

**Achievement in Science Award 2019**  
**Professor Ernest Lawrence Rossi, PhD & Professor Kathryn Lane Rossi, PhD**  
**RNA/DNA Psychosocial Genomic Theory of Cognition and Consciousness**  
**by**  
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**The Quantum Mind/Body COMT Real Healing Placebo Protocol:  
Therapeutic Consciousness and Cognition in Medical Hypnosis**

Ernest Lawrence Rossi and Kathryn Lane Rossi

**Abstract:**

We review current research on the nature of therapeutic consciousness and cognition in medical hypnosis. We begin with the 200-year Google n-gram psycholinguistic documentation of accelerating stress in the human condition and our failure to cope with it effectively since the time of Mesmer. We propose a new hypothesis about the significance and profound implications of recent research on the Quantum Mind/Body COMT Healing Placebo Response. Current research is focused on Catechol-O-Methyl-Transferase (*COMT*), a gene enzyme system that metabolizes catecholamines such as dopamine and epinephrine that have pleiotropic epigenetic effects on a broad set of diseases and treatments. The quantum dynamics of the COMT healing placebo are not a psychological trick, mere metaphor or suggestion for gullible people. We review scientific evidence that genuine psycho-physiological healing is occurring during medical hypnosis via Quantum Mechanical-Molecular Mechanisms (QM-MM) facilitated by *The Mind/Body COMT Healing Placebo Protocol* during epigenetic transitions that are positively pleiotropic (simultaneously capable of producing more than one health benefit). We conclude with a fundamental question for medical hypnosis: What new quantum research paradigms are now

required to correct the Cartesian misconceptions of mind-body dualism in order to resolve our problems of accelerating stress, uncertainty, confusion and conflict in the human condition?

## Introduction

Figure 1 illustrates the problem of accelerating stress in the human condition and our failure to cope with it effectively on a global level since the time of Mesmer. This chronic issue is documented in our 200-year Google n-gram psycholinguistic graph, sourced from more than 5 million books in scholarly libraries and media throughout the world.

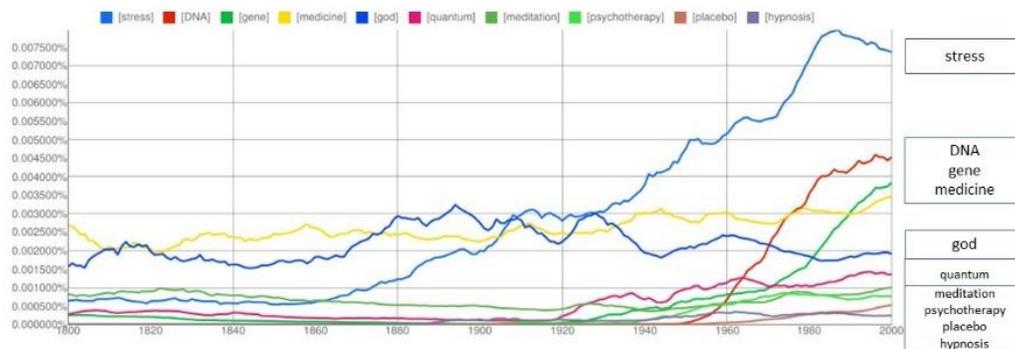


Figure 1: The exponential acceleration of stress since 1900 and the apparent 200-year history of the failure of society, cultural, medical and psychosocial therapeutic efforts to effectively cope with it.

Notice how the top blue line of accelerating “stress” appears to overwhelm the potentially therapeutic efforts of medicine even with its supporting breakthroughs in the sciences of DNA and genes. Notice how even the word “god” in the lower blue line, which is usually called upon in challenging times, is also dwarfed by “stress.” A careful look at this apparent cry for god’s help reveals two curious bumps upward during the periods of world war one (~1918) and World War two (~ 1942). These bumps illustrate the intuitive face validity of Google n-gram psycholinguistic graphs, which are a blend between the subjective human art of interpretation and the so-called objective realities of science. The possible meaning of Google n-gram psycholinguistic graphs must be handled with caution; uncertainty is always present and truth only emergent as a set of probabilities.

Next, notice how the word “quantum” suddenly appears under “god.” Who ordered that? Well, we can see how the quantum worldview begins around 1900, coinciding with epochal twin discoveries of the ultra-small quantum world ( $10^{-33}$ ) of Max Planck and Albert Einstein, which is now recognized as the foundation of sub-atomic particle physics, cosmology, chemistry, molecular biology and ultimately consciousness and therapeutic cognition that we experience as the qualia of life, mind, culture and the humanities as well as the sciences (Penrose, 1997; Rossi, 2002; Snow, 1965; Stapp, 2010 ).

Lastly, notice the underdog status of the therapeutic modalities of “meditation, psychotherapy, placebo and hypnosis” in precisely that order of influence today. “Hypnosis” is at the very bottom of this Google n-gram psycholinguist exploration. Hypnosis has struggled for over 200 years since its medical beginning with Mesmer – ever humble through periods of enthusiasm, re-naming, and re-discovery by the insightful few. We now wonder whether the quantum perspective may become a new path forward to more effective research, theory and practice of medical hypnosis.

### **The New 2018 Foundational Quantum International Standards of Science and Medical Hypnosis**

This new 2018 international standard is used in the calculations of the creation and annihilation of virtual particles/waves in the cosmos, life, consciousness and cognition in our Integrated Quantum Field Theory of Math, Physics, Chemistry, Biology and Psychology (Rossi & Rossi 2016, 2018). Figure 2 illustrates how the older inner circle (light blue) of 7 rather arbitrary constants of nature are now being replaced by the new outer circle of quantum international standards, which generate a more valid and insightful foundation for understanding the *Universal Constants in Physics* (Cohan-Tannoudji, 1993) and *The Equations of Life* (Cockell, 2018).

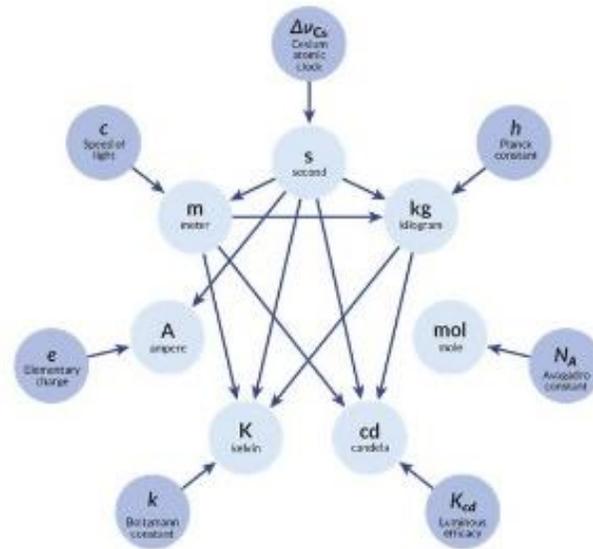


Figure 2: The new 2019 quantum international constants of science and medical Hypnosis. These new 2018 quantum international constants are required in the calculations about the creation and annihilation of virtual particles in the cosmos, life, consciousness and cognition in an integrated quantum field theory of math, physics, chemistry, biology and psychology (Brooke, 2017; Rossi & Rossi et al. 2006; Rossi, 2012; Rossi & Rossi, 2016, 2018).

