A Quantum Field Theory of Neuropsychotherapy:
Semantic Mind Brain Maps and the Quantum Qualia of Consciousness

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Abstract

This paper proposes a new scientific integration of the classical and quantum fundamentals of neuropsychotherapy. The history, theory, research and practice of neuropsychotherapy is reviewed and updated with the current STEM perspectives of science, technology engineering and mathematics. New technology is introduced to motivate more systematic research comparing the bioelectronic amplitudes of varying states of human stress, relaxation, biofeedback, creativity and meditation. Case studies of the neuropsychotherapy of attention span, consciousness, cognition, chirality, and dissociation along with the psychodynamics of therapeutic hypnosis and chronic post-traumatic stress disorder (PTSD) are explored. Implications of neuropsychotherapeutic research for investigating relationships between activity-dependent gene expression, brain plasticity and the quantum qualia of consciousness and cognition are discussed. Symmetry in neuropsychotherapy is related to Noether’s theorem of nature’s conservation laws for a unified theory of physics, biology and psychology on the quantum level. Neuropsychotherapeutic theory, research and practice is conceptualized as a common yardstick for integrating the fundamentals of physics, biology and the psychology of consciousness, cognition and behavior at the quantum level.

Introduction: The Classical and Quantum Dynamics of Neuropsychotherapy

While the history of neuropsychotherapy can be traced back hundreds of years to prescientific sources of medicine, physics, chemistry, biology and psychology, it required the advent of STEM (Science, Technology, Engineering and Math) education in our century before a truly experimental theory, research and applications of neuropsychotherapy could emerge (Boring, 1950; Ellenberger, 1970; Zilboorg & Henry; 1941; Jensen, 2016). As the name “neuropsychotherapy” suggests it is based on the integration of talk-therapy, consciousness and cognition with activity taking place in neurons of the brain as illustrated in Box One (Nave, 2016).
Box 1. The Classical Psychobiology of Neuropsychotherapy (Adapted with permission from Navo, 2016)

The action potential sequence is essential for the neural communication of consciousness, cognition and behavior. The simplest action in response to thought requires many such action potentials for its communication and performance. In response to the appropriate stimulus, the cell membrane of a nerve cell goes through a sequence of depolarization from its rest state followed by repolarization to that rest state. In the sequence, it actually reverses its normal polarity for a brief period before reestablishing the rest potential. For modeling the action potential for a human nerve cell, a nominal rest potential of -70 mV will be used. The process involves several steps:

1. A stimulus is received by the dendrites of a nerve cell. This causes the Na⁺ channels to open. If the opening is sufficient to drive the interior potential from -70 mV up to -55 mV, the process continues.

2. Having reached the action threshold, more Na⁺ channels (sometimes called voltage-gated channels) open. The Na⁺ influx drives the interior of the cell membrane up to about +30 mV. The process to this point is called depolarization.

3. The Na⁺ channels close and the K⁺ channels open. Since the K⁺ channels are much slower to open, the depolarization has time to be completed. Having both Na⁺ and K⁺ channels open at the same time would drive the system toward neutrality and prevent the creation of the action potential.

4. With the K⁺ channels open, the membrane begins to repolarize back toward its rest potential.

5. The repolarization typically overshoots the rest potential to about -90 mV. This is called hyperpolarization and would seem to be counterproductive, but it is actually important in the transmission of information. Hyperpolarization prevents the neuron from receiving another stimulus during this time, or at least raises the threshold for any new stimulus. Part of the importance of hyperpolarization is in preventing any stimulus already sent up an axon from triggering another action potential in the opposite direction. In other words, hyperpolarization assures that the signal is proceeding in one direction.

6. After hyperpolarization, the Na⁺/K⁺ pump eventually brings the membrane back to its resting state of -70 mV.
Box 1 is the classical well known theory of the basic unit of neural action of the brain and body as it is presented in most textbooks of physics, biology and psychology today. While this information is correct from the physics, biological and chemical points of view it does not provide many helpful cues of how it may be used psychotherapeutically. A paper in a recent issue of *Nature* by Huth, et al. (2016), however, does introduce research on a new semantic atlas of the human cerebral cortex that illustrates in Box two how words could make sense as bridge between mind, brain and body in neuropsychotherapy.

**Box 2. How words make sense in neuropsychotherapy.**

It is thought that the meanings of words and language are represented in a semantic system distributed across much of the cerebral cortex. *However, little is known about the detailed functional and anatomical organization of this network.* Alex Huth, Jack Gallant and colleagues set out to map the functional representations of semantic meaning in the human brain using voxel-based modelling of functional magnetic resonance imaging (fMRI) recordings made while subjects listened to natural narrative speech. They find that each semantic concept is represented in multiple semantic areas, and each semantic area represents multiple semantic concepts. The recovered semantic maps are largely consistent across subjects, however, providing the basis for a semantic atlas that can be used for future studies of language processing. An interactive version of the atlas can be explored at [http://gallantlab.org/huth2016](http://gallantlab.org/huth2016). The cover shows the cortical surface of one subject, overlaid with words predicted to cause particularly strong responses at the corresponding cortical location. Word colors indicate semantic categories: for example, green words are mostly visual and tactile concepts, and red words are mostly social concepts. White lines show the outlines of previously known regions of interest. (Cover: Alex Huth, 2016. Italics added here.)

As Huth et al. acknowledge in Box 2, “*However, little is known about the detailed functional and anatomical organization of this network.*” We therefore propose to provide a little known history of the theory, research and psychological practice of the utilization of this natural semantic
mind/brain/body network by introducing what we choose to call “a quantum field theory of neuropsychotherapy.”

**A Quantum Field Theory of Neuropsychotherapy**

A significant but still little known potential source of our proposed quantum field theory of neuropsychotherapy was reviewed by Ravitz (2002) as follows.

The human body, then, is the product of an organizing field which, in common with all the other fields is within, and subject to, the greater organizing fields of the Universe... We owe this epochal discovery to the genius of two Americans, Filmer Stuart Cuckow Northrop Ph.D., LL.D. (1893-1992) and Harold Saxton Burr, Ph.D. (1889-1973). Dr. Northrop was to become Sterling Professor of Philosophy and Law at Yale University and Harold Saxton Burr, Professor of Anatomy in Yale University School of Medicine ... This was the first biological theory based on Einstein’s relativity field physics and Maxwell’s electromagnetic equations... An electrodynamic or electromagnetic field is a continuum of experimentally verifiable vector forces defined in terms of two parameters: magnitude or intensity, $E$ and direction or polarity, $H$ ... To demonstrate the presence of electrodynamic fields in living matter, therefore, the instruments had to be capable of measuring voltage gradients having both intensity and directional properties, i.e. plus or minus polarity. (p. 2-4)

I was privileged to be a pupil of Burr at Yale. Working at first with Burr and later alone, I was able to show that continuous readings make it possible to distinguish between health men and women and those suffering from psychologic disturbances. In 1948, I was also able to demonstrate that the depth of hypnosis can be measured by characteristic variations in the field ... Despite the obvious importance of *The Electro-Dynamic Theory of Life* it would be as wrong to claim too much for it as too little. We must remember that in addition to field physics, there is also particle physics.

