

A CONVERSATION WITH PROFESSOR VENERABLE SAMDHONG RINPOCHE ON THE VISION AND LEGACY OF HIS HOLINESS THE DALAI LAMA, DHARAMSHALA, INDIA DECEMBER 2016

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Samdhong Rinpoche is a loving, intelligent, charitable and important spiritual leader who practices and teaches within the Gelugpa School of Tibetan Buddhism. He is a close associate of His Holiness, the 14th Dalai Lama. At the age of five, he was recognized as the incarnation of the 5th Samdhong Rinpoche and was enthroned at the Garden Dechenling Monastery in Jol, Tibet. He then took his vows as a monk at age seven. His outstanding scholarship to teach Tibetan Buddhist philosophy is deep and remarkable. He was appointed by His Holiness, The Dalai Lama, a member of the assembly of Tibetan People's Deputies in 1991. Within a few years, he was unanimously elected to be chairman. In 2001, the exiled people of Tibet elected him to be their prime minister by an astonishing 84% vote. Samdhong Rinpoche lives in a small, brightly lit, house in the shadow of the Dalai Lama's palace. A quote from a 2006 speech about [The Vision and Legacy of His Holiness The Dalai Lama](#) (2014) will help us understand why he is so respected and loved.

"The Buddha gave some very clear instructions in a sutra in the Pali canon called the Kalama Sutta, when he said:

Do not believe in anything simply because you heard it.

Do not believe in traditions because they have been handed down for many generations.

Do not believe in anything because it is spoken and rumored by many.

Do not believe in anything simply because it is found written in your religious books.

Do not believe in anything merely on the authority of your teachers and elders.

But after observation and analysis when you find that anything agrees with reason

And is conducive to the good and benefit of one and all –

Then accept it, and live up to it."

Meeting Samdhong Rinpoche was a special joy. At 77 years old his eyes are bright and his steps lively. He was gracious, warm and engaging. This story begins two days before our meeting. The Chonor House, operated by the [Norbulingka Tibetan Arts Council](#), is the closest hotel to the Kalachakra temple. The Tibetan refugees were invited by the Prime Minister of India to live in McLeod Ganj, upper Dharamshala in 1959. They were exceptionally welcoming, kind, helpful and happy. These people have an ability to see the good in everyone. The Chonor House helped make the initial telephone call to schedule my appointment with Samdhong Rinpoche followed by confirmation the next day. It was here that I learned how universally loved, revered and respected Samdhong Rinpoche is to the Tibetan people.

Dawa Dhundup, chef of the Hummingbird Restaurant at the Chonor House, helped me make the confirmation call. So great was his awe for Samdhong Rinpoche that he was speechless. Dawa came as a refugee 16 years ago, and had experienced great tragedy in Tibet. His soft eyes filled with tears and furrowed brow gave glimpses of the pain of leaving Tibet and all he knew, to journey across the Himalayas to India. I immediately invited him to join our meeting. "I would be too afraid," he said, so I asked him if he would please walk with me to show the way.

When we arrived at the guard gate I asked Dawa to join me. He replied, "No, I am too afraid. I wouldn't know what to say." With a big encouraging smile, I replied, "That is an excellent reason why you should come." Sincerely he asked, "Are you afraid to go alone?" to which I answered a simple, "No." He paused for a moment and finally decided to walk me to Samdhong Rinpoche's house. Upon arrival Samdhong Rinpoche and his secretary invited us both in. There was fast conversation in Tibetan followed by picture taking. Dawa, all smiles, then departed. Later he told me how

wonderful Samdhong Rinpoche was to have invited him, an ordinary person, to sit with us. This generosity of spirit exemplifies who Samdhong Rinpoche is as a person: gracious, kind and inclusive.

Samdhong Rinpoche exchanged a Khata scarf blessing with me, and then sat down for tea and conversation. The Khata blessing symbolizes the sincerity on one's offering the beauty of prayer, purity, goodwill, auspiciousness, and compassion for each other. In the first half of our meeting he was interested to learn about my work and interests. I autographed two of our books: *The Breakout Heuristic: The New Neuroscience of Mirror Neurons, Consciousness and Creativity in Human Relationships* (Rossi, 2007) and *Creating Consciousness: How Therapists can facilitate Wonder, Wisdom, Truth and Beauty* (Rossi & Rossi, 2012). Samdhong Rinpoche had not yet heard of the neuroscience of ultradian rhythms and was fascinated about the new worlds of "mirror neurons, gene expression, and brain plasticity". He was intrigued about my passion to pair Hindu stories with yoga asana postures. I shared with him the ancient story of Virabhadra, the Warrior, along with postures to his surprise and delight. The warrior is an expert in being prepared, acting swiftly and deftly when necessary, then letting go of what is no longer needed before taking a well-deserved rest. This was a perfect metaphor for him about the 4-stage creative cycle in modern Western psychotherapy.

I then turned the conversation to him. It is hard for me to imagine what it would be like to be a spiritual leader and to be in deep service to the people from age five. I was curious to learn what was personally important to him today. Whereas many people who come to Samdhong Rinpoche want something, I simply wanted to give.

"His Holiness, The Dalia Lama, is becoming older and has prostate cancer. What will you do if he passes on," I enquired?

To this Samdhong Rinpoche responded in terms of the aging process, *"I don't expect to live more than 5 years, and I have health problems of my own."*

Our conversation turned to pivotal points of aging: mood, limiting physical dexterity and energy. I explained Ultradian rhythms as a natural vehicle for pacing one's optimal self and mood in everyday life. Ultradian rhythms are our natural Basic Rest and Activity Cycle of our 4-stage creative cycle. There is a time to be active and help others and a time for rest to optimize our own consciousness, cognition and healing.

Samdhong Rinpoche then shared, *"Sometimes I get depressed and my body is in a great deal of pain. Is it psychosomatic or is it real?"*

Naturally, most of us have such feelings from time to time, particularly with aging. It was very interesting to me that he labeled his moods as depression. Now my opportunity to give had arrived. I shared with him that "Depression" is a Western idea that I think may not serve the world very well. Whereas sadness is a passing state, depression is a diagnosis and is fixed.

I suggested, *"Could it be better to think of yourself as sad from time to time and wonder how and when your sadness will lift? Wouldn't it be wonderful to not self-diagnose? What are Eastern thoughts on depression?"*

"This is very interesting to me as there is no word in the Tibetan language for depression," Samdhong Rinpoche responded. *"There is a word for sadness,"* he said with deep concentration. I was reminded of Buddha's words from the Kalama Sutta Samdhong Rinpoche offered in his 2006 speech, *"Do not believe in anything simply because you heard it or read it in a book."*

"Aches and Pains can also be transient," I offered, *"Even within chronic pain there are peaks and valleys throughout the day. Become sensitive to those valleys when your pain is lowest could become important. The question now becomes, how long can you stretch the time of the smallest pain? Can you become sensitive to the times you are pain free and magnify your comfort? All of this is consistent with neuroscience research on gene expression, brain plasticity and Ultradian theory. Exercise is also important in order to live a pain free life."*

Samdhong Rinpoche replied. *"I can easily walk a kilometer on flat ground, but find it difficult to walk nearby my home."*

I responded, *"I can certainly understand that living in the Himalayas! I watch carefully every step I take here on the uneven ground. In Dharamshala the stone steps are ancient, steep and uneven, probably set for trekkers. It is also easy to become distracted by the gorgeous views."* Just then a huge commotion broke out above our heads with a troop of monkeys running across the roof. *"Is that an earthquake?"*

Samdhong Rinpoche said laughingly *"We get used to the monkeys, and yes, they create quite a pounding on the corrugated tin roof! No, this is not an earthquake."*

Our time together came to a close. I made my way back to the Kalachakra temple to spin the Tibetan Mani prayer wheels. As I was chanting "Om Mani Padme Hum" I found myself resonating with mystery, richness and clarity of Tibetan Buddhist consciousness that shown through Samdhong Rinpoche, a living master. The following day, The Dalai Lama spoke in his native language at the Kalachakra temple for hours to both monks ready to depart Dharamshala and those who had just arrived from Tibet. His voice tone and tenor reminded me of a father speaking to his favorite child. I felt as though he spoke directly to me about the best, kindest, truest and gentle ways to live life in the "outside" world.

The wisdom Samdhong Rinpoche offered from the Pali cannon, *"After observation and analysis when you find that anything agrees with reason, and is conducive to the good and benefit of one and all – then accept it, and live up to it"* is fully alive in the Tibetan Buddhist community in Dharamshala.

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THE VISION OF THE DALAI LAMA AS A QUANTUM MICROSCOPE OF THE SOUL: A PSYCHOSOCIAL AND CULTURAL GENOMIC COMMENTARY

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This wonderful conversation between Kathryn Rossi, PhD and the Professor Venerable Samdhong Rinpoche regarding [The Vision and Legacy of His Holiness The Dalai Lama](#) goes right to the heart and soul of meditation. These very clear and profound eight statements about what to believe, accept and live up to are a call to everyone's search for their own meaningful path of meditation. Let us repeat them here in bold font as an inner guide to the self-attunement music of self-realization.

"The Buddha gave some very clear instructions in a sutra in the Pali canon called the Kalama Sutta, when he said:

Do not believe in anything simply because you heard it.
Do not believe in traditions because they have been handed down for many generations.
Do not believe in anything because it is spoken and rumored by many.
Do not believe in anything simply because it is found written in your religious books.
Do not believe in anything merely on the authority of your teachers and elders.
But after observation and analysis when you find that anything agrees with reason
And is conducive to the good and benefit of one and all –
Then accept it, and live up to it."

These eight simple statements inspire meditation on the nature, essence and the integrity of everyone's life journey. It is the essential message we would want every child to understand upon entering kindergarten around the entire globe. This is the original belief and practice of the natural wisdom and science of the best of the ancients and modern scholars.

This is the natural perspective of psychosocial and cultural genomics, which brings together an understanding of human nature on all levels from mind to genes and creative meditation illustrated here.

This is a highly speculative psychosocial and cultural genomic perspective of meditation and therapeutic cognition made by mapping "Buddha's Four Noble Truths" onto the 4-Stage Creative Cycle and the natural 90-120-minute Human 4-Stage Basic Rest-Activity Cycle (BRAC). Buddha's Four Noble Truths are outlined here as follows.

Stage 1: Curiosity; Duhkha means uneasy, unsteady, disquieted, which motivates the search for nirvana.

Stage 2: Incubate; Samudaya means misery caused by the passions can be transcended.

Stage 3: Aha; Nirodha means intense concentration in which the subject/object distinction is transcended for realization of non-duality (Nirvana); resolving the problem of the opposites (or dissociation) of being stuck in one side of a polarity.

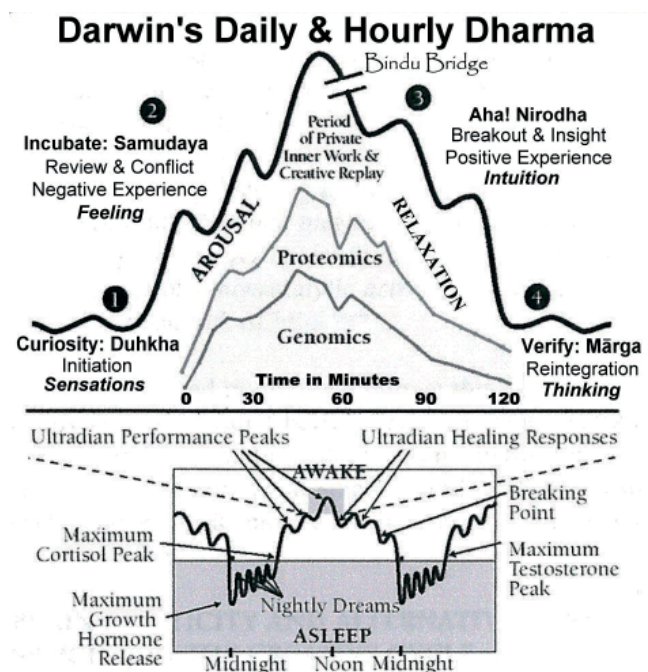


Figure 1: Top figure profiles the 4-Stage Creative Cycle maps the cognitive-behavioral levels of consciousness and cognition onto the chronobiological genomic and proteomic levels during the BRACs using Buddha's 4 Noble truths. The bottom figure is the circadian cycle (~24 hours) is made up of wave-like quantum rhythms of Kleitman's 90-120-minute Basic Rest-Activity Cycles (BRACs).

Stage 4: Verification; Mārga is the path leading to nirvana, the state of being free from suffering (Duhkha).