The Nobel Prize laureate Richard Feynman (1985) described foundational quantum nature in this way.

“There is a most profound and beautiful question associated with the observed coupling constant,  $e$  – the amplitude for a real electron to emit or absorb a real proton. . . It has been a mystery ever since it was discovered more than fifty years ago, and all good theoretical physicists put this number up on their wall and worry about it.

Immediately you would like to know where this number for a coupling comes from: is it related to pi, or perhaps to the base of natural logarithms? Nobody knows. It’s a unique, non-dimensional atomic constant in physics known as “*alpha*” or the “*Fine Structure Constant*.” It is better known by its reciprocal number which is essentially equivalent to 1/137. It is related to the probability of electrons or other charged particles absorbing or emitting photons. It is the ratio of the strength of *electromagnetism* compared to the strong nuclear force.” (Feynman, 1985, p. 129; Italics added here.)

The mere mention of “electromagnetism” in a quantum context by Feynman, of course, reminds us that the medical hypnosis originally was believed to be associated with *electromagnetism*. Experimental research over the centuries, however, cast this early idea into perpetual debate and doubt because scientific research could not validate it in a reliable manner. The theory, research and practice of medical hypnosis took a giant step forward with the clinical techniques of Milton H. Erickson MD, and the first publication by his student Leonard Ravitz (1950, 1962, 2002) of the “Electrometric correlates of the hypnotic state” in *Science*, which we document here in figure 3.



Figure 3: Autohypnotic state demonstrated Elizabeth M. Erickson (Milton H. Erickson’s wife), October 10, 1959, Chicago, Illinois. Left to right, Warren J. Elliott, Elizabeth M. Erickson, Dr. William F. Blair and Dr. Leonard J. Ravitz (Burr, 1972/1977/1982/1988).

In the three generations since the electrodynamic quantum field theory of therapeutic hypnosis was introduced at the first annual meeting of *The American Society of Clinical Hypnosis* in 1958, quantum field theory has been repeatedly confirmed as the most accurate scientific foundation of modern physics and, by extension, the dynamics of all life processes (Lancaster & Blundell, 2014; Loewenstein, 1999, 2013). This STEM perspective was the rational for Ravitz’s (2002) initial training with Milton H. Erickson, which Ravitz documents as follows.

Beginning in 1945, I was trained by Milton H. Erickson, MD, the world’s foremost authority on hypnosis, at Wayne County General Hospital, Eloise, Michigan, in the most sophisticated, empirical techniques of hypnosis which Erickson was developing. Erickson’s elegant and imaginative experiments, using maverick procedures, were a

great empirical advance in both hypnosis and psychiatry ... Field correlates of hypnosis first were presented in *Science* (Ravitz, 1950), followed by the first atlas of hypnotic tracings published by Tracy J. Putnam, MD, the editor of the *AMA Archives of Neurology and Psychiatry* and Director of Services, Neurological Institute of Columbia-Presbyterian Medical Center, 1951. On August 28, 1959, a more sensitive cathode ray oscilloscope was first used to monitor hypnotic states in Burr's Yale Medical School office" (Ravitz, 2002, p. 54-55).

As far as known, Ravitz's (1950), "Electrometric Correlates of the Hypnotic State," was the first scientific paper on hypnosis published in *Science*. It begins as follows:

Because of repeated failure to detect electrometric correlations with EEG from trance states, no completely objective criteria of hypnosis have yet been formulated beyond empiric observation. Using a Burr-Lane-Nims microvoltmeter, 60 standing potential records of 20 subjects were taken. Although results of spot determinations were sometimes equivocal, continuous EMF tracings, using the combined microvoltmeter and General Electric photoelectric recorder at a speed of 1 inch/min, with one electrode on the forehead and the other on the palm of either hand, seem to provide a reliable quantitative index of trance depth. During hypnosis, the EMF tracing becomes more regular, and potential differences either gradually increase or decrease in magnitude. At trance termination, there is usually a dramatic voltage shift, and the tracing eventually returns to that of the normal waking state (Illustrated here in Figure 4).

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

immediately by changes in voltage and in configuration of the tracing. It is thus possible to objectively measure changes in depth of hypnosis. (Ravitz, 1950, pp. 341-2).

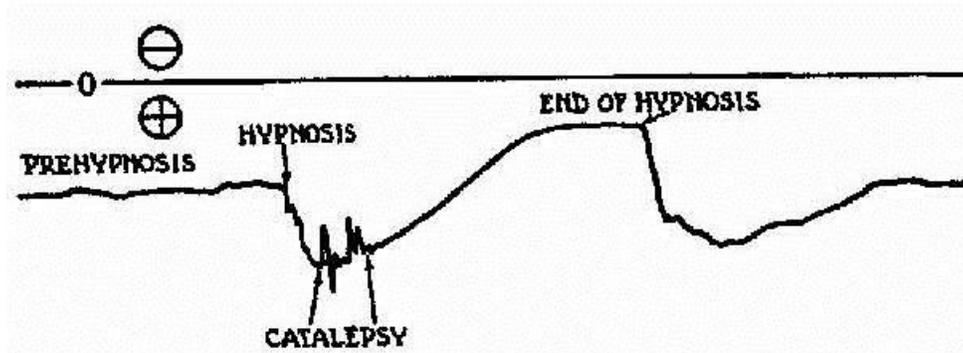


Figure 4. The DC record of catalepsy in medical hypnosis as it was originally published in *Science* by Ravitz in 1950.

During the middle 1970's, about 25 years after Ravitz's paper was published in *Science*, Erickson and Ravitz together mentored Ernest Rossi in the use of a strip-chart recording electronic device (Heath-Schlumberger Model SR-255B) for facilitating the induction and objective measurement of medical hypnosis. We assessed real patients, ourselves and some of Erickson's family during this informal learning and training period, which was later documented nostalgically with many photographs, figures and tables of data in Ravitz book, *Electrodynamic Man: Electromagnetic field measurements in biology, hypnosis and psychiatry* (2002). Rossi subsequently attempted to identify an electronic signature of Erickson's naturalistic approach to medical hypnosis and therapy illustrated below in Figure 5, which Rossi outlined as a "Two-Factor Theory of Hypnotic Experience (Erickson & Rossi, 1981/2014; Rossi, Erickson-Klein & Rossi, 2008-2016, Vol. 12).