Burr and Northrop emphasized from the onset that particles in biologic organization both determine and are oriented by the electrodynamic field. In other words, there is a reciprocal causal relationship between fields and particles.

How to relate them in inorganic, biologic and psychologic science is one of today’s and tomorrow’s most important scientific and philosophical challenges. (p.8, Italics added here.)

The field theory of hypnosis – proposed at the first annual meeting of the American Society of Clinical Hypnosis, Chicago, on October 3, 1958 as one of the basic factors in hypnotic states – derives from experimental knowledge of various factors and states which do and do not produce EMF [Electromagnetic Force] variations ... Such observations are reinforced by the frequent spontaneous clinical manifestation of trance states ... involving this ancient brain core, further implicated by its potential control of physiologic survival functions via hypnosis – including the control of bleeding ... Briefly, all evidence suggests that profound alterations occur in the balance of the ancient centers with respect to the neocortex during hypnosis, with intact, or frequently improved neocortical functioning... (p. 90-91, Italics added here.)
Field monitoring of changing state-function, including hypnotic states together with their many manifestations, confirmed by Bartlett, Blagg, Rossi and Kost independently, has resulted in deductive considerations entailing the meshing of two radically disparate approaches: The Burr-Northrop field construct with its derivative instrumentation catalyzed by Maxwell and Gibbs, and a unified tripartite logic formalized mathematically by Fonseca in 1970. (p. 90-91)

Furthermore, recent findings in wave mechanics and quantum theory at that time reduced chemical atoms to electrons and protons, implying that more fundamental electrodynamic factors underlie life. In short, atomic physics had to be supplemented with field physics. (p. 16, italics added here)

The field theory demolishes any attempt to reduce field properties to chemistry and forces on those faithful to old concepts the shattering conclusion that the atoms and molecules of chemistry, in fact the entire concept of valence, reduce to electricity, and in this specific instance, to quantum fields.” [p. 200]

These summary statements by Ravitz (2002), emphasized here in italics, is the challenge explored in this paper with our more recent neuropsychotherapy data that provides a common yardstick for unifying the fundamentals of physics, biology and the psychology of consciousness at the quantum level.

The early electrodynamic quantum field theory
In the generations since the early electrodynamic quantum field theory was proposed by Northrop and Burr, quantum field theory (QFT) has been repeatedly confirmed as the most accurate scientific foundation of mathematical physics (Klauber, 2015; Lancaster & Blundell, 2014) and, by extension, the fundamental dynamics of all life processes (Loewenstein, 1999, 2013; McFadden, 2008; McFadden & Al-khalili, 2014). This emerging STEM perspective was the rational for Ravitz’s initial professional training in hypnosis with Milton H. Erickson, which Ravitz (2002) documented as follows:

Beginning in 1945, I was trained by Milton H. Erickson, MD, the world’s foremost authority on hypnosis, at Wayne County General Hospital, Eloise, Michigan in the most sophisticated, empirical techniques of hypnosis which Erickson (1958) was developing. Erickson’s elegant and imaginative experiments, using maverick procedures, were a great empirical advance in both hypnosis and psychiatry … Field correlates of hypnosis first were presented in Science (1950), followed by the first atlas of hypnotic tracings published by Tracy J. Putnam, MD, the editor of AMA Archives of Neurology and Psychiatry and Director of Services, Neurological Institute of Columbia-Presbyterian Medical Center, 1951. On August 28, 1959, a more sensitive cathode ray oscilloscope first was used to monitor hypnotic states in Burr’s Yale Medical School office” (p. 54-55).

As far as known, Ravitz’s (1950) “Electrometric Correlates of the Hypnotic State,” was the first and only paper on hypnosis ever published in Science. It begins as follows:

Because of repeated failure to detect electrometric correlations with EEG from trance states, no completely objective criteria of hypnosis have yet been formulated beyond empiric observation. Using a Burr-Lane-Nims microvoltmeter, 60 standing potential records of 20 subjects were taken. Although results of spot determinations were sometimes equivocal, continuous EMF tracings,
using the combined microvoltmeter and General Electric photoelectric recorder at a speed of 1 inch/min, with one electrode on the forehead and the other on the palm of either hand, seem to provide a reliable quantitative index of trance depth. During hypnosis, the EMF tracing becomes more regular, and potential difference either gradually increases or decreases in magnitude. At trance termination, there is usually a dramatic voltage shift, and the tracing eventually returns to that of the normal waking state illustrated in figure one.

Fig. 1. A direct current (DC) record of catalepsy and hypnosis. This recording is in millivolts as it originally appeared in Science (Ravitz, 1950). This early bioelectronics recording is updated later in this paper with more modern technology in our series of case studies that implies how these 4 stages, which Ravitz labeled as PREHYPNOSIS, HYPNOSIS, CATALEPSY, END OF HYPNOSIS, may be a more general process for unifying fundamentals of physics, biology and the psychology of consciousness at the quantum level.

Whenever possible, induction was linked up with motor behavior, utilizing the technique developed by Milton H. Erickson (e.g., as his hand rose, a subject would become sleepier until, finally, when it touched his face, he would close his eyes and sleep, signifying he was ready by returning the hand to his lap). Catalepsy, when used to induce hypnosis, sometimes produced marked EMF Electromagnetic Force changes. When this occurred during the trance, or when the subject voluntarily raised an arm, minimal changes were recorded. Depth of hypnosis, as measured electrometrically, does not seem to be correlated with ability to develop amnesia or other phenomena often necessary for a good therapeutic trance. Any disturbance of the hypnotic state could be detected immediately by changes in voltage and in configuration of the tracing. It is thus possible to measure objectively changes in depth of hypnosis. (Ravitz, 1950, pp. 341-2).

