The NQUIET Project
(Hypothesis)
Neuronal Quantum Information and Energy Transduction Process
An International Mindfitness Foundation Initiative

By R. Adam Crane

Introduction

I undertook a career in psychophysiology focused on self-regulation including biofeedback and specializing in neurofeedback because I have had a lifelong interest in finding practical strategies that an ordinary human being like myself can do in order to improve his own mind (consciousness). I, and my wife, founded the International MindFitness Foundation in order to carry this research forward and to make the findings available for the lowest costs possible. As the science of consciousness matures, it is inevitable that the focus on practical applications is growing. It is the intention of this paper to contribute to emerging applications and theories of consciousness. We are especially interested in practical strategies useful to ordinary people.

Probably many of those reading this article share my interest in improving the quality of our individual consciousness and therefore lives. However, working with one's own mind or the minds of others in a wise and safe way is much more difficult to do than to discuss. Although there is a unitary aspect of our consciousness as a culture and species, the actual challenges each person faces in order to improve the quality of his or her consciousness (mindfulness) almost always require strategies and adaptations that are unique to that individual. For this reason, I believe the most powerful consciousness-enhancing strategies are heuristic. The best teaching is that which helps the learner to teach himself what works in his or her unique life and circumstances.

Since the research underway takes time, some of the key ideas enfolded in the NQUIET Hypothesis (NQH) must be speculative. I do not expect tough minds reading this to be as enthusiastic as I am about the potential of this hypothesis. I am a synthesizer. However, if certain aspects of NQH turn out to be correct, it seems to me we have a tool that could contribute to improvements in neuroscience, consciousness science, and education.

This concept is in the hypothesis or opinion stage. Oswald Spengler's notion that a hypothesis doesn't have to be true, it only needs to be useful, applies. I see this concept as a useful hypothesis, but if you prefer to think of it as opinion, fine. A scientist once explained to me that relativity was an opinion for almost ten years before it became a hypothesis. After relativity was tested, it became a theory.

"The field is the sole governing agency of the particles"
(attributed to Einstein).

A more conscious electorate will be more creative and energetic and will think more coherently. Assisting those who are interested in unfolding their own potentials is fundamental to the evolution of a healthier, wiser, more compassionate society, including its technological and scientific communities. Ants sometimes move rubber tree plants.

"One of the greatest scientific achievements imaginable would be the discovery of an explicit relationship between the waveform alphabets of the quantum theory and certain human states of consciousness"
Nick Herbert (1985, p. 249).

The NQUIET Hypothesis —A Brief Description

The following, as simply and briefly as I can state it, is a skeleton of the reasoning behind the NQUIET hypothesis. As described below, the NQUIET project hypothesizes that the brain can be sensitive to information and energy emanating from or via or entangled with undiscovered dimensions and sources.

Hypnopompic and hypnagogic, creative, archetypal (pre-thought) imagery may continue the transduction process until signals emerge as practical, three- and four-dimensional "standard" or "normal" consciousness. Unfolding insights and energy might then enhance creativity and lead to improved quality of day-to-day living (that is, a condition of mindfulness or mindfitness). I add some flesh and blood to the bones in the discussion section.

1. Why do neurons operate on and manifest primarily AC electromagnetic (EM) potentials and the glia primarily DC potentials?

2. The most widely accepted scientific model of consciousness is arguably the binding theory, which holds that the brain is composed of specialized anatomical parts that include lots of neurons. Approximately 100 billion neurons communicate with each other through electromagnetic and biochemical means including the continuous interchanges of information and energy at extremely subtle levels (quanta and quantum field effects). The binding theory asserts that the more globally and faster the brain integrates all of the differing bits and pieces of information (and energy) from its different parts, the better the quality of consciousness. Since AC current (action potentials) is more effective than DC current at transferring information and energy over distances, it makes intuitive sense that the neurons would exchange this information and energy using AC current.

3. The binding theory accounting and description of the brain's operation has substantial merit as a description of thinking function activity. And most scientific definitions of consciousness assert that thinking is critical to consciousness or in some cases is the essence of consciousness. However, there are subtle aspects beyond thinking of central nervous system (CNS), autonomic nervous system (ANS), and voluntary nervous system (VNS) capability and activity that are not accounted for very well in the binding theory. Some of these subtler processes are associated with the creative process. In short, the brain can gain insights that appear to be direct perceptions of subtle truths in nature (actuality) which have not been learned before. This direct perception is fundamental to the creative process and original thinking. Perhaps the brain is transducing "what is" directly from nature at subtle levels that must include the quanta (quantum fields).

4. Information and energy are being exchanged via quantum fields continuously. Therefore, it is reasonable to assume that insight, meaning, and energy have to emanate (originate?) at least partially from or in some other way be entangled with quantum processes.

5. The brain contains at least hundreds of billions of glial cells, and traditionally they have been described as a kind of glue that holds the whole thing together and supplies the neurons with nutrition and support. Today the somewhat mysterious glia, including oligodendrocytes, astrocytes, and Schwann cells, etc., are generating increasing interest (Káradóttir, Hamilton, Bakiri, & Attwell, 2008). The glia apparently operate on and manifest DC potentials. DC current appears to be better suited to the process of transduction than AC. Recent research has confirmed that at least some of the glial cells (oligodendrocytes) produce action potentials. Oligodendrocytes are brain cells that can regenerate both neurons and glial cells in adults. Schwann cells also play a role in neurogeneration.

"Oligodendrocyte precursor cells (OPCs) comprise 5% of the cells in the adult brain, where they are the main proliferate cells present. They can generate both neurons and glial cells, making them an important stem cell population in the adult brain" (Káradóttir et al., 2008).

6. The question arises, what might the glia be transducing? It is reasonable to hypothesize that the glia may be transducing information and energy from or through the media of the quanta and quantum fields.

7. Throughout history, it has been common for creative and relatively "enlightened" people to talk of their original insights as having come to them from somewhere beyond the normal learning, conditioned thinking processes. Those that are articulate about this process usually claim that creative insight and imagery, etc., come first, and then "original" thought is seeded or impregnated by this insight coming from some usually unknown source. One of my mentors, David Bohm, told me that both he and his mentor, Albert Einstein, had noted that they both felt insight/discovery coming first as a feeling "in their muscles" and later as an archetypal, pre-thought image, and from there to coherent thought. Numerous other creative people have expressed similar notions. Dave's brain was not autopsied but Einstein had more than normal glia around the visual cortex.

