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## **The Quantum RNA/DNA Theory of Cosmos and Consciousness**

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**Running Head: The Quantum RNA/DNA Theory of Cosmos and Consciousness**

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## **Abstract**

Why do we sleep and dream? Why have most cultures evolved meditation, spiritual and holistic healing practices to facilitate health and well-being? Recent research has uncovered a profound and surprising yet sensible answer to these eternal questions. Sleep and dreaming actually clears our mind by permitting 60% more cerebral spinal fluid to wash through our brain! In this paper we explore how this new and unexpected finding can help us understand the scientific dynamics of how faith, belief, meditation and spiritual practices of all cultures throughout the ages may be operating. We outline how we can use our personal and unique experiences of the 4-stage creative cycle to optimize our health, happiness and life transitions. This paper presents a new quantum version of The Evolutionary RNA/DNA Theory of the Transformations of Consciousness. Aspects of the Einstein/Schrödinger/Dirac/Bohm math oriented perspectives of the cosmos are integrated here with recent psychological research that uncovered a surprising interference pattern in human cognition that apparently mirrors the famous double-slit experiment that revealed the wave nature of light. Psychosocial mind-body research is reviewed to underpin a new RNA/DNA theory of the quantum transformations of consciousness and creative cognition in everyday life. Controversial time-reversal concepts originally formulated in mathematical physics are illustrated with an interesting case history that may have important therapeutic applications in psychology and translational medicine.

**Key Words: Consciousness, cosmos, dreams, epigenomics, psychotherapy, quantum field theory, resonance, entanglement, RNA/DNA transitions, sleep, 4-stage creative cycle, time-reversal.**

## **Introduction**

In his popular volume, *“The Road to Reality: A Complete Guide to the Laws of the Universe,”* Roger Penrose (2004) outlines his mathematical and physically oriented search for a new quantum physics of the cosmos and consciousness with these words.

“Whereas it is commonly accepted that the appropriate quantum-gravity union must have been a major goal in the search for a fundamentally new perspective on physics, the message of these chapters is that we should seek a development in which the very rules of quantum (field) theory are not held sacrosanct but should be bent, just as should the geometry of our conventional space-time pictures. Nevertheless, there is clearly much math truth as well as beauty in quantum-mechanical principles, and these should not simply be abandoned. In twistor theory, instead of imposing QFT [Quantum Field Theory] rules, one looks into the rules and tries to extract features that mesh with those of Einstein’s conceptions, seeking hidden harmonies between relativity and quantum mechanics. (p. 973)

In two previous books, Penrose (1989, 1994) reviewed in great detail his “Search for the Missing Science of Consciousness” that dealt with many profound quandaries that are not resolved even today (Berry, (1998; Dirac, 1930; Kragh, 1990). These issues are well expressed by Penrose, for example, in his questions about Darwin and natural selection in mind and nature.

“If we suppose that the action of the human brain, conscious or otherwise, is merely acting out some very complicated [math] algorithm, then we must ask how such an extraordinarily effective algorithm actually came about. The standard answer, of course, would be natural selection. As creatures with brains evolved, those with more effective algorithms would have a better tendency to survive and therefore, on the whole, had more effective progeny. These progeny also tended to carry more effective algorithms than their cousins, since they inherited the ingredients of these better algorithms from their parents; so gradually the algorithms improved—not necessarily steadily, since there could have been considerable fits and starts in their evolution—until they reached the remarkable status that we (would apparently) find in the human brain. *“Even according to my own viewpoint, there would have to be some truth in this picture, since I envisioned that much of the brains action is indeed algorithmic ... I am a strong believer in the power of natural selection. But I do not see how natural selection, in itself, can evolve algorithms which could have the kind of conscious judgments of the validity of other algorithms that we seem to have.”* (*The Emperors’ New Mind*, 1989, pp. 543-545, italics added here.)

To deal with some of these questions Penrose’s physics and math-oriented canon of cosmos and consciousness (Penrose, 1989, 1994, 2004, 2011) is integrated with a psychologically-oriented *epigenomic canon of creative consciousness*, which was generated independently over the past few decades (Rossi, 1986, 1993, 2002, 2004, 2005, 2007, 2012; Rossi & Rossi, 1996, 2013, 2014). Epigenomics, in particular, helps to explain how nurture (memory and learning) modulates the expression of biological heredity in our DNA (genes). Epigenomics is the natural life process that supplements the limitations of early “natural selection theory” (Hughes, 2014). Epigenomics answers the Penrose quandary about *natural selection* mentioned above. Further, although Penrose (2004) emphasizes the special dynamics of 4-dimensional systems in his quantum field theory, he illustrates only three worlds in *The Road to Reality: The Platonic world, The Physical world and The Mental world*. We therefore supplement Penrose by adding an ever present quantum operator integrating the classical narrative perspective about nature and cognition (Dehaene, 2014; Doxiadis & Mazur, 2012; Snow, 1959, 2001) with the numerical approaches of quantum field theory (Rossi, 1988 a, b, c, d). We begin with a new quantum version of our previous Evolutionary RNA/DNA Psychosocial Epigenomic Theory of Cosmos and Consciousness (Rossi & Rossi, 2014).

### **A Quantum Version of the RNA/DNA Psychosocial Epigenomic Theory of Cosmos and Consciousness**

We propose that ENCODE – The Encyclopedia of DNA Elements – can serve as the foundation for a new quantum version of the RNA/DNA Psychosocial Epigenomic Theory of the Cosmos/Consciousness Field. The ENCODE Consortium (2012) has recently published 30 leading papers in major scientific journals such as *Nature*, *Science Genome Research* and *Genome Biology* summarized here.