During the middle 1970’s, about 25 years after Ravitz’s original paper was published in Science, Erickson and Ravitz together mentored Ernest Rossi in the use of a paper strip-chart recording electronic device (Heath-Schlumberger Model SR-255B) for facilitating the induction and objective measurement of therapeutic hypnosis. We assessed real patients, ourselves and some of Erickson’s family during this informal learning and training period, which was later documented nostalgically with many photographs, figures and tables of data by Ravitz (2002). Rossi subsequently attempted to identify an electronic signature of Erickson’s naturalistic approach to hypnotic induction and therapy illustrated below in figure two, which was outlined as a “Two-Factor Theory of Hypnotic Experience as follows (Erickson & Rossi, 1981/2014, pp. 63-65).

**The electronic monitoring of catalepsy: A two-factor theory of hypnotic experience**

While the pendulum of current scientific thought has swung to the opinion that no objective measures of hypnotic trance exists, there is a long scientific tradition of measuring catalepsy. Early as 1898 Sidis published remarkably clear and convincing sphygmograph-oscillometer
records distinguishing normal awakeness from catalepsy (a quiescence state of mind and body) experienced during hypnosis. Ravitz 1962, 1973, 2002 published tracings of the bodies DC (Direct Current) electrical activity measured on high impedance recorders (impedance is the effective resistance of an electric circuit that makes such recordings possible) that underwent characteristic changes during the induction of catalepsy. Rossi utilized a high impedance recorder (input impedances ranging from 10 to 1000 mega ohms with non-polarizing electrodes placed on the forehead and the palm of one hand) in his clinical practice as a convenient and convincing indicator of an objective bioelectronic alteration that takes place during therapeutic hypnosis. The record of a highly intelligent, normal, 24-year-old female subject during her first hypnotic induction is presented in Figure two. The erratic, fast activity at the beginning of the record (A) is characteristic of normal waking awareness. Every impulse to activity seems related to an upswing, which then drops out as soon as the impulse is carried through. During simple relaxation, meditation, and hypnosis the record smooths out and usually drops dramatically as the subject gives up any active effort to direct mind or body (B). In Figure two a few slow up swings are noted during the beginning of the hypnotic induction, as the subject makes an effort to attend to the therapist’s remarks (C). These drop out as trance deepens, and the record shows a characteristically flat, low plateau with only low amplitude slow waves (D). With more trance experience even the low amplitude activity drops out, and a smooth line record is obtained. As long as the subject remains mentally quiescent with an immobile (cataleptic) body, there are no peaks or valleys in the record. When the subject initiates mental activity or moves, peaks and valleys are usually recorded. The awakening periods also followed by a typical pattern (E). The waking fast activity usually appears at a higher level than the initial basal waking level. This higher level is maintained for a few minutes until the record comes back to normal.

The difficulty with accepting such records as valid measures of trance is that they also appear whenever the subject quiets down during relaxation, meditation, or sleep, whether or not hypnosis has been formally induced. We would therefore offer a two factor theory of hypnotic experience. First, there must be a state of openness and receptivity wherein subjects are not making any self-directed efforts to interfere with their own autonomous (default) mental activity or the suggestions of the therapist. Ravitz’s measurements, like those in Figure two, are probably an effective indication [measurement] of this state of quiet [neuropsychotherapeutic] receptivity. The second factor might be called “associative involvement.” This process whereby the hypnotherapist engages and utilizes the subject’s associations, mental mechanisms and skills to facilitate a therapeutic experience. We regard this process of utilizing a patient’s own mental associations as the essence of “suggestion.” Hypnotic suggestion is not a process of insinuating or placing something into the subject’s mind. Therapeutic hypnotic suggestion is the process of helping subjects utilize their own mental associations and capacities and ways that were formally outside the subject’s own usual ego controls.

Students and laboratory workers who have access to the proper electronic equipment (the Heath–Schlumberger Model SR–255B Strip Chart Recorder is suitable) can explore a number of interesting relations between hypnotic experience and the electronic monitoring of the body’s DC potential. Is the depth of the curve (Area D in figure two) related to “trance depth”? It will be found at some subjects are able to speak during this low portion of the curve without any raise in their DC potential. Are these people better hypnotic subjects? Do any hypnotic phenomena other than catalepsy have such a characteristic curve? Are the classical hypnotic phenomena more readily evoked during the low plateau (D) of the curve? (Erickson & Rossi, 1981/2014, pp 63-65).
**Fig. 2. Bioelectronic monitoring of DC body potential during hypnosis.** Millivolts (mV) are recorded on vertical access, time scale of 0.5 inch per minute on horizontal access: (A) normal default state of consciousness; (B) drop in DC potential during relaxation; (C) momentary response to therapist remarks; (D) characteristically low activity during catalepsy; (E) typical awakening pattern at higher electronic level than (A) (Erickson & Rossi, 1981/2014).

To answer these questions about the basic psychophysiology of Erickson’s naturalistic therapeutic hypnosis, Ernest Rossi then teamed up with David Lloyd, a senior researcher and professor at The Microbiology Group, School of Pure and Applied Biology at the University of Wales, to begin a 16-year odyssey editing two volumes of international research into the fundamental principles of chronobiology and psychobiology (Lloyd & Rossi, 1992, 2008). Lloyd’s motivation was to highlight his lifetime of experimental research documenting how circadian (every 24 hours) and ultradian rhythms (less than 24 hours) from molecules to mind were the natural biological clocks regulating all life processes. Rossi’s motivation was to document how the natural the human 90-120-minute Basic Rest-Activity Cycle (BRAC) and 4-stage creative cycle could be the psychophysiological basis of Erickson’s naturalistic therapeutic hypnosis (Lloyd & Rossi, 1992, 2008; Hope & Sugarman, 2015; Rossi2002, 2012; Rossi & Rossi, 2016 a & b)). Little noted at that time, however, was Stupfel’s (1992) prescient concept of the quantum nature of these circadian and ultradian rhythms in medical research.

