

*The ASCH-ERF Dr. Bernauer W. Newton Award for Lifetime Outstanding
Contributions to Clinical Hypnosis*

The Psychosocial Genomics of Therapeutic Hypnosis, Psychotherapy, and Rehabilitation

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*“Science goes where you imagine it.”
Judah Folkman (1933-2008)*

Abstract

This paean composed on the occasion of the inaugural Bernauer W. Newton Trust presentation celebrates the personal and professional culture of 50 years of mentorship, teaching, and research by the American Society for Clinical Hypnosis (ASCH). This review of current neuroscience concepts of therapeutic hypnosis and psychotherapy is made possible by the cooperation and dedication of all members of our society. Emerging pathways of psychosocial genomic research, which will lead to new directions for our society, are highlighted for their impact on our professional practice in the present and future.

Keywords: ASCH culture, bioinformatics, brain plasticity, creativity, fractal, gene expression, mentorship, mirror neurons, neuroscience, psychosocial genomics, REM.

Bernauer Newton, My First Teacher of Therapeutic Hypnosis: Warmth and a Prelude to the Neuroscience Theory of Mind and Mirror Neurons

I well recall my first meeting with Bernauer “Fig” Newton over 45 years ago in 1962 when I began my two year United States Public Health (U.S.P.H.) Post-Doctoral Fellowship in Clinical Psychology to study psychosomatic medicine with Franz Alexander at the Mt Sinai Hospital in Los Angeles, California. “Fig” was an outside consultant in, of all things, clinical hypnosis. I had never previously expressed an interest in hypnosis, but I could not help suppressing a grin the first time I saw him. He certainly was a brilliant man, and yes, his face really did give a humorous fig-like impression, somehow!

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His “Fig-ness” was only emphasized when his eyes crinkled as he smiled broadly because in that very first moment of our meeting *he silently knew that I knew that he was smiling because I was smiling* in astonishment about the appropriateness of his nickname “Fig.” I could not have known it at the time, but this smiling, silent, and simultaneous perception of each other’s thoughts and evanescent emotional states was a succinct example of what would later be called, “The Neuroscience Theory of Mind,” which found evidence for the activity of “Mirror Neurons” as the basis of empathy in apes and man. Mirror neurons are now recognized as a source of the basic talents of the psychotherapist in general and practitioners of therapeutic hypnosis in particular (Rossi & Rossi, 2006).

Within the first few weeks, “Fig” invited me for a personal experience of therapeutic hypnosis in his private office. How did he know that I would be delighted with the prospect? Was this welcomed invitation another example of the neuroscience theory of mind, empathy, and mirror neurons again? I was still the greenest of prospects for therapeutic hypnosis. When I first stumbled into his private office, I immediately felt a wave of warmth. I felt lightheaded, dizzy, and desperately looked for a soft chair I could sink into before I betrayed my fast failing condition by fainting! “Fig’s” eyes seemed owlishly large as he leaned toward me perpetually smiling his figness and speaking softly for I do not recall how long. I have absolutely no memory of anything that was said during our encounter. I only recall that as I was leaving his office I seemed to really awaken as my trance popped softy like a little bubble and my full reality orientation returned.

I paused momentarily as I looked back at his office once more and asked if it was unusually warm. Did he perhaps have the heat turned up a bit high? Was that extra warmth to facilitate hypnosis? He seemed mildly surprised that I had noticed and nodded his head “yes.” His eyes crinkled even more as he chortled, “Well, that’s true; I guess you really have found me out!” I smiled and believed I had stumbled upon one of the subtle secrets of therapeutic hypnosis known only to the cognoscente. Even today, almost 50 years later, I like to have the fireplace warming my home office when I receive clients. I was soon to learn more about heat and the therapeutic encounter from my next two mentors: Milton H. Erickson and David Cheek.

Milton H. Erickson, My Second Teacher of Therapeutic Hypnosis: Heat, Work and “The Burden of Responsibility in Effective Psychotherapy”

During the last eight years of his life when I tape recorded Milton’s sessions with his patients, I often noticed that some of them would begin to sweat and actually turn red during the heat and intensity of their emotional experiences and efforts during therapeutic hypnosis. At such times Milton would turn to stare directly into my eyes with his quick laser-like look of concentrated attention giving me a just barely perceptible smile as if to say, “*There, you see the patient is really working - that cannot be faked!*” Milton would smile even more broadly and chuckle solicitously when patients would wipe the sweat from their brow, flap their arms, pull on their clothing, and exclaim that they were “hot!”

