The Journal of Mind and Behavior
Autumn 2002, Volume 23, Number 4
Pages 351–374
ISSN 0271–0137

Nature's Psychogenic Forces: Localized Quantum Consciousness

L. Frederick Zaman III

Neural Engineering Research & Development

Hill Air Force Base

It has been suggested that the quantum fluctuations of the microworld may constitute or be caused by an elementary consciousness in nature that could be the source of brain–mind consciousness as well. This essay explores the possibility that the espoused quantum consciousness, when the identity "localized quantum fluctuations" ≡ "conscious force classically manifested" is assumed, extends upward into the macroscopic world of classical physics via the "classical approximation" of the Ehrenfest theorem. Newton's laws of motion then define localized forces of consciousness that are psychogenic rather than mechanistic, which are immanent, intentional, and self-directed. In this quantum-inspired, idealist reinterpretation of classical physics, gravitational, electrical and other fields in space–time are information supplied rather than force applied, to which matter's psychogenic forces purposefully and lawfully respond. Consciousness and change (fluctuation, oscillation, flow, movement, etc . . .) are then an identity, whether the change is quantum (and non-local) or classical (and local) in character. The calculus of Newton and Leibniz in this quantum idealism is of and by conscious beings, rather than blind mechanisms. When consciousness is thus understood, our being is a more ordered form of matter ensouled by psychogenic forces explained by more refined systems of physics.

A series of papers in a special 1995 edition of the *Journal of Mind and Behavior* argue that psychology is being held back by the conventional "Newtonian meta-paradigm" regarding what is valid scientific explanation (Roth, 1995, p. 96). The authors of these papers (Faulconer, 1995; Leahey,

I am indebted to Peter Gibbs and Don and Doran Baker for discussions on physical causality. I am also grateful to Val Lofgreen, Lloyd Allred, Warren Kraft, and Charles McPhee for their interest and support. I am especially grateful to Gary Kelly for his encouragement and unfailing support. Also, special thanks to editor Raymond Russ for numerous, extensive comments and recommendations during the review stages of this paper. Requests for reprints should be sent to Fred Zaman, OO–ALC/MASAD, Hill Air Force Base, Utah 84056–5205. Email: frederick.zaman@hill.af.mil

1995; Slife, 1995a, 1995b; Vandenberg, 1995; Williams, 1995) sought ways to divest themselves of their Newtonian heritage, to find some way to "separate psychology from its troubled Newtonian legacy" (Roth, 1995, p. 88). Dissident psychologists and other social scientists have had to "put up or shut up," which generally they have been unable to do (put up) in an intelligible way, so the Newtonian meta-paradigm nevertheless persists for lack of a clear alternative. The contributing authors to the special edition attempted in various ways to expose and liberate psychology from the grip of Newton's mechanistic-turned-positivistic meta-paradigm.

In this essay we do essentially the same thing, but in a different way — by attacking the meta-paradigm on its own ground. We seek to provide an adjunct in science to the Newtonian meta-paradigm of blind, externally-impressed force, which will be a more psychologically relevant quantum meta-paradigm in which causality is based on forces that are psychogenic and conscious. It may turn out that the blind, mechanistic understanding of force demanded by Newtonian mechanics has been a major factor in psychology's inability to become science truly. Will the physical sciences ultimately allow psychogenic forces, regarded as a quantum meta-paradigm of classically manifested consciousness, within their domain of inquiry? The answer to this question, whatever it is, may turn out to be irrelevant to psychologists and social scientists, and perhaps biologists as well. The important thing is that the life sciences, psychology and the social sciences in particular, ultimately find a meta-paradigm that understands life on its own terms, wherein the physical world and our consciousness and personal sense of being cohere in a way that science can understand objectively.

This paper, through a mechanism by which elemental consciousness hypothesized at the quantum level propagates upward into classical systems as conscious, psychogenic force, considers the conceptual significance of the microworld's quantum reality for the common sense understanding of classical physics (mechanistic worldview) informed by the long-standing Newtonian meta-paradigm. That has not been done previously, perhaps because of both the long-standing correspondence principle and logical positivist metaphysics of quantum mechanics. These precepts, which have guided quantum mechanics' theoretical development, have effectively insulated the Newtonian meta-paradigm of force (within classical physics itself) against any serious questioning by theoretical developments in quantum mechanics. The alternative quantum-based meta-paradigm of psychogenic force developed here, however, is not limited by these precepts and does consider the potential significance of quantum reality for the classical Newtonian worldview.

The reader is assumed to have some familiarity with Newton's laws of motion, so that the discussion doesn't have to begin at the beginning insofar as the basic principles of matter and motion are concerned. Those generally

familiar with Newton's laws of motion thus can be expected to gain a useful understanding of the espoused evolution of physical thought — toward a non-mechanistic view of natural causation. But it is hoped as well that this discussion, which will be more difficult to those unfamiliar with these principles, will motivate the latter readers to familiarize (or re-familiarize) themselves therewith. There are many college texts that can be useful in this regard, such as Serway and Faughn (1999) or Fowles and Cassiday (1999). And then can one, paradoxically, begin to understand how nature's causality in truth may be non-mechanistic rather than mechanistic.

The non-mechanistic, psychogenic view of force espoused here is essentially a variant of panpsychism (everything is conscious at some level) in which the mathematical principles of Newtonian mechanics determine accelerative forces that are always and everywhere conscious. The view espoused, that the forces of nature mathematically described by Newton's laws of motion are conscious and psychogenic rather than blind and mechanistic, is consistent in a general way with various, panpsychic-related perspectives of quantum consciousness, including A. Cochran (1971), C. de Quincey (1994), Goswami (1990, 1993, 1995), and Walker (2000).

The Ehrenfest Theorem

Force is paramount in the Newtonian worldview because it is responsible for every motion in classical mechanics other than a body at rest or uniform movement along a straight line, which is virtually never observed in the real world. The absence of force, as described by Newton's first law of motion, is a theoretical abstraction that essentially is never encountered except as a mental exercise that facilitates understanding what force is, and what happens where it does not exist. On the other hand, in quantum mechanics, the concept of force is a mathematical formalism only, a useful fiction that physically does not exist. The forces seemingly apparent in the Newtonian worldview are explained (their causality is explained away) through the "classical limit" in quantum wave mechanics — the condition at the interface between the quantum and classical worlds described by what is known as the Ehrenfest theorem. Which view is correct? Physicists regard quantum mechanics as more fundamental, so the Newtonian concept of force has been reduced in physics to a mathematical model that is useful but nevertheless cannot be regarded as presenting a true picture of reality.