### **Electronic Monitoring of Catalepsy: A Two-Factor Theory of Hypnotic Experience**

While the pendulum of current scientific thought has swung to the opinion that no objective measures of hypnotic trance exists, there is a long scientific tradition of measuring catalepsy. Early as 1898 Sidis published remarkably clear and convincing sphygmograph-oscillometer records distinguishing normal awakesness from catalepsy [an apparent state of quiescence of mind and body] experience during hypnosis. More recently Ravitz (1962, 1973) published tracings of the bodies DC [Direct Current]

electrical activity measured on high impedance recorders [impedance is the effective resistance of an electric circuit that makes such recordings possible] that underwent characteristic changes during the induction of catalepsy with medical hypnosis. The junior author [Ernest Rossi] has utilized a high impedance recorder (input impedances ranging from 10 to 1000 megaohms with non-polarizing electrodes placed on the forehead and the palm of one hand) for a number of years. He used these in his clinical practice as a convenient and convincing indicator of an objective alteration that takes place during trance. The record of a highly intelligent, normal, 24-year-old female subject during her first hypnotic induction is presented in Figure 5.

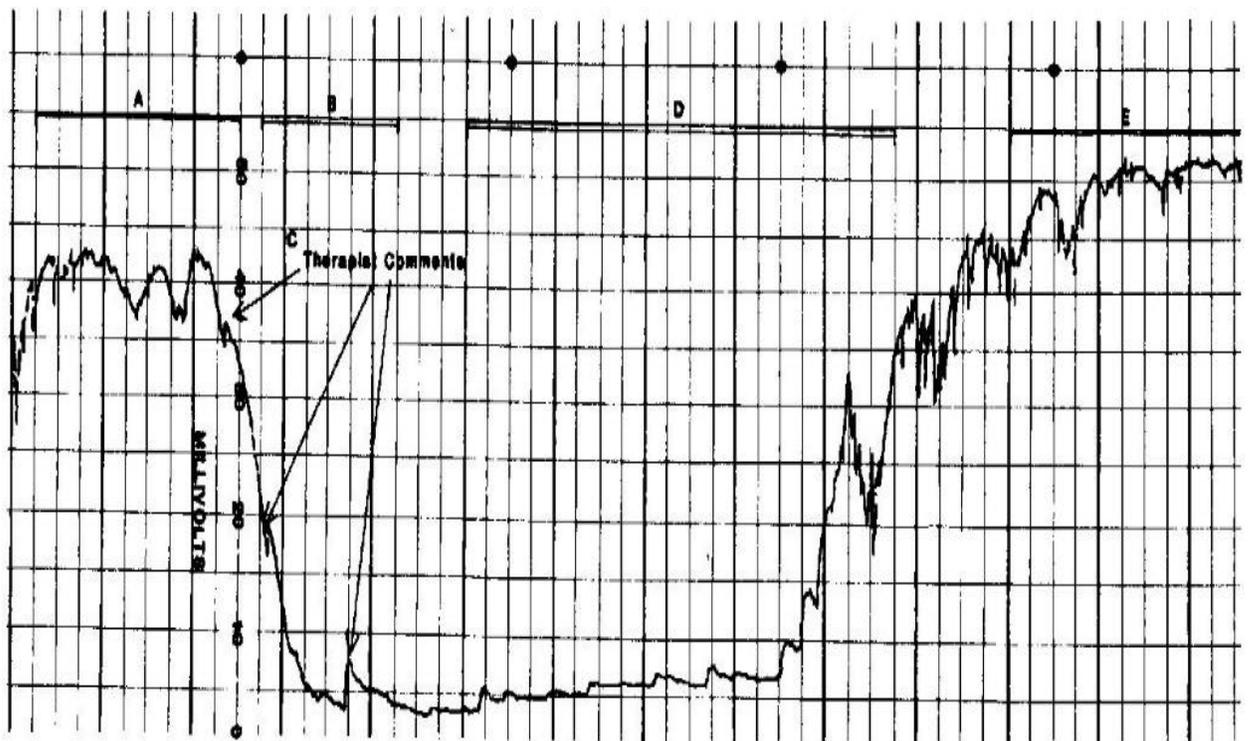


Figure 5: Rossi's Early (1981/2014) Electronic Monitoring of DC body potential during Catalepsy.

The erratic, fast activity at the beginning of the Figure 5 labeled (A) is characteristic of normal waking awareness. Every impulse to activity seems related to an upswing, which then drops out as soon as the impulse is carried through. During simple relaxation, meditation, and hypnosis the record smooths out and its amplitude usually drops dramatically as the subject gives up any active effort to direct mind or body (B).

In Figure 5 a few slow up-swings are noted during the beginning of the hypnotic induction, as the subject makes efforts to attend to the therapist's remarks (C). These conscious efforts drop out as trance deepens and the recording shows a characteristically flat, low plateau with only low amplitude slow waves of deep hypnosis (D). . . wherein even this low amplitude activity drops out, and a smooth line record is obtained. As long as the subject remains mentally quiescent with an immobile (cataleptic) body, there are no peaks or valleys in the record. When the subject [begins to wake up a few] peaks and valleys are usually recorded. This awakening period is also followed by a typical pattern (E). This waking fast activity usually appears at a higher level than the initial [normal] waking level at (A). This higher level is maintained for a few minutes until the record comes back to normal.

The difficulty with accepting such records as valid measures of trance is that they appear whenever the subject quiets down during relaxation, meditation, or sleep, whether or not hypnosis has been formally induced. We would therefore offer a two-factor theory of hypnotic experience. First, there must be a state of openness and receptivity wherein subjects are not making any self-directed efforts to interfere with their own autonomous mental activity or the suggestions of the therapist. Ravitz's measurements, like those in Figure 5, are probably an effective indication [measurement] of this state of quiet [electrodynamic] receptivity. The second factor might be called "associative involvement." This process is when the hypnotherapist engages and utilizes the subject's associations, mental mechanisms and skills to facilitate a hypnotic experience. We regard this process of utilizing a patient's own mental associations as the essence of "suggestion." [Milton Erickson's medical hypnosis] is *not* a process of insinuating or placing something into the subject's mind [by the therapist]. Medical hypnosis is the process of helping subjects utilize their own mental associations and capacities and ways that were formally outside the subject's own ego controls.

Students and laboratory workers who have access to the proper electronic equipment (the Heath-Schlumberger Model SR-255B Strip Chart Recorder is suitable) can explore

a number of interesting relations between hypnotic experience and the electronic monitoring of the body's DC potential. Is the depth of the curve (Area D in Figure 5) related to "trance depth"? It will be found that some subjects are able to speak during this low portion of the curve without any raise in their DC potential. Are these people better hypnotic subjects? Does any hypnotic phenomenon other than catalepsy have a characteristic curve? Are the classical hypnotic phenomena more readily evoked during the low plateau (D) of the curve? (Erickson & Rossi, 1981/2014 pp 63-65).

More recent efforts to answer these questions motivated Rossi & Rossi (2016, 2018) to develop more modern complex electronic equipment illustrated in the next few figures.

