OPINION AND PERSPECTIVES

A NeuroQuantologic Approach to How Human Thought Might Affect the Universe

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Abstract

The cerebral processes of observation and measurement are associated with the action potential whose energy of about 10^{-20} J matches the magnitude associated with electric forces between ions on the neuronal membrane's surface. Both intrinsic gravitational forces and the density of force within the domain of Planck's length indicate the width of a membrane is resonant with all space within the universe. The required disparities near the velocity of light to explain the discrepancy between the Compton (wavelength) width and the classical width of the electron is about 10^{-20} J. The calculations and their resultant hypotheses in this paper suggest that human thought, as the wave form associated with action potentials, might affect matter and that the act of observation might dissociate fundamental forces anywhere and anytime within the universe due to entanglement because of the paradoxical time of expansion of Planck's length from the smallest to largest increments of space.

Key Words: thought, Planck's length, action potentials, SGR-1806, matter, neuronal membrane, gravity, electron width

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Introduction

Human consciousness (Rose, 2006) can be considered a complex electromagnetic matrix that is entangled with the matter occupying an apparently constrained volume (McFadden, 2002; 2007). This volume is the human brain. The major electromagnetic phenomena primarily associated with consciousness are action potentials from neurons whose patterns are the substrates by which information is experienced. In this context information is the digital (0, 1) patterns represented by the temporal sequence of action potentials.

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This paper is dedicated to the memory of the brilliant thinker Dr. Eldon A. Byrd whose obsession with hyperspace never ceased.

After transformations into myriad miniature spatial configurations of particles (synapses) these patterns are represented over time as memory (Eccles, 1992). In this paper we explore how the energies involved with thought could affect the fundamental particles of matter and potentially accommodate the problems of non-locality and entanglement. This exploration was inspired by the imagination of Niels Bohr (1958) who suggested that thoughts may involve energies at the quantum level.

Since the calculations were completed during this exploration, experimental evidence has been published (Houweling and Brecht, 2008; Huber et al, 2008) that the stimulation of a single neuron in the somatosensory cortices affects behavioral responses in the detection of stimuli. That a change in activity of a single neuron can cause a change in an animal's detection behavior strongly supports Bohr's (1958)

concept that the processes (action potentials) associated with thought reflect quantal energies. If this association is valid, then the conceptually challenging properties of superposition and entanglement (Aczel, 2002) might be manifested within cellular dimensions.

Quantum Neuronal Operations at 10^{-20} Joules

The approximately100 mV change in potential difference across the membrane associated with an action potential exerts an energy of about10^{-20} J on dipoles (Fong, 1968; Wei, 1969). The source of the resting potential difference arises from a singular layer of charges within a narrow shell of about 0.6 nm around the membrane (Woodbury, 1968). Assuming a resting potential difference of 70 mV across the membrane, the numbers of ions within this thin band can be calculated. The surface area of a 10 μm cell is ($4\pi r^2$) or $12.56x0.25x10^{-8}$ cm^2. With q (charge)=voltage times capacitance, then $70x10^{-3}$ Vx $1x10^{-6}$ F/cm^2 is $7x10^{-8}$ coul/cm^2. Hence a cell with a diameter of10 um would display a charge of $3.14x10^{-6}$ cm^2 times $7x10^{-8}$ coul/cm^2 or $2.20x10^{-13}$ coul. Because each unit charge is $1.61x10^{-19}$ coul, a total of $2x10^6$ molecules and their charges contribute to the resting membrane potential.

The area occupied by each charge on the cell surface, assuming a thickness of only 1 charge would be ($3.14x10^{-6}$ cm^2) divided by $2x10^6$ particles or $1.57x10^{-12}$ cm^2/charge. The square root of that value is the average distance between charges which is about $1.2x10^{-6}$ cm or $1.2x10^{-8}$ m or 12 nm. Consequently, the distance between each charge within the single layer of charges on the cell surface is within the same order of magnitude and coefficient as the thickness of the cell membrane.

This similarity is not spurious. The electric force between the charges is $F=(q_aq_b)/(r^2\ 4\pi e)$ where q_a and q_b are the two unit charges, r is the distance and e is permittivity constant. The force at the 12 nm distance between charges is $(1.61x10^{-19}$ As$)^2$ /[$(1.1x10^{-8}$ m$)^2x12.56x8.85x10^{-12}$ C^2/Nm^2] or $1.8x10^{-12}$ N. This picoN value is within the range observed for intermolecular forces (Moy, Florin and Gaub, 1994). The application of this force of $1.8x10^{-12}$ N over a distance of $1.2x10^{-8}$ m is $2.2x10^{-20}$ J. From this perspective the kinetic energy associated with each action potential acting upon charges is simply the conservation of the potential energy between the charges.