8. Neuroscience and quantum physics hold that there is continuous interchange of information and energy within quantum fields. The whole human body, including the nervous systems (CNS, ANS, VNS), is constructed of entangled quantum fields.

9. If the binding theory has merit and consciousness involves the whole body, then the challenge is to facilitate the exchange of information and energy within the individual organism, and by extension other organisms (beings). Based on the principles inherent in the binding theory, such exchange of information and energy should result in an improved quality of consciousness, improved sensitivity to subtle patterns, and enhanced intelligence.

10. The NQUIET project hypothesizes that the brain (including the heart as in neurocardiology) can be sensitive to (transducing?) information and energy emanating from or via or entangled with undiscovered dimensions and sources. Hypnopompic and hypnagogic, creative, archetypal (pre-thought) imagery may continue the transduction process until signals—information and energy—emerge as practical, three- and four-dimensional "standard" or "normal" consciousness. Unfolding insights and energy might then enhance creativity and lead to improved quality of day-to-day living (that is, a condition of mindfulness or mindfitness).

11. Recent technological breakthroughs have allowed for the measurement of slow cortical potentials (SCPs), DC electrical potentials in the brain and other parts of the body. These potentials are more difficult to measure than AC potentials used in traditional electroencephalography (EEG) and most psychophysiological electromechanical recordings.

12. Neurofeedback (NFB) allows technology-assisted self-regulation modification of both AC and DC electromagnetic (EM) activity of the CNS, and by extension the ANS and VNS. There are currently at least two NFB systems that allow for combinations of AC and DC NFB. The challenge is to find those combinations which can test the hypothesis and, or enhance human creativity.

13. DC "waves" (EM potential including SCPs) apparently underlie

most or all physical and mental activity, including traditional AC EEG (Becker, 1990). These DC potentials also influence AC EEG, cardiovascular activity, and by extension all or most psychophysiological activity in the organism. Of particular interest to me is the way DC (SCP) EEG potentials may relate to the free flow of insight, creative, archetypal, hypnagogic, and hypnopompic imagery and energy. Imagery (and energy) must originate in or emanate from, through, and are entangled with quantum field(s). If so, quantum field(s) may modulate, or at least influence, all imagery, including creative imagery. Creative imagery, it appears, must qualify as at least substantially a quantum field(s) effect.

14. Enhancing creative imagery must also enhance insight and thinking, leading to more coherent thinking. Coherent thinking is critical to enhancement of performance and quality of life. But what is thinking? I like the relatively simple definition of thinking as an image-making process based on memory—holographic mental movies. Thinking seems to be a relatively mechanical process tending to repeat itself with endless iterations. However, it seems that thinking can be "seeded." The creative process (involving, as it does, imagery and insight) can enter into thinking, causing something "new," not mechanical, to manifest—creative, coherent thinking. Direct perception transduced from quanta level may be able to "seed" creative imagery.

15. A further implication is that for something "true" to be reflected in human consciousness, either the CNS, ANS, or VNS, collectively or individually, must somehow make contact or directly perceive the truth, the fact, "what is" in nature. Obviously, the five senses provide pathways that function like (holographic) lenses, but direct contact at extremely subtle levels (the quanta) may provide a kind of sixth sense. That perception must then be "brought down," transduced into the creative processes (creative imagery) and from there into the relatively mechanical thinking function imagery.

The NQH model, restated, is that more subtle glial cells with their DC (potential transduction capability) could be allowing the CNS to directly perceive phenomena, principles, truth, "that which is" at super-subtle, even subatomic levels. Once the raw information and energy enter the CNS they proceed through a continuum of transduction(s) until they emerge (are entangled with) thought, the creative process—consciousness (the flourishing life?).

The Greek word *psychology* implies the study (science and art) of all mental processes including consciousness and spirituality.

16. Stuart Hameroff, M.D. (Hameroff & Penrose, 1996) suggested that the glial cells themselves are "too large" to directly transduce from the quantum fields; however, microtubules imbedded in glia and neurons are an excellent candidate.

17. The holonomic model of consciousness processes (Pribram, 1987) proposes the senses as lenses that can transmit and focus holonomic perceptions and imagery. Penrose, Hameroff, and others have described quantum processes and brain cell structures that may result in the transformation of information and energy into holograph-like imagery in the glia and neurons. I suggest that these images may be candidates for conscious or preconscious creative imagery. NQUIET appears to be compatible with Bohm's notion of an implicit and explicit order and Nobel Laureate Espagnat's "veiled reality" (Espagnat, 2006) and suggests one potential pathway whereby information and energy flows from subtle (implicit) to conscious, experienceable (explicit) realities.

18. Should the NQUIET hypothesis prove valid, further experimentation should lead to innovative NFB training strategies. Obviously, if the NQUIET hypothesis can be validated, it rises to the level of a neuroscience and neurophilosophical theory potentially leading to psychophysiological enhanced learning breakthroughs, and may contribute to answering the question: Does consciousness emerge from matter or does matter emerge from consciousness?

Discussion

"*But in terms of sheer complexity, particle physics is a child's game—a ten-piece jigsaw puzzle of Snow White—compared to neuroscience*" (John Horgan, 1999).

The following exploration of the NQUIET hypothesis including its relationship to the binding and other theories of consciousness and the creative process intends to make the NQH perspective clearer. I have sent early drafts of the NQ hypothesis to scientists and colleagues. Their responses are encouraging. Most of them have made suggestions that I continue to integrate as NQUIET evolves.

When Nobel Laureate Francis Crick felt he had completed his contributions to the DNA field, he began an encore career by joining the Salk Institute and dedicating himself to what he considered the most important science of all—the science of consciousness. For millennia, great minds have asserted that the most important of all sciences is the science/art of consciousness. However, momentum increased once Crick publicly embraced that idea. Ancient Greeks as well as Vedic, Buddhist, Chinese, and other cultures developed sophisticated sciences of consciousness including practical applications for enhancing consciousness, unconsciousness, subconsciousness, and even supraconsciousness of ordinary human beings.

The Greek word *psychology* implies the study (science and art) of all mental processes including consciousness and spirituality. Probably most of us share the notion that if we do not understand the mind processes well, then our powers derived from other sciences may destroy us. Many extraordinary minds are now devoting their careers to the sciences of consciousness. This paper hopes to contribute to the ongoing dialogues.