The Top Figure One profiles the 4-Stage Creative Cycle maps the cognitive-behavioral levels of consciousness and cognition onto the chronobiological genomic and proteomic levels during the BRACs. The quantum qualia of consciousness and cognition varies during the behavioral performance peaks and troughs of the normal circadian cycle of waking and sleeping. The daily peaks of some major hormones are indicated along with the "Breaking Point," which designates a major circadian shift between activity or experience-dependent gene expression during waking and sleeping. The 4-stage is mapped onto one ultradian 90-120-minute Basic Rest-Activity Cycle (BRAC), which we hypothesize, is utilized in many ancient and modern approaches to hypnosis, meditation, psychotherapy, spiritual practices, and yoga. We

propose that the "Period of Private Inner Work & Creative Replay" that mediates the successful therapeutic transition between the conflicts of stage 2 and the therapeutic insights of stage 3 and 4 of the creative process are facilitated by implicit processing heuristics (IMPs) operating on many levels from the cognitive-behavioral to the molecular-genomic. The bottom half of Figure One is the circadian cycle (~24 hours) is made up of wave-like quantum rhythms of Kleitman's 90-120- minute Basic Rest-Activity Cycles (BRACs).

Elsewhere in this issue of *The International Journal of Psychosocial and Cultural Genomics* we have illustrated the most recent presentation of this paradigm of the Buddha's Four Nobel Truths as *An Integrated Quantum Field Theory of Physics, Biology and Psychology: A 100 Year Perspective of the Evolution of Psychotherapy with the New Quantum Microscope of the Creative Mind*.

AN INTEGRATED QUANTUM FIELD THEORY OF PHYSICS, BIOLOGY AND PSYCHOLOGY: A 100 YEAR PERSPECTIVE OF THE EVOLUTION OF PSYCHOTHERAPY WITH THE NEW QUANTUM MICROSCOPE OF THE CREATIVE MIND

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Abstract

We use the new quantum magnetic resonance microscope to review and update the foundations for the Evolution of Psychotherapy with an Integrated Quantum Field Theory of Physics, Biology and Psychology. We review the top-down psychosocial genomic and cultural perspectives that integrates consciousness, cognition and the 4-Stage Creative Cycle with its molecular-genomic RNA-DNA building blocks. Heisenberg's Uncertainty Principle is used to re-conceptualize activity-dependent gene expression, brain plasticity, consciousness, cognition, and dreaming as the new foundation for an integrated quantum field theory of the evolution of psychotherapy. We illustrate Dirac's bottoms-up transformational equation set integrating early quantum dynamics with the classical calculus of the wave-nature and cycles characteristic of life, consciousness and cognition. We generalize the observer-operators of quantum physics to the molecular biology of the 90-120-minute Basic Rest-Activity Cycle and the 4-Stage Creative Cycle of psychology. We report clinical case studies illustrating how the quantum qualia of these observer-operators are evident in everyday human consciousness and cognition during a wide range of experiences from negative stress and psychopathology to positive life transformations that can be measured and facilitated with our mind-body transformations psychotherapeutic protocol. We propose innovative quantum field theory research to document how the quantum qualia of the human observer/operator in subjective experience can be realized as a causal agent in facilitating health and problem solving on the objective molecular/genomic level in everyday life, as well as new approaches to facilitate the quantum evolution of psychotherapy.

Key Words: Biology, Bra-Ket notation, conflict, cognition, consciousness, creative, Dirac, expectancy, experimental, mathematics, neuroscience, observer-operators, physics, psychology, quantum field theory, quantum microscope, quantum qualia of human experience, uncertainty.

Introduction

We propose an integrated quantum field theory (QFT) of physics, biology and psychology for optimizing human health and wellness in the current evolution of psychotherapy. Our integrated quantum field theory brings together a variety of interdisciplinary fields ranging from stress reduction, psychosomatics, psychoneuroimmunology, meditation and mind-body medicine to the psychobiology of optimizing human performance, problem solving and creativity. *We utilize Paul Dirac's transformational equation set, which integrates early quantum dynamics with the classical calculus of variations as an experimental mathematical bridge between physics, biology and psychology.* In Box 1 we illustrate how the quantum qualia of human experience during activity-dependent gene expression, brain plasticity, and new consciousness may be conceptualized. Some students of psychotherapy may not grasp the significance of Dirac's math at this point, but we believe they will realize how it can facilitate their practical daily work in bridging the mysteries of Descartes's mind-body gap at quantum level visually illustrated in all the Figures (especially Figure Four) of this review together with many clinical case examples.

We carefully follow Dirac's own concise mathematical reasoning (Dirac, 1978, p. 40-41) in this review. Dirac begins with the idea of Schrödinger's wave function in 3-dimensional space. The wave function is designated as ψ , a function of the three coordinates x_1, x_2, x_3 that can vary with time:

$$\psi(x_1, x_2, x_3; t). \quad (1)$$

Dirac notes that the usual interpretation of this wave function when normalized is that the square of its modulus $|\psi|^2$ providing the probability of the particle being localized in a particular place. This wave function ψ is a complex number so it can be multiplied it by its phase factor $e^{i\gamma}$, where γ is a real number and $e^{i\gamma}$ has a modulus of unity. Dirac then multiplies ψ by $e^{i\gamma}$ to get another wave function designated as Ψ :

$$e^{i\gamma}\psi \equiv \Psi \quad (2)$$

Which now has its modulus squared just as ψ :

$$|\Psi|^2 = |\psi|^2. \quad (3)$$

This allows Ψ and ψ to have the same probability distribution.

Dirac then notes that γ in equation (2) could be a function of position as well as time so that the new Ψ has the same probability distribution as ψ in equation (4):

$$\Psi(x_1, x_2, x_3; t) = e^{i\gamma(x_1, x_2, x_3; t)} \psi(x_1, x_2, x_3; t). \quad (4)$$

However, the new Ψ and the original ψ do not satisfy the same wave equation! This becomes evident when Dirac forms $\partial \Psi / \partial x_r$ with r taking on the values of 1, 2 or 3 so that he obtains equation 5:

$$\partial \Psi / \partial x_r = e^{i\gamma} (\partial / \partial x_r + iK_r) \psi \quad (5)$$

Where K_r is a function of position in equation 6:

$$K_r \equiv \partial \gamma / \partial x_r. \quad (6)$$

Dirac then states "We would have to consider K_r as something more general, something such that when we take $K_r dx_r$ and integrate around a closed loop, the result need not be zero:

$$\oint K_r dx_r \text{ need not be equal to } 0. \quad (7)$$

Dirac then concludes "If we do that, we get a physical theory which is definitely more general than what we had before" (p. 41). We now interpret Dirac's comment that the contour integration of equation 7 "need not be equal to 0" has profoundly new implications for integrating current day scientific perspectives of physicists, biologists, neuroscientists and psychologists. This integration illustrates how new awareness could arise from a cycle of activity-dependent gene expression brain plasticity and emergent quantum qualia of consciousness and cognition (Rossi & Rossi, 2011, 2013, 2014 a & b, 2015).

Box 1.

Dirac's Transformational Equation Set from Quantum to Classical Calculus: The Quantum Qualia of Brain Plasticity, Behavior, Consciousness and Cognition

Integrating the Subjective Quantum Qualia of Mind with Objective Molecular/Genomic Dynamics

This new application of Dirac's (1930) original quantum formulations (Rossi & Rossi, 2011, 2013, 2014a & b) is consistent with Penrose (2004), Wilczek (2002, 2015) and Carroll's (2016) insights into "The essence of The Core Theory – The Laws of Physics Underlying Everyday Life." We show how the highly sensitive quantum qualia of problematic dissociations during Stage Two of the 4-Stage Creative Basic Rest and Activity Cycle (BRAC) are the source of quantum level cognitions and conflicts that can lead to war, discord, corruption, hate crimes, terrorism, and other stress related psychosocial pathologies that can be resolved in Stages Three and Four of the creative cycle. We propose how Quantum Bayesian concepts of the novel observer/operator have insightful applications in counseling, psychotherapy, translational medicine and virtually all the mind/body therapies. We conclude with clinical case illustrations of how innovative psychological quantum field theory applications of Dirac's Bra-Ket notation of subjective experience could become a causal biofeedback contribution for facilitating problem solving on the objective molecular/genomic level to optimize the evolution of psychotherapy.

Why have many cultures developed practices of rest, relaxation and the inner focusing of attention typical of therapeutic meditation and hypnosis to facilitate health and well-being? Recent research on sleep has uncovered a surprising, yet sensible answer to this question. Sleep clears the mind by permitting 60% more cerebral spinal fluid to wash through the brain to remove the toxic byproducts of normal molecular metabolism (Xie *et al.*, 2013). This unexpected finding integrates what we now believe we know about associations between the quantum qualia of the subjective experiences of mind and the objective molecular/genomic dynamics of consciousness and cognition, as well as their utilization in the holistic healing arts such as meditation, mindfulness and therapeutic hypnosis. Controversial concepts originally formulated in quantum physics (Dirac, 1930; Greene, 2011; Suskind & Friedman, 2014), biology (Baggott, 2011; McFadden, 2000; McFadden & Al-khalili, 2014) and psychology (Rossi, 1972/1985/2000, 2007, 2012) over the last century are reviewed and utilized for developing a new mind/body concept of the observer/operator to optimize self-care and health via psychosocial and epigenomic RNA/DNA molecular mechanisms. We propose and illustrate a new quantum Bayesian mathematical notation for conceptualizing a causal role for consciousness and cognition in the theory, research and practice of psychotherapy on many levels from mind to genes.

Bayesian probability, named after 18th century English clergyman, Thomas Bayes, deals with *subjective probability – the degree of belief that an event will occur*. This is in striking contrast with

the statistics most of us are taught today, which is about *objective probability – based on counting how frequently something occurs in the outside world*. It is now striking to realize how Bayesian or *subjective probability – the degree of belief that an event will occur* – is very similar to the emerging concepts of psychosocial genomics and *expectancy in therapeutic consciousness (meditation, counseling, psychotherapy expectancy theory in therapeutic hypnosis) which is also concerned with subjective belief*.

In a clear and concise paper the physicist Hans von Baeyer (2013) recently outlined a new Bayesian interpretation of quantum information, which we now apply to brain research on consciousness, cognition (Dehaene, 2014) and behavior (Rossi, 2002a, 2007, 2012).

A new version of quantum theory sweeps away the bizarre paradoxes of the microscopic world. The cost? *Quantum information exists only in your imagination*. In 2001 a team of researchers began to develop a model that either eliminates the quantum paradoxes or puts them in a less troubling form. The model, known as Quantum Bayesianism, or QBism for short, re-imagines the entity that lies at the heart of quantum weirdness—the wave function.

In the conventional view of quantum theory, an object such as an electron is represented by its wave function, a mathematical expression that describes the object's properties. If you want to predict how the electron will behave, you calculate how its' wave function evolves in time. The result of the calculation gives you the probability that the electron will have a certain property (like being in one place and not another). But problems arise when physicists assume that a wave function is real.

QBism, which combines quantum theory with probability theory, maintains that the wave function has no objective reality. Instead QBism portrays the wave function as a user's manual, a mathematical tool that an observer uses to make wiser decisions about the surrounding world—the quantum world. Specifically, the observer employs the wave function to assign his or her personal belief that a quantum system will have a specific property, realizing that the individual's own choices and actions affect the system in an inherently uncertain way.

Another observer, using a wave function that describes the world as the person sees it, may come to a completely different conclusion about the same quantum system. *One system—one event—can have as many different wave functions as there are observers*. After observers have communicated with one another and modified their private wave functions to account for the newly acquired knowledge, a coherent worldview emerges.

By interpreting the wave function as a subjective belief and subject to revision by the rules of Bayesian statistics, the mysterious paradoxes of quantum mechanics vanish... (p. 47-48, italics added here).

These realizations motivate us to propose and illustrate how quantum field theory could optimize the quantum Bayesian dynamics of expectancy in most schools of therapeutic consciousness and psychotherapy (Rossi, 1988a, b, c, d; Rossi & Rossi, 1996). We begin by outlining a new quantum Bayesian version of the RNA/DNA field theory of life and consciousness (Rossi, 2002a, 2004, 2007, 2012; Rossi & Rossi, 2011, 2013, 2014a, b).

The Quantum Field Theory (QFT) of the RNA DNA Dynamics of Life and Consciousness

Our proposal for a very broad functional definition of the role of genes in the *complex adaptive systems* of life (Gell-Mann, 1994; Holland, 2012) is now applied to the quantum field theory of therapeutic consciousness, cognition, behavior, psychology and health in general in Figure One.