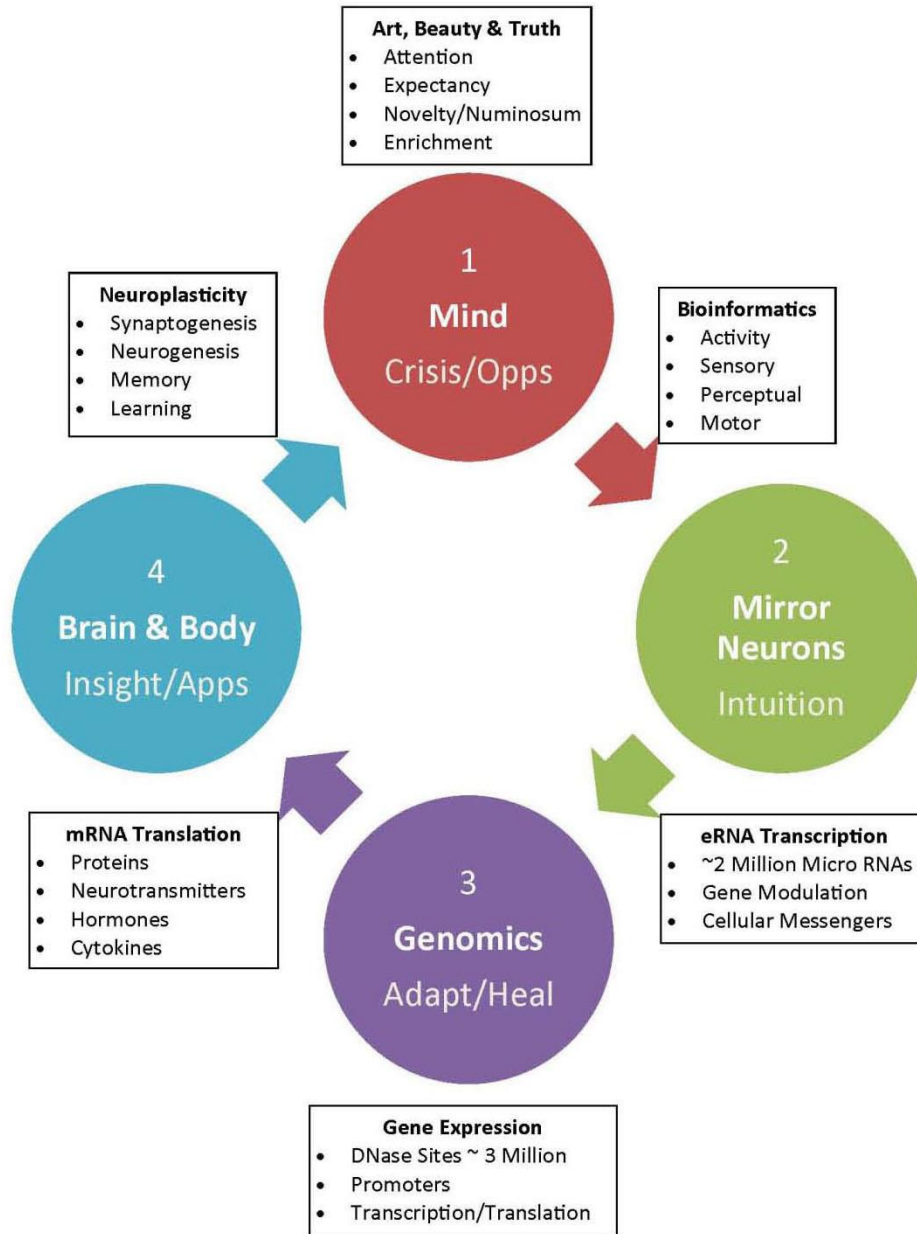
“The human genome encodes the blueprint of life, but the function of the vast majority of its nearly three billion bases is unknown. The Encyclopedia of DNA Elements (ENCODE) project has systematically mapped regions of transcription, transcription factor association, chromatin

structure and histone modification. These data enabled us to assign biochemical functions for 80% of the genome, in particular outside of the well-studied protein-coding regions. *Many discovered candidate regulatory elements are physically associated with one another and with expressed genes, providing new insights into the mechanisms of gene regulation.* The newly identified elements also show a statistical correspondence to sequence variants linked to human disease, and can thereby guide interpretation of this variation. *Overall, the project provides new insights into the organization and regulation of our genes and genome, and is an expansive resource of functional annotations for biomedical research.*

*The human genome sequence provides the underlying code for human biology. Despite intensive study, especially in identifying protein-coding genes, our understanding of the genome is far from complete, particularly with regard to non-coding RNAs, alternatively spliced transcripts and regulatory sequences.* Systematic analyses of transcripts and regulatory information are essential for the identification of genes and regulatory regions, and are an important resource for the study of human biology and disease. Such analyses can also provide comprehensive views of the organization and variability of genes and regulatory information across cellular contexts, species and individuals.

*The ENCODE project aims to delineate all functional elements encoded in the human genome. Operationally, we define a functional element as a discrete genome segment that encodes a defined product (for example, protein or non-coding RNA) or displays a reproducible biochemical signature ... The advent of more powerful DNA sequencing technologies now enables whole-genome and more precise analyses with a broad repertoire of functional assays.*" (p. 57-74, Italics added here.)

Notice, however, how this statement by the ENCODE Consortium only describes the classical biological bottoms-up approach (molecules to mind) to understanding cosmos and consciousness. *The ENCODE Consortium does not discuss the recent top-down recent protocols of psychosocial epigenomics (mind to molecules) – how mind, behavior and consciousness can mirror and modulate the molecular-genomic bioinformatics of observable behavior* as illustrated in figure 1 (Rossi, 2012; Rossi & Rossi, 2013, 2014).



*Fig. 1: An Evolutionary RNA/DNA Psychosocial Epigenomic Classical Theory of the Cosmos/Consciousness Field.*

Figure 1 is our proposal for a very broad functional definition of the gene as a complex adaptive system that embraces the daily and hourly cycles of life processes on all levels from the mind to DNA (Lloyd & Rossi, 1992, 2008). We propose that research on these four major dimensions of *The Classical Psychosocial Epigenome: Mind, Mirror Neurons, Genes* and the *Brain/Body* could be generalized with Penrose's 4-dimensional quantum theory integrating cosmos and consciousness as follows.

1. *The Classical Mind/Gene Communication Cycle of Molecular Biology*. The top circle of figure 1 embraces the classical experimental research of historical psychology updated with the more recent bioinformatic and consciousness studies of art, beauty, creativity, music, truth, dreams. Research at this top level of consciousness, dreaming, and imagination explores the *Novelty-Numinosum-Neurogenesis-Effect* as an *adaptive complex motivational system* (Holland, 2012) whereby *Novelty* evokes a highly motivating experiences of the *Numinosum* (*fascination, mysteriousness, tremendousness*) that turn on gene expression, *Neurogenesis* and a new epigenetic cycle of consciousness, creative cognition, memory and learning (Rossi, 2002-2012). *Genomics Research via the ENCODE project* that includes activity and experience-dependent gene expression on the epigenomic level. 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).

In the past decade DNA microarray technology has made it possible 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 personalized medicine. Current research documented the use of DNA microarrays for assessing therapeutic responses via a variety of top-down psychogenomic processes that were originally developed by many diverse cultural, historical and spiritual traditions of mind-body healing. These 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 and Elkins, 2013), social psychology (Cole, 2009, Cole *et al.*, 2005, 2007, 2010, 2011), and yoga (Lavretsky *et al.*, 2013) to facilitate optimal states of human consciousness and cognition as well as the healing of stress related dysfunctions (Unternaehrer *et al.*, 2012). We extended this use of DNA microarrays to explore the hypothesis that such top-down therapeutic protocols epitomized by *The Psychosocial Genomic Healing Experience (CPGHE)* is foundation of a more general theory of mind-body communication and healing. A full description of the administration, scoring and successful clinical application of the top-down CPGHE protocol is freely available (Rossi, 2012). We propose that this CPGHE protocol could update the cognitive-behavioral efficacy of evidence-based translational medicine recommended as a standard of clinical excellence by Insel (2009, 2010, 2012), Director of National Institute of Mental Health.

2. *The Classical to Quantum Transition via Mirror Neurons.* Mirror neuron research initiated by Rizzolatti *et al.*, 2008) and others (Grodzinsky and Nelken, 2014; Iacoboni, 2007, 2008) has been greatly expanded to include epigenomic processes 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 via activity-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). Presumably this epigenomic informational transition between the sound spectra of the bird song and molecular eRNAs is encoded via the wave dynamics of resonance in mirror neurons. We speculate that an analogous cycle of informational transformation occurs in human consciousness and cognition as illustrated in figure 2. *This is the fundamental insight that integrates the Top-Down path of mind, consciousness, and the behavioral intentions of so-called “free will” with the Bottoms-Up molecular-genomic paths of communication within and between individuals. We now speculate that this is a manifestation of the quantum operator engaging entanglement to bridge the so-called “Cartesian gap” between mind and body – between the physical mass of cosmos and the apparently massless light of human consciousness* (Susskind, and Friedman, 2014).