Non-Locality, 10^{-20} J, and the Width of the Universe

At this point the relevance to non-locality emerges when the gravitational forces are considered. Gravitation is usually ignored because of the minute values of the forces and energies within classic biological distances. However assuming the K^+ ion is the matter, whose spatial disparity in concentration primarily maintains the membrane voltage, the force of attraction by gravity between the mass of two ions separated by 10 nm would be related by $F=[(m_am_b)/r^2]$ G where G is the gravitational constant. With the mass of a K^+ ion being 39.1 (dalton)$x1.657x10^{-27}$ kg, the force of attraction would be $(4.197x10^{-51}$ $kg^2)/(1x10^{-16}$ $m^2)x6.67x10^{-11}$ Nm^2/kg^2 or $2.79x10^{-45}$ N. For 10^{-20} J to emerge, this force must be applied over 10^{-20} J/10^{-45} N or about 10^{25} m. For Na^+, with a mass of 23 daltons, the solution would be about 10^{26} m. These widths are within a magnitude of the estimated diameter of the universe assuming it is about 10 billion years old (Wyatt, 1965).

What does this congruence imply? One possibility is that there is a "wrap around" phenomenon whereby the completeness of a particle requires the "other particle" that is on the "other side" of the universe to also be immediately juxtaposed within the particle in order to support 10^{-20} J. Such juxtaposition of the same object at diametrically opposed distances could be the physical basis of entanglement. This apparent non-locality would require involvement of the 11 dimensions of Kaluza-Klein space (Freedman and van Nieuwenhuizen, 1985) and clearly Hilbert space. From both mathematical perspectives, there are properties of the structure of space (to the value of Planck's length of 10^{-35} m) below that occupied by matter (about 10^{-15} m) whose solutions allow any point in space to be an identity (effectively the same "place") as all other points in space.

The results of this calculation also suggest that Schrödinger's (1944; 1978) concept that the wave function of an electron could be described as the charge density of an object dispersed and extended through the whole of space may have had merit. Although the idea was reinterpreted by Max Born's (Aczel, 2002) more accepted interpretation that the wave function was a probabilistic distribution of the position of a discrete or point-like object, the two concepts may be manifestations of the same process.

It may not be coincidence that the volume of a discrete point, such as a proton (10^{-45} m^3) would extend over the width of the universe if it were a string or cylinder with a width of Planck's length of

$1.6x10^{-35}$ m. For the cross-sectional area ($3.2x10^{-70}$ m^2) of this cylinder to fill the volume of the point-like proton, the length must be 10^{25} m. As described by Friedrichs and Shapiro (1957) the Hilbert space integral for a cylinder function would also denote finite-dimensional subspaces. This means that traditionally descriptive models of multiple dimensions, such as Hilbert space, may have transformations compatible with discrete numerical solutions. Petkov (2007) has argued that the reality of "imaginary" dimensions, such as Minkowski space (or any relativistic space-time), at the macroscopic level should be pursued by contemporary physics.

This solution might also explain an intrinsic paradox involving the theoretical time for the expansion of one Planck's length (Persinger and Koren, 2007). The range in expansion according to Hubble's constant is between 40 and 100 km/s per Mparsec ($3.1x10^{22}$ m) or in the order of $2.4x10^{-18}$ s^{-1}. Consequently the velocity of expansion of any matter occupying space would be this value multiplied by the width of the space.

For the length of a proton (assuming twice the Compton wavelength of $2.6x10^{-15}$ m), the expansion velocity would be $8x10^{-33}$ m/s. The time required to expand one Planck's length would be $1.6x10^{-35}$ m divided by $8x10^{-33}$ m/s or about 3 msec. For the smallest distance of $1.6x10^{-35}$ m, the expansion would be $3.8x10^{-53}$ m/s. The time required to expand this distance would be $1.6x10^{-35}$ m/$3.8x10^{-53}$ m/s or $4.2x10^{17}$ s. On the other hand for a large space such as 10^{26} m, the expansion would be $2.4x10^{8}$ m/s. The time required for this expansion would be $1.6x10^{-35}$ m/$2.4x10^{8}$ m/s or about $6x10^{-44}$ s.

In other words the time required to expand one Planck's length for the smallest length (Plank's length) would require $1.3x10^{10}$ years ($4.2x10^{17}$ s) while the time required for the universe to expand one Planck's length would be a value that approaches the smallest possible temporal unit, Planck's time which is $5.39x10^{-44}$ s. One explanation to rationalize this contradiction is that every point within the universe must map as the entire universe. Each smallest point would be an identity with all others such that they are substitutable.

Discrepancy Energies Between Electron-Widths Match the Energy of the Action Potential

The congruence of the solution for the energy of 10^{-20} J for the inter charge distances around the cell membrane and the interspatial distances between particle masses suggests that the same processes involved with the creation or generation of thought are involved with the large but finite distances that define the spatial dimensions of the universe as we perceive it. Stated alternatively, this implies that energy involved with the spatial dimensions of the maximum set of space-time (the universe) and thinking originate from the same source of variance.