"What we think about how the brain works is going to affect how the brain actually works. Changing the way we think about it will help change the way we organize it . . . . The key point is that we need not be identified with the body. We may well be some process which is far greater, far more subtle. Then perhaps all the feelings that come from our thoughts need not disorganize us as they generally do"
(attributed to David Bohm).

It seems the older sciences of consciousness were more focused on first-person strategies. The intention was to discover and teach ordinary human beings how they might enhance the quality of their own day-to-day consciousness. Theoretical explanations of consciousness seemed secondary

to practical consciousness training. A powerful case can be made that right understanding of consciousness requires a relatively awakened individual. In other words, consciousness has to be supraconscious in order to understand itself. This notion could influence education and science. Our vision integrates first-, second-, and third-person perspectives of consciousness while emphasizing practical assistance to us ordinary people interested in improving quality of our mind/body processes.

We can begin with jewels hidden in plain view. A great deal is already known about how the ordinary human being can significantly improve moment-to-moment, hour-to-hour, day-to-day, life-cycle to life-cycle quality of consciousness. For example, neurofeedback has been demonstrated to be an excellent tool for most of those willing to work with it seriously. Although NFB is extremely time efficient, it still takes time and effort. I assert that there is an enormous need for services to those hungry to acquire the learning and the tools necessary to bring about gains in the quality of their own consciousness, including the ability to recognize in a timely way when consciousness is deteriorating and how to bring it back up to strength.

Limitations of Language and Science

"I rarely think in words at all"
(Einstein, in Galison, Holton, & Schweber, 2008, p. 42).

Alfred Korzybski's famous insight that the map is not the territory, the word is not the thing, and the description is not the described is perhaps one of the most useful and liberating of insights. It seems appropriate to acknowledge that scientific and philosophical minds often do not share the same definitions of key, critically important words such as *mind, consciousness, awareness, attention, thinking, meditation*, etc. Even words like *science, religion, agnosticism* and *atheism* have literally pages of differing definitions when you look them up. But we must use language anyway and tentatively, respectively hold the intention of evolving creative dialogue and collaboration as best we can.

The science of consciousness is a science of mental processes including consciousness, subconsciousness and supraconsciousness. Many Buddhist, Vedic, Greek, Chinese, and other teachers believed that mind is more a verb than a noun—an ever-changing, flowing process enfolding the body, including energy fields surrounding the body. Some go even further, describing a universal intelligence enfolding and unfolding our individual mind/body processes.

Researching roots of key words used in consciousness science suggests there may be languages better adapted than English to helping people gain practical insights into the science and art of unfolding their potentials. I suspect Sanskrit, Pali, Tibetan, Greek, Latin, Chinese, etc., might contribute much to consciousness science.

The translation of texts on mental processes by competent translators and even scholars whose own consciousness is not as developed as the consciousness of the authors is problematical. Many of these often "spiritual" documents are actually fairly solid, practical scientific teaching tools for enhancing the quality of consciousness. However, proper translation requires higher orders of consciousness than is possessed by the well-meaning translators. Therefore, enormous misunderstandings are propagated down through the centuries.

While participating in a chat group of consciousness scientists I observed that there were substantial differences in how we were using the term *consciousness*. Yet the group had previously agreed on one of the more widely held scientific definitions. However, when we discussed alternate states of consciousness (ASCs) it became obvious that the "consciousness" we were trying to discuss had overflowed the limited scientific definition like water overflowing a bucket. So much of the time we talked past one another.

Credible first-person practitioners and teachers of consciousness warn against the dangers of dividing consciousness up into normal consciousness, unconsciousness, supraconsciousness etc. It seems to me that our modern sciences of consciousness are evolving towards a similar notion. If the field really is the sole governing agency of the particles and interconnectedness actually is a fundamental quantum reality, then it seems obvious that consciousness must ultimately be embraced as a seamless whole that is fluctuating continuously (often instantaneously) along a spectrum of unknown

immensity. If human consciousness is continuing to evolve and is subject to the uncertainties and possibilities inherent in the quantum potential, then consciousness potentials may be virtually infinite.

One of the appealing aspects of global workspace theory (GWT) is that it seems to open within the present an ancient insight that consciousness is a seamless, fluctuating continuum (Baars, 1997). GWT seems to integrate many of the modern scientific and neurophilosophical theories of consciousness.

The limitations and unrelenting evolution of science, including physics, mathematics, nonlinear dynamics, neuroscience, even relativity theory, loom large in my own contemplation of the NQUIET hypothesis and neuroscience theories. From my perspective, the further sciences evolve, the more prescient David Bohm's "hidden variables" (Bohm, 1985) and Bernard d'Espagnat's "veiled reality" theories seem.

The challenge is to build bridges and synthesize differing views as to how consciousness may be enhanced. Extremely difficult, perhaps, but it has been done and can be done better. I assert doing so is choiceless if we are to accelerate our progress and contribute in a wholesome way to our own evolution.

The Binding Theory of Consciousness

I assert that the binding model is primarily a theory explaining thinking and some aspects of awareness while falling short of yielding much insight into creativity and sources of insight into laws and principles underlying reality and nature. Having an efficient brain that passes information and energy around well (binding model) is a critically important part of creative intelligence, but not the whole process. Healthy thinking function has to be somehow seeded by insight, which might be at least partly direct transduction of "what is" from or via the quantum field(s).

While wondering why neurons primarily have an AC potential, and glial cells have primarily a DC potential, it occurred to me that AC is better for exchanging energy and information over distance. This is consistent with the binding model, which holds that quality of consciousness is related to the speed and comprehensiveness whereby the brain's different anatomical structures and their neurons communicate with each other.

"One of Becker's fundamental observations was that the conscious state of the organism varies with the DC current which Becker (1979) stated reflects 'subtleties of brain functioning greater than general levels of consciousness.' Pribram also believes that conscious perception involves neuronal microprocesses other than the familiar axonal firing which yields a millisecond spike. Clearly axonal firing is central to communication through neuronal circuits, but Pribram does not believe it is the basis of conscious experience. Rather, Pribram appeals to the processes of the dendritic networks rather than neuronal circuits as the basis of consciousness and, in that regard, his work is clearly similar to Becker's research" (Choquette, 2002, chapter 4, para. 4).