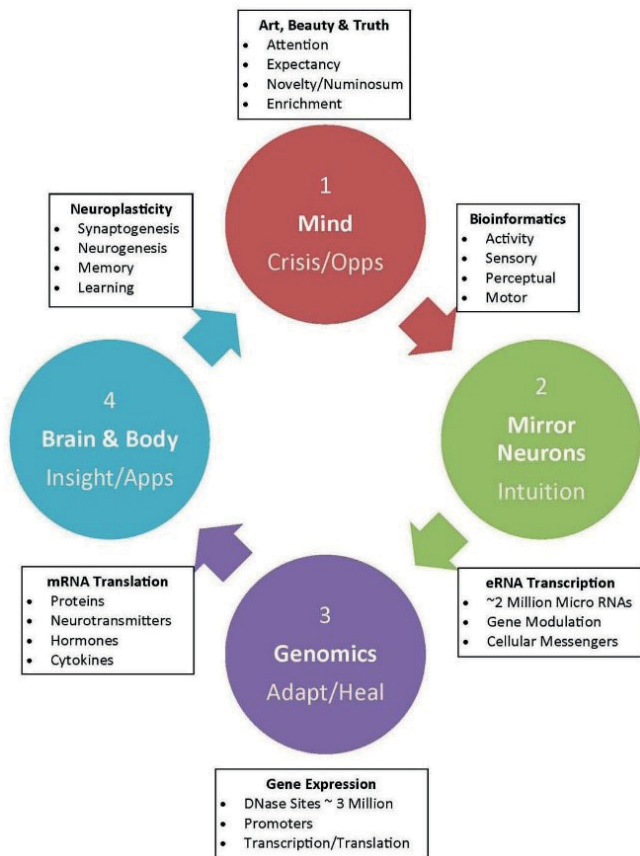


Figure 1. A Quantum Field Theory (QFT) of the Observer Operator and the Novelty-Numinosum-Neurogenesis-Effect in the RNA/DNA Dynamics of Psychosocial Genomics and Psychotherapy.

We have documented how the fundamental systems of life and consciousness are characterized by the wave nature of circadian (daily) and ultradian (hourly) rhythms on all levels from the mind to

genes (Lloyd & Rossi, 1992, 2008). We now outline how neuroscience research illustrated in Figure One underpins a general quantum field theory of consciousness, cognition and creativity (Rossi, 1986/1993, 2002a; Rossi & Rossi, 2011, 2013, 2014a).

The Classical Mind/Gene Communication Cycle of Molecular Biology

The top circle of Figure One updates the classical research on Just Noticeable Differences (JNDs) that was the original foundation of the psychophysics of sensations and perceptions that defined experimental psychology in the 1890's (Boring, 1950) with the most recent consciousness studies of art, beauty, truth in the coming age of quantum biology and psychology (Al-Khaiari, 2014; McFadden, 2000; McFadden & Al-Khaiari, 2014). We now propose how research on the qualia of Novelty-Numinosum-Neurogenesis-Expectancy Effect (NNNE) operates on the quantum level of molecules that makes life possible (Rossi, 2002a, 2005, 2007, 2012). The subjective experience of Novelty evokes highly motivating experiences of the *Numinosum* (*fascination, mysteriousness, and tremendousness*), (Otto 1923/1950) that turn on gene expression and the growth of the brain that gives rise to new levels of consciousness and cognition (Rossi, 1986/1993 to 2012). Research by the ENCODE project integrated activity and experience-dependent gene expression and brain plasticity. Key research is now exploring complex adaptive systems of information transduction in the *transcription process* arising from ~2 million eRNAs carrying signals from the physical environment and psychosocial milieu (termed "epigenomics") to genes bearing ~3 million docking sites recently summarized by the ENCODE Consortium (2012).

Current research documents the use of DNA microarray technology to measure the expression levels of many thousands of genes simultaneously (Bar-Joseph *et al.*, 2012). This evidence-based research in molecular biology has become a new standard in for validating personalized medicine. We now propose that this DNA microarray research also can be used to assess the psychosocial genomic validity and reliability of many diverse cultural, historical and holistic traditions of mind-body healing.

The primary research literature of psychosocial genomics today brings together a variety of top-down psychotherapeutic processes. They include the *relaxation response* (Dusek *et al.*, 2008); *therapeutic hypnosis* (Cozzolino, *et al.*, 2014; Rossi, *et al.*, 2008; Lichtenberg *et al.*, 2000, 2004; Rossi, 2012; Rossi & Rossi, 2013); *meditation* (Creswell *et al.*, 2012); the *therapeutic placebo* (Sliwinski & Elkins, 2013); *social psychology* (Cole, 2009, Cole *et al.*, 2005, 2007, 2010, 2011), and *yoga* (Lavretsky *et al.*, 2013). The motivation all psychosocial genomic research to facilitate the resolution of *stress related dysfunctions* (Unternaehrer *et al.*, 2012; Yount & Rachlin, 2014). We mentored the use of DNA microarrays, for example, to explore the hypothesis that such top-

down therapeutic protocols, epitomized by *The Psychosocial Genomic Healing Experience (CPGHE)* and the *Mind-Body Transformations Therapy (MBT-T)*, as a scientific foundation of a more general theory of mind-body communication and healing with therapeutic hypnosis (Cozzolino *et al.*, 2014). A full description of the administration, scoring and clinical application of the top-down creative protocol for facilitating therapeutic cognition is freely available (Rossi, 2012).

Some of the most recent research that has reached the popular press is how mindful meditation can modulate gene expression in cancer patients that has been reported as follows (Stekra, 2014).

Lead investigator Dr. Linda E. Carlson (2015) and her colleagues found that in breast cancer patients, support group involvement and mindfulness meditation – an adapted form of Buddhist meditation in which practitioners focus on present thoughts and actions in a non-judgmental way, ignoring past grudges and future concerns – are associated with preserved telomere length. Telomeres are stretches of DNA that cap our chromosomes and help prevent chromosomal deterioration – biology professors often liken them to the plastic tips on shoelaces. Shortened telomeres aren't known to cause a specific disease *per se*, but they do whither with age and are shorter in people with cancer, diabetes, heart disease and high stress levels. We want our telomeres to stay intact.

In Carlson's study, distressed breast cancer survivors were divided into three groups. The first group was randomly assigned to an 8-week cancer recovery program consisting of mindfulness meditation and yoga; the second to 12-weeks of group therapy in which they shared difficult emotions and fostered social support; and the third was a control group, receiving just a 6-hour stress management course. A total of 88 women completed the study and had their blood analyzed for telomere length before and after the interventions. Telomeres were maintained in both treatment groups but shortened in controls. Previous work hinted at this association. Studies led by diet and lifestyle guru Dr. Dean Ornish (2008, 2013) reported that the combination of a vegan diet, stress management, aerobic exercise and participation in a support group for 3 months resulted in increased telomerase activity in men with prostate cancer, telomerase being the enzyme that maintains telomeres by adding DNA to the ends of our chromosomes (Stetka, 2014).

We now propose that further research with these protocols could replicate these findings in a more standardized form to update the mind/molecular/genomic efficacy of translational medicine recommended as a standard of clinical excellence by

Insel (2009, 2010, 2012), Director of National Institute of Mental Health.

The Classical to Quantum Transition of Observer-Operators via Mirror Neurons

The original research on mirror neurons initiated by Rizzolatti and *Sinigaglia* (2008) Iacoboni (2007, 2008) and others (Grodzinsky & Nelken, 2014) has been greatly expanded in current neuroscience to include epigenomic processes (the integration of nature and nurture) that modulate mind/gene communication. Research on bird song courtship dynamics, for example, documented how eRNAs ("enhancer RNAs" enhance gene expression) respond to thought by modulating the transcription/translation cycle of activity and experience-dependent epigenomic expression. Clayton, a specialist in songbird neurogenomics, made the salient comment, "This is the first time a microRNA has been shown to respond to a particular thought process" (Saey, 2010; Warren, Clayton *et al.*, 2010; Clayton, 2013; Drnevich *et al.*, 2012; Gunaratne *et al.*, 2011). How could this be possible? Presumably the wave nature of the sound spectra of the bird song is encoded by the wave nature of molecular eRNAs resonance in mirror neurons. We now propose that an analogous cycle of informational transformation occurs in human consciousness and cognition as illustrated in

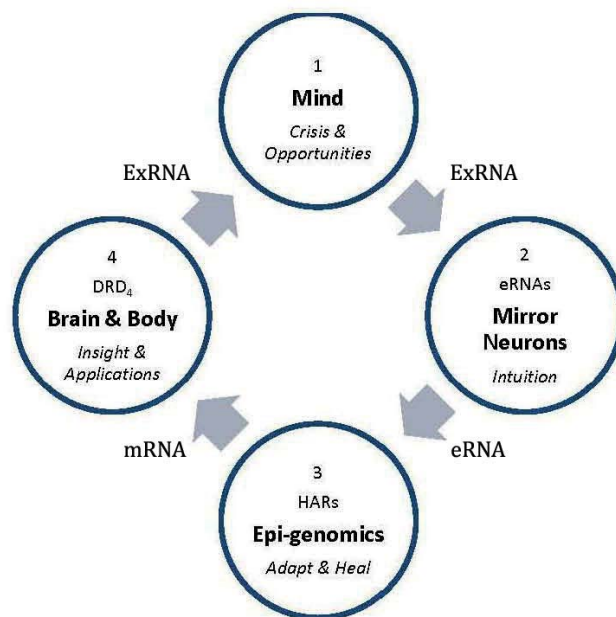


Figure 2. Conscious thoughts dialogue with our genes via the bioinformatic epi-genomic loop of communication between nature and nurture. Cognitions are converted into eRNAs (enhancer RNAs) to enhance DNA (gene expression), which codes for mRNAs (messenger RNAs) that generate the proteins (hormones, neurotransmitters, cytokines, etc.) and brain plasticity that generates mind/body communication and problem solving with therapeutic cognition (Rossi, 2002a, 2004, 2007, 2012; Vedral, 2012). In this context, we propose that Ebstein's (1997) saga of the adventure gene, novelty seeking, and substance abuse associated with the dopamine DRD4 receptor gene could be one example of the psychosocial genomic basis of what we call the Novelty-Numinosum-Neurogenesis-Expectancy effect in via the quantum observer-operator. A multimodal mathematical model of the therapeutic quantum observer-operator in the healing arts has been outlined (Leslie, 2013; Rossi, 2002a, pp. 203-251).

Figure 2. *This is the fundamental insight that integrates the top-down paths of mind, consciousness, and the expectancies of so-called "free will" with the bottoms-up molecular-genomic paths of communication. We now propose that this is a manifestation of the quantum Bayesian observer-operator bridging the so-called "Cartesian gap" between mind and body in psychosocial genomics, meditation and therapeutic hypnosis.*

More recent research on the social communication of bats confirms and extends this earlier research on bird songs. Since bats are mammals their songs provide greater detail about their appropriateness as a model of human cognition. A recent issue of *Science* (Morell, 2014) details how the FOXP2 gene, which is associated with cognition and vocal learning in humans, birds and bats, may be a closer model for human speech. The trills, chirps and buzzes of bats, for example, can communicate a series of expectancies such as announcing (1) I am species *P. Nathusii*, (2) a male, (3) specifically I am the only male with this song (4) so land here next to me. (5) We share a common social identity and communication pool. (6) The soft tones of the male lure ladies while (7) harsh tone compete with other males and warn them away. Although these songs typically last only ~1.6 seconds they may contain ~20 syllables combined in specific ways with individual rhythmic patterns of communication that are appropriate for current life conditions.

Such research on bird and bat song syntax and semantics illustrates how behavior encoded in the RNA/DNA transcription/translation cycle could mediate the vastly more complex cycle of information transduction that occurs in human consciousness, cognition, expectancy and health illustrated in Figures One, Two and Three (Gell-Mann, 1994; Sczepanski & Joyce, 2014; Shelka & Piccirilli 2014). *We propose this is the fundamental insight of bioinformatics that integrates the top-down path of consciousness, cognition and expectancy in quantum field theory with the bottoms-up molecular-genomic paths of communication within and between individuals.*

Free public data bases are being updated daily by the National Institute of General Medical Sciences, which offers information on these advances of the new genetics by Francis Collins, Director of the National Institutes of Health (NIH) and are now funding research on their new Extracellular RNA (ExRNA) Communications Program. The NIH Common Fund provides research grants to catalogue all types of ExRNA that flow between mind and body "in blood, tears, saliva and every other body fluid" to provide a baseline that can be compared with ExRNA profiles associated with Alzheimer's, ageing, autism, development, diabetes, obesity, psychiatry, Parkinson's, stress, trauma, etc. (Leslie, 2013).

Figure Two gives precise bioinformatic meaning to the commonly used terms of the 4-Stage creative cycle such as "Crisis/Opportunity" (Stage One),

"Intuition" (Stage Two), "Adaption/Healing" (Stage Three) and "Insight/Applications" (Stage Four). The integration of such psychological terms with brain/body research is the psychogenomic foundation in the RNA/DNA transcription/translation cycle of coding for mRNAs, proteins at the molecular-genomic level of therapeutic hypnosis. Key research explores how these proteins, often called "mother molecules," are cleaved into the neurotransmitters, hormones, and cytokines of the complex adaptive system of psychoneuroimmunology (Irwin & Vedhara, 2005), which integrate cells of the mind, brain and body that ultimately facilitate the dynamics of memory, learning, behavior, and the qualia of consciousness itself in therapeutic cognition (Rossi & Rossi, 2013). *Research illustrated in Figure Two lead us to propose how the quantum field theory of ExRNAs signaling between nature and nurture are the molecular/genomic underpinning of the complex adaptive dynamics of normal everyday life as well as meditation psychotherapy, and other therapeutic approaches to psychosocial and cultural health* (Gell-Mann, 1994; Holland, 2012).