The first reflection involved with this possibility is the equivalent energy between the two solutions for the radius of an electron. The classical width of an electron is $2.8x10^{-15}$ m. However if $J=mc^2$ and $J=hf$, then $mc^2=h(c/wavelength)$. The wavelength would then be h/mc and would result in Compton's radius of ($6.626x10^{-34}$ Js)/($9.109x10^{-31}$ kg multiplied by $2.997x10^{8}$ m/s, or $2.4x10^{-12}$ m. This results in a difference of almost a 1000 between the predicted width of an electron and the classical observed value.

However the observed value represents the moving electron. In order to obtain the relativistic compression of length as the particle approaches c, the Lorenz transformation (Reitz and Milford, 1967) requires that $(x_a'-x_b')=1/[sqrt(1-(v/c)^2]*(x_a-x_b)$ where the latter term is the original length. If we assume this length is $2.4x10^{-12}$ m (Compton wavelength) then a velocity of .9999995 c would be required to compress this length to 10^{-15} m. For this type of precision, the value for the speed of light in a vacuum to its furthest extension of $2.99792458x10^{8}$ m/s was required.

The energy equivalence of an electron with a mass of $9.109\ 3897x10^{-31}$ kg moving at c is $81.871107x10^{-15}$ J while this mass moving at 0.9999995 c would be $81.871025x10^{-15}$ J. The difference in energy is in the order of 10^{-20} J. This value, so approximate to the neuronal quantum, may indicate a special relationship between the action potential (and implicitly human thought) and the shift in extremely discrete velocities of the electron as it nears the speed of light.

Gravity, Universal Force, and the Width of a Neuronal Membrane

This convergence would suggest three possibilities: 1) human thought and its major correlate *observation* or *measurement* might affect the length and spatial occupation of an electron, 2) the latter could affect thought, or 3) a third factor, as yet not discerned, produces both. The presence of this third factor with which both thought and the extent of electron space are associated would allow the possibility of later superposition (Aczel, 2002). Superposition gives rise to the phenomena of entanglement.

The presence of this third factor should also reflect de Broglie's (1962) inference that each type of matter has a wave function and each wave function is associated with a type of matter. Both would be the result of an induced effects brought about by change in the quantum-fluctuation energy of the vacuum. In this instance the term "vacuum" is synonymous with the intrinsic organization of space between about 10^{-15} m (the size of protons and electrons) to Planck's length (10^{-35} m).

In fact gravitation, one of the likely processes by which entanglement occurs, was considered by Puthoff (1989) not to be a fundamental interaction at all. Instead, it is induced effect from a third factor produced by changes in quantum fluctuation energy when matter was present. According to this hypothesis, matter interacts in the form of charged particles ("partons") with zero point fluctuation forces (ZPF) of the vacuum EM field. Gravity, G, can be defined as π/2 multiplied by c^5/ [(h/2π)x the integral of 0 to w_c times wdw] where w^c is the cutoff frequency for the vacuum ZPF spectrum. After transformation, w_c= the square root of: [πc^5]/[h/πG]. In this model mass corresponds to the kinetic energy of ZPF-induced motion ("jitter") internally within point particles. The motion generates broadband ZPF radiation fields and forces there are long-range with van der Waal-like manifestations.

The quantitative solution for this cut-off frequency, w_c, employing the Puthoff-Sakharov's approach, would be the square root of [3.14x ($3x10^8$ m/s)^5]/[($1.06x10^{-34}$ Js)x ($6.67x10^{-11}$ N m^2/kg^2] =$10.79x10^{86}$ Hz, or $3.28x10^{43}$ Hz. The wavelength for this frequency, using the speed of light as the reference ($3x10^8$ m/s)/($3.28x10^{43}$ Hz or $0.9x10^{-35}$ m) would approaches Planck's length of $1.616x10^{-35}$ m, the estimated value of some "strings".

By knowing the values of $1/s^2$ (Hz^2) we could potentially calculate the force of the entire universe if its width and mass were estimated. The estimated mass of the universe is $1.34x10^{52}$ kg (Kolombet, 1996) a value similar to the empirical value from the masses of the estimated numbers of stars in the universe. The width of the universe would be based upon the time required for light to travel over 10 billion years or $1.216x10^{26}$ m. The application of Newton's second law, F=ma as F= kg m $1/s^2$ results in $1.76x10^{165}$ N of force.

Assuming a spherical shape, although any bound geometric form would be equally applicable, the force per unit Planck's length volume could be calculated. In a length of $1.216x10^{26}$ m there would be $1.96x10^{61}$ of $1.616x10^{-35}$ Planck lengths. Hence the numbers of Planck "voxels" within the volume of the universe would be $4/3\pi r^3$ or $1.76x10^{183}$. This means that the force per Planck voxel would be $1.76x10^{165}$ N/$1.76x10^{183}$ voxels or 10^{-18} N/"voxel". This might be considered the "homogeneous" unit force within the smallest fabric of space.