Other Theories of Consciousness —Orchestated Objective Reduction, Theater of Consciousness, Holonomic Model

I am still learning about orchestrated objective reduction (Penrose & Hameroff, 1996), theater of consciousness (Baars, 1997), and the holonomic model of brain processing (Bohm, 1985; Hameroff & Penrose, 1996; Penrose, 1994; Pribram, 1998). From what I understand so far, the NQUIET hypothesis seems compatible with all three theories. Dr. Hameroff's perspective that microtubules in the glial cells might be good transduction candidates fills in another piece of the NQUIET hypothesis.

To borrow from a metaphor that Dave Bohm used: Imagine that the microtubule is like a small antenna on the top of a huge ship. The antenna can pick up "invisible" radio waves (information and energy from the quantum fields—potential) and "transduce" them into navigational signals that guide the immense freighter (glial cell) through the vast sea (life, creativity, mind processes?).

Holonomic Brain Processing Model

"When you come down to reality as such, to the reality of realities, everything is present to everything else in one vast instantaneous co-implicated completeness"
William James (2004).

The NQUIET hypothesis is compatible with the holonomic brain processing model. Microtubules may be picking up information and energy as per the antenna metaphor above. From there the information and energy may be further transduced through holonomic processes until images form in or on the edge of consciousness.

Karl Pribram, David Bohm, and others have proposed that the brain may be using holographic or holographic-like mechanisms. Hameroff suggests that microtubules within the cytoskeleton of brain cells may be acting like wave guides for photons leading to holographic processing mechanisms (Hameroff & Penrose, 1996).

It has been suggested that dendritic polarizations and the cytoskeleton interact and contribute to communication between neurons. Cytoskeletons consist of lattices of protein rods forming microtubules throughout the cell. The structure of the neuron depends on the cytoskeleton. It plays a critical role in the transportation of particles all over the cell. Karl Pribram and others believe that microtubules seem to be carrying information (and energy?) from the synapse to the nucleus. If so, microtubules must make a fundamental (holonomic?) contribution to perception and memory (Dayhoff, Hameroff, Lahoz-Beltra, & Swenberg, 1994).

A 1993 paper proposed that microtubules of the cytoskeleton may also be providing a communication network between the membrane and nuclear genetic material (Samsonovich, Scott, & Hameroff, 1992). This holds potential implications for evolutionary "acceleration." Devolution is also implied, as happened on Easter Island when trapped Polynesians destroyed the island's natural resources.

Fred Allen Wolf points out that "Nobili's work shows that ionic wave movement (that is similar in form and structure to quantum waves but different from them in certain essential details) occurs in the glial cells of the brain making it an ideal medium for supporting and producing holographic imagery . . . this could be thought of as Schrodinger wave wave holography in brain cortex" (Wolf, 1996, p. 2).

Furthermore, Wolf (1996) suggested that self-awareness may arise from holographically generated dream images. "Self-awareness arises from the ability of a simple memory device, an automaton in the brain, to obtain images of holographically stored glial cell memories and, most importantly, through a quantum mechanical process, to also

obtain images of itself. Each self-image is composed of a quantum-physical superposition of primary glial cell images and an image of the automaton containing those images" (p. 1).

Albert Einstein had more glial cells around the visual cortex than is normal. It is hypothesized that this had something to do with his ability to visualize very abstract concepts. He often said he saw math expressions.

Quality of Information (and Energy) Influences Quality of Consciousness

What improves the quality of consciousness? Surely, this at least partially if not entirely depends on the integrity of the information that is being interchanged. Let us assume that the more completely and energetically the brain's different parts communicate with each other, the greater the consciousness (binding model). An argument can be made that consciousness may have enormous emotional force as in rage, jealousy, fear, some kinds of euphoria (bipolar disorder), and intoxication, but such consciousness may be of poor quality, leading to a decrease in quality of life. The quality of consciousness is dependent on the quality of the information (and possibly on the nature of the energy) that the brain passes around between its many parts.

How true or actual is the information feeding consciousness? An indication of the quality of consciousness is the degree of creativity the individual manifests in his or her life, including creativity in relationships. I push this notion a bit further, suggesting that creativity is also a measure of intelligence, and intelligence (as sensitivity rather than IQ) is the foundation of the creative process. Possibly the same could be said for artificial intelligence but that is not yet clear to me. Perhaps intelligence is intelligence and to break it down as "artificial" is a counterproductive fragmentation.

Sensitivity to "what is," or the truth, the actual, the fact, is probably the best measure of intelligence and quality of consciousness we have. Sensitivity in the sense that we use the word implies recognizing subtle patterns and extracting meaning from these patterns. How does this relate to the individual creative process? Does the creative process derive from our brain's capability to talk to itself, which implies passing around memory-based images (thoughts—many of which are, at best, flawed), as in the binding model? Or does creativity derive from our brain's ability to perceive the truth in nature, a situation, etc., and then transduce that truth (via archetypal, creative imagery, feelings, etc.) "down" into coherent thoughts, or as the physicist David Bohm sometimes put it, "felts"? After that, the binding model makes great sense as an explanation of how creative insights may unfold into thinking and practical application in daily life.

Creative people often claim they are like a channel and their insights come to them from somewhere beyond their normal mental processes (perhaps the Big Mind, or collective unconscious feeding little, individual, mind?) and are often felt before they become cognitively clear. It seems reasonable to speculate that to a substantial degree, the clues/insights come from or via the quantum field. Next (as per the binding theory), the ability of the brain to talk to itself (including integration of the heart-"brain") becomes a critically important step in further bringing creative insight "down" into manifestation in consciousness, the three- and four-dimensional physical manifestation of our "real world."

The Creative Process Requires Enormous Energy?

Strangely, one of the most neglected subjects during dialogues about creativity is energy. It takes tremendous energy to fuel the creative process and a relatively good quality of consciousness. The quanta are comprised of both information and energy that appear to be popping into and out of existence. One consequence of the practice of skillful stress management is that it reduces unnecessary expenditure of energy as well as irrelevant and counterproductive information. Since the organism is an energy generation and transformation system, it follows that:

1. A healthy human being generates a lot of energy.
2. If the same human being manages that energy well with a calm mind and good quality stress management (mindfulness, awareness, calmness, mindfitness) strategies, the energy will build.
3. If the energy builds beyond a certain point there must be a kind of "explosion."
4. That explosion is probably a good way to describe the creative process.