The correspondence principle of quantum mechanics, as stated by Albert Messiah (1958, p. 29), is that classical theory in physics is macroscopically correct, so that *quantum theory then must approach classical theory asymptotically in the limit of large quantum numbers* (the classical approximation). In order that this principle might be fulfilled, one in addition establishes in

principle *that there exists a formal analogy between quantum theory and classical theory*. This correspondence between the two theories in the classical limit persists down to the smallest details and must serve as guide in the interpretation of the results of the new theory. The Ehrenfest theorem (pp. 216–218) is then the result of applying the correspondence principle to the motion of macroscopic objects described by classical mechanics.

The theorem gives the law of motion of the mean values of the coordinates q and the conjugate momenta p of a quantum system. It stipulates that the equations of motion of these mean values are formally identical to the Hamiltonian equations of classical mechanics, except that the quantities which occur on both sides of the classical equations must be replaced by their average values. And quantum analogs of Newton's laws of motion then can be derived from the above Hamiltonian equations for quantum systems. Under the conditions in which these equations are valid, which is when the wave function [of a quantum system] remains localized in a sufficiently small region of space [the classical limit of quantum mechanics under these conditions] so that the force has a practically constant value over that entire region, the quantum fluctuations of the microworld are in essence transformed into macroscopic forces.

The region of space described by the Ehrenfest theorem is mathematically a highly localized "wave packet," with a mean value for position, momentum, and force at the classical level that conforms to Newton's laws of motion. The quantum particle itself may be found anywhere within the wave packet, however; and its apparent jumping around within the localized space bounded by the wave packet, which is due to the Heisenberg uncertainty principle rather than to classical forces, is a non-deterministic motion sometimes called translocation. The classical force present is then applied to the wave packet rather than to the particle, which approximates the classical particle in Newtonian physics. When the fluctuations of a quantum particle are restricted to a wave packet satisfying the Ehrenfest theorem, which establishes the conditions for the classical limit or approximation, the particle motion becomes essentially continuous and conforms to Newton's laws of motion.

The mechanism I propose for propagating an elemental non-local consciousness at the quantum level upward into classical systems as localized psychogenic forces of consciousness is the classical limit of quantum mechanics defined by the Ehrenfest theorem. The elemental consciousness hypothesized to be associated with quantum fluctuations (Goswami, 1995, p. 60; Walker, 2000, pp. 136–138), where the fluctuations are localized within a wave packet according to the classical approximation, is thereby transformed into localized forces at the classical level that are conscious and psychogenic. The Ehrenfest theorem then becomes a conceptual tool for generally interpreting forces at the classical level in terms of the quantum-level conscious-

ness espoused by Goswami, Walker, and others. The quantum origin of macroscopic forces allowed by this theorem thus supports the thesis that the quantum consciousness of Goswami–Walker is locally manifested in the macroscopic world as accelerative forces that are conscious and psychogenic.

What about the observer in quantum mechanics? Where is it then located and of what does it consist? The observer of a quantum experiment, quite simply, is the "measurement apparatus" represented by the associated classical system that monitors and records the experiment results; but whose forces are psychogenic in which a localized consciousness arises in the classical limit of quantum mechanics, where particle motion becomes essentially continuous and conforms to classical mechanics. The quantum consciousness of Goswami–Walker then, emerging at the classical level consistent with the Ehrenfest theorem, is restricted to quasi-classical wave packets; and the observer consciousness required by quantum mechanics is fulfilled at the classical level by psychogenic forces immanent within the measurement apparatus.

What about the physicist as conscious observer? The physicist as observer, who when present is part of the classical apparatus comprising a quantum measurement system, is found in the conscious, psychogenic forces of the physicist's classical brain–mind system (Goswami's terminology). The human observer in the classical world, along with the non-human measurement apparatus of a quantum experiment, thus together possess the consciousness required by quantum theory — by means of the psychogenic forces in their respective classical systems. What we obtain, when applying the Ehrenfest theorem to a quantum-based theory of localized forces of consciousness operating at the macroscopic level, is a perspective of nature that is strongly counter-mechanistic even in classical physics.

The correspondence principle of quantum mechanics, of which the Ehrenfest theorem is only one example, thus can be a double-edged sword in some cases: for while it has been used very effectively to insulate classical physics from the uncertainties and weirdness of the quantum world, it also can be used in the reverse direction to revisit the metaphysical foundations of classical physics — which up to now has not occurred. It is argued here that the mechanistic, externally-impressed forces supposedly required in nature in order for Newton's laws of motion to apply, which is a long-standing meta-paradigm that can be called "classical materialism," is not the only way in classical physics to view natural causality. The idea that nature's forces can only be mechanistic is simply wrong and should be expunged from science altogether. This criticism does not apply to Newton's equation of motion and supporting experimental evidence, however, which we shall see can have other idealist, psychogenic-based interpretations. And perhaps thereby can psychology be liberated from the crass materialism of Newtonian mechanics as presently interpreted.

The objective of this paper is to replace the classical materialism of externally-impressed force, particularly in psychology and the social sciences, with an alternative meta-paradigm of quantum idealism where force is conscious, psychogenic, and internally-impressed. These are localized forces of consciousness in the macroscopic world that arise out of the microworld's quantum consciousness through the Ehrenfest theorem, wherein the identity "localized quantum fluctuations" ≡ "conscious force classically manifested" always applies. This quantum-based, psychogenic approach to classical physics nevertheless retains the well-established mathematical and empirical foundations of Newtonian mechanics. Consciousness and change (fluctuation, oscillation, flow, movement, etc . . .) are simply different terms for the same entity, whether the change is microscopic or macroscopic, non-deterministic or deterministic. That is, however and wherever a change is manifested in nature, whether labeled fluctuation, oscillation, flow, mechanical displacement, etc . . . , it is everywhere and always manifesting some form of consciousness however elemental or complex. The calculus of Newton and Leibniz, in this quantum idealism, is the calculus of and by sentient beings rather than blind mechanisms.

Newton's original laws, as stated by Roger G. Newton (1997, p. 13), are given here for reference:

(1) When no forces act on an object, it remains at rest or in a state of uniform motion.