Regarding the oscillatory activity episodes, Aschoff and Gerkema (Aschoff & Gerkema, 1985) pointed out that ultradian rhythms of long periods may be an economic strategy to avoid continuous expense of energy, and to alternate energetic expenditure and restoration. *This biological energetic discontinuity has much in common with the physical quantum theory*. In 1900, Planck formulated the principle that energy is not continuously radiated, but is discontinuously emitted by quanta of energy $h\nu$ (*h* being the Planck constant and *ν* the radiation frequency). Biologically speaking this would correspond to the intermittent, more or less periodic, exchanges of energy, heat, food intake, and rest-activity alternations between endotherms [warm-blooded creatures such as humans] and their environment. (Stupfel, 1992, p.226, Italics added here)

Stupfel’s intuition was an early intimation of the quantum aspect of the oscillatory nature of the circadian and ultradian dynamics of all life cycles. This quantum intuition now motivates our current proposal of how “This biological energetic discontinuity” may underpin *dissociation* as a fundamental characteristic of naturalistic therapeutic hypnotic experience as well as life cycles in general. Box one outlines the Maxwell’s four classical equations of electricity (\(E\)) and magnetism (\(H\)), which were the original theoretical rational for the Erickson/Ravitz/Rossi electrodynamic quantum field correlates of therapeutic hypnosis.
Maxwell’s four electrodynamic field theory equations of divergence and curl in Box one are proposed as the mathematical and physical basis of the psychological concepts of dissociation and convergent re-association in therapeutic hypnosis. When people experience a physical or psychological shock the delicate focus of their attention, consciousness, cognition and behavior tends to diverge or dissociate, which results in symptoms of post-traumatic stress disorder (PTSD). Therapeutic hypnosis can help people reintegrate what was dissociated with the curl or re-convergence and focusing of their attention, consciousness, cognition and expectancy. The integration of the languages of mathematics, physics, biology, psychology and medicine in Box one and two highlights our STEM perspective for updating the traditional cognitive-behavioral theory, research and practice of neuropsychotherapy in general.

Physicists describe the harmonic oscillator as a mathematical concept that bridges between the classical dynamics of nature originally formulated by Isaac Newton and the quantum dynamics originated by Max Planck and Albert Einstein. The next section explores how such oscillations (cycles, rhythms, periodicities, waves, oscillations etc.) of “energetic discontinuity” in biology, behavior, brain plasticity, consciousness and cognition may be conceptualized as the quantum field correlates of neuropsychotherapy.
The harmonic oscillator in the classical/quantum dynamics of neuropsychotherapy

Susskind and Friedman (Susskind & Freidman, 2014), in their accessible book on quantum mechanics explain the harmonic oscillator in this way.

Of all the ingredients that go into building a quantum description of the world, two stand out as especially fundamental.

1. The spin, or qubit, of course is one of them. In classical logic, everything can be built out of yes–no questions. Similarly, and quantum mechanics, every logical question boils down to a question about qubits.

2. The second basic ingredient of quantum mechanics is the harmonic oscillator. *The harmonic oscillator isn’t a particular object like a hydrogen atom or a quark. It's really a mathematical framework for understanding a huge number of phenomena. This concept of the harmonic oscillator also exhibits in classical physics, but it really comes to the fore in quantum theory …*

Why are harmonic oscillators so prevalent? ... Many kinds of systems are characterized by an energy function that can be approximated by ... some variable [of life and consciousness] representing a displacement from equilibrium. When disturbed, these systems will all oscillate about the equilibrium point. Here are some examples:

- **An atom situated in a crystal lattice.** If that atom is displaced slightly from its equilibrium position, it gets pushed back within approximately linear restoring force. This motion is three dimensional and really consists of three independent oscillations.

- **The electric current** in a circuit of low resistance often oscillates with a characteristic frequency. The mathematics of circuits is identical to the mathematics of mass is attached to springs.

- **Waves.** If the surface of a pond is disturbed, it sends out waves. Someone watching at a particular location will see the surface oscillate as the wave passes by. This motion can be described as simple harmonic motion. The same goes for sound waves.

- **Electromagnetic waves.** Just like any other wave, a light wave or radio wave oscillates when it passes you. The same mathematics that describes the oscillating particle also applies to electromagnetic waves. (pp. 311-313, italics added here.)

To these examples of the harmonic oscillator in the classical/quantum dynamics of nature, this paper adds the circadian and ultradian rhythms of the psychophysiological basis of life on all levels from mind and behavior to molecules and genes, which were proposed as the fundamental basis of naturalistic therapeutic hypnosis in Lloyd and Rossi (Lloyd & Rossi, 1992, 2008). Three circadian and ultradian behavioral examples of independently collected data and graphs prepared by Helen Sing (1992) in the Department of Behavioral Biology at the Walter Reed Army Institute of Research in Washington are illustrated in figures 3 a, b, c. (Rossi & Lippincott, 1992).
Fig. 3a: An overview of the circadian rhythm (every 24 hours). The ultradian healing response (less than 24 hours) and self-hypnosis in 292 diary recordings of 16 subjects over a 1-week period (Reproduced with permission from Lloyd & Rossi, 1992, p. 383).

Fig. 3b. The predominant 180-minute rhythm of rest. The ultradian healing response in the diary group (Reproduced with permission from Lloyd & Rossi, 1992, p. 383).

Fig 3c. The predominant 180-minute rhythm of self-hypnosis. The hypnosis healing response in the diary group (Reproduced with permission from Lloyd & Rossi, 1992, p. 383).
The main conclusion to be drawn from the data summarized in figures 3 a, b, c is that the 200-year history of therapeutic hypnosis has been vastly over simplified as “suggestion” on the purely cognitive/behavioral level. These data, however, are entirely consistent with the RNA/DNA quantum field theory of neuropsychotherapy, which asserts that most, if not all, of the classical phenomenology of hypnosis are expressions of the wave nature of mind/body circadian and ultradian psychobiological oscillations of adaptive homeostasis (Rossi & Rossi, 2016 a, b; Rossi & Lippincott, 1992). More fundamental experimental associations between hypnotic susceptibility, time of day, core body temperature and gene expression by other independent research groups (Aldrich & Bernstein, 1987; Jensen, 2016) was described as the unification hypothesis of chronobiology in an evolutionary view of mind-body rhythms, stress and rehabilitation. (Rossi, 2004; Rossi & Rossi, 2004; Rossi, Iannotti, et al, 2008).

Fig. 3d. Experimental associations of hypnosis. Hypnotic susceptibility, time of day, core body temperature and gene expression during hypnosis (Rossi, 2004; Aldrich & Bernstein, 1987).
A careful study of figures three, a-d, illustrate how they all approximate of the mathematical concept of the quantum harmonic oscillator in nature and life described by Susskind and Friedman (2014). These empirically based psychophysiological correlates of therapeutic hypnosis now could now be recognized as the correlates of “eigenfunctions and energy levels” formulated in the characteristic equations of quantum field theory (Klauber, 2015; Lancaster & Blundell, 2014), which are illustrated below in examples of the Quantum Electrodynamic Field Theory of Neuropsychotherapy.