5. At least some of that energy may be transduced directly from the quantum. It could be argued that all of the energy comes from or via quantum fields.

6. One of the tenets of science is that energy is energy and discussion about unmeasurable energy qualities is unscientific. I believe an emerging, more holistic science will soon be discovering differing qualities of energy that can be "invited" into the mind/body processes by self-regulation processes. The debate about energy qualities, especially as regards biology and psychology, will gain traction as our understanding of energy grows more subtle. Vedic, Buddhist, and Chinese chakra drawings and traditional teachings imply differing qualities of psychophysiological energies. It seems to me that quantum physics has already begun this process through the investigation of dark energy and nonlocality/instantaneous remote influences, what Einstein (1971) called "spooky action at a distance."

The Glia Are More than Passive Bystanders?

For a long time neuroscientists believed that the purpose of the glia was to support, protect, and nourish the neurons. Suppose an additional function of glia is "feeding" the brain a kind of direct perception harvested from the quanta? I hypothesize that further transduction of that direct perception of actuality (truth) unfolds from possibly a virtually infinitely subtle, primordial source. The path of transduction may proceed further "down" into AC-powered neurons virtually instantaneously (50 mseconds or less?). David Bohm, Krishnamurti, Fred Allen Wolf, and others suggest a common "ground of being" out of which both the material universe and consciousness unfolds (Krishnamurti & Bohm, 1985; Wolf, n.d.).

Information "downloaded" from the quanta may be modified by usually preconscious aspects of intelligence dispersed around the brain/mind, producing the phenomenon of "binding" or "consciousness." Neuronal processes involving alpha/theta brain waves (the well-researched "theta flash" or eureka-aha experience) may be further transducing this "direct perception" (Criswell, 1995; Green & Green, 1978; Gruzelier, n.d.). Further transduction may then take place into or in the relatively mechanical thinking function and imaging process. Creative, hypnopompic-hypnagogic, archetypal imagery seem a bridge process enabling information and energy to finally emerge as conscious actions including creative, enhanced living.

In this model, the original "preconscious" insight is carried forward into action and recognizable materialization. Materialization refers to objects and visible actions that can be observed by the five senses and experienced (scientifically measured) in normal, standard, conditioned consciousness. In an expanded version of the NQUIET hypothesis, it is my intention to attempt to integrate some of the implications of dark matter, dark energy, Heisenberg and Schrodinger's quantum measurement dilemma, whether or not different qualities of energies exist, and the possibility that the brain may be integrating information and energy unfolding from undiscovered dimensions, sources, "grounds," or fields**.**

"Glia Glow"

"Jibu et al. (1994, p. 199) described 'superradiance' in microtubules. Something like an optical version of a superconductor, the emergence of coherent photons are predicted inside the hollow microtubules which propagate without loss of energy. This quantum coherent state is described as 'self-induced transparency.' The exchange of energy between the Emf and the water molecules can create or annihilate such photons. Dicke (1954) was the first to describe superradiance, a macroscopic process which results in such pulses of photons. More recently, Del Giudice, Preparata and Vitiello (1988) stated that water can release pulses of photons in a laser like process. Del Giudice et al. further noted that the substantial electric dipoles of water molecules can coherently interact with the surrounding Emf to generate macroscopic phenomena which could be fundamental to the organization of living matter" (Choquette, 2002, para. 19).

Another difficult-to-define word that intrigues me is "enlightenment." Does such a condition actually exist? Common sense seems to suggest that some people, some of the time, seem to behave in ways that can be called at least relatively enlightened. Can individual efforts lead to an improvement in the individual's "enlightenment quotient"? Developing the science and art of personal meditation (mindfulness, attention/awareness) to the highest level one can is important because the heart/brain is like a light bulb on a rheostat. True, high-order meditation (mindfulness; *mahamudra* in Sanskrit) and the relatively wholesome lifestyle that usually unfolds from it generates energy. Slowly or rapidly (instantaneously?), this increased energy turns up the power in the light bulb. When the power is low, then only a small area around the light bulb is lit up, and the rest is dark. This is the condition of consciousness of probably most people most of the time. I call this standard, conditioned, third-dimensional consciousness (3DC). The darkness represents the unconscious. As energy increases within the organism, the light bulb (consciousness) burns brighter, and a wider circle of darkness becomes visible, lit up. What was unconscious becomes (more) conscious. I also propose a fourth dimensional consciousness (4DC), which integrates the dynamic of timelessness as the "power of now," present-mindedness and awareness, improves "time-sense," and upgrades consciousness.

Assuming the glia may be a kind of transducer, a bridge enabling insight into "what is" and bringing subtle, primeval, archetypal perceptions (patterns) down into (seeding) the thinking function, then, amusingly and perhaps usefully, it follows that "powering up" the glia would from a quantum perspective be tantamount to increasing the "light" within the heart/brain, revealing more of what was previously unconscious, and also providing the kind of energy necessary for continuing the thought process into grosser and grosser materialization (activation of executive function—the frontal cortex plus?).

If matter is defined as energy traveling in a pattern, then thought is matter and thinking is a material process. Pouring energy plus information into the thought form makes it "thicker" until it becomes material, for example, a table. The brain seems to actually create its own light as an electrical/chemical transduction is triggered by photons striking the eye. Suppose the brain can increase internal light emitted by its photons using information and energy harvested at least partially by the glia? Note Einstein's powers of visualization and abundant glia around his visual cortex. This process, if true, could update our modern understanding of the ancient notion of enlight-

enment and the countless artworks depicting light around the heads of people who were believed to be unusually wise and compassionate. It is amusing to think of that light as "glia glow."

Toward Strategies for Testing and (if Proven Useful) Implementing NQUIET

From my perspective, the evidence that self-regulation and especially NFB can enhance the creative process is overwhelming. It seems reasonable to suggest that self-regulation of DC (EM) brain and body potentials for the purpose of influencing thinking function and enhancing creative insight, health processes, and sensitivity may also be possible. It also seems plausible that AC (traditional) EEG signals may be used to influence slow wave potentials (SCP's) including DC EEG potentials and vice versa. Assuming that the NQUIET hypothesis has merit, technology may be used to enhance the transduction of quantum information, energy, creative imagery and insight into the CNS—especially the neuronal systems of the brain including the vascular system or "heart/brain" as understood in neurocardiology (Armour, 2003).