(2) Acceleration — changing the state of rest or uniform motion of an object — requires the action of a force of a magnitude proportional to and in the same direction as the acceleration, the constant of proportionality being the object's inertial mass; in mathematical form, the law[1] is written as $\mathbf{F} = m\mathbf{a}$.

(3) To every applied force there is an equal and opposite force of reaction.

I will argue that all phenomena to which these basic laws of physics apply are manifestations of nature's consciousness, because the non-local consciousness of quantum systems is effectively transformed through the Ehrenfest theorem into macroscopic forces of classical physics that are localized, conscious, and psychogenic.

[1]Bold face variables in the force equations of this paper denote vectors, while italics denote scalars.

Quantum Idealism

Quantum Consciousness and Will

There appears to be emerging out of the quantum worldview a physical basis for consciousness and will, which represents a quantum idealism that contrasts strongly with the classical materialism of conventional physics. One of the earlier presentations of quantum idealism was given by Albert and Loewer (1988), which describes quantum mechanics at a very basic level in terms of a many-minds theory wherein physical systems are sentient. More recent efforts in this direction have been made by Amit Goswami (1990, 1993, 1995) and Evan Harris Walker (2000). These works clearly suggest the possibility of developing a quantum idealism as an alternative to the prevailing classical materialism.

Here we shall develop quantum idealism via the classical approximation of the Ehrenfest theorem (Cassels, 1970, pp. 24–25; Houston, 1959, pp. 67–71), which propagates the non-local mind and will of the quantum microworld locally upward into the classical macroworld. The microworld's localized quantum fluctuations are effectively transformed into conscious macroworld forces that conform to Newton's equations of motion reinterpreted psychogenically, so that the forces of what are now regarded as mechanistic systems are conscious even at the most elementary levels. These forces are immanent and lie wholly within the particle or body in which they originate, and respond to various fields originating from the outside (gravitational, electromagnetic, etc . . .) as information. But their responses nonetheless are determined by Newton's laws of motion and whatever laws govern the fields involved — appropriately restated in informatic terms.

In quantum idealism thus defined, the physicist qua person is unnecessary for the measurements of quantum experiments, because the consciousness required by theory is objectified in nature and self-contained within the experimental apparatus. The conscious observer that collapses the quantum wave function and makes the necessary quantum measurement lies wholly within the experimental apparatus itself. In this quantum idealism the classical approximation of the Ehrenfest theorem directly extends the quantum consciousness of microbodies (quantum particles) into macrobodies (classical particles) by transforming the blind, externally-impressed forces of classical physics into empirically equivalent forces that are conscious and self-impressed.

However, the physicist clearly can be a part of a quantum experiment's measurement apparatus as well in quantum idealism. Goswami proposes that the brain–mind is a macroscopic quantum system in which the wave function expands as a coherent superposition of states, out of which the quantum

brain–mind selects one state for realization (1993, pp. 161–175). The quantum waves available are various neurophysical states that are initiated quantum mechanically, rather than classically. So, when the brain–mind system makes a choice, the system's superposition of states collapses and a quantum measurement is made that reduces the brain–mind to a single state. The psychological event that occurs upon state superposition collapse is an awareness of something (primary stimuli, memory, etc . . .) that previously was not conscious. Conditioning in the brain–mind gives rise to the classical processes of the behavioral and cognitive sciences (1993, p. 140). Most of this, which Goswami (1990, 1993) calls quantum functionalism, appears to be generally consistent with a quantum idealism that includes macroworld forces that — based on the Ehrenfest theorem — are localized consciousness and will. The classical forces of the brain–mind system that become operative, when awareness ensues upon wave collapse, are psychogenic and conscious at some level.

Consciousness thus understood as a macroworld phenomena is much different than microworld consciousness because of the macroscopic localization described by the Ehrenfest theorem. Macroworld consciousness is local, which means that it is situated within the brain and cannot be directly observed by another mind, as it might if it were microworld and non-local (a single mind, universal and infinite). The brain–mind consciousness of the macroworld thus is a private affair known to others only indirectly through information communicated through the classical processes of physics, chemistry, and neurophysiology. This isn't to say, however, that the brain–mind doesn't exhibit other more esoteric forms of consciousness as well in the course of making choices, which as suggested by Goswami may involve nonlocal processes (1993, pp. 185–198).

Grounded conceptually in the quantum consciousness of Goswami, Walker, and others through the Ehrenfest theorem, the mechanistic, spatial forces of classical materialism are transformed into the nonspatial, psychogenic forces of an empirically equivalent quantum idealism. The classical materialism and quantum idealism here considered are labeled ϕ-model and ψ-model respectively. The basic postulate and related corollaries of ψ-model (quantum idealism) are considered next.

The Force of Consciousness and Will

Basic postulate of quantum idealism. The translocation of a quantum object within a wave packet, which is its discontinuous, non-classical movement (quantum jumping) from one location to another without passing through the intervening space, is an identity with quantum consciousness and will (localized quantum fluctuations ≡ conscious force classically manifested).

Corollary 1. Quantum consciousness and will is maintained locally in the classical limit of the Ehrenfest theorem. The localized wave packet of a quantum object in the classical limit is a repository of consciousness and will whose classical dynamics mathematically conform to Newton's second law of motion.

Corollary 2. The forces of classical physics are thus forces of consciousness directly situated (immanent) within matter, which respond to fields in the surrounding space that are information rather than force. What in classical materialism are force fields in space, in quantum idealism become information fields physically residing in space.

In *ψ-model* then, the forces specified by Newton's laws (equations) of motion are sentient, immanent, and self-directed, rather than insentient and externally impressed as in *ϕ-model.* And every physical system, including the macroscopic apparatus through which a quantum measurement is made, is a manifestation of nature's consciousness. Consider from this perspective the forces operating on a single body m that is interacting with a larger system X (Jammer, 1999, pp. 244–245). The forces collectively operating on m, for the classical materialist *ϕ-model* (equation 1) and quantum idealist *ψ-model* (equation 2) respectively, are:

(1) $\phi(X)_m = ma$, where $\phi(X)_m$ is the force collectively impressed on m by mechanistic forces originating in the larger system X. The forces ϕ_m comprising the collective $\phi(X)_m$ are externally impressed upon the body m according to Newton's laws of motion conventionally understood, where m is passive and accelerates only when forces externally arising in X are applied. These forces are all mechanistic, impersonal, and without conscious or mental significance. Newton's third law of motion on action–reaction for these forces is: $\phi(X)_m = -\phi(m)_X$.

