Exploration

THE QUALION HYPOTHESES: Some New Proposals on the Physical and Supraphysical Bases of the Conscious Mind (Part 1)

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Abstract

Cogent objections to explaining mental phenomena solely in terms of the *known* components of the brain indicate that new ways of confronting the problem may be needed. The approach taken here is to consider whether physical processes could endow the brain with something unexpected, elusive to detection, and "mindful."

This article presents two mechanisms that deserve scrutiny. One or the other may transform energy from the body's 310 K thermal background into a brain-wide microcosm of localized, spinning quanta that are stable and immune to absorption—a highly versatile microcosm with perhaps 10^{24}–10^{26} massless components.

Logic suggests these energy structures exist and are the ultimate psychophysical nexus. Essentially, they are proposed to generate *highly variable* levels and states of *supraphysical consciousness fields* into the virtual emptiness of the brain region. (Recall that all matter is 99.99+% empty space.) These fields are attributed an inherently protean, manifold character and the ability to superimpose network-wide into a single ultracomplex field.

When these and other postulates are then added to what is known about the brain's involvement in cognition, they provide a coherent framework for understanding the *genesis* of the conscious mind, its continuity as a relatively autonomous, higher-level system, its content and processes, and its ability to exert volitional controls. The basics of these proposals are testable in described ways.

(Part 1 of this two-part article includes the main article)

Keywords: Hypothesis, qualion, physical basis, supraphysical basis, conscious mind.

> *Are the conscious states we experience ultimately made up of complexes of fundamental elements? Is there, say, a mental analogue of the quark?* — Colin McGinn (1993)

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Introduction

Ever since the scope of scientific inquiry expanded in the late 1980s to include the enigma of consciousness, there has been a procession of attempts to explain it. Dennett (1991) sees the brain as a virtual machine and claims that consciousness is simply a property of whatever pattern of neural activity is "dominant" at any particular time. Edelman (1992) has suggested that it emerges when groups of interconnected neurons bristling with revisions work to produce accurate representations of the world. Crick (1994) and Koch view it as an electrophysiological by-product of the synchronized, high-frequency firing of vast assemblies of neurons in different parts of the brain. And turning to the most basic level, Penrose (1994) and Hameroff have taken the position that consciousness arises from indeterminate quantum physical processes occurring in microtubules.

None of these or any other hypotheses (e.g., Baars, 1992; Chalmers, 1996; Dretske, 1995; Gazzaniga, 1988; Humphrey, 1992; Lycan, 1996; Scott, 1995; Stapp, 1994) has generated much enthusiasm. While these works have been widely praised for their eloquence, their erudition, and their courage, when it comes to their positions on *consciousness*, reviews and reactions have been almost uniformly negative[1] and quite often hostile. Dennett is generally thought to have explained it away. Edelman does not explain *how* mere structures and functions become conscious. Crick and Koch to some degree share the general view that their ideas are inadequate. And Penrose, too, has faced a barrage of criticism—with two reviewers (Grush and Churchland, 1995) calling his position a "caterpillar-with-hookah" hypothesis.

Why These and All Similar Hypotheses Regarding the Physical Basis of Consciousness May Be Misguided

The apparent reason for the extent of the Rodney Dangerfield syndrome[2] among existing hypotheses is that none of these proposals really feels right or goes far enough. Typically open to decisive objections, they generate in whatever it is in us that thinks more of a "gong" than a resonant ring of truth. This sense is often accompanied by a twin feeling that *something fundamental eludes us* (Güzeldere, 1995; Chalmers, 1996)—in the words of Güven Güzeldere, there may be "a missing ingredient in the make-up of the world" (p. 126). These twin reactions arise for some combination of the following reasons (hereinafter referred to as the *Standard Objections*):

1. **The Humdrum Neuron Objection.** In terms of physics and chemistry, the processes that have been observed in nerve cells are very ordinary. Slightly polarized neural membranes, depolarizations, and flows of ions are, in fact, about as remarkable as rain in Seattle. Indeed, nothing about neurons, as presently understood (hereafter, *APU*), genuinely suggests the potential for generating the added property of consciousness in an organism (McGinn, 1991). This is accentuated by the fact that there are no essential differences between those neural systems whose activity is known to *accompany* consciousness and systems, such as the cerebellum, whose activity is unrelated to this phenomenon. Vague assertions that consciousness somehow arises from complexity per se only evade and confuse this central issue. There is no more reason to believe that consciousness would

emerge from a mere complex arrangement of nerve cells (APU) than it would from a complex structure of Tinkertoys® or Legos®.

2. **The Unity of Conscious Experience Objection.** Neurons (APU) are completely separate from one another. They are *islands* whose events may be also be separated by time; but subjective awareness, including the perception of selfhood and sensations, is typically experienced as a complex, but unified, *whole.* This objection has come to be known as *the unity problem*. No one has yet proposed a satisfactory solution.

3. **The Monotonous Neocortex Vs. the Disneyland Mind Objection.**

Observation A. Both the brain and its neocortex (APU) are built of very simple, repetitive units (Shepherd, 1994). The only observable difference known to exist between them are generally inconsequential variations in shape and there are less than a dozen of these. Neurotransmitters differ but in effect they *all* simply promote or inhibit neural impulses. All the fifty or so regions of the neocortex are virtually identical in structure and organization. Each has the same neural hardware and the nature of neural impulses within each region is also identical. In short, monotony reigns throughout the neocortex (APU).