Brain/Mind Plasticity and the Classical Quantum Transitions

Psychosocial genomic transitions between classical-to-quantum dynamics of Stage Two and quantum-to-classical dynamics of Stage Four are experienced psychologically as illustrated in Figure Three. Genomics Research via the ENCODE project that includes qualia and experience-dependent gene expression is currently manifesting a profound breakout on the epigenomic level in Figure Three. As was stated earlier key research is now exploring complex adaptive systems of information transduction in the transcription process arising from ~2 million eRNAs carrying signals from the physical environment and psychosocial milieus to genes bearing ~3 million docking sites recently summarized by the ENCODE Consortium (2012). Pollard (2006, 2012) has recently pioneered research into the Human Accelerator Regions (HARs) that are now recognized as groups of genes that are undergoing very rapid adaptation distinctively different from our nearest primate relatives.

Brain/Mind Plasticity and the Quantum to Classical Transition

Figure Three illustrates how the transitions between classical-to-quantum dynamics in Stage Two, and quantum-to-classical dynamics in Stage Four, are experienced in the nonlinear dynamics of therapeutic consciousness and cognition (Chiarucci *et al.* 2014). It is interesting to ask, for example, whether the *intuitions of Stage Two* are psychologically sensed, or felt, to be the same or different in comparison with the experience of *insights during Stage Four*. This is important because Stage Four of the creative cycle is the quantum-to-classical transition that purportedly takes place in the

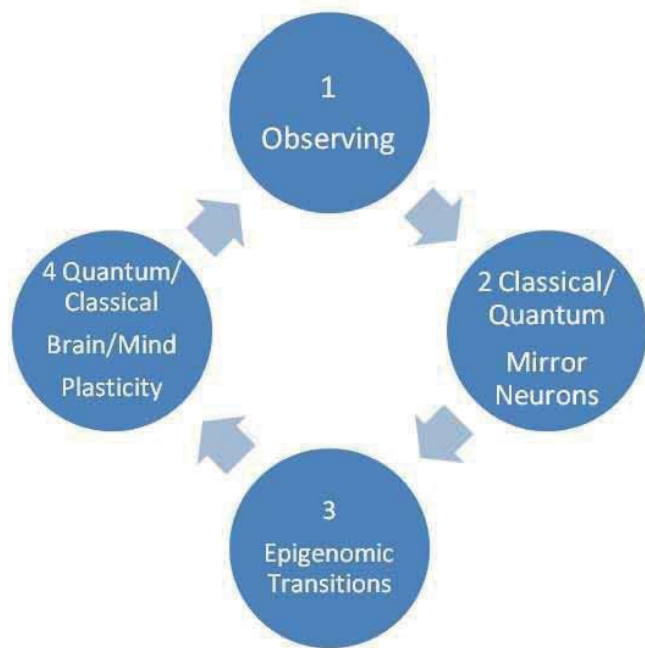


Figure 3. The Communication Cycle between (1) Observing Consciousness, (2) The Classical to Quantum Transitions of Mirror Neurons, (3) The RNA to DNA Epigenomic Transitions, and (4) The Quantum to Classical Transitions on the "The Road to Reality" (Penrose, 2004) in therapeutic consciousness and health (Rossi, 1986/1993, 2002a, 2012).

Penrose/Hameroff "Orch OR" model of consciousness entangled with microtubules within the cells of brain (Hameroff & Penrose, 1996;). Jeong, Lim & Kim (2014) recently investigated the classical/quantum and quantum/classical transitions in a manner that we believe are consistent with the deep psychosocial genomic dynamics of therapeutic consciousness and cognition. In two pioneering books, the highly-esteemed neurobiologist Lowenstein (1999, 2013) presents detailed overviews of how quantum level dynamics underpin the molecular biology of the body, brain and mind. Such research supports some little known but startling research at Carleton University, in Canada, that implies how the quantum Bayesian dynamics are manifest in the wave nature of sleep, dreams and therapeutic quantum observer/operators (Rossi, 1972/1985/ 2000).

The Quantum Wave Nature of Mindfulness: Consciousness, Cognition, Sleep and Dreams: The 4-Stage Creative Cycle and the Psychosocial Genomics of Therapeutic Hypnosis

The wave nature of psychosocial genomics, meditation, mindfulness, and indeed, all holistic forms of mind/body psychotherapy is mapped onto the Biological 90-120 minute 4-Stage Basic Rest-Activity Cycle (Lloyd & Rossi, 1992, 2008), and the Psychological 4-Stage Creative Cycle (Rossi, 1967, 2007, 2012) illustrated in yellow in the upper curve of Figure Four. The proteomics (protein) pink profile in middle curve depicts the energy landscape for protein folding within neurons of the brain into

the correct structures needed for adaptive brain plasticity (Cheung *et al.*, 2004). This proteomic profile arises from the functional concordance of co-expressed genes illustrated by the green genomics profile below it (Levsky *et al.*, 2002). This psychosocial genomic curve represents the actual gene expression profiles of the immediate-early gene *c-fos*, and 10 other genes (alleles), over the typical Basic Rest-Activity Cycle of 90-120 minutes. The lower diagram of Figure Four illustrates how the quantum qualia of consciousness cognition and behavior are typically experienced within the normal circadian cycle of waking, as well as REM dreams while sleeping (Rossi, 2002b, 2004; Rossi & Nimmons, 1991).

Our most recent addition to Figure Four is to map the quantum equations of Heisenberg's (1927) Uncertainty Principle and Dirac's (1978) quantum notation (introduced above in Box 1) onto the Biological 4-Stage Basic Rest-Activity Cycle, and the Psychological 4-Stage Creative Cycle, illustrated in the top colored part of Figure Four. In a remarkable book, *The Great Equations*, Robert Crease, chairman of the philosophy department at Stony Brook University tells the engaging story of Heisenberg's emotional journey as he experienced the ups and downs of the 4-Stage creative cycle during his discovery of the uncertainty principle and the equations that formulated it. In the following quote from Crease (2010, pp 242-245), we intersperse in square brackets [our comments on the 4-Stage creative cycle] that Heisenberg is apparently experiencing when he writes his epoch-making uncertainty paper.

The paper showed how to *compile tables of amplitudes and frequencies associated with transitions between states* – he called such tables "quantum-theoretical quantities" – and how the tables could be related by a new kind of calculus, which he called "quantum-mechanical relations." [This is Stage One of the 4-Stage Creative Cycle integrating *quantum quantities and relations* – this may ring a bell for students of psychotherapy who may have struggled to understand the what, why and how of Dirac's integration of math and relationships in Box 1 above.]...

Heisenberg then hit a snag. [Snag means stuck, which is the defining characteristic of Stage Two of the 4-Stage Creative Cycle.] The tables and the multiplication rule he invented for them obeyed a new kind of algebra that mathematicians had discovered long before, but was unfamiliar to most physicists, himself included. Most strikingly, the rule did not follow the "commutative law," the mathematical principle according to which the order in which one multiplies two numbers does not affect the result: $ab = ba$. When Heisenberg used his new calculus to multiply one quantum-theoretical table (let's call it *A*) by another (*B*), the result depended on the order: $AB \neq BA$. The feature "was very disagreeable to me," he said later,

and try as he might he could not rid his theory of it. "I felt this was the only point of difficulty in the whole scheme, otherwise I would be perfectly happy." Heisenberg then did what many people do when a nuisance threatens to spoil an invention: he swept it under the rug ... Heisenberg concluded his paper with a disclaimer of the sort that is often seen in early papers in a field ... The answer, he declared, would have to await "a more penetrating mathematical investigation." (Crease (2010, 243, Italics added here.)

Heisenberg, still a very young student, wisely recognized he was stuck at this point and gave his paper to his academic supervisor, Max Born, to determine if it was worth publishing. Born in due time finally recognized that "Heisenberg's funny quantum-mechanical relations were actually the most natural way that mathematicians had discovered to "multiply" matrices.

Born was overjoyed. [Overjoyed is characteristic of Stage Three – the Aha! Of the 4-Stage Creative Cycle] ... He knew that matrices can be noncommutative – the order in which one multiplied them mattered. This explained Heisenberg's embarrassing difficulty that, for instance, the matrix **p** associated with momentum and **q** with position did not commute; the matrix **pq** was not the same as **qp** (by convention, physicists often indicate matrices with bold symbols). But there was more. This pair of variables – known as canonically conjugate variables – was not commutative, but in a special way. Though Born could not prove it, the difference between **pq** and **qp** seemed to be a specific matrix proportional to Planck's constant: $\mathbf{pq} - \mathbf{qp} = \mathbf{Ih} / 2\pi i$, where **I** is the unit matrix – "ones" along the diagonal entries and zeros everywhere else ... Its central feature is what they called the "fundamental quantum-mechanical relation," the strange equation $\mathbf{pq} - \mathbf{qp} = \mathbf{Ih} / 2\pi i$. The paper is a landmark in the History of physics, for it is the first map of the quantum domain. (Crease, 2010, pp. 242-245).

In QBism, the subjective inner world of personal experience, the so-called mysterious and weird physical paradoxes of the objective outer world quantum mechanics vanish (von Baeyer, 2013). This motivates us to propose that the physicist's problem of paradoxical quantum observations (measurements) over the past century may be transformed into an opportunity for the psychologist today in our Integrated Quantum Field Theory of Physics, Biology and Psychology: we call this the "Observer/Operator (O_b / O_p)" and illustrate where takes place at the peak of the 4-Stage Creative Cycle in Figure Four. The quantum wave nature of the Observer/Operator is often experienced psychologically as The Novelty-Numinosum-Neurogenesis Effect (NNNE) – whereby the wondrous, Novel and Numinous **Observations**

(O_b) experienced during "peak experiences" (Maslow (1968) in the arts, humanities, sciences and positive empathic psychosocial relationships – automatically **Operate** (O_p) to turn on adaptive activity-dependent epigenetic gene expression and brain plasticity to underpin the new Quantum Qualia of Creative Consciousness, Cognition and Behavior (Rossi, 2002 a & b, 2007, 2012). Our New Quantum Microscope of the Creative Mind reveals that the ultimate microdynamics of Freud's so-called "unconscious" now could be expressed in the "fundamental quantum-mechanical relations," of the strange equation $\mathbf{pq} - \mathbf{qp} = \mathbf{Ih} / 2\pi i$ of Heisenberg, Born, Jordan and others. Fedaka and Prentisb (2009) describe the profound implications of this quantum equation as the commutation law.

Indeed, the commutation law is one of the most fundamental relations in quantum mechanics. This equation introduces Planck's constant and the imaginary number "i" into the theory in the most basic way possible. It is the golden rule of quantum algebra and makes quantum calculations unique. The way in which all dynamical properties of a system depend on "h" can be traced back to the simple way in which $\mathbf{pq} - \mathbf{qp}$ depend on h. In short, the commutation law stores information on the discontinuity, the non-commutativity, the uncertainty, and the complexity of the quantum world (Fedaka & Prentisb, 2009, p. 133).

Figure Four illustrates Stage One of the 4-Stage Creative Cycle, which is often described as data collection in science, or the initial recognition of a problem or issue that needs to be resolved in everyday life. Stage Two is often accompanied by experiences of turning inward, incubation and/or conflict, cognitive dissonance (Festinger, 1957), emotional negativity (Bilalić & McLeod, 2014), stress, emotional regression and/or uncertainty as one searches for a solution (Rossi, 2007, 2012). In poetry, myth and saga Stage Two is often called "the storm before the light" or "the dark night of the soul" or some other such metaphor. Stage Three is the Aha! or Eureka flash experience of a new insight or solution of the problem. In neuroscience and psychosocial genomics, we cite research documenting how experience-dependent gene expression, brain plasticity and new consciousness develop during Stage Three. Stage Four completes the cycle with the growth integrated into new networks of cognitions for formulating a more adaptive reality and self-identity.

In Figure Four we underpin these 4-Stage Cycles of Biology and Psychology with the quantum mathematical formulation of Heisenberg's (1927) **Uncertainty Principle: $\Delta x \Delta p \geq \hbar/2$** ; Born & Jordan's (1925) **Fundamental Quantum-Mechanical Relation: $\mathbf{pq} - \mathbf{qp} = \mathbf{Ih} / 2\pi i$** and Dirac's (1928) **Quantum Notation: Bra $\langle \Psi |$ Ket $|\Psi \rangle$** , which will be illustrates with clinical case studies later.