Neuropsychotherapy measurements of brain plasticity

We now propose how brain plasticity, behavior, consciousness and creative cognition could be assessed and facilitated with an update of the Erickson-Ravitz electrodynamic measurements in a manner that is appropriate for neuropsychotherapy. Most approaches to psychotherapy, counseling, meditation and virtually all top-down holistic mind-body dynamics of health and rehabilitation from ancient times to the present are essentially concerned with the creation, destiny and change of behavior, consciousness and cognition. Quantum physicists typically trace the source of this evolution as the spontaneous creation and annihilation matter out of the vacuum of space (Baggott, 2011; Davies & Brown, 1988; Schweber, 1994; Krauss, 2012). The Nobel Prize winning physicist, Frank Wilczek (2002) describes this profound scientific integration of biology, mathematics, physics, biology and psychology via quantum field theory as follows:

The more profound, encompassing result was a complete reworking of the foundations of our descriptions of matter. In this new physics, particles are mere ephemera. They are freely created and destroyed: indeed, their fleeting existence and exchanges is the source of all interactions. The truly fundamental objects are universal, transformative ethers; quantum fields. These are the concepts that underlie our modern, wonderfully successful theory of matter (usually called, quite inadequately, the Standard Model). And the Dirac equation itself, drastically reinterpreted and vastly generalized, but never abandoned, remains a central pillar in our understanding of nature…

In hindsight we can discern that much more ancient and fundamental dichotomies are in play: the dichotomy of light versus matter; the dichotomy of continuous versus discrete. These dichotomies present tremendous barriers to the goal of achieving a unified description of nature of the theories Dirac and his contemporaries’ sought to reconcile, relativity was the child of light and the continuum, and quantum theory the child of matter and the discrete. After Dirac revolution had run its’ course, all were reconciled, in the mind-dash stretching conceptual amalgam we call a quantum field. … Early in the 19th century a very different of light, according to which it consists of waves, scored brilliant successes. Physicists accepted that there must be a continuous,
space filling ether to support these waves. The discoveries of Faraday and Maxwell, assimilating light into the play of electric and magnetic fields, which are themselves continuous entities filling all space, refined and reinforced this idea [quantum field theory] … p. 105

Indeed, many authors in philosophy and the humanities as well as scientists in quantum mechanics have used light as a STEM metaphor of the dynamics consciousness, cognition and human nature (Gregory & Gregory, 2014; Lowenstein, 1999, 2013; McFadden, 2000; Stapp, 1993), which are illustrated in our proposed quantum electrodynamic field theory of neuropsychotherapy in the next section. Wilczek (2002) continues.

In 1927 [Dirac] applied the principle of the new quantum mechanics to Maxwell’s equations of classical electrodynamics. He showed that Einstein’s revolutionary postulate that light comes in particles—photons—was a consequence of a logical application of these principles… Few observations are so common as that light can be created from non-light, say by a flashlight … This means that the quantum theory of Maxwell’s equations is a theory of the creation and destruction of particles (photons). Indeed, the electromagnetic field appears, in Dirac’s theory, primarily as an agent of creation and destruction. The particles—photons—we observe result from the action of this field, which is the primary object. Photons come and go, but the field abides. . .

The result of a logical application of the principles of quantum mechanics to Dirac’s equation is an object similar to what he found for Maxwell’s equations. It is an object that destroys electrons and creates positrons. Both are examples of quantum fields. When the object that appears in Dirac’s equation is interpreted as a quantum field, the negative-energy solutions take on a completely different meaning, with no problematic aspects. The positive-energy solutions multiply electron-destruction operators, while the negative-energy solutions multiply positron-creation operators … The description of light and matter was put, at last, on a common footing. Dirac said, with understandable satisfaction that with the emergence of quantum electrodynamics physicists had obtained foundational equations adequate to describe ‘all of chemistry, and most of physics’ (p. 117, italics added here).

The molecular biologist, McFadden (2000), proposed the scientific development of quantum biology and psychology in his highly innovative volume on quantum evolution as follows.

The classical view of the dynamics inside living cells (still the view held by most biologists) was of classical particles perusing independent trajectories through intercellular spaces. This vision allowed biochemists and geneticists to wholeheartedly adopt the reductionist program of dissecting the cell into smaller and smaller pieces, with the expectation of gaining a greater and greater level of understanding. However, now biology has reached the level of fundamental particles, we must confront the quantum cell, which has revealed itself as a dynamic mosaic of quantum and classical states. Particles can no longer be considered as independent entities but as the products of internal quantum measurement. Quantum mechanics directs us to look up from the fundamental particles and examine the environment measuring them.

Why does this matter? … Measurement of quantum particles is not ever innocuous; it always affects dynamics. Physicists are normally employed to make quantum measurements, and the choices they make … affect the dynamics of the systems they study. But now, we have the living cell as an independent quantum-measuring device that measures its own state, so that the choices it makes about what it wishes to measure will influence its internal dynamics.
The environment of the cell arms their quantum-measuring devices and thereby determines the properties that the cell can measure. This will in turn influence the internal dynamics of the cell. This represents a kind of choice, since it is an influence denied to inanimate objects unable to measure the quantum states of the particles, within them ... Nevertheless, I do believe that this ability to make quantum choices is the basis for our sense of volition as conscious beings. (Pgs. 252-3, Italics added here.)

These carefully considered hypotheses about quantum dynamics as an essential characteristic of all living systems now finds further important scientific support in the fundamental role of the weak force (McFadden & Al-khalili, 2014; Wilczek, 2008, 2015) during the DNA dynamics of transcription and translation that could be facilitated with neuropsychotherapy as implied by the following case studies.

**Results: Case studies of the quantum electrodynamic field theory of neuropsychotherapy**

We now illustrate our proposed quantum electrodynamic field theory of a variety of human experiences with new technology (www.picotech.com/products/data-logger: (ADC-20/24 with ± 39 to ± 2500 millivolts input) to update the Erickson/Ravitz archival devices that are no longer available commercially. Preliminary case studies of the electrodynamic quantum field correlates of neuropsychotherapy are presented here to illustrate a number of basic patterns observed with volunteer subjects as a prelude to more systematic studies (Schork, 2015). These patterns are only suggestive of the many open questions that now require more systematic and better controlled STEM research to explore how physics, biology and psychology interact in our proposed top-down quantum electrodynamic field theory of neuropsychotherapy.