Observation B. Over a typical human lifetime, we experience an extraordinary variety and range of subjective phenomena. We experience technicolor images such as those in a Spielberg movie or the fireworks on the Fourth of July. We hear shouts and whispers and the music of Mozart and Andrew Lloyd Webber. We can tell what's cooking in the kitchen with our sense of smell and then savor it even more when we begin tasting it. We know that a kiss feels one way and a slap in the face another. We know the difference between hot and cold, hard and soft, sharp and dull. On a Saturday, we may be on cloud nine; and on the following Tuesday, we may be bluer than blue. If someone insults us, we get angry; and if our car starts sliding on an icy highway, we feel the grip of terror. At other times, we may feel serene, anxious, lonely, bored, obsessed, guilt-ridden, grief-stricken, infatuated, inebriated, envious, confident, or triumphant. We laugh and cry and believe and hope and love and dream. And just when we think we've experienced it all, there's always something new.

Conclusion. There is a staggering contrast here. William James (1890) observed over a century ago that the difference is the "strongest contrast in the entire field of being. The chasm which yawns between them is less easily bridged . . . than any interval we know" (vol. I, p. 134). More recently, Ned Block (1978) has reminded us that *"no* physical mechanism seems very intuitively plausible as a seat of qualia, least of all a *brain"* (p. 293).

4. **The How Could There Be an Engram? Objection.** Established knowledge about brain activity in general makes the possibility of cogent neural (APU) theories of memory seem very remote. As E. R. John(1967) has noted, the vast majority of neurons are incessantly discharging during the waking state, but there is no infusion of the information fragments these neurons purportedly contain into conscious awareness. More poignantly, he notes

that neutral signals and signals hypothetically containing information content for encoding would affect a neuron in exactly the same way. How then could information be properly isolated? Even if a neuron received nothing but "data bearing" signals for a given time-interval and they were properly encoded, later signals would presumably initiate the same recording processes. How then, he asks, could individual memories be segregated and maintained rather than overlayed and distorted?

5. **The Where Am I? Objection.** One of the most universally held views is that each of us is a very complex individual. When you read this paragraph, for example, you do so with the sense that you're a *person* with an intricate and multidimensional personality embodying motives, drives, values, inhibitions, and a great variety of other qualities. *No* neural features have been identified, however, which could account for the self. And while this has led some to simply deny that the self exists, personal experience makes it impossible for most people to accept this conclusion.

6. **The Mechanistic Brain (APU) Vs. the *Seemingly* Freely Active, Volitional Mind Objection**.

Observation A. The conscious mind (although influenced by its own content) *seems* to be essentially free. People don't *seem* to be automatons or robots. And we *seem* to experience this freedom directly—so much so that we wonder about the sanity or motives of those who deny it. We can think about virtually anything we want, in any way we want, and change our mind as often as we please. And in the next few minutes, we can, it seems, *somehow* direct our body to do almost anything. We can get up, start shadowboxing, bark like a dog, or take a ball-point pen and place a tiny blue dot on any of a billion places on the walls around us—simply by acting on a choice to do so. And while some scholars continue to deny freedom of thought and action, it is so strongly intimated by experience that it has become enshrined in our psychology, our legal systems, our histories, and our humanities. If people cannot do other than what they do, then the members of ISIS and Boko Haram are as blameless as newborn infants. (How would you like to make an argument like this to a jury?)

Observation B. The brain (APU), as an operative system, is a physically determined mechanism. It is a choiceless, machine-like organ. Certainly on the quantum level there is some indeterminate or random activity. But this represents only minor (and uncontrollable) *chance* fluctuations from a determinate course of events, not the freedom we seem to experience (Popper, 1973). The more randomness governs a system, the more chaos, not freedom, reigns. This is one reason random activity on the quantum level is not thought to significantly impact events on the macroscopic (or neuron) level. If it did, the result would a brain that operated randomly or chaotically. Regardless of the extent of the random effects, however, chance alone offers a basis for neither freedom of thought nor the kind of coordinated broad-scale *control* effects required for an efficient volitional mechanism.

Summation. The brain (APU) is a physically determined mechanism with the possible exception of some mere randomness or chaos in its activity. The mind, by contrast, *seems* to be free.

> **Conclusion.** If our commonsense impression that the mind is free is correct, then it *must* have some other basis than the known components of the brain.

Because of the very formidable nature of the Standard Objections (especially the last one), it is somewhat puzzling that more experts do not take seriously the following conclusion: it is impossible to explain the conscious mind in terms of the *known* components of the brain.

Some have already come to this conclusion. A number of eminent neuroscientists (Eccles, 1970, 1989; Kety, 1978; Page, 1957; Penfield, 1975; Sherrington, 1950) and other critical analysts of the mind-body issue (Beloff, 1962, 1994; Blanshard, 1970; Burt, 1961; Carrier and Mittelstrass, 1995; Ducasse, 1951; Foster, 1991; Jaki, 1969; Kelly and Kelly, 2007; Lewis, 1969; Lowe, 1996; Madell, 1988; Margenau, 1984; McGinn, 1997a; Polten, 1973; Popper, 1973; Popper and Eccles, 1977; Shaffer, 1966; Swinburne, 1986; Thorpe, 1978) have rejected the neuronal doctrine and become dualists. But this position is now problematic because no one has yet explained the origin and nature of a second entity and how it would interact with the brain.