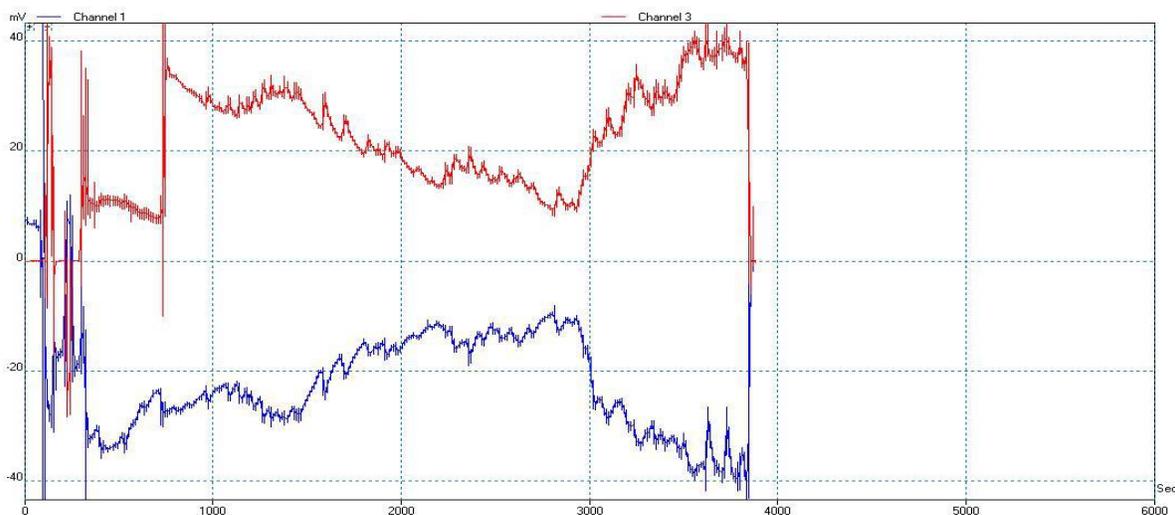


Figure 6: More recent efforts to measure the Integrated Quantum Field Theory (QFTi) of medical hypnosis with sensors on the forehead and both hands. Symmetrical bioelectronic amplitudes of  $\pm 40$  mV are illustrated on extremes of the vertical axis. The right hand (red) line shows the typical Erickson-Ravitz-Rossi downward slope of medical hypnosis (a cataleptic state of inward focusing meditation, quietude or relaxation) while the left hand (blue) line records its bioelectronic mirror symmetry of the (Hill & Rossi, 2017).

The experimental integration of the top-down and bottom-up approaches to the bioelectronics of physics, biology, chemistry and psychology is adapted from Walter Penfield's original concept of the mind-brain-body homunculus in figure 7.

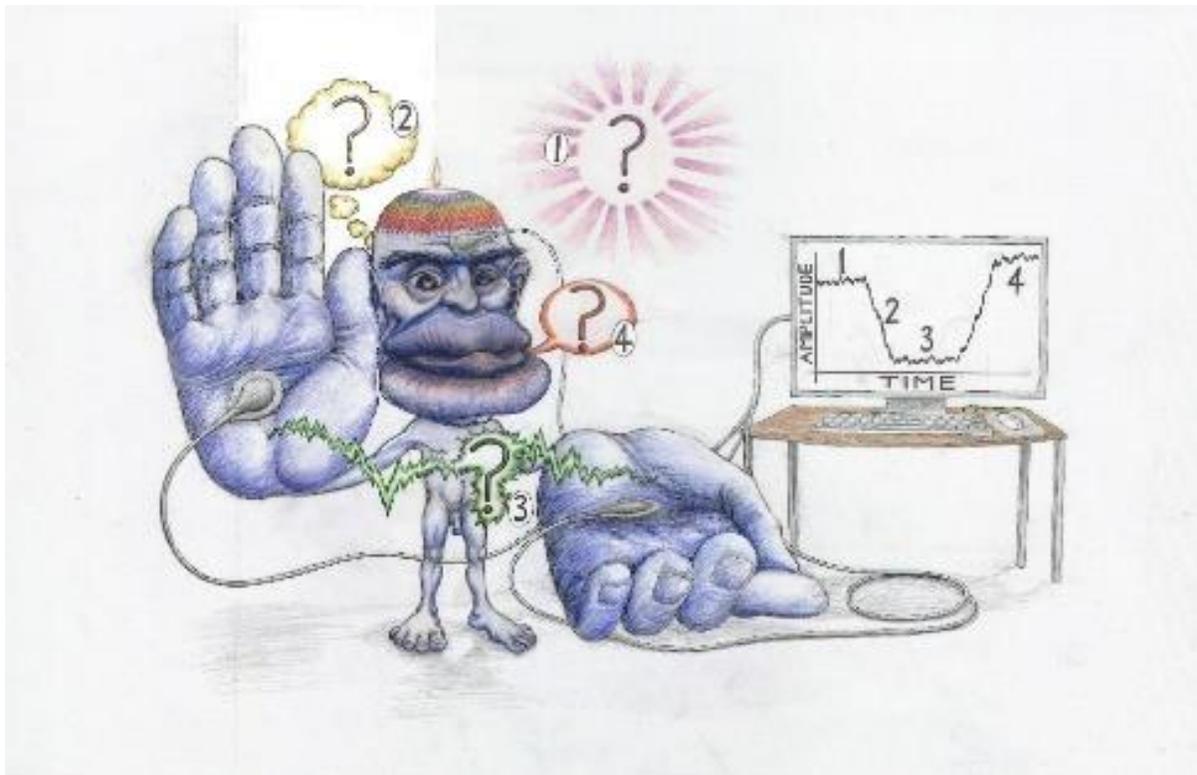


Figure 7: A bioelectronics cartoon of the Erickson/Ravitz/Rossi *observer/operator (Ob/Op)* that illustrates the quantum dynamic signature of medical hypnosis. A still controversial postulate of quantum mechanics implies that anything we can *observe* (consciously) can be automatically operated on (unconsciously).

Notice in figure 7 how we map the 4-stage creative cycle of conscious, subjective human experience onto objective bioelectronic Erickson/Ravitz/Rossi signature of medical hypnosis. *Stage 1. Observation; Stage 2. Incubation (Inner Work); Stage 3. Aha! (Insight); and Stage 4. Re-integration* which is objectively measured by bioelectronic amplitudes in a computer. The oversized hands, lips, and tongue—the main sensory communication channels of human communication—mirror the actual semantic mind–brain space that evolution has selected for over at least 4 billion years (Hill & Rossi, 2017).

Figure 8 illustrates the 4-Stage Creative Quantum Mind-Body Talk and Therapy via QFTi of COMT Epigenomic Transitions recently updated from the evolutionary perspective of RNA world (Service, 2019).