Now the most prominent wavelength of the universe is the 21 cm hydrogen line. The energy associated with the force applied across this distance (wavelength) would be 10^{-18} Nx $2.1x10^{-1}$ m or $2.1x10^{-19}$ J. Applying E=hf, and solving for f, the frequency would be $3.2x10^{16}$ Hz. If it were applied as electromagnetic radiation, then the wavelength would be $3.0x10^8$ m/s/$3.2x10^{16}$ Hz or $0.9x10^{-8}$ m or 9 nm. This value is within the range of the neuronal membrane. From this perspective the neuronal membrane as well as the synaptic spaces might be considered immersed within the gravity equivalent field of the entire universe. With such a spatial congruence a specific resonance between the essential unit of universal space and the substrate for human thought, the membrane width, becomes possible.

Thought and Observation Affecting Outcomes

That the energy for bifurcation of the reality of the emerging universe has a discrete value has profound implications for our future as a species as well as the direction in which the organization of matter, including biological systems, might evolve. One model has predicted that beams of protons at energies of 14 TeV, or about $2x10^{-6}$ J, would be required to affect the direction of a bifurcation of reality from direction A to direction B or visa versa (Halpern and Wessen, 2006).

Bohr's (1958) suggestion that small increments of energy at quantum levels might determine the essential features of thinking created the possibility that thought and the essence of matter could be mutually interactive. His concept of the magneton converges with the "constant" of Planck ($6.63x10^{-34}$ Js). It is the value for the energy equivalent of the classical mass of an electron moving at 1/137 the velocity of light multiplied by the time required for the completion of one orbit.

Within the adult human brain, with a weight of about 1.5 kg, there would be about 10^{27} protons and electrons or (neutrons) if we assume that the mass of the proton ($1.6x10^{-27}$ kg), which is 1837 times heavier than the electron, was dominating this measure. A magnitude of $0.93x10^{27}$ proton-electron pairs, regardless of their chemical configuration as

elements, would be associated with $0.93x10^{27}$ times $6.63x10^{-34}$ Js or a total value of $6.21x10^{-7}$ Js.

This value is remarkably similar to the amount of energy per sec from the production of action potentials of 10^{12} neurons, a number within the range of the entire brain. For 10^{12} neurons and a value of $1.6x10^{-20}$ J per action potential, the total energy would be $1.6x10^{-8}$ J. To achieve the above value to "bifurcate" the universe, the average numbers of action potentials per neuron would be about 40 Hz. This is precisely the band of activity that has been hypothesized to be associated with consciousness and the re-entrant pathways within which the "binding" forces that allow it to exist are created and recreated every 20 to 25 msec (Jeffreys, Traub and Whittington, 1996; Llinas and Ribardy, 1993; Persinger, 1999).

The close congruence between the hypothetical level of energy to bifurcate reality and the energy available from the thoughts associated with a single brain or a group of brains engaged in similar activity (Persinger and Lafreniere, 1977) suggests that there would be a critical threshold, defined by numbers of action potentials or thoughts per unit time, that would affect the direction of reality. What is not clear is the mechanism and temporal pattern by which the energy must be applied.

The validity of this assumption would require a re-assessment of traditional interpretations of discovery. The concept of the "zeitgeist" or "the spirit of the times" explains multiple but independent discoveries (which are observations) in the history of science as consequences of "similar stimuli" within the information environment. However the present hypothesis would argue that once one brain displayed the critical threshold to affect the bifurcation of reality, other observers existing within the same space-time frame would also conceive of or perceive the phenomenon.

This prediction is congruent with the concept of morphogenic fields developed by Sheldrake (1981). His concept of formative causality theorizes that the energy and physical factors for all living systems are regulated by these fields that act across space and time. They serve as blueprints for all form and behavior. Once a morphogenic field has been created, there is less impedance and greater probability for the event to occur a second time. For example, if one laboratory has crystallized a compound subsequent replications by other laboratories become easier; if one generation of rats has learned a particular task subsequent generations learn the same task more quickly (Pulos and Richman, 1990).

If 10^{-20} J, the energy associated with a single action potential, is a fundamental quantum that mediates the effects of these morphogenic fields, then Sheldrake's hypothesis may reflect a quantum basis. Houweling and Brecht (2008), who found that the activity of only one neuron could affect the direction of a rat's gross behaviour, also reported that the single barrel cortical column contained approximately 8,500 excitatory neurons. The animal's detection threshold required about 2,500 action potentials above the 1500 spontaneous action potentials in a 200 msec period. This means that the detection (and effect) required on average between 1 and 2 action potentials per neuron per sec. This value is well within the range of 10^{-20} J that would, if formative causality exists, modify the morphogenic field for that particular response in space-time.