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* (<http://publications.nigms.nih.gov/thenewgenetics/>). Francis Collins, Director of the National Institutes of Health (NIH) is 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 & 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). These research developments illustrated in figure 3 lead us to propose how the psychosocial epigenomics of ExRNAs signaling between nature and nurture are the classical molecular/genomic underpinning of the complex adaptive quantum dynamics of the cosmos/consciousness field.

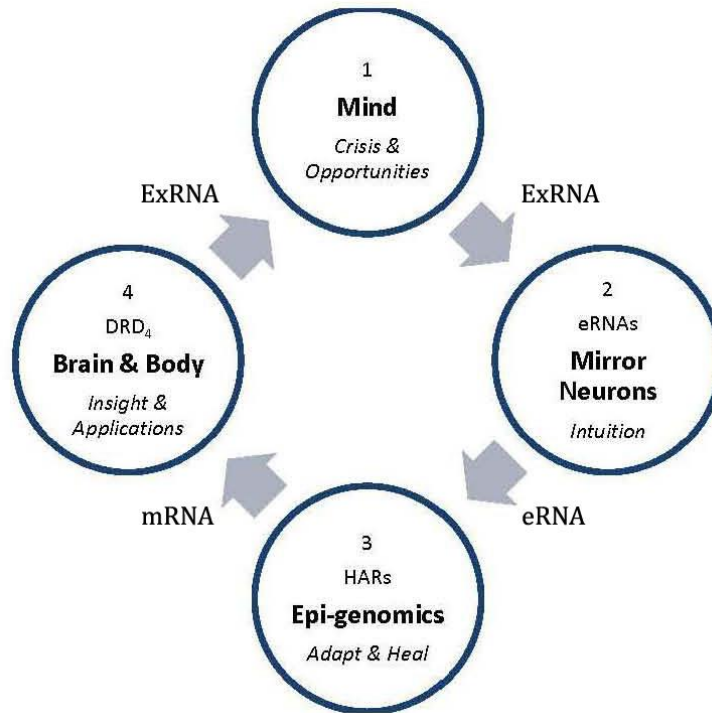


Fig. 2 updates the Watson/Crick central dogma of molecular biology, DNA codes for mRNA, which codes for protein, to include mind and consciousness. Conscious thoughts dialogue with our genes via the bioinformatic epi-genomic loop mediating between nature and nurture. Cognitions are converted into eRNAs (enhancer RNAs) to enhance DNA (gene expression), which codes for mRNAs (messenger RNAs) that generate the proteins (hormones, neurotransmitters, cytokines, etc.) throughout the complex adaptive mirror neuron system that engages the quantum level phenomenon of entanglement to facilitate mind/body communication and healing (Rossi, 2002, 2004, 2007, 2012; Vedral, 2012).

3. Genomics Research via the ENCODE project that includes activity and experience-dependent gene expression is currently manifesting a profound breakout on the epigenomic level in figure 3. 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 being groups of genes that are undergoing very rapid adaptation distinctively different from our nearest primate relatives.

Notice how we give precise bioinformatic meaning to the commonly used but vague psychological terms of the 4-stage creative process such as “Crisis/Opportunity” (stage 1),



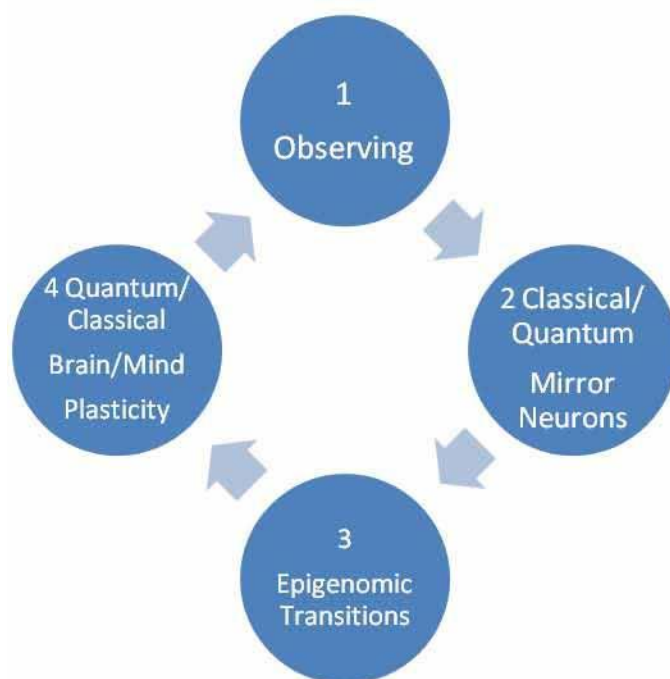
“Intuition” (stage 2), “Adaption/Healing” (stage 3) and “Insight/Applications” (stage 4). The implications of this new epigenomic general theory of mind-body communication and healing range from the practical, such as the development of more effective psychiatric drugs and psychotherapy, to the profoundly philosophical issues of integrating mind and matter in our conceptions of the cosmos/consciousness field. Brain/body research has a new psychogenomic foundation in the translational process of coding for mRNAs, proteins at the molecular-genomic level. 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 via synaptogenesis and neuroplasticity, etc. (Rossi & Rossi, 2013).

4. *Brain/Mind Plasticity and the Quantum to Classical Transition.* Figure 4 suggests the question of how the epigenomic transitions between classical-to-quantum dynamics in stage 2 and quantum-to-classical dynamics in stage 4 of the creative cycle in the RNA/DNA epigenomic theory of the quantum cosmos/consciousness field are actually experienced. It is interesting to ask, for example, whether the *intuitions of stage 2* are psychologically sensed or felt to be the same or different in comparison with the experience of *insights during stage 4*. This is a particularly important question because we presume that Stage 4 of the creative cycle is the quantum-to-classical transition that purportedly takes place in the Penrose/Hameroff "Orch OR" model of consciousness entangled with microtubule structure and function within the cells of brain (Hameroff and Penrose, 1996; <http://www.quantumconsciousness.org/penrose-hameroff/quantumcomputation.html>).

Others such as David Bohm, a quantum physicist and philosopher, however, developed new perspectives of the essential holism of cosmos and consciousness that purports to go beyond relativity and early quantum theory (Rossi, 1988c). Chandrankunnel (2008) described Bohm’s profound integration of science and philosophy as “Holism: Science Singing itself” as follows.

“Thus he raised science to the realm of philosophy, as a love of wisdom: *philos Sophia*. Here we see science singing itself; science thinking not only the tunes of *logos* but also singing the melodies of *mythos*, he blended these two in his thought. . . Here Physics and Metaphysics are encountering as the other; physics and metaphysics contemplating “into the most extreme possibilities.” (p. 382)

Jeong, Lim and Kim (2014) recently investigated the dynamics classical/quantum and quantum/classical transitions in a manner that we believe are consistent with our deep psychogenomic perspective illustrated in figure 3. Their paper emboldens us to review and reinterpret some little know but startling research at Carleton University in Canada that points to a new 21<sup>st</sup> century integration of cosmos, consciousness and creative cognition that implies how the quantum dynamics of time reversal may become manifest in the therapeutic psychosocial epigenomics of sleep and dreams (Rossi, 1972/1985/ 2000).