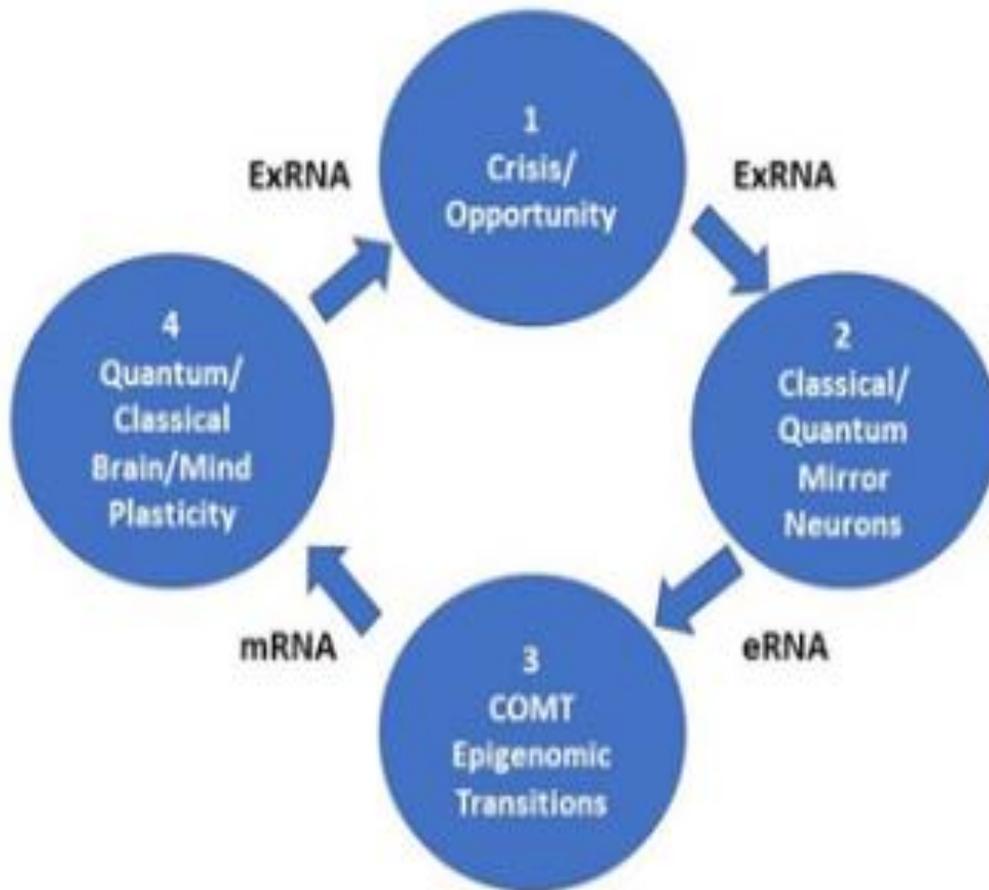


Figure 8. The 4-Stage Creative Quantum Mind-Body Talk and Therapy (QMBT) of medical hypnosis. This illustrates the quantum communication cycle that underpins conscious/unconscious transition experiences of medical hypnosis. 1. The crisis/opportunity that people experience as a stress. 2. The *Classical to Quantum* transitions within mirror neurons. 3. COMT Epigenomic Transitions. 4. The *Quantum to Classical* transitions of Brain/Mind Plasticity that generate problem solving and psychophysiological therapy via medical hypnosis.

Figure 9 is a quantum update of the two volumes on the dynamics of cyclic nature mind/body circadian (~24 hours) and ultradian Basic Rest-Activity Cycle (~ 90-120 minutes, Lloyd & Rossi, 1992, 2008).

# The Quantum Dynamics of Medical Hypnosis

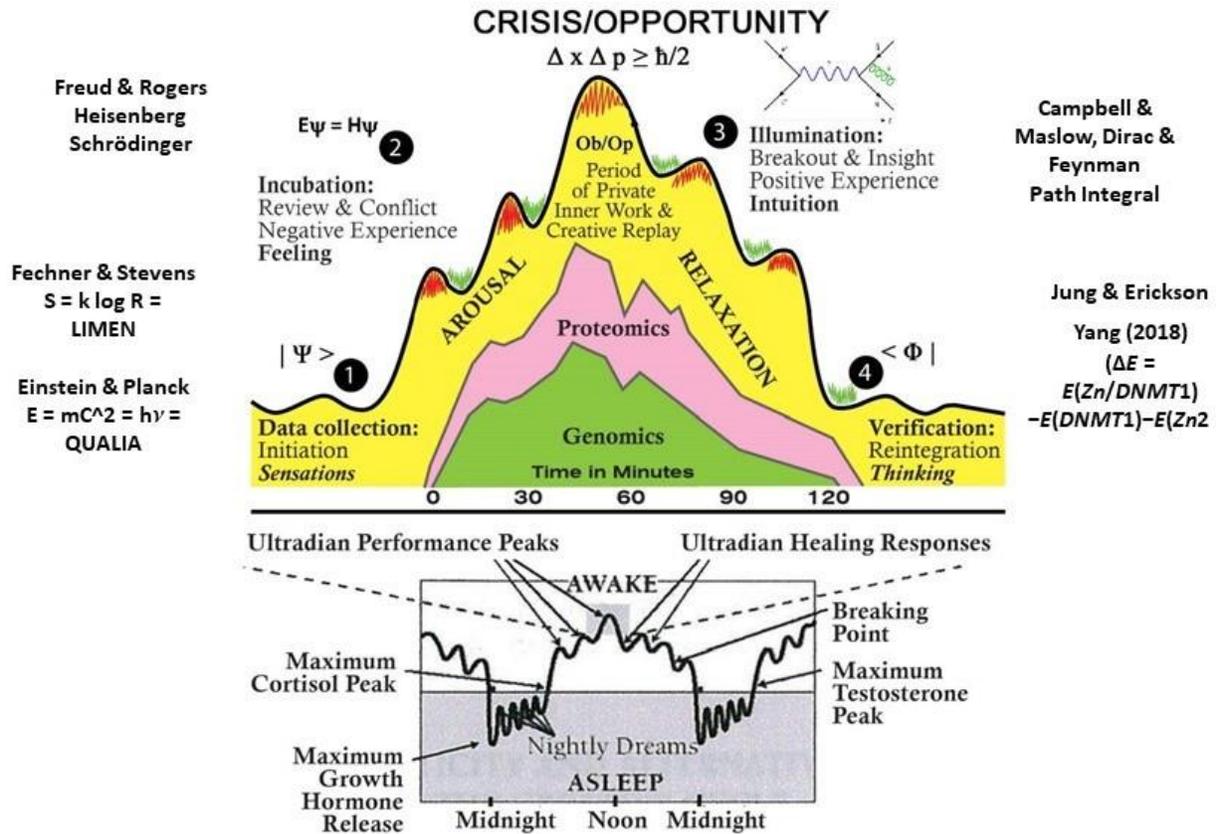


Figure 9: A recent update of our Integrated Quantum Field Theory (QFTi) of the Cosmic Evolution of Life consciousness and therapeutic cognition as a pyramid illustrating the physics, math, chemistry, biology, the 90-120-minute Basic Rest-Activity Cycle (BRAC), the 4-Stage Creative Cycle of problem solving and medical hypnosis as we now conceptualize it along with some of the key scientists who contributed to it with their math equations.