Now I suddenly understood the significance of the little known and appreciated paper he had published two decades earlier on “The burden of responsibility in effective psychotherapy” (Erickson, 1964/2008). There is something very simple, reassuring, and yet profoundly paradigm shaking about the nature of therapeutic hypnosis in this brief six page paper. Erickson maintained that *therapeutic hypnosis is not relaxation, sleep, or a “miracle of healing!”* Erickson, after all, came from a hard working family of farmers. He recognized burden and worth of hard work when he saw it! *Therapeutic hypnosis and effective psychotherapy involved hard work – intense inner activity on the part of the patient - not necessarily the therapist!*

How different this view is from our current demonstrations of therapeutic hypnosis under the hot lights of big camera TV where we typically see the therapist sweating and working very hard to carry the burden of responsibility in effective psychotherapy while the “good patient” sits quietly and relaxed simply imbibing it all. *Erickson believed effective psychotherapy was the result of the patient’s intense inner activity not the therapist!* It was another 10 years before I realized that the patient’s intense creative inner *activity* and work was fundamentally a manifestation of what the molecular biologist called “*activity-dependent gene expression and brain plasticity*” (Rossi, 1986/1993).

**David Cheek, My Third Teacher of Therapeutic Hypnosis:
Psychobiological Criteria for Assessing Validity of Ideodynamic Signaling**

David Cheek, one of Erickson’s early students, was the clincher in convincing me that therapeutic hypnosis depended on the heat of the intense inner activity and work of the patient rather than simple relaxation and programming by the therapist. Cheek trained me to observe patients very carefully during the ideodynamic finger signaling technique of therapeutic hypnosis. He taught me to notice the very first fine sheen of sweat that often appeared on a patient’s finger, forehead, or nose during the emotional intensity of ideodynamic finger signaling. Cheek proposed that heat and sweating were reliable criteria of the validity and intensity of the emotional experience during cathartic experiences of therapeutic hypnosis outlined in box one (Rossi & Cheek, 1988).

**David Cheek’s 3-Stage Psychobiological Criteria for Assessing Validity of
Ideodynamic Finger Signaling**

1. *Emotional and Physiological Memory* can be seen first through changes in *respiration, pulse rate, and emotional reactions such as facial and/or finger flushing, feeling hot, and perspiration*. These occur very rapidly and must occur *before* a designated finger lifts to show an inner orientation to the time of an important experience.

2. *Ideodynamic Finger Signals* indicate the accessing of memory at an unconscious (implicit) level. They usually occur a few seconds after the appearance of physiological memory. At the moment the finger lifts signaling this second, higher level memory, the patient still does not have a verbal level of awareness of the experience; there are only feelings of anticipation, vague unrest, or discomfort.

3. *Verbal reporting* of the experience follows these physiological and ideodynamic finger signals of the inner accessing of meaningful material with a traumatic history. *To reach this conscious horizon of cognition and verbal reporting, the entire experience may have to be reviewed repeatedly*. The patient is told that one finger will lift to signal the beginning of an experience and another finger to signal its ending. *The number of required repetitions to elevate the memory from deep unconscious zones of memory storage depends upon the gravity of the experience*.

Newton's, Erickson's, and Cheek's clinical experiences did not make sense in terms of the prevailing relaxation and sleep approaches to hypnotic induction. It wasn't until the 1990's that a number of German researchers investigated heart rate variability as a function of the provoked "intellectual work load by means of a hypnotic suggestion" (Hautkappe & Bongartz, 1992, p. 75; Unterweger, Lamas, & Bungartz, 1992). While traditional applications of therapeutic hypnosis focused on relaxation or "low phase hypnosis," research by these workers indicated that therapeutic hypnosis could engage a significant "work function" that operates differently in high and low hypnotic susceptibility subjects. Consistent with Cheek's recognition of heart and pulse changes as an index of responsiveness in ideodynamic signaling, Hautkappe & Bongartz (1992) found that heart rate variability was a useful physiological index for discriminating high and low hypnotic susceptibility. They found that high susceptible hypnotic subjects have less heart rate variability. "High susceptible subjects do not have to work as hard on passing a suggestion as do low susceptibles" (Unterweger, Lamas, & Bongartz, 1992, p. 87).

Milton Erickson often described good hypnotic subjects as having higher "response attentiveness" or focus of attention so their mind-body system does not require an indiscriminate massive arousal to do certain tasks (Erickson & Rossi, 1979/2008). Erickson actually used psychological shocks and creative moments to focus attention in what we would now call "high phase hypnosis" (Rossi, 1973). This leads to the view that high hypnotic susceptibility may be associated with a more efficient psychobiological use of information and energy. Barabasz and Barabasz (1996) have documented how this work function or heightened activity of "alert hypnosis" can facilitate neural biofeedback in children with attention deficit hyperactivity disorder (ADHD). These considerations led me to believe that any truly complete theory must embrace both high and low levels of activity in the domain of therapeutic hypnosis as illustrated in figure one.