At present when a new discovery of a biological specimen, an atomic configuration, or a stellar object is reported and then cascades of similar measurements by other "observers" occur, the "sudden appearance" of multiple replications is attributed to the establishment of a categorical label. In classical perception, which is the synthesis of memory and sensation, the establishment of an *a priori* expectancy or verbal label allows the detection of the stimulus configuration that hereto was ignored because the pattern (like a "hidden figure") was not congruent with either a cerebral pattern of memory or the intrinsic "structure" of the sensory modalities.

However if thought bifurcates reality, the escalating numbers of congruent observations would occur because a bifurcation has occurred that contains these alternative realities with "new" or modified phenomena. Such an effect places human thought or at least the *NeuroQuantologic* processes associated with it into the domain of powerful forces that influence matter and space. It would also require a reinterpretation of all phenomena, particularly the Rosenthal Effect, whereby just the close contact of an experimenter with a particular "hypothesis" or thought near a living system can statistically affect the outcome of otherwise random behavior (Jahn and Dunne, 1987).

Where Would the "Other" Possibilities Be Represented in Space?

Although the "spaces" in which alternative outcomes are imagined are often conceived as external, they

are more likely to be internal. Science has assumed that "levels" of discourse are valid and that different phenomena emerge approximately every 10^3 m within both convergent and divergent space. Involution into smaller space, these powers of 10 would include the organism (1 m), the organ (10^{-3} m), the cell (10^{-6} m), the membrane (10^{-9} m) the atom (10^{-12} m), and the proton/electron (10^{-15} m). Expanding into larger spaces these increments expand to the width of the universe (10^{25} to 10^{26} m).

On the other hand Planck's length, the smallest spatial unit derived from the fundamental constants of G, h, and c, is $1.6x10^{-35}$ m. This suggests that there are many more degrees of freedom or potential variations for levels of discourse existing within *inner* space rather than outer space by a factor of at least 10^9. If the power of 10^3 aggregations is valid then there are an additional seven "levels of discourse" existing below the phenomena of matter (10^{-15} m) within the structure of space itself (Persinger and Koren, 2007). This would be consistent with the assumptions of Kaluza-Klein space.

The most elementary calculation indicates that the volume of space occupied by particles such as the proton and electron of a neutral hydrogen atom is about $33x10^{-45}$ m^3 while the atomic "space" occupied by these two particles, assuming a radius of $37x10^{-12}$ m is $222x10^{-33}$ m^3. In other words the space occupied by the particles is in the order of one part per trillion which is similar to the proportion of space occupied by the planets and sun within the spatial boundaries of the solar system. This means that if the space were potentially saturated, there could exist approximately $6.34x10^{12}$ "parallel" or juxtaposed systems.

If each of these systems occurred in phase space where all possible states of a system are represented or were slightly phase-shifted (displaced in time) by a minute serial duration they would be potential but never existing at the exact same time. One description of these representations would involve Hilbert space which expands three-dimensional space of the moment into infinite dimensional spaces. From some perspectives the states of a quantal mechanical system are described by vectors in specific types of Hilbert space.

Some metric such as the orthonormal basis of Hilbert space would be required to support the juxtaposed "phases". It involves a set of elements with a dense span in space in which the elements are mutually orthogonal and exist as identities, that is a magnitude of 1. This allows for a type of resonance congruence between elements as well as the substitution of elements (or outcomes) between elements. Signals that vary in space and vary only in phase are scalar phenomena that are pure information. These scalars arise from a different term in the equation from which the more well known magnetic vector potentials (or A fields) arise (Aharanov and Bohm, 1959).

Although spaces with inner products (scalar products) are often assumed to be vector spaces with possibly infinite dimensions, the actual numbers are arbitrary and there can be finite subspaces (Friedrichs and Shapiro, 1957). If there are finite subspaces, such as in the order of 10^{12} orthogonal systems and there is access to all of them , then their summed duration must be within the time frame of neuronal function (and hence thought) in order to affect outcomes.

The time required for a single electron to complete one orbit at the fine structure velocity (1/137 c) would be about 10^{-16} s. That indicates that it would require $(6.63x10^{12})x10^{-16}$ s or about 0.5 msec to complete the sequence through all the parallel systems that exist as orthogonal elements in Hilbert space. The value, 0.5 msec, is within the range of the action potential of the average neuron. This suggests that within the duration associated with the substrate of thought these approximately trillion juxtaposed systems of possibility would exist.

Does Observation Affect Entanglement?

The condition of Schrödinger's cat has plagued *NeuroQuantologists* since the formulation of the dilemma (Einstein, Podolsky and Rosen, 1935; Jibu and Yasue, 1995). The cat is both alive and dead until someone decides to measure or observe the cat and releases (or not) the fatal sequence. At this point the universe splits, one containing a living cat, the other containing a dead one. Schrödinger might also have said that just before the point of observation the processes of life and death were integrated and balanced. The cat was a process of both living (anabolism) and dying (catabolism). The act of observation dissociated the two processes and released the consequences of each singular manifestation.