(2) $\psi(X)_m = ma$, where $\psi(X)_m$ is the collection of psychogenic forces arising within and operating on the self-same body m, which at the highest level of organization collectively constitute the mind of m as it interacts with the larger system X. These forces are psychogenic, personal, and conscious, and obey Newton's laws (equations) of motion psychogenically interpreted. The accelerative forces in the psychogenic collective $\psi(X)_m$ are self-induced and immanent within m; they inhere within the body m and self-accelerate m intentionally in reaction to other immanent, self-induced forces $\psi(m)_X$ arising by reaction to m within the larger system X. Newton's third law of motion on action–reaction for these forces is: $\psi(X)_m = -\psi(m)_X$.

Equations (1) and (2) are Newton's second law of motion viewed from the perspective of the classical materialist *ϕ-model* and quantum idealist *ψ-model* respectively. Note that equation (2), through the corresponding action–reaction equation for conscious forces, implies that consciousness, macroworld consciousness expressed classically at least, is always oriented toward someone or something else that lies without. The *ψ-model* thus represents the aboutness or intentionality of consciousness addressed by philosophers (Dennett, 1991, pp. 333–334, 365–366, 371).

Matter's accelerative forces in *ψ-model*, which are fundamental to existence rather than contingent or accidental, are therefore localized consciousness that always originates within and remains confined to matter. Indeed, these forces of consciousness, through the associated information fields which accompany them, *are* the material world each of us experiences — consciousness and matter are fundamentally one and the same. In this idealist meta-paradigm there is an equivalence between matter's motion in space and the conscious forces operating within matter, which here are labeled *ψ-forces*. Wherever and whenever material bodies are accelerated, their acceleration is self-induced by *ψ-forces* originating within the body accelerated. Everything in *ψ-model* arises out of this fundamental equivalence between the consciousness of force and matter's accelerated motion, or more generally, the time change of momentum. The conventional, externally-impressed forces of classical physics (*ϕ-model*), which are insentient and impersonal, are correspondingly labeled *ϕ-forces*.

Viewed more philosophically, *ψ-model* is a quantum idealism where there is a unity of subject and object, the knower and the known are one in principle. All is consciousness and all is matter in *ψ-model*, simultaneously, for they are different perceptions (inner vs. outer) of the same thing. *ϕ-model* is the opposed classical materialism of conventional science where there are no subjects — only objects, and the knower (the person) simply is an epiphenomenon of the known (the material world).

Psychogenic Forces

Newton's Laws of Motion

As conventionally understood, Newton's three laws of motion always refer to externally-impressed *ϕ-forces*. These laws can be restated in terms of four laws, however, which will allow Newton's three laws to be more generally interpreted through either the external, mechanistic *ϕ-forces* or the internal, psychogenic *ψ-forces*. And the "fourth law" then specifies which of these two types of force is operative in the first three laws. This statement of Newton's laws of motion thus avoids indicating a priori the nature of the forces accel-

erating a body, whether they are mechanistic forces whose origin is external to the body accelerated (*ϕ-forces*), or psychogenic forces that arise within the same body accelerated (*ψ-forces*).

[1] *Law of inertia.* If there is no force acting on or within a body, either mechanistic *ϕ-force* or psychogenic *ψ-force*, it remains at rest or continues along a straight line with uniform speed.

[2] *Law of force.* If there is a non-zero net force acting on or within a body, whether *ϕ-* or *ψ-force*, the body will accelerate in the direction of the force. The acceleration or change in motive state is in direct proportion to the force and inversely proportional to the mass of the body. In mathematical form the law is written as $\mathbf{f} = m\mathbf{a}$ or $\mathbf{f}/m = \mathbf{a}$, where $\mathbf{a} = d\mathbf{v}/dt$; or in more general terms as $\mathbf{f} = d(m\mathbf{v})/dt$ when m changes as well.

[3] *Law of action–reaction.* If there is a force acting on or within one body A, whether *ϕ-* or *ψ-force*, there will be an *equal* and *opposite force* of the same character (*ϕ-* or *ψ-force*) acting on or within a second body *B*. In mathematical form the law is written as $\mathbf{f}_A = -\mathbf{f}_B$ ($\mathbf{f}_A$ and $\mathbf{f}_B$ lie along the same line, however, only if the forces obey a central force law, such as the inverse-square laws for gravity and electric charge).

The statement of Newton's laws of motion given above are conventional except that they avoid identifying the origin of the forces defined as being external to the body accelerated. Law [4] given below then specifies two possible origins for these forces (mechanistic or psychogenic) that are consistent with the mathematics and empirical content of the first three. Laws [1]–[3] provide a more general definition of classical mechanics that applies to both *ϕ-* and *ψ-forces*, which are quantitatively equivalent, dynamically isomorphic alternatives.

Mechanistic vs. Psychogenic Forces

With Newton's laws of motion thus more generally stated, in terms that avoid specifying a particular origin for matter's acceleration forces (whether impressed externally or internally), a fourth law of motion then specifies where the forces originate relative to where they are impressed. Law [4a] below is the conventional explanation given, which is the materialist *ϕ-model.* Law [4b] is the explanation given by the alternative idealist *ψ-model*, in which the forces accelerating a body are immanent and self-induced. Laws [4c] and [4d] are further options, where [4c] includes the possibility that [4a]

and [4b] are both physically present, and [4d] excludes both [4a] and [4b] as possibilities.

[4] *Law of Induction*

[4a] $\mathbf{f}_{AB} = -\mathbf{f}_{BA}$. The forces induced within body A originate in body B and vice-versa. These are the conventional, externally-impressed forces of classical mechanics, here labeled *ϕ-forces*. *ϕ-forces*, either through action-at-a-distance or some type of external force field, are spatially extended. They operate blindly and are completely without any sort of awareness, intentionality, or rationality. And they are never autonomous in a personal sense, for moved and mover ultimately (at some level of analysis) are never the same — a body or any part thereof never moves (i.e., self-accelerates) itself. These are external forces that always originate outside the body or part accelerated. Law [4a] is the metaphysical foundation of the conventional *ϕ-model*.