*Fig. 3. Communication Cycles between 1. Observing Consciousness, 2. Classical to Quantum Dynamics of Mirror Neurons, 3. Epigenomic Transitions and 4. The Quantum to Classical Dynamics on the road to constructing a new experience of reality.*

### **Quantum Approaches to Self-Reflection in Dreams, Consciousness and Creative Cognition**

A surprising experimental result of research with quantum implications about the entanglements of cosmos and consciousness centered around Rossi's (1972/1986/2000) original self-reflectiveness scale in dreams and waking consciousness. This research was conducted and published independently by a team of academic researchers at Carleton University of Ottawa in Canada (Purcell, 1987; Purcell, Moffitt, & Hoffman, 1993, Moffitt, 1994). Moffitt, the team leader, described this research program as follows (Rossi, 1972/1985/2000).

“To make Rossi’s seven-step scale useful in an experimental context, we expanded it to nine steps by breaking down his seventh category into more finely graded steps. Our seventh category was devoted to the emergence of multiple perspectives in the dream—in particular, the emergence of the awareness of bizarreness by the dream ego within the dream. Category eight was concerned with the appearance of control over the content of the dream by the dream ego, and category nine concerned the emergence of lucid dreaming, an awareness of dreaming while dreaming by the dream ego. The other categories of our self-reflectiveness scale were left as Rossi had developed them. The resulting scale is presented in Table 1.

**TABLE 1: DREAM SELF-REFLECTIVENESS SCALE CATEGORIES**

1. *Dreamer not in dream; objects unfamiliar; no people present*
2. *Dreamer not in dream; people or familiar objects present*
3. *Dreamer completely involved in dream drama; no other perspective*
4. *Dreamer present predominantly as an observer*
5. *Dreamer talks over an idea or has definite communication with someone*
6. *Dreamer undergoes a transformation of body, role, age, emotion, etc.*
7. *Dreamer has multiple levels of awareness; simultaneously participates and observes; notices oddities while dreaming; experiences dream within a dream*
8. *Dreamer has significant control in, or control over, dream story; can wake up deliberately*
9. *Dreamer can consciously reflect on the fact that he/she is dreaming; lucid dreaming*

We found that the average self-reflectiveness score of dream reports from stage REM sleep were slightly but significantly higher than from stages 2 and 4, which did not differ. Similarly, the average self-reflectiveness of dream reports from frequent recallers was slightly but significantly higher than infrequent dream recallers. There were no gender differences. I use the phrase “slightly but significantly” because the absolute differences in the group averages mentioned above were in fact very small, amounting to less than a single category. ... More

importantly, all types of self-reflectiveness of the dream ego as scored by the self-reflectiveness scale were found. The most frequently occurring scale category in table 1 was 5, indicating single-minded, active involvement of the dream ego in the dream without concomitant thought or speech. The next most frequent self-reflectiveness category was 3, indicating single-minded involvement in the dream but *with* accompanying thought or speech. According to Rossi, these dreams need to be distinguished from those in category 3. Although the dream ego is still single-mindedly involved in the dream, the presence of language in the form of thought or speech is an important aspect of the emergence of self-reflectiveness: “The discriminating power of the word evolves from the imagery of the dream drama and greatly enhances the clarity and significance of self-reflection. Verbal associations form cognitive networks binding more autonomous processes of emotion and imagery for the construction and stabilization of new forms of awareness.” (Pages 150-151).

These researchers found an unusual distribution of scores about self-observation in dreams illustrated in Figure 4. In the typical distribution of scores measuring such psychological experiences one would expect to see a fairly normal bell-shaped curve rather than the jagged-edged tooth, diffraction-like pattern actually found.

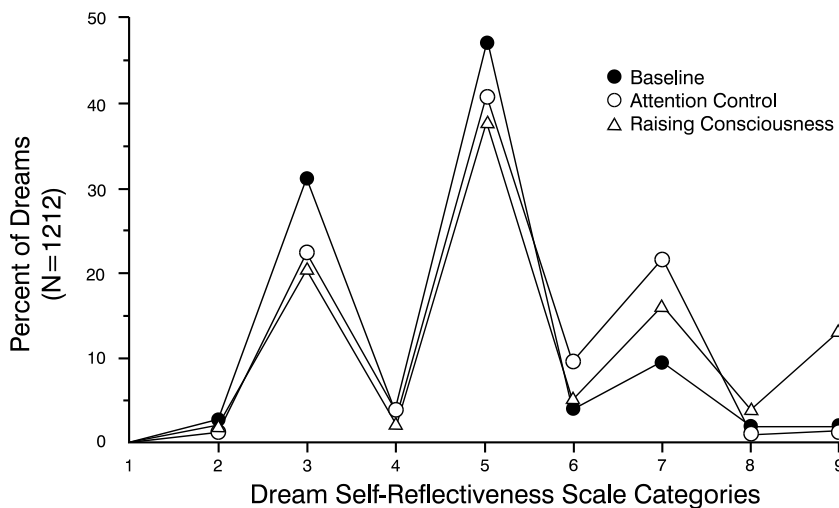


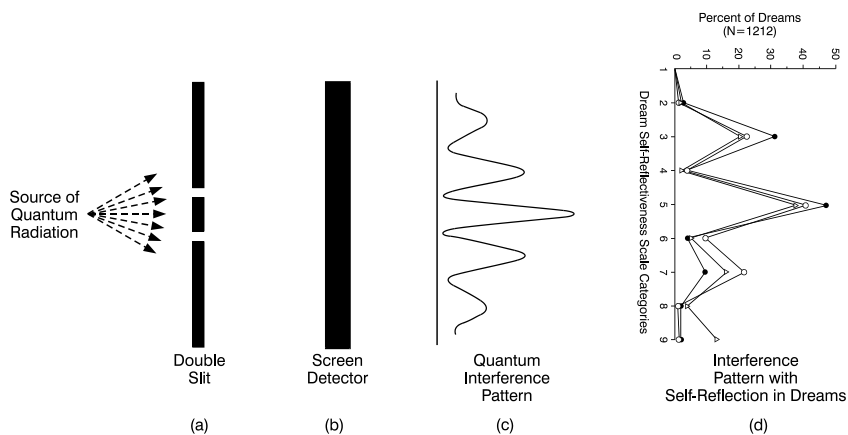
Fig. 4. The interference pattern of the Dream Self-Reflectiveness Scale categories: the actual distribution of dream (%) scores in college students across the nine categories of self-reflectiveness (Purcell, 1987).

What could account for this quantum-like pattern that is highly characteristic of the double-slit experiment on the physics of light? Two different explanations have been offered by scientific observers.