The technology required already exists. Systems are produced by BrainMaster Technologies and Thought Technology. We have acquired both systems, which are capable of registering AC and DC EEG activity and other parameters. Research is underway exploring biofeedback self-regulation of AC and DC (SCP) EEG and neurocardiological relationships.

I have been told that Freud predicted that technology that could open a path to the unconscious would eventually be invented. Some neurofeedback practitioners believe that NFB is at least one such technology and can also lead to better integration of differing states of consciousness.

***Homo Resurrectio Evolutis*— Is Evolution Changing Our Minds?**

There is growing evidence that not only is Homo sapiens sapiens still evolving, the rate of evolution is increasing. Nobel Laureate Robert Fogel (2002) believes that for at least 300 years we have been in a "techno-physio" evolution. I think our technologically enhanced evolution goes back much further than 300 years. It seems reasonable to suggest that we are profoundly influencing our own evolution through technology and other means. Some scientists and philosophers believe we are actually in an evolutionary leap, even a singularity. Therefore, technologies of self-knowledge (such as biofeedback and especially neurofeedback) may be contributing to evolutionary processes already underway.

> "All means prove but a blunt instrument if they have not behind them a living spirit"
>
> —Einstein

Arguably, we have already evolved so much that we are becoming a new species or at least a subspecies. If psychologist Steven Pinker (n.d) is correct, we are awakening our potentials and life is improving by many measures for most of us. The last five evolutions leading up to modern humans (Homo sapiens sapiens) all overlapped. So, if Homo sapiens sapiens is becoming obsolete—moving toward extinction—then what are we evolving toward? I suggest that a new species is already emerging and that most of us are already hybrids of the old and the new. Until I hear a term I like better, I propose calling the new us Homo resurrectio evolutis (awakening man influencing his own evolution and the evolution of others).

It seems to me that a powerful drive in our collective unconscious may be using technology as a means to accelerate our evolution. Many factors underlie evolution. However, the ultimate self-regulation strategy for enhancing quality of consciousness and life may be processes unfolding from the meditation model.

"We are told by biologists that it has taken millions of years for the brain to develop to its present stage and that it will take millions of years to develop further. Now, the religious mind does not depend on time for its development. What I want to convey is that when the brain, which must function in its responses to the outward existence, becomes quiet inwardly, then there is no longer the machinery accumulating experience and knowledge. Therefore, inwardly it is completely quiet, but fully alive, and then it can jump the million years" (Krishnamurti, 1991, p. 115).

Integration of Neurofeedback with Traditional Mind-Enhancing Strategies

It seems obvious that if brain transduction (BT) exists as a process, there must be many paths to BT enhancement including education, meditation, lifestyle changes, altered states (childbirth, near-death experiences, dreaming, athletic activity), etc.

I suspect we may already be enhancing BT using traditional alpha/theta training as well as other NFB protocols including combinations of synchrony/coherence training. So according to this model, traditional neurofeedback strategies that enhance neural quietness may lead to BT. It is my view that neural quietness increases sensitivity and reduces conditioned perceptual distortions (Crick, 1994; Evans, 2007; Lutz, Greischar, Rawlings, Ricard, & Davidson, 2003).

I hypothesize that radical or extreme neural quietness increases sensitivity along a virtually unlimited continuum. Contemplating the creative process, the metaphor of being able to hear the "still, small voice" comes to mind. Regardless of the strength or weakness of the NQUIET hypothesis and role that the glia may play, what natural processes may enhance or invite the transduction capabilities of the mind/body?

We probably share the conviction that a short path for actualization of the highest potentials of the human being exists as and within nature herself. Immersion within the immensity—the gross and subtle profundities of nature—quickens the brain, opening wide the eye of the heart, perhaps more quickly, more surely, better than anything else. However, embracing nature does not exclude integration of technology.

After all, technology comes from the human mind, and the human mind has emerged from nature herself. Technology is a manifestation of nature. So then, how can we use our technologies to unfold our potential? One simple example is to take NFB equipment outdoors on a lovely day, and do alpha/theta (A/T) training surrounded by the sights, sounds, and smells of nature. As sensitivity is increased, nature draws the mind of the healthy human being to herself, breeding a particularly fecund kind of attention. This profound attention (PA) further enhances the A/T mix and transduction capabilities of the brain (glia?), and,

I hypothesize, "turns on," that is, unfolds information and energy enfolded in the quantum fields. This transference/transduction of information and energy should have multidimensional integrity whether or not we are aware of the dimensions.

Biofeedback and neurofeedback are by no means a panacea; however, I believe the educational community in general is unaware of the current NFB potential for enhancing consciousness and self-regulation learning in general. NFB is in its infancy. I believe NFB can play a significant role in proving or disproving the NQUIET hypothesis. Should NQUIET prove to have merit, NFB may be a powerful tool for applying dynamics underlying this hypothesis. That said, the NQUIET hypothesis must stand alone on its own merits regardless of the applicability or lack thereof of NFB.

Brain Aerobics—Tough to Do but Worth the Effort

One of the definitions of meditation that seems useful to me is: The art and science of learning to actualize one's own personal intelligence and creative processes to the highest levels one can. Meditation is a strategy for developing specific mental processes and skills, in particular the skills of attention, sustained creativity, wisdom, and compassion.

"I have trained myself to notice what I see" –Sherlock Holmes (Doyle, 1927/2007, p. 267).

A critical skill that meditation can enhance is awareness of the loss of awareness in time to do something about it (mindfulness or mindfitness). Easy to say, but difficult to do. The rewards of noticing as close to the first moment as possible when awareness is decreasing and quality of consciousness is diminishing are immense. Learning what to do to slow or stop the decline in consciousness, stabilize it, and even improve it is life changing. Obviously a high quality of consciousness takes care of itself. Avoiding the danger of loss of quality of consciousness must be one of the highest priorities of any life. Stress management and especially technology-assisted radical stress science may be more than a great beginning. It may be all that is required in order to actualize high levels of innate potentials. It is my experience that practice of radical or extreme stress management strategies will almost always result in the emergence of a high order of mindfulness, mindfitness, sensitivity, intelligence (*mahamudra* in Sanskrit).