CRISIS/OPPORTUNITY

$$\Delta x \Delta p \geq \hbar/2$$

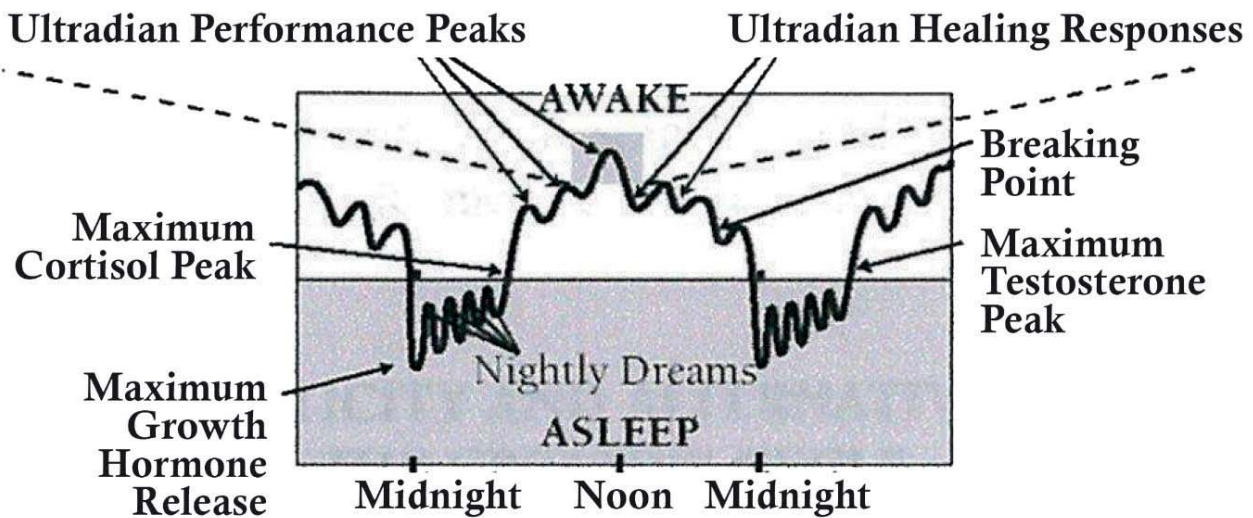
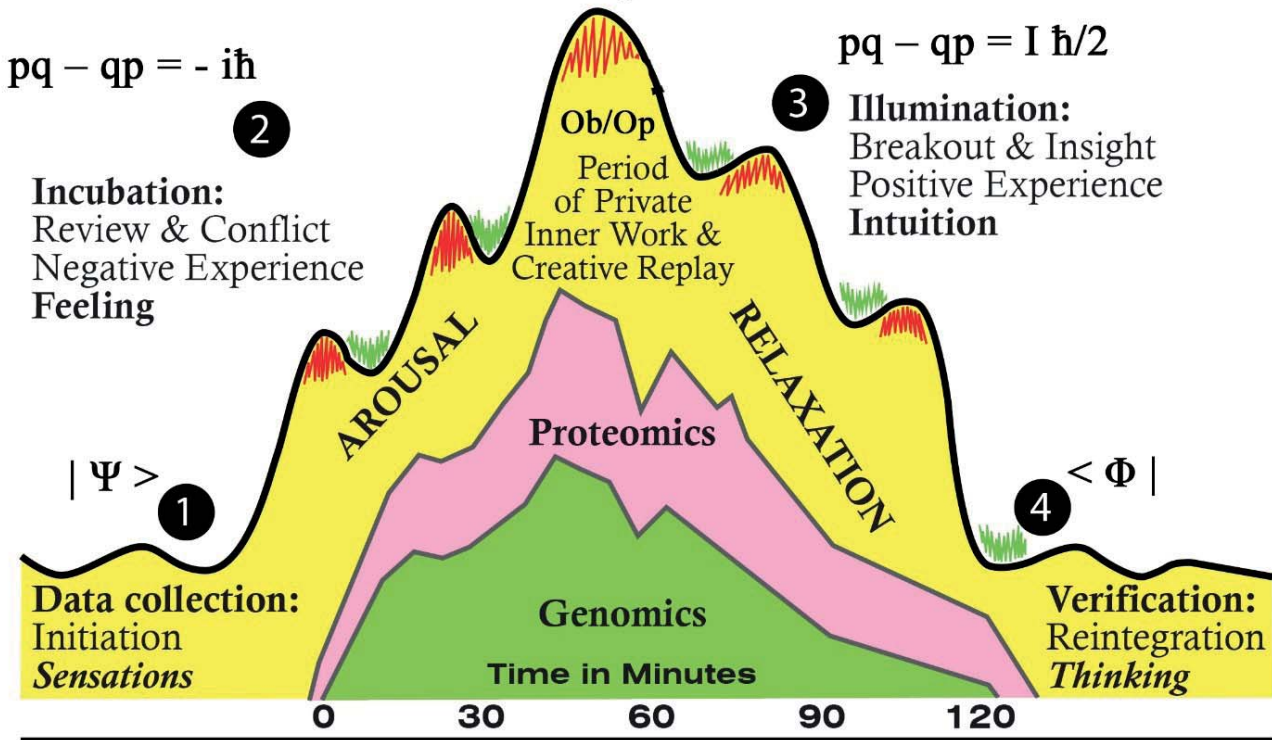


Figure 4. The quantum wave nature of the Observer/Operator (Ob / Op in the top yellow tip of the Crisis/Opportunity at the peak of uncertainty) in our Integrated Quantum Field Theory of Physics, Biology and Psychology maps the psychosocial genomics, consciousness and therapeutic cognition onto the biological profile of the 90-120- Minute Basic Rest-Activity Cycle (Lloyd & Rossi, 1992, 2008) and the psychological 4-Stage Creative Cycle (Rossi, 1967, 2007, 2012).

Pioneering electronic monitoring of catalepsy during hypnosis by Milton H. Erickson and his early student, Leonard Ravitz (1950, 1962), motivated the formulation of a new two-factor theory of therapeutic hypnosis by Ernest Rossi. These compiled graphs and tables of amplitudes and frequencies associated with transitions between states – [that Heisenberg] called “quantum-theoretical quantities” (Erickson & Rossi, 1981; Rossi, Erickson-Klein & Rossi, 2008-2016) that are now being investigated with more

advanced EEG methods (Chiarucci, *et al.*, 2014; Jamieson & Burgess, 2014). Such research documents how the overall domain of hypnotherapeutic work is a wave function of high and low phase hypnosis in chaotobiological time of mathematical chaos theory illustrated in Figure Five (Rossi, 2002a & b), which is consistent with the recent calls for reorienting the education, theory and practice of therapeutic hypnosis (Alter & Sugarman, 2017; Hope & Sugarman, 2015).

The Domain of Hypnotherapeutic Work

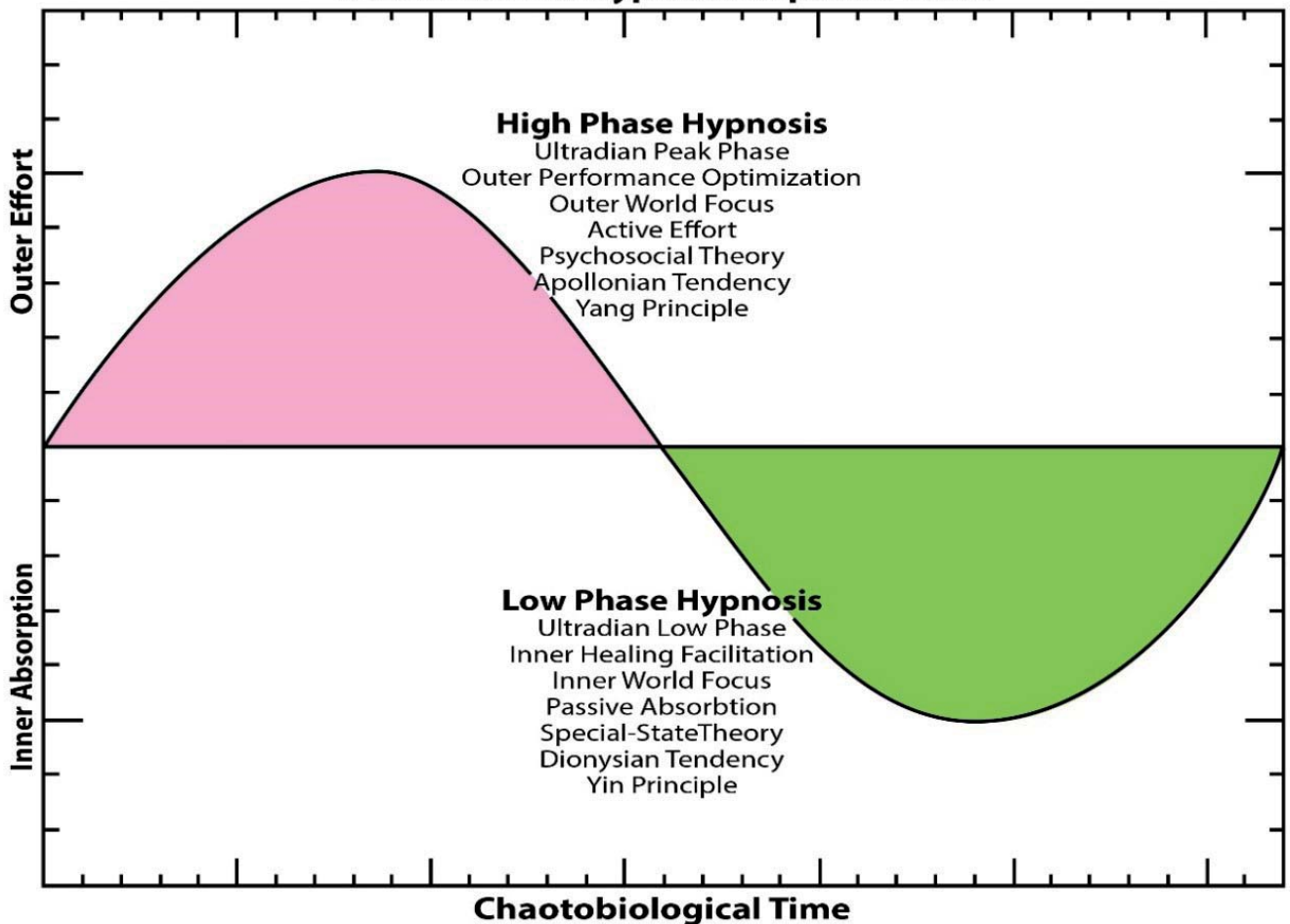


Figure 5. The wave nature of the observer/operator quantum qualia of subjective experiencing during the high and low phases of therapeutic hypnosis are conceptualized as the 4-Stage Creative Cycle mapped onto the 90-120-Minute Basic Rest-Activity Cycle of everyday life (Rossi, 1997a, b, 1982, 1998, 1999; Lloyd & Rossi, 1992, 2008; Rossi, 2002a, b, c, 2005; Mazzoni, Venneri, McGeown, Kirsch, 2013; Pekala, Kumar, Maurer et al., 2011; Rossi, Erickson-Klein & Rossi, 2008-2016; Wagstaff, 2010).

The high-performance phases of activity are illustrated in red in the top part of Figure Six. These red high performance peaks alternate with low phases of healing and recovery shown in green during the 90-120-minute basic rest-activity cycle. The bottom part of Figure Six illustrates the recent research of Xie *et al.*, (2013) documenting the cleaning up of toxic metabolic waste products of daily conscious work during sleep (green) and dreaming (rainbow).

The Quantum Magnetic Resonance Microscope and the Quantum Qualia of Human Experience

The alternating wave phases of consciousness, cognition and creativity, as well as rest, sleep and therapeutic hypnosis in Figures Four, Five and Six derived from research on the *classical level of our usual perspectives of everyday life* look very similar to *independently derived images on the quantum level produced by the theoretical wave equation in various perspectives* (Figures Seven a, b, c), which are confirmed by more recent research with the innovative quantum magnetic resonance microscope (Simpson *et al.*, 2017) illustrated in Figures Seven

d & e. Whether these apparent correspondences between the classical and quantum levels are:

- 1) A simple coincidence,
- 2) An artifact due to Qbism and the subjective nature of all human sensation, perception and cognition, as measured by the early psychophysics of "Just Noticeable Differences (JNDs) or
- 3) The quantum reality of nature on the ultra-small scale of Planck's Constant ($\sim h = 6.626 \times 10^{-34} \text{ J}\cdot\text{s}$) revealed by current images of the quantum magnetic resonance microscope has profound implications.

