enfolding "purely" psychological observables accessed by a distortion gauge which, because its curvature is extrinsic, "cunningly" hides itself from so-called non-psychological physics "in plain sight," much as the veil of Maya for Schopenhauer constituted the "cunning" of the will and occult aspects of the historical dialectic for Hegel comprised the "cunning" of reason (Hegel, 2003; Schopenhauer, 1969).

We can visualize a "toy" model of the required extrinsic gauge by way of geometrical analogy. Consider the skew-symmetric "space" of canonically conjugate Fourier duality to be a flat plane. One may then think of this plane as potentially tangent to any point on a smoothly bending two-dimensional surface whose warping "curvature" might be either intrinsic or extrinsic to the bent manifold's geometry. If warping bends the manifold into the surface of a sphere, then the corresponding curvature will reveal itself intrinsically: triangulated "surveys" conducted entirely within the curved two-dimensional surface of the sphere without recourse to a third "depth" dimension will yield a total number of degrees differing from the value of 180 degrees expected

when summing the three vertex angle magnitudes of any single assayed Euclidean triangle. However, if warping bends the manifold into the surface of a cylinder, then the corresponding curvature will manifest itself only extrinsically, i. e. in the third dimension, insofar as an intrinsically limited survey will yield a number exactly equal to 180 degrees, a value indistinguishable from that obtained within the flat Euclidean tangent plane (Sklar, 1976).

The above "toy" geometry suggests the possibility of extending the Fourier-dual mutual incompatibility of canonically conjugate quantum operators to all sets of "qualia," yet extrinsically hiding "psychological" aspects of that extension from "intrinsic" physical detection, by structuring the applicable gauge-like distortion operator to "bend" the quasi-planar skew symmetry of canonically conjugate observables into a "non-flat" conformation whose "curvature" is analogous to the surface of a cylinder rather than a sphere. One might reasonably expect that such an "extrinsic warping" can serve to generalize the Fourier duality of canonically conjugate qualities to all "qualia" in a manner making the agency of quantum measurement formally Fourier-dual in every realm of psychophysics while preserving the "intrinsic" appearance of causal completeness exclusively within physical domains not traditionally quantum-assayed for psychological "qualia."

### **Floppy Psychophysics and the Stream of Consciousness In Vivo**

An important mathematical caveat exists regarding the above analogy: for "flat" skew-symmetrical vector spaces, as opposed to the over-simplified "planar toy" of a symmetrical vector space, no uniquely curved manifold is capable of providing the geometry to which a "tangent plane" can be plausibly and consistently affixed. Instead, the manifold to which a skew-symmetrical vector space may be considered "tangent" must exhibit "floppiness" and "torsion," features imposing constraints on the determinacy

of the manifold's conformation (Penrose, 2005). The fact of this apparent technical problem, however, also opens up avenues of possible solution which may illuminate the relationship of discontinuous quantum measurement in the "non-psychological" experimental physics laboratory to the continuous stream of "in vivo" human consciousness.

We can attempt mathematically to address the non-uniqueness of "floppy" manifolds to which the skew-symmetrical vector space of Fourier-dual canonically conjugate observables might be deemed suitably "tangent" by expanding our inadequate notion of a uniquely curved manifold into an ensemble of multiple manifolds. Whereas passage from the "flat tangent plane" to a single curved manifold might be accomplished by conventional integration, transition from the skew-symmetric vector space to a "floppy" manifold aggregating an ensemble of divergent possibilities suggests as a more adequate mode of integration the probabilistically enhanced, set-theoretically generalized integration method of Lebesgue (Kramer, 1981). This more powerful line of attack endeavors to resolve the ambiguities of discontinuous pluralities in a manner that yields convergently quasi-continuous outcomes; Lebesgue-style integration may therefore potentially map a route leading beyond the "in vitro" discontinuously discrete measurements of traditional quantum mechanical laboratory assays and point toward effectively continuous measurements of the world by an "in vivo" stream of consciousness. The continuous in vivo mode of measurement might be expected to unmask, perhaps along with remote and subtle empirical effects on predicted vacuum energy values (Carroll, 2010), those "cunning" qualia whose Fourier-dual interrelations would otherwise "hide in plain sight" under the in vitro conditions of discrete measurement imposed by the controlled experimental paradigms of "non-psychological" physics.

Set-theoretically probabilistic integration's engagement with the "floppy" problem of divergent pluralities also dovetails with possible contributions by



geometrical "torsion," suggesting additional potential tools for bridging the Explanatory Gap. Commensurate enhancement of integration should aim at reconciling "non-categorically" (Kline, 1980) ambiguous plurality in a fashion that simultaneously compresses and dilates measures of sets; Bose-Einstein and Fermi-Dirac statistics together applied not to objects of measurements but to acts of measuring agency (Mender, 2007), whose torsionally divergent phenomenology should be empirically revealed by measurement operating at the effectively continuous in vivo frequencies of streaming consciousness, may instantiate such set-theoretically compressive/dilating reconcillation. Torsion meanwhile should introduce a continuously discontinuous "twist" with novel spin-like properties, detectable in vivo, into the dynamics of continuously active measuring agency. It may thus be possible, through Lebesgue-like integration expanding the skew-symmetric vector spaces of canonically conjugate observables into extrinsically curved manifold ensembles, to infer otherwise unanticipated transformations of spin-statistical relationships manifesting novel aspects of supersymmetry which, during the discrete in vitro measurements traditionally made by "non-psychological" physicists, have remained "hidden in plain sight." Some of these supersymmetrical aspects may imply previously unexpected relativistic (Coughland and Dodd, 1991; Freedman and Van Nieuwenhuizen, 1978; Gambini, 1996; Green, 1986; Smolen, 2001) "lensing" effects upon wavefunction frequencies (Mender, 2008, 2011), perhaps leading to a new post-metaphysical variant of Penrose's "objective" gravitational collapse hypothesis (Hagan, 2002; Hameroff and Penrose, 1996; Penrose, 1989, 1994), modified to handle a continuous in vivo stream of consciousness.