**A Basic Quantum Electrodynamic Field Signature of Therapeutic Hypnosis?**

![Fig. 4. A typical quantum field theory recording of hypnosis. Symmetrical bioelectronic amplitudes of ±40 mV is illustrated on extremes of the vertical axis. Notice how the right hand (red line) shows the typical downward slope of a hypnotic (or cataleptic state of quietude and relaxation) induction. The left hand (blue line) records its bioelectronic mirror symmetry.](image)

The original 4-stage pattern of the “electrometric correlates of the hypnotic state” via “catalepsy” illustrated and discussed earlier in figures one (Ravitz, 1950) and two (Erickson & Rossi, 1981/2014) is again evident in the red top half of figure four. This provides us with some assurance that our current neuropsychotherapy technology is replicating the early work of Erickson, Ravitz and Rossi. Whereas the early recordings from
1950 and 1981 had only one-line measuring electromagnetic amplitude in millivolts (mV) between sensors placed on the forehead and palm of one hand, however, current technology permits measurements from two or more sensors usually placed on the forehead and the palms of the right and left hand. The lower half of this electrometric recording of hypnosis, for example, appears to be a mirror reflection of the top half. What could this left-right hand mirror symmetry mean? We propose this a manifestation of Noether’s theorem relating the mathematical associations between symmetry and the fundamental conservation laws of nature as discussed below.

Mirror reflections of left-right symmetry are referred to as parity and/or chirality in the quantum electrodynamic field theory on many STEM levels from particle physics to biology and psychology (Lancaster & Blundell, 2014; Baggott, 2011; Davies & Brown, 1988; Gleick, 1992). Because of this the recorded field (area, channel or space) between the head, left and right hands is conceptualized in this paper as a computational image (Tricoche, et al, 2008) of the boundaries of the quantum electrodynamic field, which in more familiar terms, could be described as “the span of attention, the focus of concentration, the bandwidth of consciousness and/or mental activity, the mind-body information channel capacity, electrodermal activity (Prokasy & Raskin, 1973) or the more recent concepts of bio-molecular energy landscapes (Neptune, et al, 2016; Wolynes, 2016). Further research is now required to ascertain whether such neuropsychotherapeutic amplitudes are useful visualizations for measuring the bits or qubits of information in quantum electrodynamic fields and/or signatures of the various states of consciousness, cognition and behavior (Lowenstein, 1999, 2013).

Neuropsychotherapy of stroke and biofeedback

Figure five is the electrodynamic recording of a professional woman who had a hemorrhagic stroke about 20 years ago and was now interested in exploring biofeedback for rehabilitating the hemiparesis in her left hand and foot. She was encouraged to “simply look at and bring together” her emerging bioelectronic recording that initially showed a gap of about 20 mV between her left and right hands. Throughout the course of her 50-minute exploratory study she was gently encouraged to simply bring the emerging top (red) and bottom (blue) parts of her electrometric recording together “so her normal right could teach her left stroke hemiparesis impaired hand to move normally.” She was apparently successful in that the bioelectronic gap between her right and left hand was greatly reduced to about 5mV by the end of this exploratory session. (The burst of electronic activity recorded in the last 5 minutes was an artifact due to the large physical movements of terminating the recording.) She was warmly congratulated for her success in reducing the gap but she seemed unimpressed since there was no evident improvement in the paralysis of her left hand in this single session. Figure five, however, does suggest how to cope with one of the most fundamental problems of applied mathematics: how can subjective states of human consciousness and cognition be mapped with objective measurements? These case studies suggest that bioelectronic amplitudes can be objective correlates of subjective states of human consciousness and cognition under the appropriate measurement conditions of neuropsychotherapy.
Fig. 5. The bioelectronics biofeedback of stroke. A professional woman who had a hemorrhagic stroke about 20 years ago who wished to exploring biofeedback for rehabilitating the hemiparesis in her left hand. While she was not successful in curing the paralysis of her left hand she did successfully demonstrate how her subjective consciousness and cognition (her conscious will) could modulate her objectively measured bioelectronic amplitudes in this trial.

None-the-less, two weeks later she wanted to explore whether hypnosis could improve her performance in figure six. Notice how the first 15 minutes of her second recording in Figure six began with the typically downward slope characteristic of hypnotic induction. This was interrupted by a sudden burst of bioelectronic activity at about 17 minutes with a great widening of her quantum electrodynamic field when she apparently “got it,” whatever “it” was for her as shown here.

Fig. 6. Bioelectronics of hypnosis and biofeedback. The downward slope characteristic of hypnotic induction illustrated here is strikingly different from the biofeedback recording of the same subject in Figure 5.

This very striking expansion (widening) was followed by a symmetrical narrowing of her quantum electrodynamic field between 0 mV and -5mV for about 20 minutes, which Ravitz and Erickson noted as typical of deep hypnosis (Rossi, Erickson-Klein, Rossi, 2008, 2015). Such rapid changes in electromagnetic polarity were regarded as heralding significant shifts in consciousness, cognition, emotions and behavioral dynamics in normal individuals as well as psychiatric patients by Ravitz (1962). Well controlled independent bioinformatics research is now required to assess the significance, reliability and validity of such early claims by Ravitz.
Neuropsychotherapy of head trauma, kriya meditation and yoga

The next case example was of 59-year-old woman who experienced a head concussion six years ago leading to what she called a loss of her “immediate term memory” for about a year. A part of her rehabilitation was the practice of yoga for which she received documented credit for 750 hours of teacher training. In several trips to India she received initiation into Kriya meditation (Wyder, 2014) that she continues to practice for about an hour twice a day. Her practice of Kriya meditation touched upon the highest intensity of bioelectrodynamic activity at 60 mV documented in this paper in figure seven.

![Fig. 7. Bioinformatics of Kriya meditation.](image)

*Fig. 7. Bioinformatics of Kriya meditation. This 5-year practice of meditation touched upon the highest intensity of bioelectronics activity documented in this paper at 60 mV.*

The first 30 minutes illustrates the wave nature of an active series of Kriya meditations, which her right hand (red) records at a higher level of gradually ascending activity (beginning at about 50 mV to almost 60 mV), while her left hand (blue) records a lower level (beginning at about 25 mV and topping out at about 30 mV). The last 20 minutes of her self-guided meditation appears to be a resting state (Rossi, 2012) with the intensity level of both sides reduced to about 20 mV (Spetsieris, 2015). What does this neuropsychotherapy pattern of her meditation mean? She had recovered from the loss of her “immediate term memory” with the help of her yoga practice long ago but now she wondered if an experience of hypnosis would show a meaningful neuropsychotherapy pattern.