We now propose this 2019 update of our Integrated Quantum Field Theory of the Evolution of Life, Consciousness and Cognition in figure 9 to illustrate the cooperating classical and quantum foundational dynamics of medical hypnosis. Notice how the outer labels in **bold font** suggest some of the historical leaders in psychotherapy who usually emphasized (without realizing or making it explicit) one stage or more of the 4- Stage Basic Rest-Activity Cycle and its associated 4-stage creative cycle. We also note some of the Nobel Prize winning scientists who formulated

the fundamental concepts and math equations of Quantum Field Theory (QFT) told something about their personal stories, struggles and paths of discovery in their Nobel Prize lectures over the past century (<https://www.nobelprize.org/prizes/lists/all-nobel-prizes>). While none of these scientists raised their hand and solemnly intoned explicitly how they used the 4-stage creative cycle to earn their Nobel Prize, we notice how many of their personal accounts could be implicitly identified with the various stages of what we call the 4-Stage BRAC and 4-Stage Creative Cycle.

### **How Quantum Dynamics Energize the Enzymes of Life: Therapeutic Consciousness and Cognition of Medical Hypnosis**

Most of us are familiar with the popular science writers' ideas over the past century about how quantum mechanics is so complex, counterintuitive and weird. Anyone who believes they understand it really does not because quantum dynamic is claimed to be irrational – how can something be both a particle and wave, here or there – at the same time with its exact position and velocity forever uncertain? Please notice, however, that most of these popular authors usually do not use the numbers and computational equations of math that are the most useful language of science. Pusuluk et al. (2018) is only one of many international research groups that actually calculate how quantum dynamics energize the enzymes of life that we illustrated in figure 9. We now illustrate in figure 10 how we could apply these methods and math to calculate each step up and down the quantum pyramid that we proposed as the daily circadian and 90-120-minute BRAC therapeutic consciousness and cognition of medical hypnosis. Pusuluk and colleagues introduce their work as follows.

*We examine a generic molecular recognition event in which two quantum H-bonds are formed between the substrate and a multifunctional enzyme that requires the tautomerization of the substrate to execute a different biological function which is outside the scope of the paper. Consistent with the induced-fit model, we allow a significant conformational change in the binding site of the enzyme. Then, we approach the problem of proton motion in these H-bonded systems using the tools of quantum information theory where correlations are routinely regarded as a resource for specific tasks. Although the binding site is reshaped in a fully classical way, we find that this*

classical motion increases the quantum correlations in the intermolecular H-bonds and spreads them among all of the four H-bonded atoms. Finally, we discuss the possibility of using these quantum correlations as a resource for the tautomerization of the substrate in the first catalytic stage of multi-step enzyme catalysis. [Tautomers are constitutional isomers of organic compounds that readily interconvert. This reaction commonly results in the relocation of a proton. Tautomerism is for example relevant to the behavior of amino acids and nucleic acids, two of the fundamental building blocks of life. [Wikipedia Creative Commons]

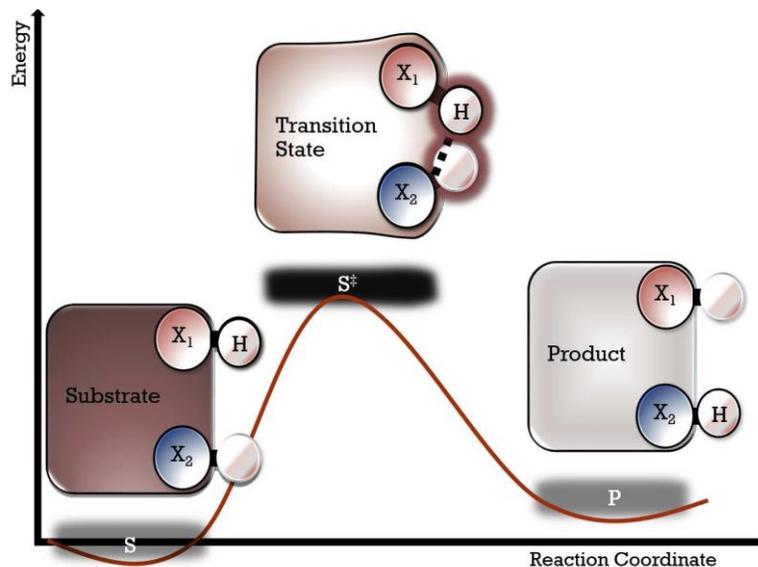


Figure 10: How Quantum Dynamics Energize the Enzymes of Life (public domain, Wikipedia). A substrate (S), transition state structure (S<sup>‡</sup>), and product (P) in a generic tautomerization reaction. S and P are constitutional isomers (Pusuluk et al. 2018), which we now apply to the recent update of our Integrated Quantum Field Theory (QFTi) of the Evolution of Life as a pyramid illustrating the dynamics of therapeutic consciousness and cognition in medical hypnosis. Notice how this image illustrates one step up and down of the pyramid (figure 9) of the enzymatic pleiotropic placebo response, which documents how the Top-> Down quantum dynamics of mind moves molecules to simultaneously multiple healing effects of the ~90-120-minute 4-Stage Basic Rest-Activity Cycle (BRAC) onto which we map the 4-Stage Creative Cycle (originally intuited by the mathematician Henri Poincaré, 1854-1912).

Although the intermolecular conversion from S to P is nothing more than the movement of a proton from X1 to X2, a more reactive intermediate (S<sup>‡</sup>) is involved in the reaction. Since S corresponds to a saddle point on the potential energy surface, the spontaneous tautomerization occurs very slowly. We consider a generic nucleotide existing in its

major tautomeric form as the substrate (S) in a putative tautomerization event as shown in Fig. 10. Here, S is converted to a product (P) that corresponds to a minor tautomeric form of the molecule originating from the relocation of a proton from one electronegative atom/group (X1) to another (X2) like oxygen or nitrogen. A direct relocation due to the tunneling is not possible because of the large bond angle  $\phi_{12} \equiv \angle X_1X_2$ . Thus, the molecule undergoes a conformational change resulting in an unstable intermediate structure denoted by S. This new conformation of the molecule allows a bond angle smaller than  $\pi/2$  that facilitates orbital interactions and proton tunneling between X1 and X2. However, as S corresponds to the highest potential energy along the reaction coordinate, this tautomerization reaction is not likely to occur on its own. How do we now apply these agreeable, cooperating interacting classical and quantum energy dynamics of therapeutic consciousness and cognition in medical hypnosis?

### **Quantum Mind-Body Talk and Therapy with Medical Hypnosis: A Resolution of The Mind-Body Problem?**

More recent research on the COMT healing placebo documents how medical hypnosis may be documented with scientifically verifiable and reliable quantum psycho-physiological cycles of mind/body healing. The mind-body problem was addressed by René Descartes in the 17th century, resulting in Cartesian Dualism, which assumed that mind and body were separate realms that could not modulate each other. The recent image of the COMT enzyme documented in figure 11 by Yang et al. (2019) implies that Cartesian dualism was wrong! The COMT Placebo QM-MM Mind-BodyTherapy bridges the Cartesian mind-body gap at the quantum level of the smallest energy/matter dynamics that are possible in nature. We hypothesize that figure 11 is an example of mind-body therapy via medical hypnosis. The so-called Cartesian gap between the subjective qualia of mind and the objective movements and measures of matter was an assumption of philosophy based on immature science a few centuries ago.