### **Normative and Psychopathological Gauge Structures**

The possibility of quasi-Penrosean "lensing" influences on the scale of wavefunction frequencies raises normative

questions about the psychophysics of qualia. Such axiological issues arise insofar as somatic concomitants of "healthy" consciousness appear biologically to derive nourishment from electromagnetic negentropy at "green"-reflective (i. e. red-absorptive) frequencies (Mender, 2011). A natural set of psychophysical criteria for "normal" qualitative experience and its associated quantum agency might thus be sought in "green" scaling adjustments imposed on the noise of "brown" photon-waves by floppy/torsional relativistic effects of measurement agency potentially operating in vivo through a continuous stream of consciousness.

As a starting point in the elucidation of "naturally" normative schemata for mathematically distinguishing "psychophysically healthy" from "psychopathological" distortion operator blueprints, a temporary return to the toy model of a cylinder will be useful. The extrinsic curvature of the cylinder's surface in comparison both to the intrinsic curvature of the sphere's surface and to the null curvature of the flat plane relates to differences among the expressed symmetries of the three applicable geometries. The plane is globally symmetrical with respect to invariance of shapes whose component points are each shifted the same distance and direction within that flat surface. The surface of the sphere is symmetrical only to the extent that, once a "gauge" compensating for curvature-related changes of angles is applied in locally varying ways to each different point of the shifted shape, the same invariance can be inferred for all points; we may call this a local rather than a global symmetry. The surface of the cylinder demonstrates an apparent symmetry similar to that of the plane, but this similarity is not comprehensive: figures shifted along a looped path across the entire cylinder's surface in the direction of non-flat "extrinsic" curvature will be reduplicated topologically; this reduplicative effect can be understood in terms of global symmetry breaking (Georgi, 1981; Icke, 1995; Mender, 1994; Weinberg, 1952). Variations in the

topology of the cylinder's surface and its symmetry breaking will be generated by bending the cylinder's ends together to form the donut shape of a torus, and adding additional pretzel-like holes, i. e. changing the "genus" of the manifold (Kramer, 1981), will add further topologically symmetry-breaking variants. If we frame global symmetry breaking in quantum mechanical terms, then the surface of the cylinder together with its various geni may be conceived as wave function frequencies, each genus representing a different pure "overtone" of a fundamental cylindrical "pitch." Here symmetry breaking serves to fracture the symmetrically heterogeneous cacophony of a multifrequency-superposed wavefunction into the resonant shards of its component parts.

How can the above "toy" structure, built from the oversimplified, limiting assumption of a symmetrical vector space, be extrapolated to address the richer problem of a globally broken skew-symmetry with normatively "green" and psychopathologically "brown" implications for the psychophysics that this paper has tried to develop? Toward that more challenging end we can again employ the notion of an ensemble. One may now at least heuristically think of the ensemble not as a "floppy" collective of manifolds but instead as a multi-channeled set of parallel "measurement" portals into Everett's multiverse (Barrow and Tipler, 1986; Deutsch, 1997; Gale, 1981; Gardner, 1986; Smolin, 1997). A specific subset of the multiverse can be parsed to comprise all those universes with homogeneously "green" electromagnetic properties constituting the residues of diversely superposed wavefunction frequencies whose heterogeneous symmetry anthropically appears to be broken by "greening" measurement agencies (Mender, 2011). The aggregate of all such anthropic "greening" agencies subsumes among its own subcategories not only discrete measurement operators culled from "non-psychological" physics but also "hyperanthropic" measurements flowing from continuous streaming of consciousness in vivo. One might then

expect this continuously generated subcategory of conscious "green" measurement to demonstrate, by virtue of its in vivo continuity, quasi-Penrosean relativistic lensing effects of novel spin-statistical relationships implied by the floppy torsion of globally symmetry-breaking "cylindrically" generalized quantum observables embracing "qualia."

Operator architectures normatively distinguishing psychologically healthy "greening" from psychopathological "browning" thus may involve hyperanthropic distortion matrices that incorporate complex quaternions (Henle, 1997) with locally Lorentz-invariant (Coughland and Dodd, 1991) properties required for lens-like general-relativistic effects. Algebras of quasi-Penrosean singularities, wormholes, and other inferences from "deviant" general-relativistic geometries might thereby suggest themselves as models for "sick" variations (Mender, 2011) in the distortion operators. These geometrical deviations, "naturally" culled from analogies to Klein's Erlanger Program (Kramer, 1981), could lend "haecceity" (Mender, 2010a) to a generalized quantum psychophysics of mental illness.

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