If you believe in either or both 1 & 2 you are implying your understanding of Descartes' Mind/Body philosophical gap and the Hard Part of Consciousness Research remains controversial and unresolved (Chalmers, 1996; Rossi 2007, 2012; Rossi & Rossi, 2015). If you believe in 3 the convincing reality of the quantum magnetic resonance microscope, then you join those researchers in physics, biology and psychology who believe that the Second Creation of Quantum Reality (Crease & Mann, 1996) is, indeed,

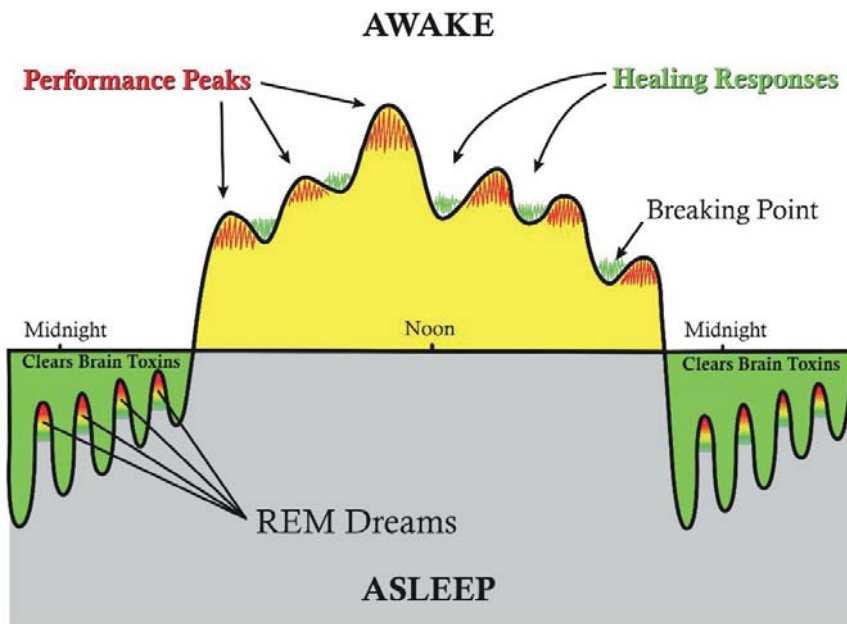


Figure 6. Top: The quantum wave nature of the 4-Stage creative process as a basic paradigm of the epigenomic RNA/DNA quantum field theory in the mind/body healing of stress and PTSD during the 90-120-minute basic rest-activity cycle in everyday life, sleep, dreams as well as meditation and therapeutic hypnosis. Notice the rainbow-like periods (usually about 20 minutes) of symmetry between waking consciousness and dreaming that implies how Emmy Noether's Theorem that covers all types of conserved transformations in the quantum field theory that we here generalize from mathematical physics and biology (Klauber, 2015; Lancaster & Blundell, 2014) to applications in the psychology of consciousness, cognition and behavior (Rossi & Rossi, 2014). The small rainbows imply how many such alternating phases of RNA/DNA activity during REM dreaming as well as waking consciousness, which clean up toxic waste products of brain/mind metabolism could be the molecular/genomic foundation of many therapeutic practices that emphasize rest and relaxation (therapeutic hypnosis, prayer, meditation, yoga, etc.) developed independently over the ages by many cultures.

as real as all the modern quantum level technology that makes your iPhone, GPS and smart TV possible. You may now be ready to explore the enlightening possibilities of the quantum qualia of your own personal experience, as well as the therapeutic possibilities of modern mind/body psychology and medicine that may become the wave of the future. In Figures Seven a through e, we present a series

of images of the fundamentally wave nature of the quantum domain in physics. We hypothesize that they are consistent with the fundamental wave nature of all the molecular genomic cycles of biology and psychology discovered earlier in Figures One through Six derived from (Lloyd & Rossi, 1992, 2008) and Rossi (1967, 2007, 2012).

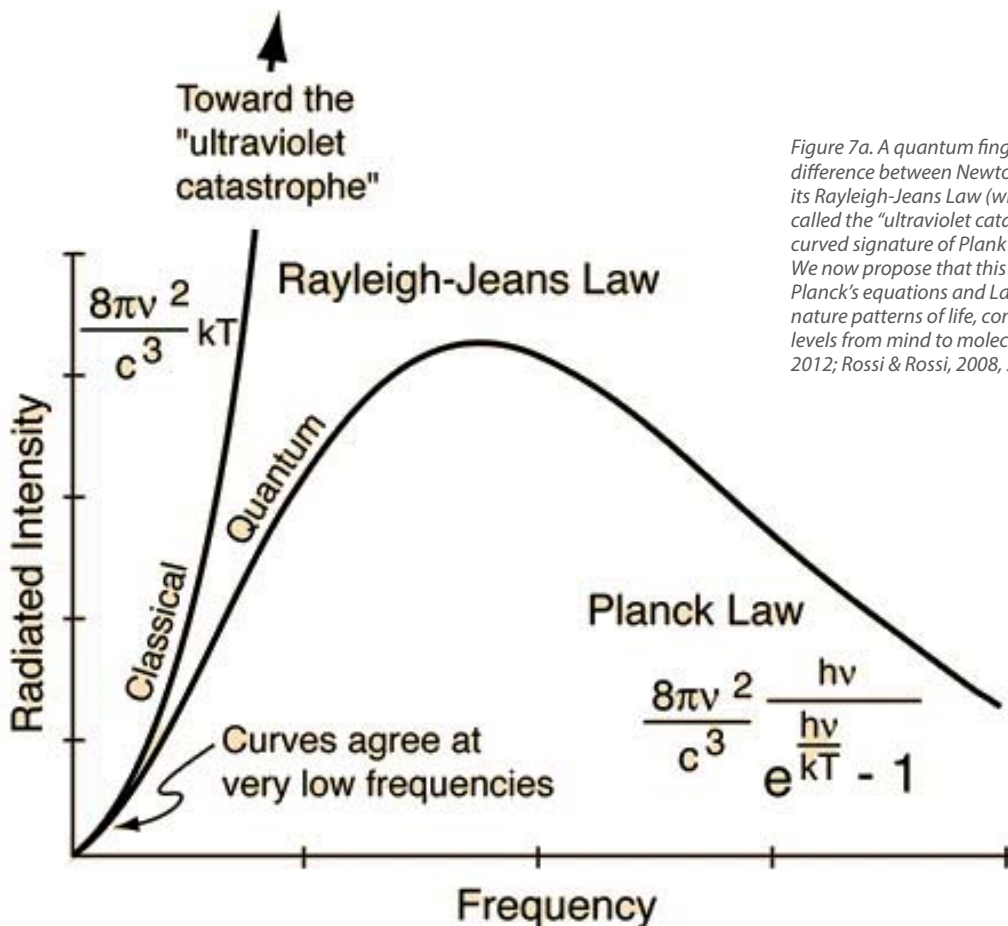
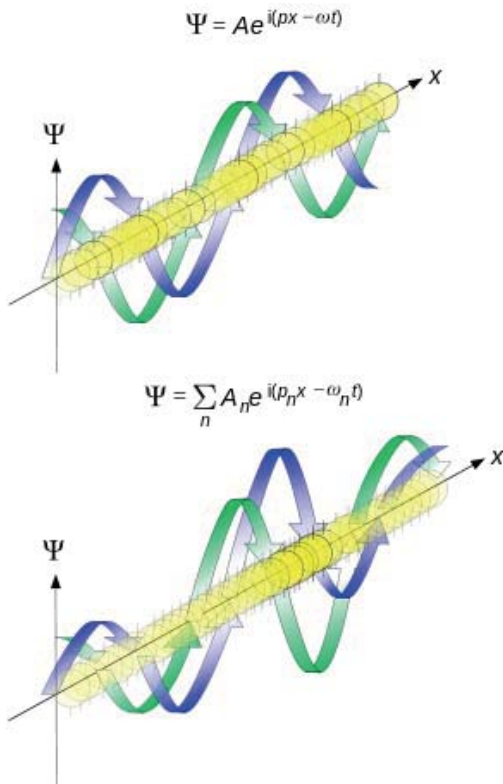
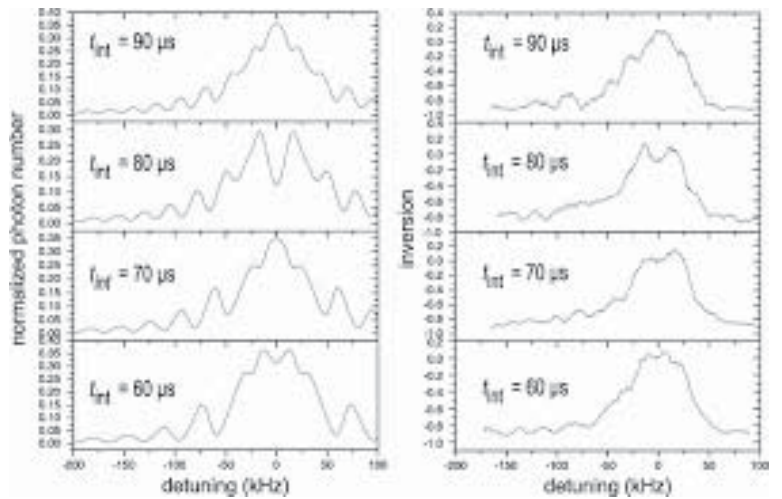


Figure 7a. A quantum fingerprint that helps us visualize the difference between Newton's classical dynamics that fails in its Rayleigh-Jeans Law (which implies an impossible infinity called the "ultraviolet catastrophe") versus the quantum curved signature of Planck's Law (with permission, Nave 2016). We now propose that this gently curved quantum signature of Planck's equations and Law is consistent with the cyclic wave-nature patterns of life, consciousness and cognition on most levels from mind to molecules (Rossi & Lippincott, 1992; Rossi, 2012; Rossi & Rossi, 2008, 2013, 2014 a, b).

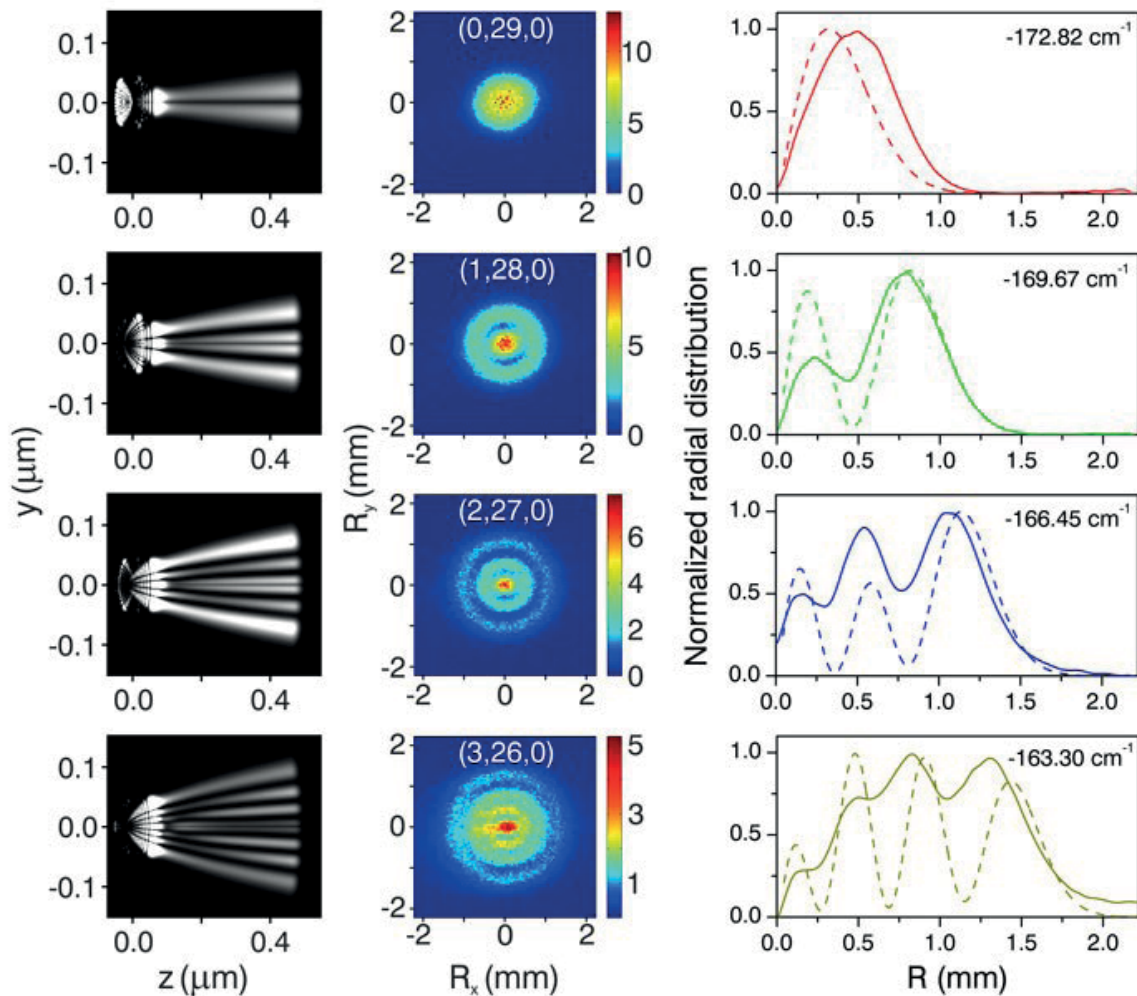


↑ Figure 7b. De Broglie Matter Waves and their accompanying quantum wave equations that now await “a more penetrating mathematical investigation” for the unification of our Integrated Quantum Field Theory of Physics, Biology and Psychology (Creative Commons Wikipedia, 2017).