## COMT Placebo QM-MM Mind-Body Therapy of Medical Hypnosis

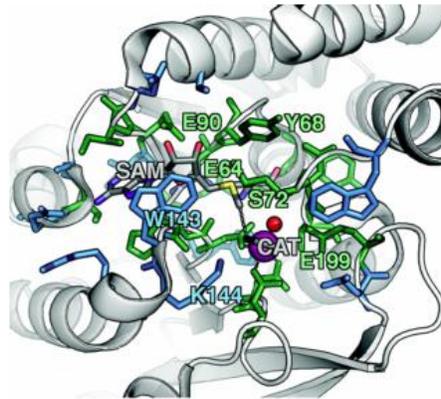


Figure 11: The Green Central Core of Quantum Mechanical-Molecular Mechanism (QM-MM) of the pleiotropic healing placebo, which we now propose is the essence of medical hypnosis in bridging the so-called Cartesian Top->Down mind-body gap. (Image by Yang et al. 2019.) The green and red/violet quantum core energizes the molecular movements of life. This is how the consciousness of mind moves molecules (QM-MM) during medical hypnosis postulated by our Integrated Quantum Field Theory (QFTi).

Yang et al. (2019) describes the motivation for their research presented in figure 11 as follows.

Enzymes have evolved to facilitate challenging reactions at ambient conditions with specificity seldom matched by other catalysts. Computational modeling provides valuable insight into catalytic mechanisms, and the large size of enzymes mandates multi-scale, Quantum Mechanical/Molecular Mechanical (QM/MM) simulations. *Although QM/MM plays an essential role in balancing simulation cost to enable sampling with full QM treatment needed to understand electronic structure in enzyme active sites, the relative importance of these two strategies for understanding enzyme mechanism is not well known. We explore challenges in QM/MM for studying the reactivity and stability of three diverse enzymes: 1. Mg<sup>2+</sup>-dependent catechol O-methyltransferase (COMT), 2. radical enzyme choline trimethylamine lyase (CutC), and 3. DNA methyltransferase (DNMT1), which has structural Zn<sup>2+</sup> binding sites. In COMT strong non-covalent interactions lead to long range coupling of electronic structure properties across the active site, but the more isolated nature of the metal cofactor in*

DNMT1 leads to faster convergence of some properties. We quantify these effects in COMT by computing covariance matrices of by-residue electronic structure properties during dynamics and along the reaction coordinate. In CutC, we observe spontaneous bond cleavage following initiation events, highlighting the importance of sampling and dynamics. We use electronic structure analysis to quantify the relative importance of CHO and OHO non-covalent interactions in imparting reactivity. These three diverse cases enable us to provide some general recommendations regarding QM/MM simulation of enzymes (*Italics added here*).

In collaboration with Professor Ted Kaptchuk and other members of a Program in Placebo Studies Hall's (2015) recent research focused on catechol-O-methyltransferase (*COMT*), an enzyme that metabolizes catecholamines such as dopamine and epinephrine and has pleiotropic effects in a broad set of diseases and treatments. Her landmark paper published in *PLOS ONE* identified *COMT* as one of the first genetic markers of the real Top->Down Psycho->Physiological medical placebo response. With her colleagues she describes her research for such medical placebos as follows.

Placebo controls are a cornerstone of randomized clinical trials. They are also one of the single biggest threats to bringing new drugs to market. In a majority of clinical trials, new drugs must produce effects greater than placebo to receive approval. Failure to exceed the placebo response means that novel treatments, many with compelling mechanisms of action, never reach the patient and billions of dollars invested in drug development are lost.

Placebo responses vary widely across subjects and growing evidence suggests that genetics plays a part in individual response to placebo treatment. Indeed, some individuals actually have a negative or 'nocebo' response to placebos. *Recent research has demonstrated that the placebo response has a real psycho->physiological basis in signaling by neurotransmitters like dopamine and endorphins. Studies also suggest that some drugs can target overlapping endogenous neurotransmitter pathways and thereby disrupt the placebo response. Leveraging the functional effects of genetic variation in genes related to the placebo response, collectively called the "placebome" in clinical trial*

*design and analysis has the potential to 1) reduce the size of trials, 2) improve the accuracy with which drug efficacy is determined, and 3) greatly enhance the precision of medicine. (Table 1 and Italics added here.)*

**Table 1: Polymorphisms in candidate genes that may be part of the placebo that modulates the Quantum Mechanics-Molecular Mechanism (QM-MM) during Medical Hypnosis**

<b>Placebo pathway</b>	<b>Gene name</b>	<b>Symbol</b>	<b>Chromosomal location</b>	<b>Placebo SNPs</b>
Dopamine	catechol-O-methyltransferase	<i>COMT</i>	22q11.2	rs4680
	monoamine oxidase	<i>MAO-A</i>	Xp11.3	rs6323, rs6609257
	dopamine B hydroxylase	<i>DBH</i>	9q34	rs2873804
	dopamine receptor 3	<i>DRD3</i>	3q13.31	rs6280
	brain derived neurotropic factor	<i>BDNF</i>	11p14.1	rs6265
Serotonin	tryptophan hydroxylase 2	<i>TPH2</i>	12q21.1	rs4570625
	5-hydroxytryptamine transporter	<i>SLC6A4</i>	17q11.2	rs4251417
	5-hydroxytryptamine receptor 2A	<i>HTR2A</i>	13q14.2	rs2296972, rs622337
	serotonin transporter gene-linked polymorphic region	<i>5-HTTLPR</i>	17q11.2	Variable tandem nucleotide repeat
Opioid	opioid receptor	<i>OPRM1</i>	6q25.2	rs510769
Endocannabinoid	fatty acid amide hydrolase	<i>FAAH</i>	1p33	rs324420

Further confirmation and documentation of current research in the real COMT psycho->physiological placebo is provided by Crum (2018).

There is evidence that altering stress, the mindset and belief that stress is enhancing vs. debilitating, can change cognitive, affective and physiological responses to stress. However individual differences in responsiveness to stress mindset manipulations have not been explored. Given the previously established role of catecholamines in both placebo effects and stress, we hypothesized that genetic variation in catechol-O-methyltransferase (COMT), an enzyme that metabolizes catecholamines, would moderate responses to an intervention intended to alter participants' mindsets about stress. Participants (N = 107) were exposed to a stress mindset manipulation (videos highlighting either the enhancing or debilitating effects of stress) prior to engaging in a

Trier Social Stress task and subsequent cognitive tasks. The associations of the *COMT* rs4680 polymorphism with the effect of stress mindset video manipulations on cognitive and affective responses were examined. Genetic variation at rs4680 modified the effects of stress mindset on affective and cognitive responses to stress. Individuals homozygous for rs4680 low-activity allele (met/met) were responsive to the stress-is-enhancing mindset manipulation as indicated by greater increases in positive affect, improved cognitive functioning, and happiness bias in response to stress. Conversely, individuals homozygous for the high-activity allele (val/val) were not as responsive to the stress mindset manipulation. These results suggest that responses to stress mindset intervention may vary with *COMT* genotype. These findings contribute to the understanding of genes by environment interactions for mindset interventions and stress reactivity and therefore warrant further investigations.