Figure eight illustrates her next session when hypnosis was used. After about 5 minutes of random activation due to the attachments and preparations for this exploration, this recording of her electrodynamic field illustrates the typical downward slope of a hypnotic induction from her initial default level of normal waking consciousness at ~50 mV to about 20 minutes of a symmetrical pattern of inner focusing at the ± 20 mV level at the end of her session.
Thirty minutes into the session she suddenly announces she has to use the rest room. When she returns the electronic sensors are reattached to her forehead and hands. She then spontaneously and serenely poured forth with the most intimate personal psychodynamic history of her early childhood abuse, adolescent identity struggles and a hero’s journey for a place in the professional world. All this with absolutely no prompting from the astonished authors of this paper who were both present in all these exploratory sessions with her but previously never heard about her abusive childhood. When questioned about this she demurely responded that she had always known about this abuse but somehow or other never realized its significance. Notice the widening of her bioelectrodynamic field in the last half of her recording; is this a correlate of the widening of her consciousness, cognition and self-awareness facilitated with a spontaneous review of her childhood abuse? Notice the left-right hand symmetry at the zero level of her recording during the last 10 minutes of quiet non-verbal serenity and rest of this recording when neither she nor the authors uttered a single word. Does this imply she was really finished or at least satisfied with her self-directed neuropsychotherapeutic work for now?

**Symmetry in the neuropsychotherapy of the creative consciousness and cognition**

The highly symmetrical neuropsychotherapy recording of creative consciousness and cognition in a 42-year old woman who was a well-functioning CEO of a business enterprise is illustrated in figure nine. When she was shown this recording she immediately became brightly animated and explained, “Oh! I know what this is all about! Here right in the middle is a high peak when I became excited with a new insight that solved a business problem I’ve been working on! It was a real “Aha” experience! Then I reviewed it several times with these smaller peaks and when I was sure I would remember it I opened my eyes.”
These observations suggest how this recording may illustrate the bioelectronic correlates of the 4-stage experience of creative consciousness and cognition during neuropsychotherapy. *Stage 1* is the normal default state of ordinary consciousness at about 10 minutes. The initial neuropsychotherapeutic drop of more than 20 mV in *Stage 2* is the typical indication of an inner focusing of attention and expectancy for about 15 minutes. An ascent with a series of 2 or 3 rising peaks for about 10 minutes then culminated with an “Aha” peak at *stage 3*. This was followed by a series of 3 descending peaks for about 15 minutes when she apparently was reinforcing her memory, which culminated in the characteristic *stage 4* peak that was a bit higher at about 25 mV than her initial default state.

We propose that the type of neuropsychotherapeutic symmetry illustrated by figure nine is an integration of the classical/quantum interfaces of physics, biology and psychology. Emmy Noether (1882-1935), one of the leading mathematicians of her time, made fundamental contributions to our current conception of fields, algebras and equations. In physics, Emmy Noether's theorem relates the mathematics of symmetry to the fundamental laws of nature such as the conservation of energy, the conservation of linear and angular momentum as well as the conservation of electric charge. This mathematical perspective suggests that modern theory and research in neuropsychotherapy could make important contributions to a unified theory of the classical/quantum interfaces between physics, biology and psychology (Halpern, 2015). Symmetry in human neuropsychotherapy is conceptualized here in terms of Noether’s theorem of nature’s conservation laws for a unified theory of physics, biology and psychology on the quantum level.

The neurosurgeon Walter Penfield (1891-1976) created the original well-known image of the “human homunculus,” which illustrated what we would look like if our body parts were as big as the brain space they take up. We have redrawn the Penfield image in figure ten to integrate our conception of the 4-stage creative cycle of the of the observer/operator in psychology that is consistent with the Penrose (1994, 2004) and Cohen-Tannoudji (1993) perspectives of the quantum/classical horizons of consciousness and cognition in the neuropsychotherapy of the mind/brain.
Fig. 10. Bioelectronics cartoon of the observer/operator. This illustrates an integration of the top-down and bottom-up approaches to the bioelectronics of physics, biology and psychology adapted from Walter Penfield’s original concept of the mind/brain/body homunculus. Note how the 4-stage creative cycle of subjective human experience (1. Observation, 2. Incubation (Inner Work), 3. Aha! (Insight), 4. Reintegration) is objectively measured by bioelectronic amplitudes in a computer. The over-sized hands, lips and tongue, the main sensory communication channels of human communication, mirror the actual semantic mind/brain space evolution has selected for over at least 4 billion years. If there is anything funny about this cartoon we note the miniscule size of the penis relative to the hands, lips and tongue suggests that evolution is not Freudian.

Discussion

Semantic Mind Brain Maps and the Quantum Qualia of Creative Consciousness

This paper outlines a new integration of the theory, research and practice of neuropsychotherapy at the classical/quantum (conscious/unconscious) interfaces of physics, biology and psychology. The mathematician Ian Stewart (1989) discusses some of the salient issues in this way.

It isn’t easy to interpret quantum mechanics at a human level. Indeed, one school of thought argues that there’s no point in trying to do so, because the quantum world and our senses have nothing in common. Others disagree, and offer interpretations anyway. In a popular one, the wave-function represents not the state of a particle, but a superposition of all possible states; and when an observation is made, the wave-function ‘collapses’ to a single state. Before this collapse, it represents the probability that the system will be found in a given state. I don’t actually like this interpretation much. As we’ve seen, neither did Albert Einstein. Let me quote his letter to Max Born at greater length, to show the context:

You believe in the God who plays dice, and I in complete law and order in a world that objectively exists, and which I, in a wildly speculative way am trying to capture. I firmly believe, but I hope that someone will discover a more realistic way, or rather a more
I agree with Einstein. I like the second idea – the deeper game, which we don’t understand yet – a lot more. (Stewart, 1989, p.292-293)

We now propose that this “deeper game” of integrating the quantum world view of physics and biology is currently emerging with new insights into uncertainty, expectancy and the observer-operator effect in neuropsychotherapy. It was a difficult problem for physics to realize that the inner mind/brain observer could interfere with the observed in the outside world. That is, the so-called objective scientific measurements of the outside world are dependent on the perceptions of the inner subjective world of psychology! We now propose that the physicist problem of quantum observations (so-called weird or paradoxical measurements) may be transformed into an opportunity for neuropsychotherapy that we propose to call the “Observer/Operator Effect” illustrated above in figure ten. The “Observer/Operator Effect” is a central challenge for an integrative science of neuropsychotherapy: making novel or highly salient observations on the classical/quantum (consciousness/unconsciousness) interface automatically operates on the molecular-epigenomic level of brain plasticity to update and change consciousness, cognition, expectancy and behavior. A summary schematic of the cyclic classical to quantum and the quantum to classical transitions of consciousness and cognition previously published in detail (Rossi, 2002; Rossi & Rossi, 2016 a, b) is illustrated here in figure 11.