One explanation based upon classical statistical theory suggested that Rossi’s original seven stages of self-reflection simply might be placed the wrong order. Moffitt (personal communication, 1997) proposed another approach to “correct and normalize” the unexpected dips in stages 4, 6 and 8, based on the way the stages were originally defined by Rossi. While these *post hoc* explanations seem plausible, they both of involve second-guessing the original hypotheses upon which Rossi’s self-reflectiveness scale was based, the way the research was conducted, and the data actually found. What if we had the courage to take the honest data of figure 4 at face value and accept that it represents the objective facts? Rather than try to bend these facts to match our current worldview, what kind of a new theory would we have to construct to provide a more fitting context for these facts?

The classical theory of cognitive dissonance developed by Festinger (1957) plays an important role in modern approaches to cognition and behavior. Our understanding of attitude formation in children, message transmission, motivation, music appreciation, sensation, perception, and social dynamics, as taught today in standard textbooks of psychology depend upon cognitive dissonance theory. We now propose that the experimental research consistent with Festinger’s cognitive dissonance theory today. Bilalić and McLeod (2014) provided a data base for exploring the implications of a quantum theory of psychological experience. In brief, the modalities of psychological experience on a phenomenological level — such as thought, attitudes, emotions, sensation, perception, and behavior — can interfere with each other just as physical quanta — such as subatomic particles and photons (light quanta) — interfere with each in the classical double-slit experiment. Festinger’s theory of cognitive dissonance provides a context on the psychological level for interpreting the interference pattern of self-reflectiveness scores as mirroring the general interference phenomena of quantum reality.

The interference experiment diagramed in Figure 5 has been used in quantum physics to illustrate the apparently paradoxical dual nature of light and subatomic particles. Light may exist as discrete particles (or “quanta”) shot from an electron gun (light source) and detected as separate spots on a detector in part (b) of Figure 5.



*Fig. 5 a-d. Is there a relationship between quantum physics and psychology? An illustration of the similarity between the interference pattern of the classical double-slit experiment in physics (5 a,b,c) and self-reflection in dreams (5d). A source of quantum radiation such as light passing through a pair of appropriately spaced slits (5a) onto a screen detector (5b) yields a quantum interference pattern (5c) that is very similar to the interference pattern of self-reflection scores found in dreams (5d).*

Light, however, also exhibits a quantum interference pattern of hills and valleys when quanta passing through the double slit apparently interact to form the wave-like interference pattern illustrated in part (c) of Figure 5. This similarity between the interference patterns of light and self-reflection scores illustrated in part (d) of Figure 5 could be interpreted as evidence consistent with a quantum theory of thought and consciousness as proposed by many workers. Fred Alan Wolf (1994), for example, proposed a quantum theory of dreaming and consciousness that is consistent with these interference patterns.

“Dreaming is like observing an interference pattern in the famous double-slit experiment in physics. And waking is like adjusting the distance between the slits so that the interference effects begin to wash out. ... If we look at all events in consciousness in this manner, we would be looking down on a pond that has many pebbles bombarding it and sending out many, many waves. Now if we look at any two of the pebble sites [as] events, something rather marvelous happens. The waves tend to reinforce themselves in the space between the events and during the time between events... The greater the match, the greater the reinforcement between the events and the greater the cancellation outside of events in much the same way that a radio-station wave is modulated by the information that is put on it from the broadcasting studio. ...

This produces the probability field of quantum physics. Now all physicists know that you must multiply these two waves together modular style ... Now suppose this mechanism occurs throughout the universe and suppose that our cognition depends upon this process... Consciousness is the relationship via this ... the quantum-physical mechanism. ... I suggest that the conscious field is the product of these two quantum waves ... and this product appears as a probability field that exists everywhere, not just in the brain, but everywhere.

“The richer the number of neural events there are, and this now gets into the neural-network models, the more meaningful the initial event becomes. Thus a rich probability field is built up around an outside stimulus, and that density of the probability field is what we mean by consciousness, provided the second event is occurring that can correlate with the primary event. This is what constitutes an act of consciousness (Wolf, 1994, pp. 163–164).

Wolf (personal communication, 1998) has commented on the possible relevance of the Dream Self-Reflectiveness Scale research illustrated in Figures 4 and 5 for an experimental approach to a quantum field theory of consciousness and cognition as follows.

“If there is a wave interference phenomenon occurring then what would the wave be in your model? What would the slits correspond to? As one moves from 1 to 9 along the abscissa [of Figure 5] one is moving through a space of lesser to greater relative self-awareness. Does the graph indicate that dreams are events where there are certain states of alternating forbidden and allowed self-awareness, or if not forbidden and allowed, of less probable and more probable self-awareness?

“I may offer this suggestion. Experimental results based on Rossi’s Dream Scale could correspond to the presence of thoughts as a cognitive modality in the dream. The cognitive wave passing means that two thoughts or word sequences are causing an interference pattern analogous to the double slit experiment with light. Possibly our dreams are interrupted by such double thought streams of experiencing during self-reflection ... The key idea is the number and complexity of the thought stream images making up the self-reflection. The greater the number of these images the higher is the index of self-reflection but the weaker the effects in terms of lucidity.”

Wolf’s speculation that dreams are interrupted by multiple words and thought streams that result in self-reflection when they overlap are consistent with Festinger’s (1957) classical theory of cognitive dissonance in human experience. It will be a challenge for future research to sort out the relative roles of the similarity and difference between the various levels of emotions, imagery and cognition in the process of self-reflection. Wolf’s use of the concept of *complexity* in assessing Purcell and Moffitt’s research is in keeping with the view that *quantum theory* and *chaos theory* (or *adaptive complexity* theory) both are leading candidates for understanding the striking physical and phenomenological analogies between massless light and the spectrum of consciousness (Rossi, 1997a, b, 1998; Wilber, 1993).

A more detailed exposition and demonstration of the striking physical and phenomenology analogies between light, consciousness and the 4-stage creative cycle has been published previously (Rossi, 2005). The *quantum field theory of cosmos and psychological experience* that seems to be emerging is consistent with what people report when they try to make sense of their dreams. Meaning seems to emerge when the quantum field of dream experience interacts with the conscious field with a *numinous* (*fascination, mysteriousness and tremendousness*) sense of significance (Rossi & Rossi, 2011, 2013, 2014). This quantum field theory integrating cosmos and consciousness is also suggestive of what happens in the 4-stage creative cycle when people experience the spontaneous intuitions and insights that pop up —

*quantum jumps* — into consciousness from preconscious levels of implicate processing particularly during time reversal in mind and memory.

### **3. Time Reversal in Mind and Memory: Sleep, Dreaming, Ageing, PTSD and Psychotherapy**

In classical psychology the concept of time reversal is explored in *episodic memory*, originally discovered and defined by Endel Turving (2002, 2005). Neuroscience imaging of the mind/brain cognitive system responsible for this mental version of time travel is the same moving forward and backward in time (Kellogg, 2013). The therapeutic implications of quantum field theory for the integration of cosmos and consciousness in psychology are most apparent during psychotherapy when people struggle on *The Symptom Path to Enlightenment* (Rossi & Rossi, 1996) as is briefly illustrated in this recent dream of a 78 year old male 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 a nice guy who is building a new home and I am a little boy sort of 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 my father and I scatter some kind of organic fertilizer on it so that green grass and flowers and trees will grow in our new yard.

I can hardly believe I’m now having such nice dreams 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. Can this really be happening to me, doctor? Is this what you call, ‘brain plasticity?’ All that stuff you write about in your theories – that RNA and DNA and crazy quantum ideas?”