Others (Jackson, 1982; McGinn, 1991, 1997b; Nagel, 1979, 1986) have thrown their hands up and become "mysterians" (a term adapted by Flanagan, 1992). They think that because all hypotheses so far have been knocked to the canvas by some sort of fatal (or near fatal) objection—and because of unique difficulties inherent in the problem—the issue may never be solved. To them, a solution to the mind-body problem is either centuries away or beyond human understanding.

A Completely New Approach to the Problem of Consciousness—A Response to a Possible Need for Something "New"

The position taken here is not so pessimistic. Approaching the mind-body problem in a *completely* new way, this article probes the following questions: Are there any physical processes that might endow the brain with something unexpected and elusive to detection—something that may account for consciousness, form a higher level subjective realm, and is correlated with but essentially disengaged from mechanistic cerebral processes? And if nature does provide a "quark" of consciousness, can a model based on this concept surmount the Standard Objections? The answer to both questions may be *yes.*

In terms of fundamental concepts and with special reference to man, this article will describe two potential endowment mechanisms and their derivatives, and then propose characteristics that would allow these derivatives to implement a wide variety of mental phenomena. To demonstrate the explanatory power of the system as a whole and its transcendence of the Standard Objections, these concepts will then be developed more fully—largely in a series of footnotes—into a *rough* but coherent explanation of various kinds of mental phenomena.

Finally, ways of testing these proposals will be described.

General Summary of Hypotheses

Nature may provide two mechanisms with mind-making potential: *an anomalous thermal emission process* and *quantum entrapment.* The first mechanism would consist of a direct emission of the body's 310 K thermal energy in an anomalous form due to certain unique features and interactive processes of biological molecules. The second may occur when ordinary thermal emissions interact in their various potential states with biological structures or processes.

One of these mechanisms may engender a brain-wide network of localized microphysical energy-structures that are stable and immune to absorption. Designated *qualions,* these quanta, if they exist, may be the ultimate substrate of mental activity. Essentially, they are proposed to generate highly variable states of supraphysical *consciousness fields* into the virtual emptiness of the brain region. (Recall that all matter is 99.99+% empty space.)

Based on the inference that these fields have an inherently protean, freely active essence that allows them to self-configure and assume a superordinate role over their energetic sources, several other properties, such as field-intensity variation, can be attributed to these quanta. As the means of achieving subjective unity, consciousness fields from distinct qualions are proposed to merge by superposition into a single ultracomplex field.

When these and other postulates are added to what is known about the brain's involvement in cognition, they provide a coherent framework for understanding the *emergence* of the conscious mind, its continuity as a relatively autonomous, higher level system, its content and processes, and its ability to exert volitional controls.

The Body's 310 K Thermal Energy Background: a Possible Basis for the Provision of a Higher Level Emergent

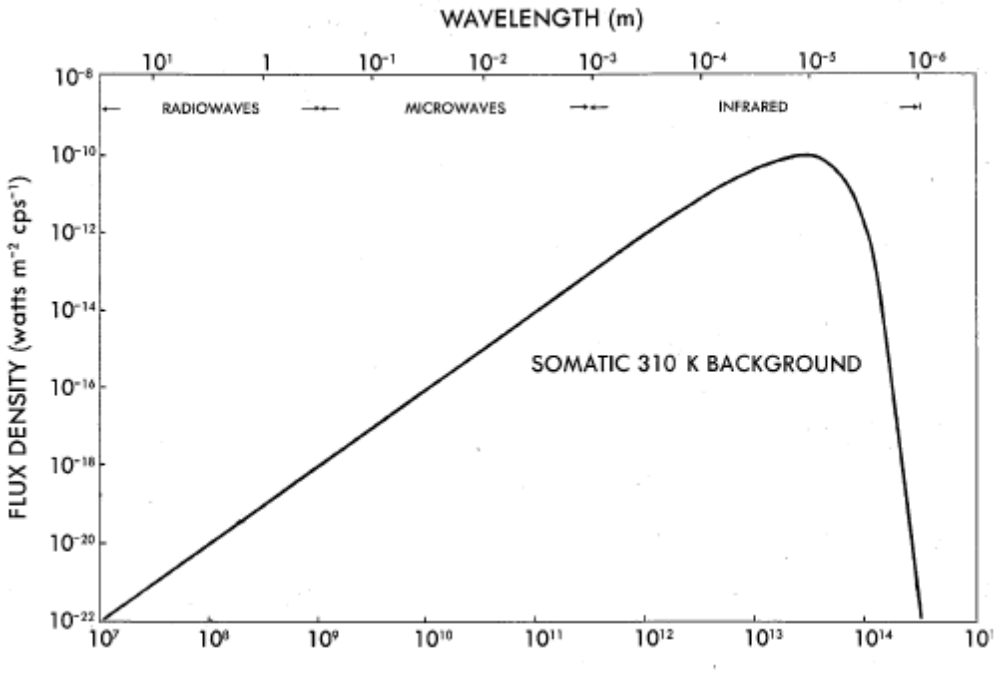
All matter that is warmer than absolute zero exhibits thermal agitation in its atoms and molecules and constantly emits this energy in the form of electromagnetic radiation over a broad range of frequencies. Human tissue does not represent the hypothetical ideal of a blackbody, but its characteristics are close enough that blackbody formulas may be applied (Cossins and Bowler, 1987). Thus, the total emission of radiation by a cross section of the human body at its temperature of 310 K occurs nearly at a rate expressed by the Stefan-Boltzmann law; and the spectral energy distribution of this radiation is described by Planck's radiation law. A 310 K background has a photon density of slightly more than $6x10^8/cm^3$ (see Born, 1969; Kittel and Kroemer, 1980; Reif, 1965; Riedi, 1988).