![Fig. 11. The quantum observer/operator effect.](image-url)

The communication cycle that underpins the consciousness/unconsciousness transitions experienced in psychology. 1. Observing consciousness, 2. The Classical to Quantum Transitions of Mirror Neurons, 3. The RNA to DNA epigenomic brain plasticity transitions, and 4. The Quantum to Classical Transitions on “The Road to Reality” (Penrose, 2004), translational medicine and psychology (Rossi, 2002, 2012; Rossi & Rossi, 2016a, b). The classical to quantum transition in stage 2 underpins psychological...
transition from consciousness to unconsciousness in cognition and behavior. The quantum to classical transition in stage 4 underpins the shift back from unconsciousness to consciousness in cycles of cognition and behavior. These horizons between the classical (conscious) and quantum (unconscious) transitions of normal every-day life have been aptly described (Penrose, 1994, 2004; Cohen-Tannoudji, 1993; Stewart, 1989, 2012).

The upshot for a neuropsychotherapy of consciousness/unconsciousness (classical/quantum) transitions experienced in everyday life as well as counseling, meditation, couching, mindfulness and translational medicine, etc. is that any novel and numinous (Otto, 1923) conscious observations that are made by the therapist and/or the patient automatically operate unconsciously to transform both of them on the quantum level (Rossi, 2002; Rossi & Rossi, 2014b, 2016a). It may initially only be a small quantum qualia of sensation, perception, and meaning in subjective experience and/or transference – but we propose that amplifications of these quantum qualia of psychological transformation can be a causal in mediating objectively measured RNA/DNA cascades of epigenetic activity-dependent gene expression and brain plasticity that underpins new states of consciousness, cognition and behavior (Rossi, 2002, 2004, 2007, 2012; Doidge, 2015).

Over the past century quantum field theory has become the most accurate science on atomic as well as cosmic scales of observation and measurement. In quantum mechanics, quantities such as energy and mass are not continuous: instead they come in discrete lumps or quanta. Paradoxically these quanta have dual wave-particle identity described mathematically by a quantum mechanical wave-function equation that is supposed to represent something existing in outside reality. A recent school of thought called Quantum Bayesian (QBism) (Caves, et al., 2001; Fuchs, 2001, 2010, 2011, 2012), however, reinterprets the wave-function as a subjective psychological belief system governed by the rules of Bayesian statistics, so that the so-called mysterious and weird physical paradoxes of quantum mechanics vanish. We propose that the physicist’s problem of paradoxical quantum observations (measurements) may be transformed into an opportunity for neuropsychotherapy and psychology called the “Observer/Operator Effect.” The upshot for neuropsychotherapy is that any novel and numinous observation that is made by people in positive empathic relationships automatically operates to transform activity-dependent epigenetic gene expression and brain plasticity that underpins new therapeutic states of creative consciousness, cognition associated with rewarding emotional experience and social relationships (Rossi, 2002, 2012; Rossi & Rossi, 2016a, b).

Open questions about the dynamics of neuropsychotherapy

The STEM (Science, Technology, Engineering and Mathematical) concepts of the quantum electrodynamit field theory of bioinformatics that originated in the pioneering work of Northrop, Burr, Erickson and Ravitz three generations ago has been enriched with modern bioelectronic recordings of what could be called “the span of attention, the focus of concentration, the bandwidth of consciousness, mental activity, electrodermal activity, the mind-body information channel capacity or more generally the Mind Brain Maps and the Quantum Qualia of Creative Consciousness.” Our research review implies that modern Quantum Field Theory (QFT) is entirely consistent with and greatly extends the foundational details of Lankton’s (2015) classical States of Consciousness (SoC) model of therapeutic hypnosis and its induction. Indeed, QFT conceptualizes subjective states of consciousness (SoCs) as objectively measured quantized fields of cognition. We now may ask open questions about how evolution selected for the QFT dynamics of gene expression, brain plasticity, behavior and their associated quantum qualia of consciousness in the SoC model of hypnosis (Rossi, 2012, Rossi & Rossi, 2016a, b; Lankton, 2015). Why do we have consciousness
in the first place? *What adaptive value could the highly sensitive quantum qualia of the electrodynamic fields of subjective consciousness in neuropsychotherapy possibly have?* Why are we not unconscious zombies relying on blind and brute bottoms-up DNA epigenetic molecular mechanisms for survival (Lowenstein, 1999, 2013; McFadden & Al-khalili, 2014; Pekala, 2015; Chalmers, 1996; Dennett, 1991; Nörretranders, 1998)?

Are the STEM inspired quantum electrodynamic fields illustrated in this paper meaningful in terms of the seemingly eternal philosophical debates about the nature and utility of consciousness, cognition, dream, emotions, fantasy, subjective belief and free will? Could the QFT Observer/Operator bioelectronic recordings of novel and *subjective* quantum qualia of human cognition actually be correlates of *objectively measured* activity-dependent epigenetic expression and brain plasticity in creating new consciousness and self-identity that are apparently lost in Alzheimer’s disease, for example (Rossi & Rossi, 2014 a, b, 2015 a, b)? Indeed, does the intense focusing on the quantum qualia of subjective human experiencing in neuropsychotherapy really facilitate the causal efficacy of the top-down holistic approaches to healing and rehabilitation optimized by the art, beauty and truth in the cultural rituals of meditation, spiritual rituals and the many styles of therapeutic mindfulness throughout human history? Could integrations of the classical/quantum cyclic dynamics of physics, biology and psychology provide a unified update of the Von Neumann & Morgenstern (1953) game model of human behavior? Recall how these author’s carefully discussed one of the most fundamental problems of applied mathematics: how can *subjective states of human consciousness, cognition and experience* be mapped with *objective measurements*? Our case studies suggest how a new generation of neuropsychotherapy research could scientifically pursue this integration of the subjective experiences and objective measurements of physics, biology and psychology with semantic mind/brain maps of the quantum qualia of creative human consciousness.

**Summary**

The STEM perspective of science, technology, engineering and mathematics provokes profound but still poorly understood open questions about the quantum nature of bioinformatics in physics, biology and neuropsychology. Current bioelectronic technology is illustrated for implementing a proposed quantum field theory to integrate research on activity-dependent epigenomics, brain plasticity, behavior, consciousness, cognition, dissociation, expectancy and the quantum qualia of neuropsychotherapy. This paper proposes that the physicist problem of paradoxical quantum observations (measurements) may be transformed into an opportunity for neuropsychotherapy called “The Observer/Operator Effect.” Under appropriate conditions bioelectronic amplitudes can be objective correlates of subjective states of creative consciousness and cognition facilitated with neuropsychotherapy. It should not escape our notice that this STEM perspective of neuropsychotherapy could support a new quantum level integration of fundamental research in physics, biology and psychology for the objective measurement and optimization of human behavior, consciousness and therapeutic cognition.

**References**