Seemingly crazy quantum therapeutic dreams, indeed! At the end of this tearful dream report the therapist showed the 78 year old patient figure 6 to support the idea that this healing dream was actually a therapeutic reframing of his early traumatic life with his abusive father (Hughes, 2014; Xie *et al.*, 2013). The seemingly paradoxical therapeutic drama of time-reversal in this dream allowed his inner mind to constructively replay his traumatic early life with his abusive father. Such therapeutic reframing during sleep, dreams, normal reverie and meditation in appropriate phases of the 90-120 minute basic rest-activity cycle is typical of so-called “natural healing” via The RNA/DNA Epigenomic Quantum Theory of Cosmos and Consciousness. That is, inner, implicit, pre-conscious



brain/mind plasticity is typical of the stage-4 quantum-to-classical transitions of creative cognition. Such quantum-to-classical transitions function as inner resources to heal past life traumas via time-reversal psychodramas (Rossi & Rossi, 1996, 2011, 2013, 2014). From the more technical perspectives published previously the math of the Feigenbaum scenario together with the Dirac's Bra-ket notation of quantum physics are new languages of creative human cognition and dreaming (Rembold, 2009; Rossi, 1972/1985/2000,1997a ,b, 1982, 1998, 1999).

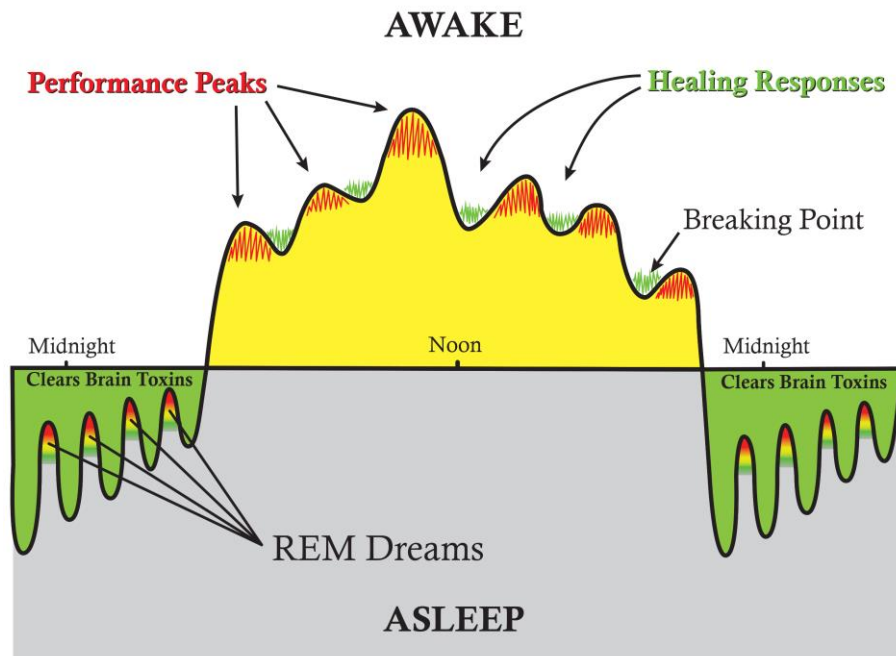


Fig. 6. Top: The 4-stage creative process as a basic paradigm of the evolutionary RNA/DNA epigenomic quantum field theory of mind/body healing of stress and PTSD during the 90-120 minute basic rest-activity cycle in everyday life, sleep, dreams and psychotherapy.

Hot phases of high performance activities are illustrated in red in the top part of figure 6. 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 6 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 small rainbows support our hypothesis of how the presence of 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 actual molecular/genomics basis of many holistic psychotherapeutic rituals that emphasize rest and relaxation (hypnosis, prayer, meditation, yoga etc.) developed independently over the ages by many different cultures. All together the alternating phases and entanglements of cosmos and consciousness illustrated*

herein look suspiciously like manifestations the basic quantum wave nature of many natural epigenomic therapeutic processes that could enhance counseling, psychotherapy and translational medicine. It would be wonderful if some of us could now calculate to what degree such wave patterns of nature in human cognition and dreaming are consistent with a more general quantum RNA/DNA epigenomic theory of cosmos and consciousness on all spacetime scales.

## **Summary**

Recent quantum concepts of cosmos and consciousness are integrated with the classical Newtonian world view of reality as people ordinarily experience it. Current research in psychosocial genomics is reviewed to underpin a new evolutionary RNA/DNA epigenomic theory of the quantum transformations of consciousness and creative cognition. The alternating classical-to-quantum and quantum-to-classical transitions on all levels from mind to gene are explored for developing an understanding of how the 4-stage creative process operates in an emerging cosmos/consciousness field theory. Research has uncovered surprising interference patterns in consciousness and human cognition that apparently mirror the famous double-slit experiment revealing the wave nature of light. Traditional cognitive dissonance theory in classical psychology fails to account for these unexpected experimental results about a quantum interference pattern of self-reflectiveness during sleep and dreaming that is consistent with an evolutionary RNA/DNA epigenomic theory of the quantum cosmos/consciousness field. Controversial concepts of time-reversal originally discovered in mathematical physics may have profound theoretical, practical and therapeutic applications in counseling, psychology and translational medicine.

## **References**

- Bar-Joseph, Z., Gitter, A., and Itamar, S. (2012). Studying and modeling dynamic biological processes using time-series gene expression data. *Nature Reviews Genetics*, 13, 552-564.
- Berry, M. (1998). Paul Dirac: The purest soul in physics. *Physics World*, 11 (February) 36-40.
- Bilalić, M. and McLeod, P. (2014). Why Good Thoughts Block Better Ones. *Scientific American*, 310 (3), 74-79.
- Chandrakunnel, M. (2008). *Philosophy of Quantum Mechanics. Quantum Holism to Cosmic Holism: The Physics and Metaphysics of Bohm*. New Delhi, India: Global Vision Publishing House.
- Clayton, D. (2013). Genomics of memory and learning in songbirds. *Annual Review of Genomics and Human Genetics*, Vol. 14: 45-65.