[4b] $\mathbf{f}_{AA} = -\mathbf{f}_{BB}$. The forces induced within body A originate in body A, and the forces reciprocally induced within body B originate in body B. These are immanent, self-impressed forces here called *ψ-forces*, which are fully equivalent empirically to *ϕ-forces* under laws [1]–[3]. *ψ-forces* thus defined always arise within the self-same body accelerated and act upon (self-accelerate) that body according to the particular law governing each force. The *ψ-forces* of [4b], unlike the *ϕ-forces* of [4a], are non-spatial, because their point-of-origin and point-of-application are one and the same — an identity. The forces [4b], although they respond to external fields of information lawfully, are nevertheless self-induced, autonomous, and necessarily possess some degree of awareness, intentionality, and rationality concerning the information fields to which they respond. Law [4b] is the metaphysical foundation of the alternative *ψ-model*.

[4c] *ϕ-forces* [4a] and *ψ-forces* [4b] can both be used in a given application. This mixing of causation, mechanistic with psychogenic, is logically implausible, however, and perhaps physically inconsistent. One problem with [4c] is that it violates Mach's continuity principle, which states that that which is a principle of nature at any one time and in any one place constantly and everywhere recurs (at all times and in all places), though perhaps not with the same prominence (Cromer, 1997,

p. 26). Mach's continuity principle, which is necessary if science is to be consistent in its explanations of phenomena, does not allow the coexistence of *ϕ-* and *ψ-forces* because the assignment of cause and effect is then arbitrary and possibly contradictory as well.

Law [4c] may be preferred, however, by those assuming we each somehow have an independent will through psychogenic forces [4b], while the mechanistic forces of [4a] at the same time are present in the physical world. Law [4c] thus reflects the common sense vitalism that nature, somehow, in ways not yet understood by science, includes both low level *ϕ-forces* (blind, impersonal) and high level *ψ-forces* (conscious, personal). Law [4c] also is implicit in theories of emergent phenomena in biology and psychology. For example, the mechanistic forces [4a] may be understood to operate at lower levels of biological organization, while the psychogenic forces [4b] then somehow emerge out of complexity and effectively operate at higher levels.

[4d] Neither forces [4a] nor forces [4b] are present in nature. Law [4d] includes other cosmologies regarding the forces of nature, exclusive of [4a]–[4c]. The general theory of relativity is one such theory: it eliminates the concept of force altogether in favor of the non-causal, geometric constraints of curved space–time. Law [4d] also is the logical positivist approach that simply avoids causal explanations of laws [1]–[3]. However, this is generally unsatisfying philosophically to those who want to understand nature, rather than simply calculate and predict phenomena in a cookbook fashion. Law [4d] is included here only for the sake of completeness and will not be further discussed.

A corollary of law [4] is that a composite force is metaphysically the same as its components, whether *ϕ-force* or *ψ-force*. That is, if individual forces $\mathbf{f}_x$ and $\mathbf{f}_y$ acting on a body are mechanistic and externally caused per *ϕ-model* [4a], then the composite force $\mathbf{f}_{xy}$ is mechanistic also. But if the components $\mathbf{f}_x$ and $\mathbf{f}_y$ are immanent and self-induced per law [4b], then the body's composite force $\mathbf{f}_{xy}$ is immanent and self-induced as well. Also, a systematic reduction based on *ϕ-model* [4a] will reveal that the mover and moved always are distinct at some level of analysis, while systematic reduction based on *ψ-model* [4b] will show that the mover and moved always are one and the same at every level — an identity. The internal forces of physical systems described using [4a] are therefore never the *ψ-forces* of [4b], and such systems are never autonomous in the way indicated by [4b].

Mary Hesse (1965) suggests that science does not demand, nor even accept as truth, causal explanations of natural phenomena.

> Scientific theory in general does not presuppose any particular mode of causal connection between events, but only that it is possible to find laws and hypotheses, expressed in terms of some model, which satisfy the criteria of intelligibility, confirmation and falsifiability. The mode of causal connection in each case is shown by the model, and changes with fundamental change of model. The requirements for a mode of causality are thus roughly those of coherence and correspondence: the causal behavior of the model must not be self-contradictory, and it must correspond in observable situations to those common-sense notions of causality which are empirically demonstrable. (p. 285)

Given this understanding of science, the causal worldviews of [4a], [4b], and [4c] are metaphysical and lie beyond science proper. If that is the case, however, virtually all science textbooks should be rewritten in such a way that the existence of mechanistic, externally-impressed forces in physical systems is not presupposed as a principle of nature.

The question could be asked as to why I have made the effort to reformulate basic physical laws, if the experimental outcomes are the same in either case? One of the objectives of this essay is to demonstrate that the present experimental basis of the mechanistic worldview in classical physics doesn't support the mechanistic view of nature's forces alone — it clearly supports equally an empirically equivalent, non-mechanistic, psychogenic view of the forces described by classical physics. In a truly objective and scientific view of force then, for scientists that feel a non-mechanistic, psychogenic view of nature's forces better explains the subject matter, this concept should be available — in both the social and natural sciences. And indeed, this concept of force has been investigated in applications to psychosocial (Zaman, 2001a, 2001b), and physical phenomena.[2]

Psychogenic Fields

Force vs. Information

Quantum idealism (*ψ-model*) as previously indicated has two basic components — forces and fields, the same as the conventional classical materialism (*ϕ-model*). The first component (*ψ-forces*) has been considered in some detail. The second component, which until now has been referred to only briefly, will now be considered in more detail. We call the second component *ψ-fields*, which are fields of information in space rather than force. If matter's motive forces are all immanent, self-induced, and nonspatial in accordance with [4b], then the fields of modern physics — including gravitational and electromagnetic fields — that are now regarded as force must be

[2]A non-mechanistic account of electrical force in classical electromagnetics suggests that causality in the basic experiments of electromagnetic theory can be reconsidered as well. This will be covered later.

information instead. The physical sciences are now firmly grounded in the field concept, whether in classical fields or some modern messenger particle equivalent in quantum theory, so that quantum idealism must fully take into account such information fields if it is to be a valid alternative to classical materialism.