These photons are almost exclusively in the infrared and microwave range. The entire spectrum is presented in the figure below. Every molecule in the human body continually emits and absorbs this radiation. It's everywhere inside us.

Two Prospects for Emergent Generator: An Anomalous Thermal Emission Process and Quantum Entrapment

Electromagnetic radiation is generated when an electric charge undergoes some form of acceleration. At a temperature of 310 K, such energy-yielding motions exist because molecules are periodically vibrating, bending, inverting, or rotating. The energy levels associated with these motions are closely spaced; and quantum transitions, when they occur, result in small energy changes that reduce the amplitude of these movements. Such transitions give rise to the thermal emission of photons in the infrared-microwave range.

It is important to bear in mind that these emissions result not from instantaneous "quantum jumps" but from smooth, progressive, time-varying changes in the electric and magnetic properties of a unit or system undergoing a transition (Macomber, 1976; Henderson, 1979). Consequently, any factor affecting the kinetics, thermodynamics, and/or electric and magnetic properties of the emitting unit or system may in turn affect the character of the radiation emitted.



In organic tissue, biological molecules and their events display a great variety of distinctive features capable of affecting an emission process, especially those molecules involved in bioenergetics. Unusual charge configurations and electromagnetic environments, enzymatic mechanisms, electron-transfer processes, the formation and breaking of energy-storing bonds, and isomerization reactions are examples of these phenomena[3]**.** In most cases, single biological events incorporate a composite of distinctive features; and often such events involve reactions between extremely complicated molecules undergoing transitions.

These conditions and processes may result in unusual patterns and interactions of the charges constituting emission systems. They may also affect the dynamics of the charge acceleration as

well as the interplay of electric and magnetic fields during the course of a transition. They may therefore significantly affect the manner in which thermal energy is emitted. Briefly stated, some combination of factors may operate together to generate, and emit as quanta, a stationary, stable, rotating energy structure. Several intriguing scenarios and related questions are presented in a footnote[4]; but these represent only a few possibilities. Indeed, the variety and interplay of factors relevant to an anomalous thermal emission process may be much more complex than these suggest. Whatever the degree of complexity, however, it is not feasible to present an exhaustive list of conjectures as to which blend of factors may be involved. The observation here is simply this: in a biosystem there is a broad range of emitter motion-patterns as well as intricate interplays of charges during an emission process. And the inference is simply that a localized structure of electromagnetic energy may emerge[5].

A second and more remote possibility is that photons in their various potential states and biophysical systems may interact in ways that entrap and transform the photon's energy.

It is anticipated that physicists will be able to probe these new conjectures systematically,[6] but at this early stage it seems sufficient to simply open an inquiry.

How Likely Is It That Either Process Actually Occurs?

To get a feel for the likelihood that either process succeeds in adding something "new" to the brain, it is first helpful to recall that since the moment of the Big Bang, Nature has shown itself to be a prodigious innovator. Anything that *can* happen usually does. There are some processes, like stellar formation, that flow as easily from the physical laws and constants as day after night. Then there are processes that have physicists shaking their heads in awe—fortuitous processes that just *barely* manage to occur, like the formation of carbon atoms in stellar cores.

Although it's too early to provide a mathematical assessment of whether the proposed mechanisms face a high natural hurdle or an easy path, a simple commonsense analysis strongly suggests that *one* of them may well be another of Nature's success stories. There are two alternative hypotheses: either subjective phenomena can be accounted for by the known components of the brain or they must be accounted for by something "new." Unless we deny some seemingly self-evident facts about our existence, we are forced to conclude that the first hypothesis is badly undermined by the Standard Objections. Nature, therefore, may have to provide something new; and modern physics may be limited to the two alternatives described in this paper. One or the other, then, would seem more likely than not to be one of Nature's modes of innovation.

The Qualion: The Proposed "Quark" of Consciousness

What then could emerge from these mechanisms? Plausible configurations of stable, localized electromagnetic fields-structures include spherical shells (Barut, 1975), balls (Barut, 1975), strings (Barut and Bornzin, 1974), spinning loops of magnetic flux (Jehle, 1972), a torus composed of closed and spinning loops of electric flux (with magnetic fields), or a soliton-like structure.

In light of these and other possibilities,[7] it would be premature at this time to commit to any specific position on the structure of the derivative quanta. Until these proposals become further developed, it is best to leave this matter open.

It may, nevertheless, be surmised that these energy structures *would* be massless and therefore would rotate at light-speed with the portions nearer the axis of rotation (i.e., having a smaller circular path) revolving progressively more times per second than the outer portions. In the following sections, they will sometimes be exemplified simply for conceptualization as a spinning toroidal structure with an average diameter of 10^{-12}m.