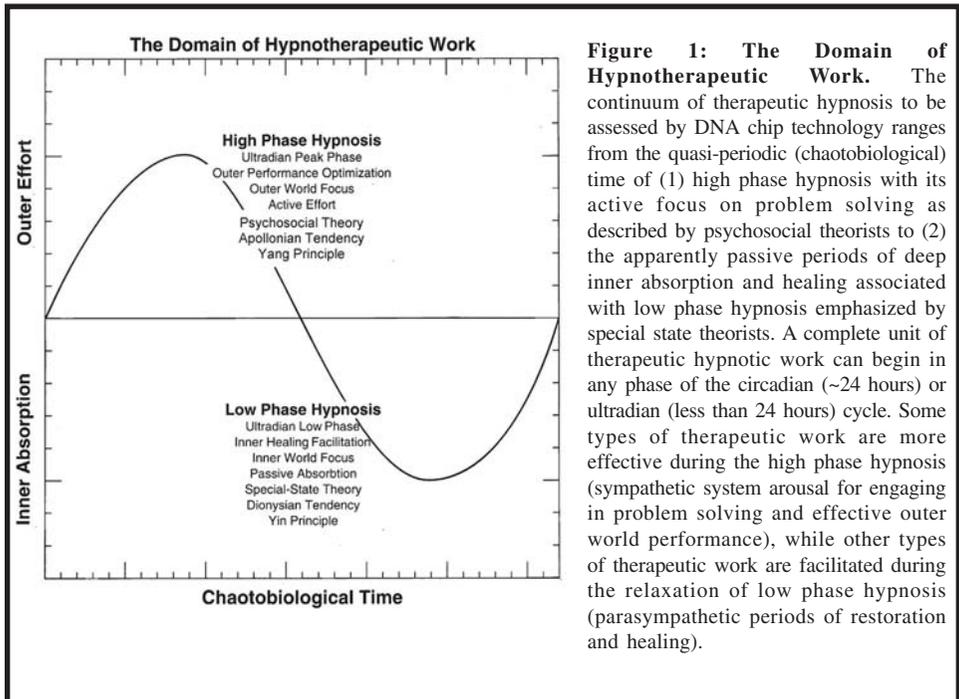
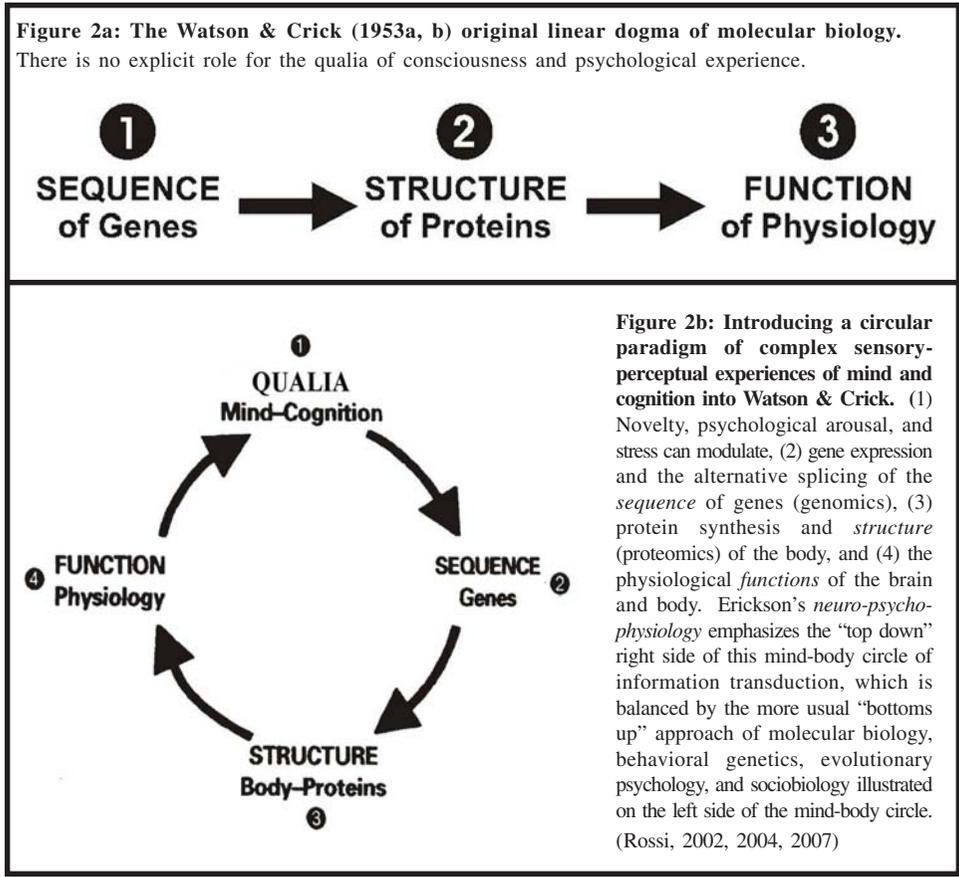