In *ψ-model* [4b] these fields — to which matter's *ψ-forces* respond (self-accelerate) according to laws [1]–[3] — are geometric information rather than force, which are distributed in space and changing in time according to the applicable laws (for gravity, electric charge, etc . . .). *ψ-fields*, whether the information is gravitational or electromagnetic, are information both induced and sensed by *ψ-forces*. These fields guide — through the information provided rather than through force exerted — the motion brought about by matter's immanent, self-induced *ψ-forces*. All material objects, through the immanent, self-induced forces therein, are rational and purposeful relative to whatever information fields inform their change in motive state.

The gravitational fields of the moon, earth, and sun, for example, are each a field of information propagated outward in space, to which each of these celestial bodies — through forces of gravity that are immanent and self-induced — responds according to Newton's laws of motion and gravitational attraction. The same is true of electric, magnetic and all fields now regarded as force fields: they are spatially extended *ψ-fields* all the way down to and including the fields of elementary particles, like the metaphorical turtles upholding the world. In *ψ-model* then, what we intuitively regard as bodies of ponderable matter are actually information fields induced or transmitted by matter's immanent forces, in the space immediately surrounding and outwards toward infinity. That is, each particle of matter manifests one or more *ψ-fields* (gravitational, electromagnetic, or other spatio-temporal information) that surrounds, encapsulates, and indirectly makes perceptible to other particles of similar kind its immanent, self-induced force *ψ*.

An elementary definition of the field that applies to both force and information is simply that it is a property of space where the value of the field at any point specifies the force (whether *ϕ* or *ψ*) that will act on a body located thereat (Harpaz, 1993, pp. 80–83). It should be noted that the terms force-per-unit mass and acceleration vector, according to law [2] ($\mathbf{f}/m = \mathbf{a}$), denote the same physical quantity. Using this definition of field, the respective field definitions of force and information become:

> *ϕ-field (force)*. The field at any point in space is the externally-impressed *ϕ-force* [4a] that accelerates a unit mass placed there. Such fields, here called *ϕ-fields*, are all mechanistic; they are the modern, spatially extended version of the contact forces of mechanism in the sixteenth and earlier centuries.

ψ-field (information). The field at any point in space is geometric information physically situated there, which indicates what magnitude and direction the *ψ-force* [4b] should assume. These forces, immanent within the bodies located thereat, respond to such fields by self-accelerating the bodies in which they reside according to the information given. Denoted by *ψ-field*, such fields are non-mechanistic because they are information both induced and sensed by forces within matter that are psychogenic. The lawful, cooperative, reciprocal response of *ψ-forces*, to the perceptible, information-bearing *ψ-fields* induced in space by other similar forces, is the mechanism underlying law [3] on action–reaction in *ψ-model*.

The information fields of *ψ-model*, fields of information both psychogenically induced and sensed by *ψ-forces* immanent within matter, may be either force-per-unit mass as in the case of gravity, or may be in some other units such as the force-per-unit charge of the electric field. In either case — by way of analogy with the spacetime geometric constraints of general relativity — they represent spatio-temporal distributions of geometric information. The gravitational force-per-unit is the only acceleration vector, however. The electric force-per-unit is another kind of geometric information that results in the acceleration of a body that, unlike gravity, is in inverse proportion to the body's mass. That is, for a given electric force ψ_e (of charge q), unlike the gravitational force ψ_g, a larger mass results in lower acceleration while a smaller mass increases the same. Other kinds of information fields with as yet unknown characteristics may exist as well.

It has been noted that the concept of a particle, which is a singularity in space, is extraneous to a consistent field theory (Jammer, 1999, p. 261). This is true for force fields composed of forces [4a], but it isn't true for the information fields induced by forces [4b]. The psychogenic forces of [4b], unlike those of [4a], are non-extended points in space. *ψ-forces* are singularities of the potentials of the field equations in principle; they are idealized points to which the geometric information fields of space–time are necessarily tied. Every spatially-extended *ψ-field* — and all *ψ-fields* are spatially extended — has its origin in nonspatial *ψ-forces* that are manifested as singularities in space. The singularities of physical theory thus are in principle essential to the information-bearing *ψ-fields*, rather than the troublesome, paradoxical feature of reality they are to the mechanistic forces of *ϕ-fields*.

Space as a Repository of Information

When the force fields of *ϕ-model* are regarded as mathematically and physically equivalent information fields, each point in space constitutes a local

repository of information that *ψ-forces* at that point access. The local repository of space at any point includes information about the nonspatial *ψ-forces* of gravity, electricity, magnetism etc. . . . located elsewhere in the universe, which is dynamically updated over time in accordance with the applicable field theory. Furthermore, there is a one-to-one correspondence between matter's *ψ-forces* and *ψ-fields*; one does not exist without the other; so that the repository at each point in space in principle includes information about every *ψ-force* (particle) in the universe in the form of an associated *ψ-field*. Space in *ψ-model*, rather than being a meaningless void as it is in *ϕ-model* (classical physics), holds information about all *ψ-forces* throughout the universe.

The geometric information placed (induced, transmitted, radiated, etc . . .) in the repository of space by matter's *ψ-forces* thus is in the form of *ψ-fields* that can be objectively described by mathematical laws that define a given field's space and/or time variation, such as the inverse-square law of gravity or electric charge. Other equations in field theory, including those for the field gradient, divergence, and curl (Maxwell's equations for example), quantitatively define the geometric information specified. The wave equations in electromagnetics are another example, which show how electromagnetic information is propagated through space and thereby placed in the repository thereof. In each case the equations that specify a force field (in *ϕ-model*), or related quantities such as energy or momentum, now (in *ψ-model*) specify or imply the physical existence of a spatially extended information field with corresponding physical attributes of energy, momentum, etc . . . . And the psychogenic, nonspatial *ψ-forces* [4b] immanent within matter respond to these fields (self-accelerate) in accordance with laws [1]–[3]. Thus defined *ψ-fields* provide what is sometimes called semantic information, which is physically meaningful to the responding *ψ-forces*. That is, these fields provide geometric information that determines how the world appears to the responding *ψ-forces*, rather than simply providing the abstract information of quantitative information theory that has no physical meaning whatever.