Whatever their ultimate character, these hypothesized microphysical energy structures are designated *qualions* to characterize them as the ultimate source of qualia in biological organisms. The distribution patterns and rate of qualion formation are, of course, incalculable at this time; but since most of the potentially relevant factors described earlier are ubiquitous in any biosystem, it seems plausible that these quanta may be evenly distributed in immense numbers (perhaps 10^{26}–10^{28} in the human body)[8] throughout all life-forms[9].

Qualions and Consciousness Fields

There are sound reasons for supposing that qualions would be steady tenants within our bodies,[10] immune to absorption,[11] and mobile;[12] so these matters needn't be belabored here. Let us turn instead to the most critical postulate to be made in this article. It is this: *qualions continuously generate highly variable levels of consciousness fields.* And to be more precise, these fields are *supraphysical* fields (real but not governed by physical laws).

The idea that consciousness is a field has been proposed before (e.g., Greenfield, 1995; Kinsbourne, 1988; Libet, 1994; Margenau, 1984; Rosenberg, 1996; and Searle, 1993) and makes good sense. This is the way it *feels* to be conscious and—harking back to the binding problem—the only way for mental elements separated by space to be truly *bound* is to share a common field.

A New View of Cosmic and Supra-cosmic Reality: C↔E↔M

An explanation of *why* qualions would generate consciousness fields entails a multiple-interrelated-potential view of cosmic reality. It views mass, energy, and consciousness as

fundamental interrelated potentialities. Mass (M) has the potential of energy (E) and energy the potential of mass; and further, energy has the potential of consciousness (C) and consciousness the potential of energy. Hence, C↔E↔M. If this is so, then perhaps the qualion is one particular energystructure in which this potentiality becomes realized. This view also suggests that consciousness *engendered* the energy of the Big Bang (i. e., the cosmos is a creation *ex Deo* rather than *ex nihilo*) and that the ultimate explanation of our awareness is as follows: **C** (God) → E (the Big Bang) → M (mass or matter-based structures) ›› E (a special type of energy, i. e., qualions, emitted by matter) → C (human consciousness as *derivative God-stuff*). Given the ample evidence of intricate *fine-tuning* in the genesis, structure, and dynamics of the universe (see, e. g., Corwin, 1983; Leslie, 1996), it is not surprising that a growing number of distinguished scientists (e. g., Adair, 1987; Davies, 1992; Dyson, 1979; Ellis, 1993; Gingerich, 1994; Harrison, 1981; Hawking, 1985, 1988; Hoyle, 1993; Jastrow, 1992; Lovell, 1990; Misner, 1977; Pagels, 1985; Parker, 1988; Polkinghorne, 1987; Sandage, 1998; Thompson, 2011; Trimble, 1977) now take very seriously—or openly embrace—the concept of a divine origin.

Further Proposals Regarding Consciousness Fields

The distribution of consciousness fields. Consciousness fields may be capable of penetrating space unimpeded, permeating not only regions devoid of particles (including the virtual emptiness—99.99+%—of atoms and molecules), but also co-occupying the spaces in which particles exist. Like the electron's Coulomb fields, consciousness fields are conceived to emanate evenly in all directions from either the midpoint of the qualion's rotational axis or from a spherical region centered on this point. Similarly, we may consider the intensity of the consciousness fields at a particular locus to be inversely proportional to the square of the distance from the point or region of emanation.

The autoconfiguration of protean consciousness-field lines. It is now postulated that the freedom we seem to experience is authentic and that two factors may account for it. The first is that qualions are bundles of energy disengaged from mechanistic brain processes. The second is that consciousness fields have an inherently protean, freely active essence that enables component field lines to self-arrange into limitless varieties of configurations and/or to assume a wide variety of dynamic activity-patterns.

Such freedom may be thought to exist in its purest and simplest form. As a corollary, once such a property has been exercised, the resulting configuration or activity pattern becomes locked in until the property is again used to change them.

Superposition of consciousness fields. Consciousness fields may be designated a *linear system*. This means that the fields generated by distinct qualions would *superimpose* upon (i.e., merge with) each other to produce a single complex field. We'll explore later how qualions may underlie phenomena such as sensory perception, focal mental activities, and the self; but the important thing to note here is that each of these would be *regional* processes or structures within a single whole. Our conscious experience can thus be pictured as a unified multi-phenomenal field occupying definite regions of space.

Consciousness fields as exercising control over the qualion as a unit. Due to the proposed interrelation between consciousness fields and their energetic sources, it is postulated that these fields can control the spatial dimensions of qualions. They may expand or contract these quanta and in so doing affect their own intensity.

If the qualion is a torus, for example, an expansion or contraction of the toroidal circumference would result in an inverse variation in both the amount of energy flux in a cross section and in the number of revolutions per second (RPS). More concretely, if the average circumference is doubled, then both the cross-sectional flux level and the RPS will be halved (i.e., half the number of rotations are needed to maintain c). In so doing, the generative energy-configuration becomes *diffused;* and therefore the consciousness-field production process is reduced in magnitude (and vice-versa when qualions are contracted). To be more specific, the proposed consequence is a direct inverse effect on the intensity of fields generated[13].