However the more fundamental question may be does the observation or measurement dissociate fundamental forces thus shifting symmetry (King, 2004) and order towards randomicity and entropy? If thoughts can affect this shift, then would they be effective regardless of when in time or where in space the event occurred? Recently Krauss and Dent (2008) have suggested that the observation of dark

matter has accelerated the duration and hence diminished the life time of the universe.

This is not a new thought. The intrinsic tenet of the philosophy of Idealism is that there is literally no such thing as matter because it is reducible to thoughts. At the one extreme is the egocentricism of solipsism that argues that the organization of matter and the manifestation of physical reality are created by the observer. Eddington (1981) applied this concept within a less extreme context by simply stating that the universe is a subjective experience. Any of these approaches would suggest the altered perceptions remain within the reference system, that is within the microstructural alterations of the observer's brain.

The implication that consciousness and thought actually affected matter and expanded into space was developed by Teilhard de Chardin (1955) during the 1920s. He postulated that the unique structure of the human brain allowed an expanding "noogenesis", a development of consciousness whose proclivity and potency has been steadily increasing. From his perspective, "we have as yet no idea of the possible magnitude of "noospheric" (consciousness) effects there is a whole layer of consciousness exerting simultaneous pressure upon the future and the collected and hoarded produce of a million years of thought" (p.313). From a strictly philosophical perspective, he imagined the effects of consciousness would ultimately spread into the galaxy and organize its configuration. The idea of a "conscious universe" has itself expanded (Jahn and Dunne, 1987; Radin, 1997).

However, if thoughts act through the smallest increment of space anywhere in space, then could the observation of some events actually contribute to catastrophic phenomena? This possibility is an extension of the concept (Horgan, 1992) implicit to quantum philosophy. It has been assumed that the astronomer's choice of how to observe photons from a quasar *here* and *now* determines whether each of two entangled photons took two paths or just one path around the gravitational lens billions of year ago.

One potential example of this involves the detection of electromagnetic radiation from distant sources. On 27 December 2004, at 21:30.26 UTC a massive burst of gamma radiation was first detected from the system SGR 1806-20 which is about 50,000 LY away. About 24 hrs *before* at 00:58.50 UTC on 26 December, 2004, one of the largest earthquakes (9.0 magnitude) in centuries occurred accompanied by a tsunami that killed thousands in Indonesia near Sumatra. The discrepancy between the arrival times was 1.60296×10^5 s.

Although contemporary geophysicists and astrophysicists argued there was no association between the two events, a quantum approach would support a probabilistic intercalation. The distance of 50,000 LY is 4.70×10^{20} m. If the two events, the electromagnetic burst and the anomaly in the structure of space (reflected through gravitational perturbations), were related this means that the velocities differed by only 30 m/s. In other words, if one moved at 2.99792458×10^8 m/s the other was slower at 2.99792428×10^8 m/s.

From the perspective of entanglement (Aczel, 2002), the act of measuring the gamma burst resulted in a dissociation of the electromagnetic field and the intrinsic structure of space from which it was generated at the time of the event 50,000 yrs ago. If we had not measured the radiation burst, the "structural anomaly" in space would not have occurred and this particular massive quake would not have been evoked. This conclusion would be consistent with Horgan's (1992) interpretation of quantum philosophy.

The existence of this connection would significantly alter our perception and attribution of cause and effect. Although the concept that "innocent" human activity could result in large-scale mortality may evoke humanistic indignation within contemporary perspectives, the history of science is replete with such challenges. Five hundred years ago, before the understanding of contagion and the concept of phenomena (bacteria, viruses) that could not be seen with the naked eye, the idea that "innocent" human activity sanctified by a "creator" could result in the death of millions from what we now realize was poor sanitation would have been considered blasphemous.

That thought was involved with this creation of two universes (like with Schrödinger's cat) one in which the gamma radiation occurred without a structural change within the spatial fabric and one with a change in this fabric, would be suggested by the specific velocity that defined the discrepancy: 30 m/s. This is within the average range of the velocity of the action potentials within the human brain, particularly within the visual cortices that include the occipital lobe and caudal portions of the parietal and temporal lobes.

From this perspective the superimposition of the velocity of the intervening state, in this situation thought associated with observation, left its presence

upon the process. This conclusion is similar to the argument of Hu and Wu (2006) that quantum entanglement originates from the primordial spin processes in non-spatial and non-temporal pre-space time. They argue that quantum spin, which is a unique quantum concept with no classical equivalent, is the "mind-pixel" which is a necessary condition for consciousness. The entanglement of quantum entities controlled by thought with the quantum entities responsible for physical processes results in modifications of otherwise random results.