↑ Figure 7c. The wave nature of the normalized quantum photon numbers of light often found in the fundamental experiments of quantum physics are strikingly similar to those found in biology and psychology (see Figures One through Six above).

↓ Figure 7d. The first direct observation of the orbital structure of an excited hydrogen atom has been made with the quantum microscope by an international team of researchers. The observation was made using a newly developed quantum microscope, which uses photoionization microscopy to visualize the structure directly. The team’s demonstration proves that “photoionization microscopy”, which was first proposed more than 30 years ago, can be experimentally realized and can serve as a tool to explore the subtleties of quantum mechanics (Commissariat, 2013).



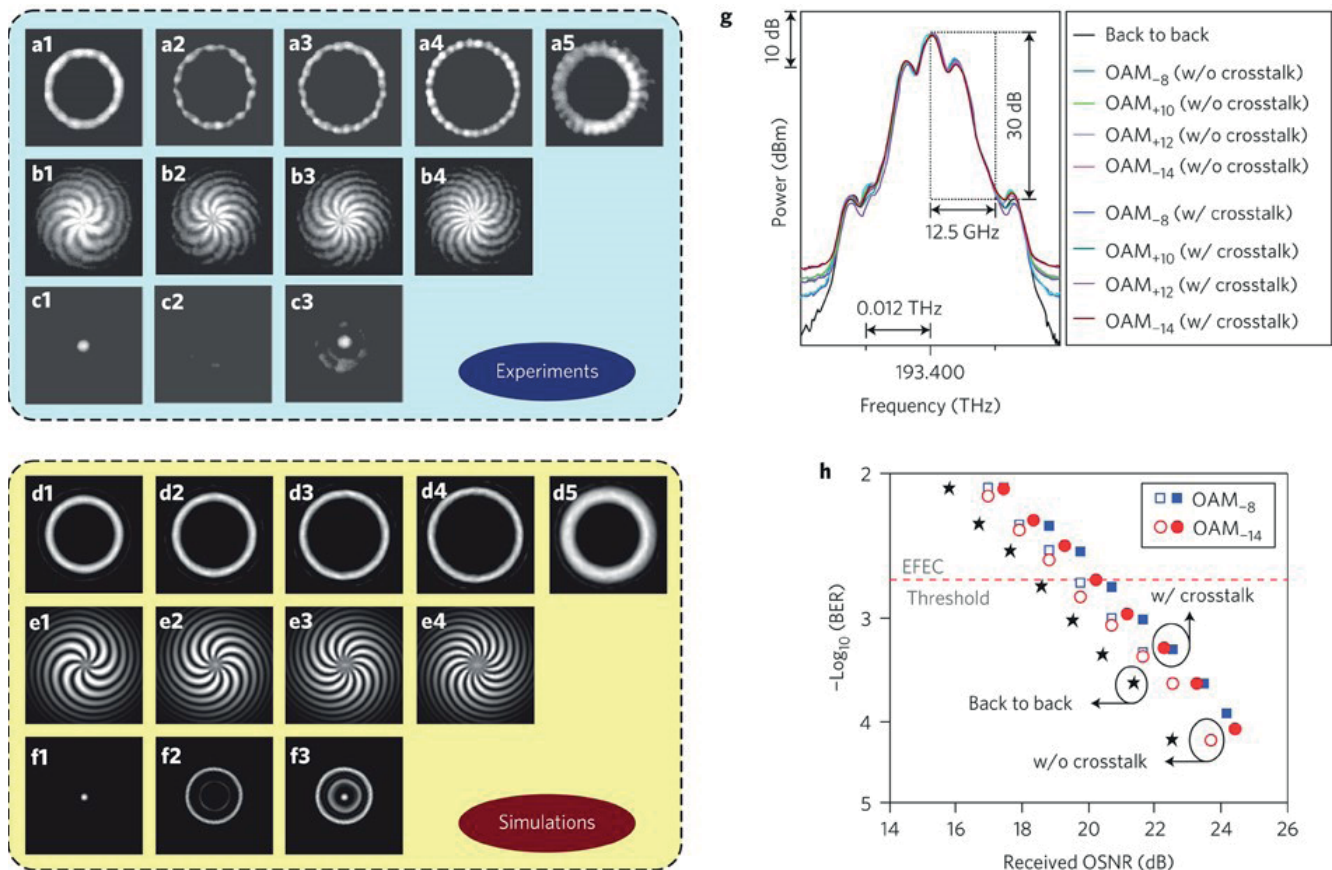


Figure 7e: Experimental and theoretical results of measuring the wave function of angular momentum beams of the quantum microscope (Wang et al., 2012). The wavefunction is a central tenet of information flow in our integrated quantum field theory of physics, biology the psychology of consciousness and cognition. Mathematically the wavefunction is the solution to the Schrödinger equation. Notice the similarity between the pyramidal profile in the upper right of this quantum level construction and the pyramidal profiles of biology and psychology in Figures 4 and 6.

The basic quantum Bayesian wave nature of many natural epigenomic processes could enhance psychotherapy and all schools of therapeutic consciousness. We now need to assess how such wave patterns are consistent with a more general quantum RNA/DNA psychosocial genomic theory of consciousness, cognition, creativity and positive expectancy. To do this we introduce some fundamentals about quantum Bayesianism as a new notation for a mathematical model of quantum field theory of therapeutic consciousness.

Quantum Bayesian Notation 101 for a Mathematical Model of Therapeutic Consciousness

The original publication that began the current quantum Bayesian revolution emphasized how the extreme accuracy of the calculations of *quantum physics probability replaces the determinism of classical Newtonian physics* (Caves, Fuchs & Schack (2001). What could Bayesian dynamics really mean for the quantum field theory of mindfulness, psychotherapy and therapeutic consciousness?

The first fundamental insight for physics, biology and psychology is that the quantum qualia of subjective experience are probabilistic in the normal consciousness and behavior of everyday life (Crease

and Mann, 1996; Rossi, 1972/1985/2000, 2012; Rossi & Rossi 2014a &b, 2015).

The second fundamental insight is that the highly sensitive quantum qualia of subjective experience are discrete; this means they are quantized into tiny, separate, natural Planck units of sensation and/or perception (Fuchs, 2001, 2010; Schiller, 2015). The qualia of the redness of red and the blueness of blue, for example, can be experienced as continuous blends in the rainbow, but also, we can distinguish about 7 separate or discrete colors depending on how we humans choose to interpret them. Mathematicians have formulated an *axiom of choice* in logical systems (Doxiadis & Mazur, 2012) and physicists have had a century of struggle formulating the mathematical notation of light itself having a *dual nature as either discrete particles or smooth continuous waves* depending on how experimental situations are arranged to observe photons (Baggott, 2011, 2015). We now note that letters, words, emotions and states of consciousness as well as cognition, mathematics, music and the 4-Stage creative cycle also have a dual nature depending on how we choose to arrange our observations of them. The observer/operator qualia of humans highly sensitive subjective experience manifest an infinite axiom of choice in creating and organizing its own world. The vast possibilities of

human choice can be confusing and stressful in the transitions between Stage Two (conflict/incubation) and Stage Three (insight) of the 4-Stage creative cycle (Rossi, 2002a, 2004, 2007; Rossi & Rossi, 2012, 2013).

The third fundamental insight is that quantum Bayesian dynamics are manifest (observable) on all levels from mind to genes in living systems (Fuchs, 2011, 2012). Although quantum physics began with the need to resolve the paradoxes that emerged from atomic and subatomic levels, early theorists like Bohr, Dirac, Heisenberg and Schrödinger realized that the quantum level underpinned the entire universe as well as the molecular chemistry of life and consciousness (Baggott, 2011, 2015; Susskind & Friedman, 2014; Wilber, 1993).

The fourth fundamental insight is the central role of quantum Bayesian expectancy in an uncertain world (Fuchs, Mermin & Schank, 2013; Fuchs & Schank, 2013). Heisenberg's fundamental uncertainty relationships are the basis for understanding the broad scope of how modern Quantum Field Theory (Klauber, 2015; Lancaster & Blundell, 2014) is challenging our conceptions about creating new consciousness, cognition and our sense of free will and reality itself (Rossi & Rossi, 2014 a, b; Rossi & Rossi, 2015). In Figures Seven a through Seven e, we illustrated how the core concepts and equations of the Born, Heisenberg, Jordan Matrix Mechanics and Uncertainty (Crease and Mann, 1996) play a fundamental role in our 4-Stage Creative Cycle.

Dirac Notation Illustrating the Psychosocial and Cultural Genomics of the Quantum Observer/Operator in Consciousness, Dreaming and Psychotherapy

In classical psychology, *episodic memory*, originally discovered and defined by Endel Turving (2002, 2005) can now be assessed by neuroscience imaging of the mind/brain (Kellogg, 2013). Memory and its transformations during learning, REM dreaming and cognition (Rossi, 1972/1986/2000; Rossi & Rossi 1996; Rossi & Rossi, 2015) can be easily evaluated with our new quantum Bayesian notation. We illustrate this with the dream and therapeutic intervention in a 78-year-old male patient still recovering from a childhood post traumatic syndrome disorder (PTSD) perpetuated by his abusive father.

My father is a young man as he was when he used to beat me so badly that I would scream so loudly that our neighbors would knock on our windows yelling, 'Stop beating that child!' Anyway, in my dream he is now a nice guy who is building a new home and I am a little boy helping him! The house is now almost finished but there is still fresh dirt piled up roughly around in piles. This dirt is clean but it needs nutrients. So, we scatter organic fertilizer on it so that green grass and flowers and trees will grow real pretty in our new yard.

I can hardly believe I'm now having such a nice dream about my long ago terrible father

who abused me sexually! All my life I have hated him and struggled to get away from my family vowing never to forgive any of them! I left home as a young man and never went back! But somehow, I now seem to actually like my father and we are doing nice things together in my dream. Can this really be happening to me, doctor? Is this what you call, 'brain plasticity'?

Brain plasticity, indeed! We summarize the therapeutic reframing of this life story with the observer/operator [O] in positively transformative bra-ket notation like this.

$$\langle \Psi_{+FUTURE} | O_{\Psi_{+}} | \Psi_{-PAST} \rangle$$

Consciousness can function as a Janus-faced positive *quantum operator/observer* [O] in the intense focus of the dream work; to *observe is to operate simultaneously on the past as well as the future!* The patient still has an urgent question. He needs the help from the psychotherapist [O_{psy+}] to convert the *quantum probability amplitude* of a possible therapeutic reframing of his life story with his father into the *qualia of new quantum Bayesian psychological reality in Hilbert space* (math notation for infinite possibilities). The patient urgently needs the therapist to witness and validate the patient's own newly created and nascent reality by answering, "Yes, this is the result of gene expression and brain plasticity operating successfully within you!" Suppose the psychotherapist had responded with the common but cynical, destructive and false public opinion: "Too bad it was only a dream."

A young woman dreams:

I am an apprentice to a baker making a sandwich several yards long! An inspector comes by and asks the baker if he is responsible for making the sandwich. But with a cynical attitude the baker ignores the inspector. I am *puzzled* in the dream about why the baker is ignoring the nice inspector.

Upon awakening the young woman's first sleepy early morning thoughts spontaneously replays her dream: she would have told the nice inspector the truth about how the baker was indeed responsible for making the huge sandwich. She intuits the inspector needed this information so someone could be *rewarded* for such excellent work.

In this dream the observer/operator (O_{±BAKER}) was her ambivalent identification the baker. In bra-ket notation there was no complete positive transformation in her dream. She is still stuck in an ambivalent and puzzled Stage Two at the end of her dream.

$$\langle \Psi_{\pm PUZZLED} | O_{\pm BAKER} | \Psi_{-CYNICAL} \rangle$$

Fortunately, this young woman has the wit to utilize the *axiom of choice* in her early morning thoughts to give her identity a wonderful makeover

that generated a positive transformative to Stage Four of the creative cycle. This is expressed in bra-ket notation:

$$\langle \Psi_{+REWARDED} | O_{+CHOICE} | \Psi_{-CYNICAL} \rangle$$

During her nighttime of sleep her brain was cleared of metabolic toxins (she had been stressfully overworked lately) so she could more objectively re-consider the cynical side of her personality that requires therapeutic reframing to empower her to tell the world (the inspector in the dream) the truth about her growing abilities (symbolized by making fantastic sandwiches) so she can be appropriately recognized and rewarded.