### **Conclusions**

1. The Quantum Mechanical-Molecular Mechanism (QM-MM) of the Pleiotropic Healing Placebo is the essence of medical hypnosis that bridges the so-called Cartesian gap between mind and body.
2. Our emerging Integrated Quantum Field Theory (QFTi) of medical hypnosis integrates the math, physics, chemistry, biology and psychology of life that now requires further scientific confirmation.
3. Catechol-O-methyltransferase (COMT) is a cyclic gene-protein-enzyme Top-> Down psycho->physiological pleiotropic system that metabolizes catecholamines such as dopamine and epinephrine, which have many healing effects in a broad set of diseases and medical treatments.
4. We hypothesize that most (if not all) forms of Alternative and Complementary Medicine are mediated via this type of COMT mind-gene-protein-enzyme psycho -> physiology and analogous Quantum Mechanical-Molecular Mechanism (QM-MM) systems.
5. We have documented how the characteristic graph of the Erickson-Ravitz-Rossi electronic signature of medical hypnosis has patterns that are useful for quantifying and exploring the

Quantum Mechanical-Molecular Mechanism (QM-MM) foundations of psychosomatic medicine.

6. We mapped the 4-Stage Creative Cycle of problem solving on to our normal 90-120-minute Basic Rest-Activity Cycle (BRAC) within the circadian 24-hour cycle as nature's own natural medical hypnosis.
7. The chronic abuse of ignoring nature's natural 90-120-minute BRAC Healing Response results in the Pleiotropic Stress Response is the source of most problems of fatigue, uncertainty, malfunction, conflict, confusion and cognitive-behavioral errors, addictions, depression and unhappiness in the human conditions.
8. More systematic scientific research is required for the development of inexpensive wireless 24/7 recording in the real time analysis of all stress syndromes of psychology, psychiatry and medicine to explore the natural healing dynamics of medical hypnosis in daily and hourly life as well as the professional consulting room.

## Q & A

A student in the audience of this presentation to the Austrian Society of Medical Hypnosis on 19 January 2019 asked one final question: Could you make a simple summary of the 5 most important features of this theory and practice of Medical Hypnosis? We answered as follows:

1. Medical hypnosis engages and utilizes the **Common Everyday Trance**: the low phase of about 20 minutes of the natural **4-Stage Basic Rest-Activity Cycle (BRAC)**, which occurs about 12 times for about 90-120 minutes every day (24/7) while we are awake or asleep (REM dreaming).
2. We map the **4-Stage Creative Consciousness and Therapeutic Cognition Cycle** of medical hypnosis onto nature's **4-Stage BRAC**.
3. Most practices of alternative and complementary medicine are mediated by the epigenetic COMT mind-gene-protein-enzyme real placebo effect and are analogous with the **Quantum Mechanical-Molecular Mechanisms (QM-MM)** of medical hypnosis.
4. Most experiences of **Creative Consciousness and Therapeutic Cognition** feel wonderful – they are manifestations of the neuroplastic **Novelty-Numinosum-**

**Neurogenesis Effect (NNNE)** – whereby **Numinous (Fascination, Mysterious, & Tremendous)** cognitive/emotional states enlighten the meaningful motivation of adaptive consciousness, the evolution of behavior and many cultural healing rituals of meditation, mindfulness and spiritual beliefs.

5. The characteristic **4-Stage Erickson-Ravitz-Rossi Electronic Signature of Therapeutic Hypnosis** documents data for exploring and quantifying the **Quantum Mechanical-Molecular Mechanisms (QM-MM) for the psychosocial and cultural epigenomics** of self-identity, relationships, play, games, drama, literature, poetry, politics, storytelling, etc., that fix attention, memory and learning as well as facilitating the natural healing transformations of therapeutic consciousness and cognition.

**QUANTUM MIND-BODY THERAPY PROTOCOL (QMBT)**  
**Group Self Report Version (2019)**  
 Ernest Rossi and Kathryn Rossi

NAME \_\_\_\_\_ DATE \_\_\_\_\_ TIME: \_\_\_\_\_

Age: \_\_\_\_\_ Education: K8 HS BA MA Dr. Work: \_\_\_\_\_  
 Night Sleep Length: 1h 2h 3h 4h 5h 6h 7h 8h 9h 10h 11h 12h + (Circle)  
 Dreams: \_\_\_\_\_ Days/Week. Dreams/ Night \_\_\_\_\_

Initial Stress: On a scale from 0-10 rate your level of stress 0 - 10 \_\_\_\_\_

End Stress: On a scale from 0-10 rate your level of stress 0 - 10 \_\_\_\_\_

**STAGE ONE: Accessing Inner Resources:**

- 1. Warmer – Cooler: Yes / No
- 2. Stronger – Weaker: Yes / No

**STAGE TWO: Engaging Personal Issues:**

- 3. Adult - Child: Yes / No
- 4. Problem - Opposite: Yes / No

**STAGE THREE: Creative Private Replays:**

- 5. Negative Past Review: Yes / No
- 6. Positive Now & Future: Yes / No

**STAGE FOUR: Integration and Reality Testing:**

- 7. Positive Self-Change: Yes / No
- 8. Positive Self-Prescription Yes / No

9. Without looking at the clock estimate in minutes how long the hand exercise lasted: \_\_\_\_\_.

10. On a scale from 0-10, how real was your experience? 0 - 10 \_\_\_\_\_

11. On a scale from 0-10, how surprised were you by your experience? 0 - 10 \_\_\_\_\_

12. On a scale from 0-10, how *confident* are you in your self-prescription? 0 - 10 \_\_\_\_\_

**OFFICE USE**

Initial Time: \_\_\_\_\_ am pm Real Time (Min): \_\_\_\_\_

13. Creative Mental Engagement: Real Time \_\_\_\_\_ / Est. Time \_\_\_\_\_ X 100 = \_\_\_\_\_ %

14. % Stress Reduction: Initial Stress% \_\_\_\_\_ (-) Final Stress% \_\_\_\_\_ = \_\_\_\_\_ %

15. 4-Stage Ideodynamic Protocol: yes = 100% no = 0%, Sum #1 - #8) / 8 \_\_\_\_\_ %

16. Mind/Body Healing Numinosum (NNNE): (#11 + #12 + #13 + #14 + #15) / 5 = \_\_\_\_\_ %

(COMT, GE, BP, SCH, PNI, GDF-11, SNCB, DRD<sub>4</sub>, etc.)

Telegen \_\_\_\_\_ SISRI-24 \_\_\_\_\_ Comments: \_\_\_\_\_

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