There are two potentially precarious implications from this argument if it is valid. First, within the last decade astronomers and astrophysicists have been reporting more evidence of unprecedented numbers of expanded energies from supernovas and gamma-bursting stars. The explanation has been that the measurement devices have become more sensitive. However, more sensitive measurements might also indicate more and more observations of and closer approximation to the level of space where dissociation occurs between normally balanced forces. This has resulted in a greater and greater incidence of exceptional and catastrophic events.

The second implication is that the extreme empiricism of historical researchers such as Charles Fort (1974) should be re-evaluated as more than the obsessive cataloguing by schizotypical recluses. Fortean phenomena are actual events that do not fit into contemporary scientific paradigms (Persinger and Lafreniere, 1977). There are always the "left-overs" following every shift in conceptual paradigm that are excluded because their existence challenges the cognitive structure.

Meteorites were considered "unreal" or "misinterpretations" in the 19th century. Ball lightning was considered "impossible" in the early 20th century. Other phenomena, often occurring as singular events, such as the Dark Day of 19 May 1780 over the New England coast in North America (Persinger and Lafreniere, 1977), the repeated "slow" fall of rocks from the sky within the same localized area, and the occurrence of powerful luminous phenomena in Fatima, Portugal (1917) or Zeitoun, Egypt (late 1960s) have never been fully explained.

The data within Fort's four books (1974) and the statistical analyses of them (Persinger and Lafreniere, 1977) demonstrate repeated episodes of the "sudden appearance" or "sudden disappearance" of non-congruent phenomena from the distant past (archeological oddities) and from distant space (appearance or disappearance of stars) during the same durations as significant human events. Although some researchers have argued the latter were affected by astronomical forces and most scholars have preferred the interpretation of random association, the results from the present calculations indicate that the thoughts associated with those human events may have changed the direction of reality through *NeuroQuantologic* processes.

Penultimate Prescience and Human Potential

The intrinsic premise of modern neuroscience is that all experiences and capacities are derived from the function and structure of the human brain. These experiences include the phenomena that one's memories are valid representations of what has indelibly happened and that the conviction that the sense of self exists. These capacities include the complex conceptual gymnastics of describing the behavior of physical events by symbolic or mathematical formulae and the numerical culmen to measure and predict those same events.

Perception, no matter how sophisticated or apparently verified by contrived instrumentation constructed for its congruence, is determined by brain function. Perception is still the organization of the "states of nerves" for those few events out of billions of events that achieve access to and are discernable by neuronal activity. Until the fundamental organization of brain microstructure and processes that functionally relate these microstructures are changed by experiment or by evolution, there will always be axiomatic processes reflected like fractal solutions at levels of scientific description.

They will produce the commonalities that integrate and provide analogies across levels of discourse. Their occurrence may be illusionary epiphenomena of the human brain's structure and function. They may be determined by the strong dependence of reasoning upon linguistic processing for the categorization of experience and awareness of these experiences rather than representative of the actual sources that produce human perception (Persinger, 1999). We may never escape Gödel's incompleteness theorem (proof) that there exists an unprovable statement within every sufficiently complicated logical system.

Even with this caveat, the calculations, solutions, and implications developed in this paper suggest that the energies associated with human thought may have at present unfathomable impact

upon the structure, dynamics, history, and outcome of the entire universe in which we exist. Quantitative solutions indicate that the quantal energies involved with the physical bases of human thought are coupled from the smallest increments of space to the entire conceptual set: the universe.

Critical questions with cosmic implications emerge from these solutions. What is the quantitative impact on the rate of change of bifurcation by a single thought? What is the "critical mass" or "geopsyche" (Persinger and Lafreniere, 1977) of human brains engaging in the same "thoughts" that can affect the entanglement of matter throughout space-time? Does the increasing homogeneity of human thought because of the unprecedented convergence of shared reinforcement history and media exposure amplify the energies that could affect the rate of change within the universe and the correlative catastrophes that we have encountered and will encounter?

The future of our fate as a species and the universe in which it occurs may depend upon our complete comprehension of the implications of *NeuroQuantology*. This understanding will require a shift in the current scientific and conceptual paradigms that have begun to constrain creativity and arbitrarily partition the phenomenal world into smaller and smaller components, each defended with a territorial imperative. A *NeuroQuantologic* approach would allow the integration of information from the smallest to the largest sets of human conception.

References

Aczel AD. Entanglement: the greatest mystery in physics. Vancouver: Raincoast, 2002.

Aharanov Y and Bohm D. Significance of electromagnetic potentials in quantum theory. The Physical Review 1959; 115: 485-491.

Bohr N. Atomic physics and human knowledge. New York: Wiley and Sons, 1958.

De Broglie, L. New perspectives in physics. New York: Basic Books, 1962.

Eccles JC. Do mental events cause natural events analogously to the probability of quantum mechanics? Proceedings of the National Academy of Sciences 1992; 89: 7320-7324.