A spectrum of consciousness. To continue the current line of thinking, let us simply suppose the following: the diameters which a single qualion can adopt range in size over three orders of magnitude from about 10^{-13}m (about fifty times the diameter of a proton) to about 10^{-10} m (the radius of a typical atom). Within these limits, the intensity of consciousness fields generated would vary from extremely strong to very weak and such variance would be reflected in either the contribution of a unit to a regional field or, when exercised microcosm-wide, in the general level of subjective awareness.

On the small-diameter end of the spectrum, there may be a limit on qualion compactness. Near this limit, the qualion may generate *supraluminous* consciousness fields. Still within the high compactness zone but less so, the qualion may generate the phenomenon perceived as *luminosity.* As qualions further expand, the fields generated would reduce to high subluminous intensity, to moderate intensity, to low intensity, to extremely low (or subliminal) intensity.

On the microcosm scale, the contribution of qualions would average out to generate, without sharp transitions, the following spectrum of possible conditions (all subluminous): hyperconsciousness, average waking-levels of consciousness, hypoconsciousness (or stupor), and absence of waking (or subliminal) consciousness.

A quick exercise. Consider taking a minute now to imagine a cubic module of a billion qualions forming a static hologram-like image of a dove in flight. Such an image would be formed by various intensities and patterns of field lines within the module. A good metaphor for these field intensities would be very light to very dark shades of "gray".

Initially, this module would be a uniform medium of qualions generating moderate—or "gray"—levels of consciousness fields. The first of two concurrent processes would be a "chiseling" out of the medium to achieve relatively vacant or "dark" areas. To do this, the relevant subpopulation of qualions and their field intensities would be damped down to a low—or "dark gray"—level. These would envelop the ultimate image with increasing precision.

Complementing this injection of "darkness" would be an interfacing infusion of "light." Starting perhaps as an amorphous concentration of qualions generating high intensity—or "near white"—consciousness fields, this group would then arrange itself to realize its intended form. These quanta would exact their positions and converge their protean field lines to form a head, the protrusion of eyes and a beak, a breast and a back, a pair of extended wings, then legs, feet, and tail feathers. In a brief elapsed time-period, the image of the dove is complete. (Ideas developed in Appendix I will suggest how this plain "white" dove might be turned into a multicolored talking parrot, but let's be content with the dove for the time being.)

States of Consciousness and Unconsciousness

In this article, the term *conscious state* will refer to any condition in which the qualion microcosm generates a sufficient level of consciousness fields to produce a subjectively discernable state of awareness in an organism. *Unconscious state* will refer to the absence of such a condition (i.e., consciousness fields are at a subliminal level).

General activation and arousal and the base-level conscious state. In describing the processes that eventually lead to consciousness, *activation* will refer to the initiation of broad patterns of cerebral activity; and *arousal*, to a *contractive response* by individual qualions in key areas of the brain that "lifts" them into a fully conscious state.

Neuroscientists have some understanding of the general form of activation leading to full waking consciousness. This is a process involving the reticular formation, many nearby related structures, and their ascending pathways (Shepherd, 1994). Initially, some required degree of sensory input triggers a complicated chain of events involving these structures, which causes progressively greater numbers of neurons to discharge and eventually results in a general activation of the neocortex.

Billions of neurons are continually firing when activation is achieved, and each of the thousands of channels in individual neurons can pass 100 or more ions during impulses lasting about one millisecond (Keynes, 1979). Arousal may occur when the magnetic fields of ionic currents act upon the magnetic fields of qualions constituting the *ego* (similar, as described in footnote 20, to the one proposed by Hilgard, 1977) and achieve a certain threshold level of agitation. In effect, this may provoke spontaneous qualion contractions and thereby "noise" within the system that serves as a "wake-up call." The qualion components of the ego that were at a subliminal level then respond and *contract* into a conscious state and we begin tending to the problems of the day.

Simultaneous to the arousal of the ego, it may be surmised that a *base-level* subjective system also responds and emerges into a fully conscious state. In accord with some combination of innate and learned adaptive-disciplinary processes, this base-level system would include *only* those elements that would subserve an efficient, coherent, and responsive subjective realm.
In addition to the ego, it is proposed that the other primary components of this realm are a reality orientation data-system, the finished products of sensory perception, and a central mental arena (similar to the global workspace of Baars, 1988) where focal mental operations are conducted. It

may also be surmised that a peripheral arena of semiconscious short-term memories would exist to provide context for ongoing experience.

General deactivation and the downtime response. When the transmission of signals from the brain's activating system is significantly reduced, cortical activity in general falls dramatically and the subject becomes unconscious.

This may be viewed as the consequence of several processes. In terms of direct effects on the qualion microcosm, the cessation of the arousing or galvanizing influence alone would probably have a strong depressant effect in a distinct but correlative system that is intimately attuned to it. On a second level, as the brain becomes relatively inactive in certain critical areas, the bridge to external reality, and hence externality itself, may be said to "collapse." This decline would deepen as the outside world is replaced by an isolating void—a *self*-consuming limbo with a caveat: do not linger here. There is but one exit, unconsciousness; and a state of rest has both an attractiveness and usefulness of its own. All these subverting factors then are conceived to work together to trigger a subconscious reaction, the *downtime response*, which compels the ego and possibly the base-level subjective system to retreat (via an *expansion* of their constitutive qualions to a subliminal level) to a neutral state of unconsciousness.