A depressed middle age man reports a spontaneous daydream during psychotherapy.

I am down deep in a bomb shelter with a small group of cowering fearful people. A strong muscular fellow is guarding the exit door so we cannot run out in panic when the bombs start to fall. This guard has a long pole with a soft cushion on the end so he can safely push people back in if they foolishly try to exit when the bomb begins exploding above. In quantum Bayesian bra-ket notation:

$$\langle \Psi_{+INCUBATION} | O_{+GUARD} | \Psi_{-WAR} \rangle$$

Together the depressed man and therapist intuited a helpful and hopeful therapeutic interpretation of this dream. The man's depressing dream is a Stage Two expression of the 4-Stage creative cycle wherein he needs to recognize the realities of his currently dangerous but temporary life situation. The guard is an emergent manifestation of the positive observer/operator in his dream protecting him and others so they can safely incubate about their condition. The need to incubate in Stage Two until appropriate *quantum Bayesian probability amplitudes* of the adaptive RNA/DNA transition/translation dynamics of experience-dependent gene expression and brain plasticity evolve new Stage Three therapeutic possibilities. This hopeful *expectancy* will optimize his ability to recognize the fruits of a good night's sleep in clearing his brain to facilitate gene expression and brain plasticity for creating new quantum qualia of consciousness.

All these clear examples of Dirac's brief Bra-Ket notation document how an initially dysfunctional quantum qualia of consciousness and cognition have a state identified with a negative subscript such as Ket $|\Psi_{-}\rangle$, that could be a medical or psychological symptom, which is then therapeutically transformed by the observer/operator into a positive final state identified with a positive subscript such as a Bra $\langle \Psi_{+} |$. This concise Dirac notation characterizes the typical human condition as problematic – needing a 4-Stage Creative 90-120-minute Basic Rest-Activity Cycle (BRAC) on all levels from mind to activity-dependent gene expression and brain plasticity 12 times a day

to evolve life, consciousness and cognition in an optimal manner.

But why all this negativity in the first place? Why after 4.5 billion years of Darwinian evolution has life and mind not achieved a state of permanent positive bliss and nirvana? Our psychologically oriented quantum field theory of cosmos and consciousness suggests an obvious hypothesis about these questions in the following statement about "*That little minus sign makes a huge difference?*" between real and quantum numbers by Wilczek (2015).

We map ordinary dimensions onto ordinary, so-called "real" numbers. We pick a reference point, usually called the origin, and label any point by a (real) number that describes how far you must go to get there from the origin. Real numbers, in a word, are suitable for measuring distances, and labeling continua. They satisfy the multiplication rule

$$xy = yx$$

Quantum dimensions use a different kind of numbers, called Grassmann numbers. They satisfy a different multiplication law,

$$xy = -yx$$

That little minus sign makes a huge difference? Notably, if we put $x = x$ we get $x^2 = -x^2$, and so we conclude $x^2 = 0$. That strange rule encodes, in the physical interpretation of quantum dimensions, Pauli's exclusion principle: you can't put two things in the same (quantum) place.

After those preparations, we're ready to meet SUSY. Supersymmetry is the claim that our world has quantum dimensions, and that transformations exist which interchange ordinary with quantum dimension (change), without changing the laws of physics (without change).

Supersymmetry, if correct, will be a profound new embodiment of beauty in the world. Because the transformations of supersymmetry turn substance particles into force particles, and vice versa, supersymmetry can explain, based on symmetry, why neither of those things can exist without the other: Both are the same thing, seen from different perspectives. Supersymmetry reconciles apparent opposites, in the spirit of yin-yang. (Wilczek, 2015, p. 311, Italics added here.).

It will require a great deal of the further research on our psychologically oriented quantum field theory to confirm "*That little minus sign makes a huge difference*" in the therapeutic transitions from negative stress to positive states of creativity. As we have seen above "*That little minus sign makes a huge difference*" because it is the sign of *non-commutation* in "fundamental quantum-mechanical

relations," evident in that strange equation $\mathbf{pq} - \mathbf{qp} = \mathbf{lh} / 2\pi i$, which is a landmark in the history of physics because it is the first map of the quantum domain that underpins all life, biology, psychology and profoundly sensitive quantum qualia of human experience. Consciousness, cognition and creativity as we experience them in daily life, as well as meditation and therapeutic consciousness could not exist without it.

In this paper we have introduced the new concept of the observer/operator ($\mathbf{O}_b / \mathbf{O}_p$) as a pair of mind/body conjugate variables to replace the $\mathbf{pq} - \mathbf{qp}$ in the non-commutation relation in the fundamental quantum-mechanical equation so that it becomes: $\mathbf{O}_b \mathbf{O}_p - \mathbf{O}_p \mathbf{O}_b = \mathbf{lh} / 2\pi i$. At the present time, however, this still an open problem that will require a "a more penetrating mathematical investigation."

The major practical implication for the quantum field theory of physics, biology and the evolution of psychotherapy at this time, however, is to help people learn to value and tune in appropriately to the most highly sensitive and ineffable quantum qualia of their observer/operator to help them navigate the perils of everyday acute and chronic stress. We need to do away with the common disparagement of "merely subjective experience of intuition and imagination" that favors the pursuit of the so-called "virtues of objective thinking and rational," which can so easily become corrupted by narcissism, ego power, advertising and avarice in cultures that over-value competition and personal excellence whatever the cost. We need to transcend the rather stale reductive ideologies and manipulative models of psychotherapy as stimulus/response conditioning, gaming, programming, suggestion and rather dry cognitive-behavioral transactions by returning to the living, experiencing, and primacy of the vivid Novelty-Numinosum-Neurogenesis-Effect (NNNE) to realize our best creative selves in the quantum evolution of psychotherapy.

Summary

The integrated quantum field theory of physics, biology and the psychology of consciousness, creativity and health is proposed for a new conception of the quantum evolution of psychotherapy that is made possible with the innovative quantum magnetic resonance microscope. Research in the quantum field theory is updated with an adaptive RNA/DNA theory of the quantum Bayesian transformations of consciousness, creative cognition, meditation and therapeutic hypnosis. Alternating classical-to-quantum and quantum-to-classical transitions on all levels from mind to genes of the natural 90-120 minute 4-Stage Basic Rest-Activity Cycle of biology and the 4-Stage Creative Cycle of psychology, are integrated with the wave nature of quantum physics. Surprising tendencies toward cognitive dissonance, conflict, negativity and psychological regression during Stage Two (incubation/conflict) of the 4-Stage creative cycle were uncovered during dreams when

parsed with Dirac's bra-ket quantum notation. We propose how the highly sensitive quantum qualia of problematic dissociations during Stage Two of the 4-Stage creative cycle are the source of quantum level uncertainty and conflicts that can generate psychosocial non-commutation pathologies, which could be resolved in Stages Three and Four of therapeutic consciousness and cognition. Quantum Bayesian concepts of the novel observer/operator are documented with insightful applications for counseling, psychotherapy, medicine and all the mind/body therapies. Freud's concept of the so-called "unconscious" is no longer entirely unconscious; it can be updated with new explorations of the basic quantum non-commutation equation: $\mathbf{pq} - \mathbf{qp} = \mathbf{lh} / 2\pi i$. Integrated quantum field theory research on how *the quantum qualia of the human observer/operator during subjective experience* can be a causal agent in facilitating health and problem solving *on the objective molecular/genomic level* now needs to be replicated for facilitating the living experience of the quantum evolution of psychotherapy and well-being.

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THE BEGINNER'S MIND

THE COMPLETE WORKS OF

MILTON H. ERICKSON

Volume 4 – Advanced Approaches to Therapeutic Hypnosis

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The opening pages of Volume 4 pay tribute to Milton Erickson's wife, Elizabeth Euphema Moore Erickson, who possessed "... an ineffable genius for living that is all her own..." (p. ix). Many people know of Milton Erickson's "...disabling problems..." that might have "... inhibited another person's mental functioning..."; yet in the Erickson household this "...stimulated wonderment and curiosity." (p. x) From this warm preparation, the editors lead us into "...what may be the most salient of open ended questions... How do we facilitate the creation of new consciousness and identity here and now today?" (p. xiii).

Part I delves into the Confusion Technique. Erickson worked on this intensively, experimenting, testing and refining. The Confusion Technique is, interestingly, founded on our "... unwillingness to keep the confusion." In Complexity Theory, this might be classed as an organising principle or rule. Ernest Rossi contends, in the introduction, that confusion is a natural condition of the second stage of the creative cycle where therapy is often required. Confusion, from a number of perspectives, is a natural state that is utilized by our human system to know where *not* to be and to stimulate the mental and physical activity necessary to resolve the confusion.

Whenever activity is prompted, it can now be assumed that there is an activity dependent gene expression and various other non-observable biological responses. This invites the idea that confusion may well promote *whole of being* responses. The exact nature of all these processes continues to be the subject of research in neuroplasticity, psychosocial genomics, neuroendocrinology and other disciplines.

Erickson could not have guessed at some of the current biological discoveries, which makes his prescience all that more fascinating. We are left with a million questions about the sort of genius that acts in the possibilities of knowing – even though it is not yet consciously known. I feel a heightened excitement reading this early work, often in the 1930's and 40's, being aware of the current insights

into brain plasticity, memory reconsolidation, neural networks and the how neurochemicals emerge from the gene expression that constructs the matter of our being.

As usual, there are numerous case studies, some with detailed transcripts that draw you deeply into the experience. Erickson was diligent in both preparation and practice, still he reminds us that it is "...not a matter of the operator *doing* something ... or compelling them... or even telling them what to do..." but being "... primarily a matter of communication of ideas and the elicitation of trains of thought..." (p81).

Part II takes us into another of Erickson's controversial techniques – Psychic Shock. This technique reminds me of Einstein's comment that it is difficult to solve a problem within the same consciousness that created it. Shifting mindset and neural functioning creates the conditions in which there is an opportunity for the neurobiological "system" to reframe – effectively reconstruct connections (reconsolidate) – toward a healthier state. The case studies show how people who are unhappy, dissatisfied and unfulfilled, can discover, within themselves, the existence of someone quite different, comfortable, enriching and able to be happy.

Erickson developed and utilized psychological shock in order to overcome deeply entrenched, rigid psychological states. Again, Complexity Theory informs us about the "edge of rigidity" and the need for creative, inspiring and enervating interventions. Erickson "knew" all this in the 1930's – another beautiful prescience.

Chapter 15 is particularly interested for those familiar with the "February Man" technique utilizing regression. The most famous case is reproduced in Volume 10, but that is not the only time Erickson played the February Man. This chapter explores fragments of other cases and includes commentary from Ernest Rossi.

Part III explores the testing process of creating/implanting experiences that can metaphorically

assist the patient to find a co-existent resolution of the actual problem. This approach bears a degree of risk and we are wise to read of the extensive preparatory work, "During a period of several weeks the story was rewritten in various wordings many times before it seemed to be satisfactory. Two colleagues read and discussed the proposed complex story ..." (p. 253).

Part IV presents Erickson's therapeutic hypnosis approach with psychotics. Working with psychosis requires caution and strict attention, so it is valuable to read how Erickson assisted people with this mental disorder. There are many people with psychotic disorders that function successfully in life -with assistance. There is much that the non-medicating therapist can do to assist: how do we best serve the issues of the client and how do the issues of the client provide insight into the therapeutic action that will best promote beneficial change?

In **Part V** we are brought into the present. The editors provide insight into the current knowledge of the deeper biological processes involved in therapeutic hypnosis. Although some of the cases studies in this volume may seem extraordinary and almost magical, it is not necessary to disembod-

the experience. It is also not necessary to reduce the experience only to the biological. There is a dynamic system of activity that embraces the *ideo* and the *dynamic*.

Deepening our knowledge only goes to move us down the pathway to trigger curiosity and wonder. Ernest Rossi's 2005 paper, reproduced in Chapter 22 delves into the importance of memory reconsolidation, brain plasticity and the labile state, where synaptic connections literally change, creating a new state of brain and mind. Memory reconsolidation involves protein synthesis to establish new connections. Ernest Rossi's notion of activity dependent gene expression is elemental in understanding how memory reconsolidation creates beneficial, therapeutic change.

This volume sets us on a fascinating and complex dance around fundamental themes of what the mind is, what it can be, how it alters and shifts and how it can be altered and shifted. In the current updates we are introduced to the impact of idea on action – the essence of the *ideomotor* concept. There is a lot to find in these pages. It is like an adventure for hidden treasure. You may need to return a number of times to find it all.