- Cole, S. (2009). Social regulation of human gene expression. *Current Directions in Psychological Science*, 18, 132-137.
- Cole, S., Arevalo, J., Takahashi, R., Sloan, E.K., Lutgendorf, S., Sood, A., Sheridan, J., Seeman, T. (2010). Computational identification of gene–social environment interaction at the human IL6 locus. *Proc. Natl. Acad. Sci.* 107, 5681–5686.
- Cole, S., Hawkey, L., Arevalo, J., Sung, C., Rose, R., Cacioppo, J. (2007). Social regulation of gene expression in human leukocytes. *Genome Biology*, 8, R189–R189.13.
- Cole, S., Hawkey, L., Arevalo, J., Cacioppo, J. (2011). Transcript origin analysis identifies antigen-presenting cells as primary targets of socially regulated gene expression in leukocytes. *Proc. Natl. Acad. Sci.* 108, 3080–3085.
- Cole, S., Yan, W., Galic, Z., Arevalo, J., Zack, J. (2005). Expression-based monitoring of transcription factor activity: the TELiS database. *Bioinformatics*, 21, 803–810.
- Cozzolino, M., Tagliaferri, R. Castiglione, S., Fortino, V., Ciatelli, A., De Luca, P., Guarino, F., Napolitano, F., Celia, G., Iannotti, S., Raiconi, G., Rossi, K. and Rossi, E. (2014). The creative psychosocial and cultural genomic healing experience: A new top-down epigenomic psychotherapeutic protocol. *The International Journal of Psychosocial Genomics: Consciousness and Health Research*. Vol.1(1), 18-25.
- Creswell, J., Irwin, M., Burklund, L., Lieberman, M., Arevalo, J., Ma, J., Breen, E., Cole, S. (2012). Mindfulness-Based Stress Reduction training reduces loneliness and pro-inflammatory gene expression in older adults: A small randomized controlled trial. *Brain, Behavior, and Immunity*, DOI: 10.1016/j.bbi.2012.07.006.
- Dehaene, S. (2014). *Consciousness and the Brain: How the Brain Codes Our Thoughts*. NY: Viking.
- Dirac, P. (1930). *The Principles of Quantum Mechanics*. Oxford: Clarendon Press.
- Doxiadis, A. and Mazur, B. (2012). *Circles Disturbed: The Interplay of Mathematics and Narrative*. Princeton: Princeton University Press.
- Drnevich *et al.* (2012). The impact of experience-dependent and independent factors on gene expression in songbird brain. *Proceedings of the National Academy of Sciences (USA)* 109:17245–17252.

- Dusek, J., Otu, H., Wohlhueter A., Bhasin, M., Zerbini L., Joseph, M, Benson, H, Libermann, T. (2008). Genomic Counter-Stress Changes Induced by the Relaxation Response. *PLoS ONE* 3(7): e2576. doi:10.1371/journal.pone.0002576.
- ENCODE Project Consortium, (2012). An integrated encyclopedia of DNA elements in the human genome. *Nature*, 489, 57–74.
- Festinger, L. (1957). *A theory of cognitive dissonance*. NY: Basic Books.
- Grodzinsky, Y. and Nelken, I., (2014). The neural code that makes us human. *Science*, 343, 978-979.
- Gunaratne *et al.* (2011). Song exposure alters the profile of microRNAs in the zebra finch auditory forebrain. *BMC Genomics* 12:277.
- Hameroff, S., and Penrose, R., (1996) Orchestrated reduction of quantum coherence in brain microtubules: A model for consciousness. In: *Toward a Science of Consciousness The First Tucson Discussions and Debates*, S.R. Hameroff, A. Kaszniak and A.C. Scott (eds.), MIT Press, Cambridge, MA. Also published in *Mathematics and Computers in Simulation* 40:453480.
- Holland, J. (2012). *Signals and Boundaries: Building blocks for complex adaptive systems*. Cambridge, Massachusetts: MIT Press.
- Hughes, V. (2014). The sins of the father: The roots of inheritance may extend beyond the genome, but the mechanisms remain a puzzle [Epigenomics]. *Nature*, 507, 22-24.
- Iacoboni, M. (2007). Face to face: The Neural Basis of Social Mirroring and Empathy: *Psychiatric Annals*, 37(4), 236-241.
- Iacoboni, M. (2008). *Mirroring People: The new science of how we connect with people*. NY: Farrar, Straus and Giroux.
- Insel, T. (2009). Disruptive insights in psychiatry: Transforming a clinical discipline. *Journal of Clinical Investigation*, 119 (4), 700-705.
- Insel, T. (2010). Faulty circuits. *Scientific American*, 302 (4), 44-51.
- Insel, T. (2012). Next-generation treatments for mental disorders. *Science Translational Medicine*, 4, 155.
- Irwin, M. & Vedhara, K. (2005). *Human Psychoneuroimmunology*. NY: Oxford University Press.

- Jeong, H., Lim, Y., and Kim, M. (2014). Coarsening Measurement References and the Quantum-to-Classical Transition." *Physical Review Letters*, DOI: 10.1103/PhysRevLett.112.010402. arXiv:1307.3746.
- Kellogg, R. (2013). *The Making of the Mind: The Neuroscience of Human Nature*. NY: Prometheus Books.
- Kragh, H. (1990). *Dirac: A Scientific Biography*. Cambridge: Cambridge University Press.
- Leslie, M. (2013). NIH Effort Gambles on Mysterious Extracellular RNAs. *Science*, 341, 947.
- Lichtenberg, P., Bachner-Melman, R., Gritsenko, I., and Ebstein, R. (2000). Exploratory Association Study between catechol-O-methyltransferase (COMT) high/low enzyme activity polymorphism and Hypnotizability. *American J. Medical Genetics*, 96, 771-774.
- Lichtenberg, P., Bachner-Melman, R., Ebstein, R., Crawford, H. (2004). Hypnotic Susceptibility: Multidimensional Relationships with Cloninger's Tridimensional Personality Questionnaire, COMT polymorphisms, absorption, and attentional characteristics. *International Journal Clinical of Experimental Hypnosis*, 52, 47-72.
- Lloyd, D. & Rossi, E. (Eds.), (1992). *Ultradian Rhythms in Life Processes: An Inquiry into Fundamental Principles of Chronobiology and Psychobiology*. NY: Springer-Verlag.
- Lloyd, D. & Rossi, E. (Eds.), (2008). *Ultradian Rhythms from Molecules to Mind: A New Vision of Life*. NY: Springer.
- Moffitt, A. (1994). The Creation of Self: Self-Reflectiveness in Dreaming and Waking. *Psychological Perspectives*, 30, 42-69.
- Penrose, R. (1989). *The Emperor's New Mind*. Oxford: Oxford University Press.
- Penrose, R. (1994). *Shadows of the Mind: A Search for the Missing Science of Consciousness*. NY.: Oxford University Press.
- Penrose, R. (2004). *The Road to Reality: A Complete Guide to the Laws of the Universe*. NY: Knopf.
- Penrose, R. (2011). *Cycles of Time: An Extraordinary New View of the Universe*. NY: Knopf.
- Pollard K., Salama S., Lambert, N., et al. (2006). An RNA gene expressed during cortical development evolved rapidly in humans. *Nature*, 443 (7108): 167–172.