Restful unconsciousness, or "downtime," may thus be viewed as the inevitable result of a radical subjective decline and is partially due to the preferability of such a state to the dangers of total existential deprivation[14].

This proposed reaction may be either an innate response or a learned response with roots in the prenatal-infancy period and would have the added utility of preventing qualion activity from interfering with vital sleep. For all the above reasons, the downtime response may be considered an essential adaptive mechanism.

The Content and Processes of Our Minds

In addition to the properties of qualions and consciousness fields proposed up to now, it must be surmised that they also have a number of other innate qualities and potentials. Variations in intensities and field-line configurations, of course, would give consciousness fields the ability to create *forms* ranging from simple symbols like the number *two*, to hologram-like images such as the dove in flight, to animated figures; but there is more to our subjective life than symbolic or geometric representations of reality, however complex. There are sounds and technicolor images, pleasure and pain, love, joy and sadness.

In appendices I-V, this paper will attempt to make a rough but hopefully tantalizing beginning in the area of subjective phenomena—many of which may ultimately be adaptive mechanisms[15]. It will take on sensory perception and qualia as well as thinking, memory, selfhood, and volition. It will, for example, propose that the experiences of the colors *red*, *yellow*, and *blue* are constituted by (and identical with) different intensities of consciousness fields in the luminosity range. It will propose that the experience of sounds occurs when qualions vibrate. It will propose that thinking

is essentially consciousness-field information structures undergoing change. It will suggest that the person is a very complex cognitive superstructure with a highly concentrated "nuclear" core.

Readers are asked to approach these footnotes with an open mind because much of what will be proposed runs contrary to today's "conventional wisdom." They are asked to remind themselves that heliocentricism, microorganisms, general relativity, and quarks also contradicted popular viewpoints of the past. And they are asked to remember that the basics of this paper rather than amendable details are what ultimately counts. What is presented is merely one of many possible series of derivative hypotheses.

Testability of Hypotheses

Let us now turn to the issue of testability. As a prelude to doing so, it is worth noting that these new hypotheses have already undergone some *antetesting.* This means that they predict certain results that have already been discovered about the mind-brain relationship—results that currently exist as puzzling anomalies in neuroscience. For example, they suggest that conscious experiences will lag slightly time-wise behind the brain events that evoke them. This has been demonstrated by Libet (1966). And they predict that during the performance of tasks requiring higher levels of directed mental effort and activity than the average waking state there would be no significant increase in the energy utilized by the brain. This has been demonstrated by Kety (1957).

Looking ahead, these hypotheses are testable in other ways. In regard to the proposed substrate of consciousness fields, it must be remembered that qualions are conceived to be *real* energy-structures that are derived from and reduce the energy in biological tissue. One obvious prediction then is that there exists in living tissue some small unaccountable loss of thermal energy. If it is determined that this is not so, the qualion hypothesis would be falsified.

Further, since qualions are anticipated to have an electromagnetic character, it seems plausible that methods could be devised for detecting them. In an age when scientists have devised ways of detecting something as miniscule and elusive as a quark and can provide compelling evidence for something as "ghostly" as a neutrino, it seems likely that the same could be done for the qualion.

One tantalizing possibility involves phantom-limb patients. Amputees commonly report that the removed limb still seems to be "out there"—as real, lifelike, and part of themselves as a normal limb (Bowser, 1991; Melzack, 1992; Ribbers et al., 1989; Shreeve, 1993). One part of a *complete* explanation for this still mysterious phenomenon[16] may be that the qualion component of the original limb remains *in the phantom region* when the material limb is removed. If so, these invisible quanta (recall that *air* is also invisible) could be the target of a detection experiment.

Another possible area of investigation involving phantom-limb patients could involve various kinds of stimuli to the extrasomatic phantom region. If it could be demonstrated that subjects completely shielded from the process can detect stimuli occurring in the region, it would constitute compelling evidence that a field bridged to the body exists there and subserves

awareness. Stimuli could involve hot and cold temperatures, mild electrical shocks, passing various forms of matter through the region, and other forms of "intrusion."

Jensen and Rasmussen (1994) report that sensations of *touch* are a "common" experience in phantom limbs. More remarkably, Vilayanur Ramachandran has reported that an amputee may assert the ability to grip and feel the contours of a material object with a phantom hand (see Shreeve, 1993). This purported ability could be tested by placing behind a screen objects with different shapes, such as cubes, balls, cylinders, and a spindle and determining whether the patient can correctly identify them.

Once the formidable practical and ethical issues involved have been addressed, another detection experiment could involve a second puzzling phenomenon that has been widely documented. There is already a very large body of evidence that *something* (something conscious and *self*-embodying) *somehow* may detach from the material body when *clinical* death occurs (Corcoran, 1988; Fenwick and Fenwick, 1995; Griffin, 1997; Grosso, 1981; Manley, 1996; Parnia et al., 2001; Ring, 1980; Sabom, 1982; Schoenbeck, 1993; Schröter-Kunhardt, 1993; Stevenson and Greyson, 1979; Van Lommel et al., 2001).