Newton's conception of inertia remains basically unchanged in *ψ-model*. The inertia of a body is what causes it to persist in doing what it does in the absence of a perceptible *ψ-field* to which its *ψ-forces* can respond. If there is no perceptible information field, then no *ψ-force* is manifested either. The accelerations or motive changes-of-state self-induced by a body's *ψ-forces* are reciprocally linked with accelerations similarly self-induced by the *ψ-forces* of other bodies, which interact through the exchange of information via laws [1]–[3] and whatever laws govern the associated *ψ-fields* (gravitational, electrical, etc . . .). *ψ-forces* apparently never directly perceive or respond to their own information fields, however; they perceive and respond only to the information fields of other forces of the same kind (e.g., a charged particle is never self-excited by its own electric field, but by the electric field of other

charges). And for each *ψ-force* of a given kind, there is a corresponding *ψ-field* that allows other forces of the same kind to interact and communicate in accordance with laws [1]–[3] and whatever law defines the associated *ψ-field.*

One big difference between *ϕ-model* [4a] and *ψ-model* [4b], which might make a difference in our understanding of complex, nonlinear systems in physics, chemistry, and biology, is their respective non-cooperative and cooperative natures. *ϕ-forces* are fundamentally non-cooperative because they are blind and mechanistic, and everything that happens — other than simple inertial motion along a straight line — occurs through the external imposition of forces that are unwilled and without purpose. *ψ-forces*, on the other hand, are potentially and often truly cooperative because everything that happens occurs through the mutual dissemination of information amongst the forces involved, via the information fields held in the repository of space locally accessed by these psychogenic forces. The emergence of cooperative behavior in *ψ*-model then, behavior that is often seen in both the physical and life sciences but is generally far more dramatic in the latter, is expected because matter's motive forces are psychogenic (perceptive, willful), intentional (purposeful), and rational (intelligent, rule based). In *ϕ-model*, however, the emergence of cooperative behavior is always paradoxical, mysterious, and surprising, because the underlying forces are all inherently blind, unwilled, and without meaning or purpose. So the neurophysiology, electrophysiology, and psychology of emergent (or emerging) awareness and consciousness, on which the cooperative behavior of animate beings is physically based, seems to be best understood in terms of the psychogenic forces [4b], rather than the mechanistic forces [4a].

Psychogenic Causation

Physical Consciousness

Empirically manifested, immanent, psychogenic *ψ-forces* that are sentient at some level of awareness, intentional, and rational are defined below in classical terms, and then justified in concept through general relativity. The equations below outline the *ψ-model* description of classical physics:

(3) $\vec{f}_I/m_I = \vec{a}_I$

> *ψ-acceleration.* a *ψ-force* f_I immanent in the inertial mass m_I produces the acceleration a_I. The ratio f_I/m_I in this interpretation represents an acceleration whose cause and effect are manifested at one and the same point. That is, the point-of-origin and point-of-application of the force

f_1 are one and the same — an identity. f_1 thus is intrinsic to m_1 and is the sole source of its acceleration a_1.

(4) $\vec{f}_1/m_1 = -G[m_2/r^2)\hat{r}]$

ψ-gravitation. the gravitational *ψ-force* f_1 immanent in mass m_1 senses and intentionally self-adjusts itself to the magnitude $G[m_2/r^2]$. The gravitational field of m_2 is an information field, rather than a force field, which f_1 uses in determining the value of a_1 in equation (3) to which it is to accelerate m_1.

(5) $\vec{f}_1/q_1 = -K[(q_2/r^2)\hat{r}]$

ψ-electrostatics. the electrical *ψ-force* f_1 immanent in charge q_1 similarly senses and self-adjusts itself to the magnitude $K[q_2/r^2]$, where the electric field — the same as for gravitation — is information rather than force.

(6) $(\vec{f}_1/q_1)/m_1 = \vec{a}_1$

The electrical *ψ-force* f_1 of charge q_1 then, when q_1 is added to a body with inertial mass m_1 (the electron, for example), produces the acceleration a_1 in equation (3) in accordance with equation (5).

(7) $\vec{a}_1 = -G[(m_2/r^2)\hat{r}]$

Equating (3) and (4), we mathematically eliminate the force f_1 and mass m_1 from the picture; obtaining a gravitational formulation in which matter's *ψ-forces* are not relevant — a celestial mechanics in which the inertial mass [m_1 in equation (3)] and gravitational mass [m_1 in equation (4)] of a body are equivalent and gravity thereby is mathematically reduced to a kinematics in which matter's *ψ-forces* seemingly play no part.

(8) $G^{uv} = JT^{uv}$

Equation (8) is the relativistic analog (Harpaz, 1993, p. 131) of the non-relativistic kinematic formulation of gravity given by equation (7) [with *ψ-forces* eliminated]. G^{uv} in (8) corresponds to the *ψ-model* account of acceleration in equation (3), and T^{uv} corresponds to the *ψ-model* account of gravitational attraction in equation (4). The geometric tensor G^{uv} in four-dimensional spacetime thus replaces the

acceleration vector a_1 in equation (3), and the energy–momentum tensor T^{uv} replaces the gravity field of equation (4). So equation (8) corresponds to a positivistic, kinematic account of gravity that, similar to equation (7), eliminates all gravitational forces whether *ϕ-forces* or *ψ-forces*. The immanent gravitational forces of *ψ-model* thus have simply been replaced in concept by the so-called generalized inertia of relativistic gravitation — the relativistic cause of the force free motion of gravitating bodies traveling along geodesics in four-dimensional spacetime.[3]

This idealist perspective of classical physics and general relativity is supported by an aspect of classical field theory that previously received little attention. It seems to be technically impossible for either gravitational or electrostatic force fields as they are defined in their inverse-square law definitions, respectively in terms of the products m_1m_2 in Newton's law of gravitation and q_1q_2 in Coulomb's law for electric charge, to be true force fields (*ϕ-fields*) when a single mass m_2 or charge q_2 is present. These definitions suggest that the force field of a single mass m_2 or charge q_2 actually doesn't exist, not until a second mass m_1 or charge q_1 also is present. That is, if m_2 or q_2 does exist alone, then the field each produces in truth is not a force field according to these definitions, because these fields can be calculated as force fields only when a second mass m_1 or charge q_1 also is present. This problem is obviated in practice by simply inserting a unit test charge or mass into the field being calculated, conceptually, so that the force field of a single mass or charge is then practically determined. The philosophical problem regarding the reality of the force field of a single mass point or charge, however, is not resolved by this technique.