- Pollard K., Salama S., Lambert, N., *et al.* (2006). An RNA gene expressed during cortical development evolved rapidly in humans. *Nature*, 443 (7108): 167–172.
- Pollard, K. (2012). The genetics of humanness. What makes us human? Answers from evolutionary anthropology. In Calcagno, J. and Fuentes, F. (Eds.) *Evolutionary Anthropology* 21: 184.
- Purcell, S. (1987). *The education of attention to dreaming in high and low frequency dream recallers: the effects on dream self-reflectiveness, lucidity and control*. Doctoral Thesis: Carlton University, Ottawa, Ontario, Canada.
- Purcell, S., Moffitt, A., Hoffmann, R. (1993). Waking, Dreaming, and Self-Regulation. In *The Functions of Dreaming*. Moffitt, A., Kramer, M. & Hoffmann, R. (Eds.) NY: SUNY.
- Rembold, J. (2009). *Quantum Notes*. Ebook New Mexico: New Mexico Tech.
- Rizzolatti, G. and Sinigaglia, C. (2008). *Mirrors in the Brain: How our Minds Share Actions and Emotions*. NY: Oxford University Press.
- Robinson, G., Fernald, R., Clayton, D. (2008). Genes and Social Behavior. *Science*. 322:869-900.
- Rossi, E. (1972/1985/2000). *Dreams, Consciousness & Spirit: The Quantum Experience of Self-Reflection and Co-Creation*. (3<sup>rd</sup> Edition of *Dreams & the Growth of Personality*). NY: Zeig, Tucker, Theisen.
- Rossi, E. (1982). Hypnosis and Ultradian Cycles: A New State(s) Theory of Hypnosis? *The American Journal of Clinical Hypnosis*, 25, 21-32.
- Rossi, E. (1986, 1993, 2nd. Ed.). *The Psychobiology of Mind-Body Healing: New Concepts of Therapeutic Hypnosis*. NY: W.W. Norton.
- Rossi, E. (1988a). Non-locality in Physics and Psychology: An Interview with John Stewart Bell. *Psychological Perspectives*, 19(2), 294-319.
- Rossi, E. (1988b). Beyond relativity and quantum theory: An interview with David Bohm. *Psychological Perspectives*, 19, 25-43.
- Rossi, E. (1988c). Perspectives: Consciousness and the New Quantum Psychologies. *Psychological Perspectives*, 19(1), 4-13.
- Rossi, E. (1988d). Perspectives: A Mind-Gene Connection: *Psychological Perspectives*, 19(2), 212-221.

- Rossi, E. (1997a). The Feigenbaum Scenario in a Unified Science of Life and Mind. *World Futures*: 50, 633-645.
- Rossi, E. (1997b). The symptom path to enlightenment: The psychobiology of Jung's Constructive Method. *Psychological Perspectives*, 36, 68-84.
- Rossi, E. (1998). The Feigenbaum Scenario as a Model of Conscious Information Processing. *Biosystems*, 40, 1-10.
- Rossi, E. (1999). The co-creative dynamics of dreams, consciousness and choice. *Psychological Perspectives*, 38, 116-127.
- Rossi, E. (2002). *The Psychobiology of Gene Expression: Neuroscience and Neurogenesis in Hypnosis and the Healing arts*. NY: W.W. Norton.
- Rossi, E. (2004). *A Discourse with Our Genes: The psychosocial and cultural genomics of therapeutic hypnosis and psychotherapy*. Available in English and Italian. (ISBN –89396-01-6) San Lorenzo Maggiore, Italy: Editris s.a.s. Phoenix, Arizona: Zeig, Tucker and Theisen.
- Rossi, E. (2005). Einstein's eternal mystery of epistemology explained: The four stage creative process in art, science, myth, and psychotherapy. *Annals of the American Psychotherapy Association*, 8, 4-11. Reprinted in: Rossi, E. (2007). *The Breakout Heuristic: The New Neuroscience of Mirror Neurons, Consciousness and Creativity in Human Relationships: Vol. 1, The Selected Papers of Ernest Lawrence Rossi*. Phoenix, Arizona: The Milton H. Erickson Foundation Press. office@erickson-foundation.org.
- Rossi, E. (2007). *The Breakout Heuristic: The New Neuroscience of Mirror Neurons, Consciousness and Creativity in Human Relationships: The Selected Papers of Ernest Lawrence Rossi, Vol. 1*. Phoenix: AZ., Milton H. Erickson Foundation Press.
- Rossi, E. (2012). *Creating Consciousness: How Therapists Can Facilitate Wonder, Wisdom, Truth and Beauty: The Selected Papers of Ernest Lawrence Rossi, Vol. 2*. Phoenix: AZ., Milton H. Erickson Foundation Press.
- Rossi, E., Iannotti, S., Cozzolino, M., Castiglione, S., Cicatelli, A. and Rossi, K. (2008). A pilot study of positive expectations and focused attention via a new protocol for therapeutic hypnosis assessed with DNA microarrays: The creative psychosocial genomic healing experience. *Sleep and Hypnosis: An International Journal of Sleep, Dream, and Hypnosis*, 10:2, 39-44.

- Rossi, E. & Rossi, K. [With Otto Rössler] (1996). *The Symptom Path to Enlightenment: The New Dynamics of Hypnotherapeutic Work: An Advanced Manual for Beginners*. NY: Zeig, Tucker, Theisen.
- Rossi, E. & Rossi, K. (2011). Decoding the Chalmers Hard Problem of Consciousness: Qualia of the Molecular Biology of Creativity and Thought. *Journal of Cosmology, Vol 14*. On Line @ <http://journalofcosmology.com/Consciousness126.html>. Re-Printed in: Penrose, R., Hameroff, S. and Kak, S. (Eds.) (2011). *Consciousness and the Universe: Quantum Physics, Evolution, Brain, and Mind*, pp. 210-227.
- Rossi, E. & Rossi, K. (2013). *Creating New Consciousness in Everyday Life: The Psychosocial Genomics of Self-Creation. A Video eBook available @ Amazon.com*. Los Osos, CA: The Psychosocial Genomic Institute of the California Central Coast.
- Rossi, E. & Rossi, K. (2014) Quantum Perspectives of Consciousness, Cognition and Creativity: The Dirac Equation in a New Contour Integral Model of Brain Plasticity. *Journal of Applied & Computational Mathematics*. Vol. 3 (6): 183. doi:[10.4172/2168-9679.1000183](https://doi.org/10.4172/2168-9679.1000183)
- Saey, T. (2010). First songbird genome arrives. *Science News*, 177(9), 16.
- Sliwinski, J. and Elkins, G. (2013). Enhancing placebo effects: insights from social psychology. *American Journal of Clinical Hypnosis*. 55: 236-248.
- Snow, C. (1959, 2001). *The Two Cultures*. London: Cambridge University Press.
- Susskind, L. and Friedman, A. (2014). *Quantum Mechanics: The Theoretical Minimum*. NY: Basic Books.
- Turving, E. (2002). Episodic Memory: From Mind to the Brain. *Annual Review of Psychology*. 53, 1-26.
- Turving, E. (2005). Episodic Memory and Auto-noesis: Uniquely Human? In Terrance & Metacalf (Eds.) *The Missing link in Cognition*. Oxford: Oxford University Press, 3-56.
- Unternaehrer, E., Luers, P., Mill, J., Dempster, E., Meyer, A., Staehli, S., et al. (2012). Dynamic changes in DNA methylation of stress-associated genes (OXTR, BDNF) after acute psychosocial stress. *Translational Psychiatry*, 2, e150, doi:[10.1038/tp.2012.77](https://doi.org/10.1038/tp.2012.77).
- Vedral, V. (2012). *Decoding Reality: The Universe as Quantum Information*. NY: Oxford University Press.



Warren, W., Clayton, D. *et al.* (2010). The genome of a songbird. *Nature*, 464, 757-762.

Wilber, K. (1993). *The Spectrum of Consciousness*. Wheaton, IL., Quest Books.

Wolf, F. (1994). *The Dreaming Universe: A mind-expanding journey into the realm where psyche and physics meet*. NY: Simon & Schuster.

Xie *et al.* (2013). Sleep drives metabolite clearance from the adult brain. *Science*, 342, 373-377.