Reports of this phenomenon typically involve hospitalized patients who undergo cardiac arrest or some other acute form of trauma. They lose their vital signs and are later revived. Although their material bodies are unconscious during their ordeal, they report a keenly aware and vivid *out-of-body* observation of resuscitation efforts. A good designation for this phenomenon is the *virtual* death experience, but it is commonly called the *near-death* experience.

Some (e. g., Siegel, 1980, and Blackmore, 1988) have argued that the phenomenon is a hallucination; but the universal similarity of the experience (Grosso, 1981; Ring, 1980; Stevenson and Greyson, 1979), the common absence of medical factors that could trigger hallucinations (Grosso, 1981; Ring, 1980; Sabom, 1982), the verification of detailed "visual" accounts by patients of resuscitation efforts (Sabom, 1982), patient reports of "seeing" other later-verified events or objects that couldn't have been observed by normal means (Corcoran, 1988; Ring and Lawrence, 1993; Schoenbeck, 1993), and the sometimes presence of flat electroencephalograph readings[17] or a non-functioning brain (Grosso, 1981; Parnia et al. 2001) seem to weigh very heavily against such a position. When actual events are later described in detail by a resuscitated patient, these experiences can hardly be designated hallucinations.[18]

The view that virtual death experiences have an objective reality is gaining increased acceptance by the medical community. When 143 physicians were recently surveyed regarding patient reports of out-of-body experiences, a clear majority (65%) held the view that these were veridical events rather than hallucinations (Moore, 1994).

Whether illusory or not, however, there is enough evidence to at least come to a commonsense conclusion that something *probably* does detach from the material body and, if it does, there may be ways of detecting this something and determining whether it has the energetic character hypothesized for qualions.

A variety of other predictions and methods of testing will likely emerge as these proposals undergo refinement and elaboration; but even those offered here suggest that verifying or falsifying the *basics* of this new model are *presently* within our reach. And while it is not clear at this point how we can test some of the higher-level hypotheses, Farber and Churchland (1995) have argued persuasively that we should "avoid prohibitive speculation on the ultimate limits of our understanding" (p. 1302). Problems that seem "intractable at an early stage may well become much clearer and more approachable in the context of an advanced, experimentally grounded understanding" (Id). Thus, there is no reason to conclude a priori that any of the higher level hypotheses are ultimately untestable.

Conclusion: Could There Be a "Ghost" in the Machine After All?

In his *Principles of Psychology*, William James (1890) considered the various positions on the mind-body problem and concluded that "[to] posit a soul influenced in some mysterious way by the brain-states and responding to them . . . seems to me the line of least logical resistance, so far as we yet have attained" (vol. I, p. 181). These words were written more than a century ago, but in modern times preeminent analysts such as Karl Popper, John Eccles, Wilder Penfield, Curt Ducasse, Brand Blanshard, Jerome Shaffer, and others have come to the same conclusion.

Why is this seemingly unscientific position still so attractive? Because even now it makes good sense. The conscious mind may be likened to a glass slipper, and our desire to understand the world demands that we find something to fill it—to explain it. Unlike the feet of certain haughty stepsisters, those offered by the neuronal components of the brain may simply be *too small* to fill this slipper. A parallel image is that of a toddler who comes stomping into the living room wearing her mother's dress shoes.

The doctrine that the conscious mind can be explained solely in terms of neurons has essentially only one strong argument in its favor: What else is there? Because there *seems* to be nothing else, we have imagined the little girl's feet to be larger than they are and struggled incessantly to stretch them to fit some very sizable shoes. But this hasn't worked. There is little about neurons that suggests the ability to generate consciousness. The neuronal doctrine hasn't explained the unity of conscious experience. It hasn't explained qualia and the variety of human experience. It has failed to explain selfhood. Nor does memory seem possible in a neuronal model. And the determinism inherent in this model is directly at odds with our experience of a freely acting, volitional mind. Perhaps never before in the history of science has logic so strongly suggested that something "new" may exist in nature.

The position that something "new" must account for the conscious mind has essentially only one argument *against* it: What else is there? Unlike the arguments against the neuronal doctrine, however, this one may be easier to address. This paper has presented two natural mechanisms with mind-making potential. One or the other may provide us with a brain-wide network of localized, microphysical energy-structures that are stable and immune to absorption. These

quanta have the potential to account for consciousness. They could account for the unity and diversity of human experience. They could account for memories, our sense of selfhood, our freedom, and our volitional ability.

Cinderella, it seems, may have been there all along. This Cinderella is a *ghost* so to speak, but a ghost with a biological origin that is a composite of the *physical* and the *supraphysical*. Even those who are repulsed by ghosts must acknowledge that the qualion hypothesis is testable—and falsifiable—on a basic level and therefore is entitled to the scientific minimum of a wait-and-see attitude.

Some final perspectives on this model may be derived from history's emphatic reminder that the problem at hand is unique in its multilayered complexity. Even if the basics of these hypotheses prove to be true, there may be a limit on how far they can take us. Still, we would have a better understanding of who we are, and our place in Nature would never seem quite as mundane—and as inextricably linked to matter—as it did before. The neuronal view of man would be replaced by one far more conducive to a sense of transcendence in our species—one that would reflect back upon, and perhaps elevate the meaning of, the entire cosmos.

(*Continued on Part 2*)