This problem, concerning the reality of force fields in the *ϕ-model*, does not exist, however, when the respective gravitational and electric fields of m_2 and q_2 instead are geometric information composed of acceleration or other vectors. Because m_1 and q_1 are then immanent, self-impressed forces that do not contribute to the information fields of m_2 and q_2 defined by equations (4) and (5), whose right side terms are geometric information or constraint rather than force. Information and geometric constraint are synonyms in *ψ-model*: all information constrains and all constraints are informative, rather than operating as external force.

[3]Spacetime here refers to relativistic space and time while the earlier hyphenated space–time is that of newtonian physics.

A New Kind of Science

The change in physical causality from ϕ-model to ψ-model implies the following transformations:

mechanistic causation [4a]	→	**psychogenic causation [4b]**
blind external forces	→	conscious immanent forces
mechanistic force fields	→	psychogenic information fields
geometric structure of space	→	geometric information in space
classical materialism	→	quantum idealism

Based on these changes, equations (3)–(8) describe active matter that is impelled from within, and guided by nonspatial forces that perceive and intentionally respond to geometric information fields that physically exist in space and time. This idealist interpretation of matter, as manifesting sentient forces within, seemingly can be applied to all physical forces whether gravitational, electromagnetic or whatever — and whether in three-dimensional Euclidean space–time or four-dimensional Riemannian spacetime (as generalized inertia). The external information fields sensed by such forces — because these fields, through the mathematical laws that define them, always influence the state or modification of the forces which sense them (in complex systems internal information fields also may be involved) — do not enable these forces to have direct knowledge of anything other than their own states and changes in state. Simply stated: if no information is sensed without, then no force exists within. The correlation between external information and immanent force in *ψ-model* thus provides a dynamical account of information processing.

This idealist transformation of the physical world applies of course to biology, including biophysics and biochemistry. In *ψ-model* [4b] living things, because of self-induced, psychogenic forces arising within, are sentient and animate at every level of organization: electrons, ions, and currents thereof possess an elementary sentience (perceptiveness, sensibility) as indicated by the electrical information fields to which they respond. The macromolecules, plasma membranes, and organelles within individual cells possess a certain intentionally, as indicated by their engaging in certain kinds and levels of information processing. And each cell as a whole, and multi-cellular systems composed thereof, exhibit a certain rationality of action that is appropriate to their specific purposes and objectives. Physiological systems are everywhere guided in their operations by *ψ-forces* that are neither blind nor externally impressed.

The proposed idealist transformation of nature encompasses the highest manifestations of nature's forces, found in the central nervous system, which

collectively constitute that ultimate psychogenic force of nature: the human $\psi(X)_{mind}$, $\psi(X)_{self}$, or $\psi(X)_{person}$. The physical basis of the mind and its thoughts are the brain's nonspatial *ψ-forces* and spatial *ψ-fields* respectively. In the language of psychoanalysis, the brain is a $\psi(X)_{psychic\ apparatus}$ that is composed of interacting forces immanent within its structure — $\psi(X)_{id}$ (limbic system forces?), $\psi(X)_{ego}$ (sensorimotor forces?), and $\psi(X)_{superego}$ (frontal cortex forces?) — which interact through associated neuronal *ψ-fields*. Finally, in the language of particle physics, the $\psi(X)_{mind}$ or $\psi(X)_{soul}$ of each of us — including $\psi(X)_{you}$ and $\psi(X)_{me}$ — may be a unique singularity in the universe, which operates in space and time in accordance with physical law; but whose subjective inner essence (mind, self, soul, spirit, etc . . .) nevertheless exists outside of and thus transcends both space and time.

Conclusion

It is postulated that an underlying psychogenic reality in nature, here called quantum consciousness, is responsible for state selection at the time of wave collapse, which resides within the experimental apparatus rather than the observing scientist. The classical approximation of the Ehrenfest theorem then allows the non-local consciousness thus conceived within microscopic systems to extend upward into the macroscopic world, so that matter's acceleration forces are then psychogenic and macroscopically manifested as localized consciousness, rather than being blind and mechanistic. The passive, inert matter of classical physics is thereby quantum mechanically transformed into matter that is active, conscious, and locally causal. Consciousness and change (fluctuation, oscillation, flow, movement, etc . . .) are then an identity in nature, whether the change is microscopic or macroscopic, nondeterministic or deterministic. The calculus of Newton and Leibniz, in this quantum idealism, is the calculus of — and by — conscious beings rather than blind mechanisms.

Stephen Wolfram (2002) identifies a "principle of computational equivalence" that he derived from experimental studies of automata, which he regards as ultimately providing a universal basis in computational science for natural phenomena. He indicates that "what this suggests is that a fundamental unity exists across a vast range of processes in nature and elsewhere: despite all their detailed differences every process can be viewed as corresponding to a computation that is ultimately equivalent in its sophistication" (p. 719). According to this principle, no system in nature or elsewhere can ever carry out computations that are more sophisticated than those carried out by elementary universal systems (p. 720). In Wolfram's thesis, natural systems function through computations whose rules are simple, fundamental, and widely applicable — even though the computations evolve over time,

become enormously complex and variegated, and on the surface seemingly defy explanation in the terms of simple rules.

Wolfram's basic thesis fits hand and glove with the psychogenic view of immanent natural force here presented. Matter's immanent, psychogenic forces internally sense the information provided by external fields (gravitational, electrical, etc . . . .), and then simultaneously compute and execute the necessary external response based on an information theoretic, computational reinvention of Newton's laws of motion and the laws governing the fields. The classical laws of matter in motion, thus regarded as an elementary universal system of computation in nature, are thereby transformed into simple rules whose computations govern the physical world.

And it is the "equivalence" of nature's computations in principle, as calculated through Newton's laws of motion and equivalent formulations, that cause these same laws to operate over and over again in nature and elsewhere, at multiple levels of system organization including the biological, psychological, sociological, etc . . . . And it also is the "irreducibility" of these computations (Wolfram, 2002, pp. 737–750) that produces at the different levels in the life sciences the complexity and variegation of phenomena observed. One of the "universal primitives" in natural science then, of which Wolfram speaks in general terms (p. 18) but does not specifically identify, may be Newton's laws of motion reformulated — through the principle of computational equivalence — for the psychogenic simulation of a vast range of processes in nature and elsewhere. In a Wolframian perspective of psychogenic force then, the calculus of Newton and Leibniz defines the macroscopic, non-relativistic rules by which the locally manifested quantum consciousness of change computationally constructs the future out of the past, whether in nature or society.

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