Integration of the Profound Attention Hypothesis (PA)

In my effort to bring as much substance and clarity to the NQUIET hypothesis as I can, I would like to integrate a hypothesis I developed decades ago as a teaching tool, which I call profound attention (PA). PA rests on the principle that intelligence is essentially sensitivity; furthermore, thinking and sensitivity to subtle signals (vibration) within and without are integrated and enhanced by attention.

The notion is that brain cells are behaving in a computer-like function when thinking (making images based on memory) is taking place, but in a sensory, instrument-like mode when tuning to subtle signals (ever more subtle pattern recognition) is taking place. Of course, these differing functions are virtually always taking place in differing ratios simultaneously. The PA concept hypothesizes that thinking is a rather mechanical process; but when insight takes place, thinking is "seeded" and creative (at least, more coherent, less mechanical) thinking ensues.

The profound attention (PA) hypothesis suggests that there is a relationship between the quality of attention and numerous psychophysiological (including creative) phenomena. The best first-person science, practical consciousness teachers that I've been able to find have continuously emphasized the role of attention in actualizing mind/body potentials. However, attention is one of those words that has many meanings to many people. It seems useful to discriminate between attention, concentration, and thinking.

Another important discrimination is that there are degrees of attention. The deeper, more comprehensive (think awareness, mindfulness, mindfitness) and more powerful (energized?) the attention, the better. Hence use of the word *profound*. Profound attention includes attending from the heart from both a neurocardiology and metaphorical perspective. One might go even further metaphorically (and psychophysiologically?) and say that one attends with everything one has—muscles, bones, blood. This extremely fecund, deep attention is a path to mindfulness "meditation" and probably the surest path to unfoldment of potential. I coined the term *mindfitness* in order to convey the notion that mindfulness-attention can be learned, trained just like physical fitness. In fact, becoming physically fit is one of the most effective ways to improve quality of consciousness.

Furthermore, enhanced attention skills can be learned relatively easily and naturally, whereas learning to significantly change one's thinking is far more difficult. In fact, it may be that the only way to effectively change or make more coherent one's thinking requires increased quality of attention first. The profound attention hypothesis can serve as a teaching tool into the depth and power of the meditation model, as well as offer insight into why neurofeedback is effective and usually produces beneficial but sometimes anomalous phenomena.

There are elegant electromagnetic (EM) EEG correlations for attention and thinking function including correlations for increasing attention, coherence of thought, and insight. Some of us distinguish between attention and coherent thinking. If this distinction prevails, then attention deficit disorder (ADD) might eventually be referred to as coherent thinking deficit disorder (CTDD). What stands out about the EEG correlation is that as the power and coherence of the EEG increases and the frequency decreases, the "quietness" of the brain cells increases and so does the coherence of thinking function. Sensitivity increases, and thought seems to clarify and "slow" as the coherence goes up.

An exception to this generalization is emerging because the Shear frequency at about 40 Hz and other gamma frequencies appear to accompany profound attention, coherent thinking and creativity (Crick, 1994; Criswell, 1995; Evans, 2007; Green & Green, 1978; Gruzelier, n.d.; Lutz et al., 2003). It is interesting that over 40 Hz frequencies associated with enhanced consciousness and coherent thinking are also electromagnetically synchronous and coherent. I speculate that Shear and other gamma frequencies might turn out to be harmonics, including harmonics of the intriguing alpha/theta (7.83 Hz) Schumann frequency. My perspective is that enhancing attention skills is easier and more effective than trying to change thinking (substituting one form of limiting conditioning with another form of less limiting conditioning). Enhancing attention may be one of the most learnable and effec-

tive strategies for opening doors to the creative process and beyond. Profound attention unfolds the power of "now."

The profound attention hypothesis posits that by bringing about relative neural quietness, "seeding" of thought with creative imagery and insight is facilitated. Further, such "seeded" thought tends to be psychologically more coherent and has a more coherent EEG signature. Most NFB practitioners believe alpha/theta training helps quiet the brain, and the degree of quietness correlates with the degree of sensitivity (intelligence) (Crick, 1994; Criswell, 1995; Evans, 2007; Green & Green, 1978; Gruzelier, n.d.; Lutz et al., 2003).

Additional Implications

Assuming the NQUIET hypothesis has merit, some implications which come to mind are:

1. If quantum field(s) making up the brain are entangled with quantum fields outside of the brain, then what are the boundaries of mind? If consciousness requires this entangled quantum relationship in order to function, then consciousness may also be imbedded in the quanta—the quantum potential. If consciousness is inextricably entangled with the quantum, then why can't consciousness exist beyond our brains?

2. If the quantum is conscious, when did quantum consciousness begin? Could it have been during the first second after the big bang when the four forces were still one, a singularity and universal inflation faster than light?

3. Might that suggest an infinite, supra-luminal, supra-consciousness?

4. If consciousness came before or simultaneously to the existence of the ground of being from which the material universe is emerging, then wouldn't that make consciousness a "hidden" (Bohm) or "veiled" (d'Espagnat) key to the elusive theory of everything? (d'Espagnat, 2006; Krishnamurti & Bohm, 1985; Wolf, n.d.)?

5. If the NQUIET hypothesis has merit, there are implications for education. If even a significant part of the creative process, insight, and coherent thinking depends on the brain's capability including the "heart/brain" (neurocardiology) to transduce information and energy directly from the "mind" of nature (quantum fields?), then changes in the way we educate should improve learning. Biofeedback-assisted self-regulation, radical stress management, neurofeedback, profound attention, and immersion in nature are a few examples of many strategies already discovered.

Neurocardiological training has already been integrated with biofeedback and NFB training. The "heart/brain" mediates the autonomic, feeling system (think emotional quotient—EQ). Those thoughts that have strongest feeling attached are the thoughts that are dominant in influencing actions and non-actions. So, in that sense, the ancients may be on to something with their notion that the heart (autonomic system) dominates, in the end, the brain.

"*Open wide the eye of the heart and nothing will be hidden from you*" (Zen proverb).

Emphasizing sensitivity and understanding mental processes, including creative processes, might take precedence as strategies for upgrading the quality of intelligence. In this model, increasing sensitivity to "what is"—subtle patterns in nature all the way down to the subatomic level—should lead to more effective use of traditional learned knowledge. The emphasis on memory would probably give way to awareness in the present and seeing all as process—the holomovement. Paradoxically, I predict, quality of useful, healthy memory improves. This educational model teaches skills for identifying and deconditioning inappropriate conditioning. Arguably, we may determine that our educational system is over-conditioning us and thus dulling the brain's sensitivity to the information (and energy) trying to get through to us directly from the "mouth of nature" herself.