Eddington A. Nature of the physical world. Ann Arbor: University of Michigan Press, 1981.

Einstein A, Podolsky B and Rosen N. Can quantum-mechanical descriptions of physical reality be considered complete? Physics Reviews 1935; 47: 777-780.

Fong P. RNA as a ferroelectric recording tape for brain memory. Bulletin of the American Physics Society 1968; 13: 617-625.

Fort C. The complete books of Charles Fort. New York: Dover, 1974.

Freedman DZ and van Nieuwenhuizen P. The hidden dimensions of space-time. Scientific American 1985;March:75-83.

Friedrichs K and Shapiro HN. Integration over Hilbert space and outer extensions. Proceedings of National Academy of Science 1957, 43, 336-340.

Halpern P and Wessen P. Brave new universe. Washington D.C.: Joseph Henry Press, 2006.

Horgan J. Quantum philosophy. Scientific American 1992, July, 94-101.

Houweling AR and Brecht M. Behavioural report of single neuron stimulation in somatosensory cortex. Nature 2008; 451:65-69.

Hu H and Wu M. Thinking outside the box: the essence and implications of quantum entanglement and the story of spin-mediated consciousness theory. NeuroQauntology 2006, 1:5-16.

Huber D, Petreanu L, Ghitani N, Ranade S, Hromadka T, Mainen Z and Svoboda K. Sparse optical microstimulation in barrel cortex drives learned behaviour in freely moving mice. Nature 2008; 451:61-66.

Jahn RG and Dunne BJ. Margins of reality: the role of consciousness in the physical world. San Diego: Harcourt Brace Jovanovich, 1987.

Jeffreys J, Traub RD and Whittington MA. Neuronal networks for induced 40 Hz rhythms. Trends in Neurosciences 1996; 19: 202-208.

Jibu M and Yasue K. Quantum brain dynamics and consciousness. Philadelphia: John Benjamins Publishing, 1995.

King C. Cosmic symmetry-breaking, bifurcation, fractality and biogenesis. NeuroQuantology 2004; 3:149-158.

Kolombet VA. Biological physics? Biophysics 1996; 40: 1137-1146.

Krauss L and Dent J. The late time behaviour of false vacuum decay: possible implications for cosmology and metastable inflating states. Physical Review Letters 2008, in press.

Llinas R and Ribardy U. Coherent 40-Hz oscillation characterizes dream state in humans. Proceedings of the National Academy of Science 1993; 90: 2078-2081.

McFadden J. Synchronous firing and its influence on the brain's electromagnetic field: evidence for an electromagnetic theory of consciousness. Journal of Consciousness Studies 2002; 9: 23-50.

McFadden J. Conscious Electromagnetic (CEMI) Field Theory. NeuroQuantology 2007;2:262-270.

Moy TM, Florin E-L and Gaub HE. Intermolecular forces and energies between ligands and receptors. Science 1994;266:257-259.

Persinger MA. Is there more than one source for the temporal binding factor for human consciousness? Perceptual and Motor Skills 1999; 89: 1259-1262.

Persinger MA. On the nature of space-time in the observation of physical events in science. Perceptual and Motor Skills 1999;88:1210-1216.

Persinger MA and Lafreniere GF. Space-time transients and unusual events. Chicago: Nelson-Hall, 1977.

Persinger MA and Koren SA. A theory of neurophysics and quantum neuroscience: implications for brain function and the limits of consciousness. International Journal of Neuroscience 2007; 117: 171-175.

Pulos L and Richman G. Miracles and other realities. Vancouver: Omega Press, 1990.

Puthoff HE. Gravity as a zero-point-fluctuation force. Physical Review A 1989; 39: 2333-2342.

Radin DI. The conscious universe. San Francisco, CA: HarperEdge, 1997, pp. 282-286.

Reitz JR and Milford FJ. Foundations of electromagnetic theory. Heading (Mass): Addison-Wesley, 1967.

Rose D. Consciousness: philosophical, psychological and neural theories. Oxford: Oxford University Press, 2006.

Schrodinger E. What is life? Cambridge: Cambridge University Press, 1944.

Schrodinger E. Collected papers on wave mechanics. New York: Chelsea, 1978.

Sheldrake R. A new science of life: The hypothesis of formative causation. Los Angeles: J.P. Tarcher, 1981.

Teilhard de Chardin P. The phenomenon of man. London: Fontana Books, 1955.

Wei LY. Molecular mechanisms of nerve excitation and conduction. Bulletin of Mathematical Biophysics 1969; 31: 39-59.

Woodbury JW. Biophysics of the cell membrane: The cell membrane- ionic and potential gradients and active transport. In Ruch TC, Patton HD, Woodbury JW and Towe AL (eds). Neurophysiology. Philadelphia: W. B. Saunders, 1968, pp. 1-24.

Wyatt SP. Principles of Astronomy. Boston: Allyn and Bacon, 1965.