If developing greater sensitivity is critical to enhancing intelligence, then

the skill that must be emphasized is bringing about relative neural quietness. Reduction of over-thinking seems to both generate energy and increase EQ and sensitivity. I suggest learning how to train exceptional skill at stress management is necessary if we are to increase consciousness (intelligence) and creativity (Ghiselin, 1952; Krishnamurti, 1991; Krishnamurti & Bohm, 1985; Wolf, n.d.).

An Implication for Creative People (Who Fear They Are Geniuses) and Substance Abuse

In the seventies, psychologists began developing biofeedback applications for substance abuse. I had long been pondering why so many creative people abused alcohol and other substances (Waldron, 1989; Beveridge & Yorston, 1999). By 1989, a remarkably effective neurofeedback protocol for treating alcoholism, PTSD, etc., had been developed and I eventually trained thousands of health care professionals in the technique (Peniston & Kulkosky, 1984; Peniston, Marrinan, Deming, & Kulkosky, 1993).

I heard a fascinating presentation by a famous writer, Elizabeth Gilbert, who said she had been going through a crisis because her last book was a huge success and she had no idea how she could ever do it again (Gilbert, n.d.). She was afraid that her best work was now behind her and she was only forty years old. So, she resolved to make a study of the creative process, something I have been doing as best I can since my teens.

She discovered that in some cultures creative people apparently did not always become as self-destructive as is the case today in Western cultures. For example, ancient Greeks believed that being creative was a kind of blessing that came to people through a creative spirit, like a mystic muse. Such a spirit was called a Daemon. So, if a person was unable to be creative it was because his Daemon was not helping. It really wasn't the artist's fault. The artist had showed up for work but his Daemon had not. Therefore, these ancient artists did less ego-tripping because they were not as ego-identified with their creative works, but rather believed they owed their good fortune to being open, like a channel, to the creative spirit (Daemon). I suggest this perspective could lead to learning meditation and living a relatively wholesome life.

The Romans carried on with the same concept except they called this spirit a Genius. So the human being never had to live up to being a genius. Instead of being crushed in the destructive, distracting ego-vice of living up to being a genius, a superhuman being, the artist was freer to simply call or summon his Daemon, his Genius, his Friend by living sanely, even humbly. I don't know what the substance abuse rate was but apparently it was considerably less than afflicts modern creative people (terrified of their potential Genius). Of course, one might argue that there was also less substance around to abuse—especially if you did not have a rich patron.

"Yet the ancients knew something which we seem to have forgotten. All means prove but a blunt instrument if they have not behind them a living spirit" (Einstein, 1976, p. 24).

I suggest that one of the underlying causes of substance abuse, especially but not exclusively alcohol, is that alcohol and some other psychogenic drugs in modest amounts really do increase creative imagery while simultaneously reducing anxiety and psychesthenia (over-thinking). My perspective is that until we own up to the reality that psychogenics can enhance the creative processes, we are fighting "the war on drugs" with water pistols, because the drive to be creative, even to have the illusion of creativity, is possibly the strongest drive there is. The problem is that the organism adapts rapidly to alcohol (and other psychogenics) so that more and more is needed. This leads to toxicity, addiction, and eventually a collapse of the creative process. Collapse of the creative process to a creative person is usually worse than death, and so self-destructiveness, often fatal, usually ensues. There is considerable evidence that alpha/theta training enhances creative imagery while reducing maladaptive stress response, quieting the brain, and providing access to the creative process without drugs (or at least a destructive dose of drugs) (Crane & Souter, 2000). Enhancing brain transduction may more effectively connect us to our geniuses than psychogenic drugs do.

Is the "War" between Atheists, Agnostics and the Sincerely Religious Absurd?

Jefferey Mishlove: *"What is the significance of holonomic theory to people in their everyday lives . . . in the business of life?"*

Karl Pribram: *"This is the critical thing—that if indeed we're right that these quantum-like phenomena, or the rules of quantum mechanics, apply all the way through to our psychophysiological processes, to what's going on in the nervous system—then we have an explanation perhaps, certainly we have a parallel, to the kind of experiences that people have called spiritual experiences"*

(Pribram, interviewed by Mishlove, 1998).

The root meaning of the word *religious* (*religio*—Latin) means "to return to the source." What do you think? The Holy Grail of science seems to be the reduction of all laws (the four fundamental forces) to one. And in order to do this according to "Big Bang," we have to get back to a small fraction of the first second after the "Big Bang" when the four forces were one. Now, why isn't that going back to the source? Suppose consciousness and matter are emerging from a common ground, as many suggest? Then what is all the conflict about? We can point to an very long list of incredibly sick, cruel, unconscionable, and destructive people who called themselves religious, agnostic, and atheist. And we can point to an even greater list of incredibly humane, compassionate, selflessly heroic individuals who called themselves atheist, agnostic, or religious.

According to my understanding of neuroscience and quantum physics, the NQUIET hypothesis has to be at least partially correct. Even more interestingly, NQUIET seems to me to be compatible with the perspectives of a wide spectrum of master teachers. If you put scientifically aware "militant atheists" on one end of the spectrum, "reverent agnostics" in the middle, and the "compassionate believers" on the other end, the NQUIET hypothesis should have at least some resonance with all of their world views as I understand them. As I see it, there is a unifying aspect to NQUIET that in itself seems to me to be a kind of practical, common-sense test.

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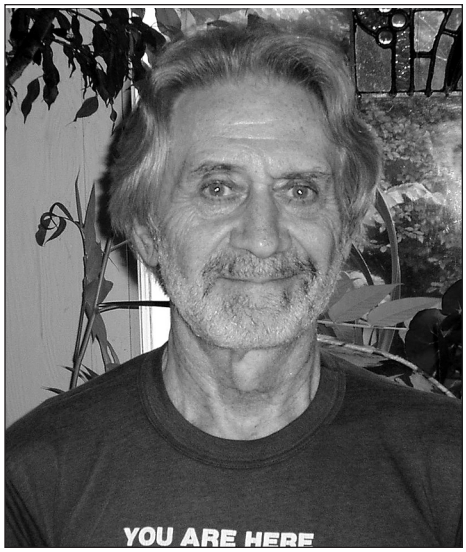

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