Figure 1: The Domain of Hypnotherapeutic Work. The continuum of therapeutic hypnosis to be assessed by DNA chip technology ranges from the quasi-periodic (chaotobiological) time of (1) high phase hypnosis with its active focus on problem solving as described by psychosocial theorists to (2) the apparently passive periods of deep inner absorption and healing associated with low phase hypnosis emphasized by special state theorists. A complete unit of therapeutic hypnotic work can begin in any phase of the circadian (~24 hours) or ultradian (less than 24 hours) cycle. Some types of therapeutic work are more effective during the high phase hypnosis (sympathetic system arousal for engaging in problem solving and effective outer world performance), while other types of therapeutic work are facilitated during the relaxation of low phase hypnosis (parasympathetic periods of restoration and healing).

Notice how figure one embraces the entire range of hypnosis theories from Hilgard’s special state perspective to the psychosocial. In a sense, *The Domain of Hypnotherapeutic Work* in figure one illustrates how we can integrate the apparent opposites of “therapeutic hypnosis.” We can see how the *Outer Focus of High Phase Hypnosis* associated with human performance peaks only appears to be the opposite of the well known *Inner Absorption and Healing Facilitation of Low Phase Hypnosis*. These apparent opposites have given rise to much of the controversy and debate about the nature of hypnosis, which I now believe can be investigated and resolved by the bioinformatics of therapeutic hypnosis, psychotherapy and rehabilitation.

The Bioinformatics of Therapeutic Hypnosis, Psychotherapy and Rehabilitation

While it is now generally believed that the molecular-genomic revolution initiated by Watson & Crick and others 50 years ago eventually will serve as a foundation for all the medical and psychological disciplines, it has had relatively little impact on therapeutic hypnosis at this time. I believe the reason for this can be found in the contrast between figures 2a and 2b. Figure 2a illustrates Watson & Crick’s (1953a & b) original view of what they called “the basic dogma of molecular biology”: how (1) the linear DNA code of nucleotides that make up the *sequence* of our genes generates and (2) the *structure* of the proteins of our body, which in turn generates (3) all the physiological *functions* of the body and mind.



Notice that there is no place for mind, cognition or the qualia of human experience in figure 2a. The entire history of therapeutic hypnosis, since James Braid (1855/1970), however, demonstrates there is an experiential connection between mind and body and their reciprocal effects on each other. This, together with current pioneering research in bioinformatics of memory and learning (Kandel, 1998; Rossi, 2002, 2004, 2007, 2008), led me to introduce qualia (mind, cognition & emotions) into the Watson & Crick's *linear outline* to illustrate the *circular process* of mind-body communication in figure 2b. This circular process, which I call, "psychosocial genomics," however, raises as many questions as it answers. How can we account, for example, for the differences between human consciousness and other primates when they both have about the same number of genes (~22,000), which are more than 98% alike? A DNA microarray revolution is currently exploring the special qualities of human brain evolution and experience associated with gene expression and brain plasticity. Cáceres et al. (2003) summarize their research as follows:

"Little is known about how the human brain differs from that of our closest relatives. To investigate the genetic basis of human specializations in brain organization and cognition, we compared gene expression profiles for the cerebral cortex of humans, chimpanzees, and rhesus macaques by using several independent techniques. We identified 169 genes that exhibited expression differences between human and chimpanzee cortex, and 91 were ascribed to the human lineage by using macaques as an out-group. Surprisingly, most differences between the brains of humans and non-human primates involved up-regulation, with ~90% of the genes being more highly expressed in humans. By contrast, in the comparison of human and chimpanzee heart and liver, the numbers of up- and down-regulated genes were nearly identical. *Our results indicate that the human brain displays a distinctive pattern of gene expression relative to non-human primates, with higher expression levels for many genes belonging to a wide variety of functional classes. The increased expression of these genes could provide the basis for extensive modifications of cerebral physiology and function in humans and suggests that the human brain is characterized by elevated levels of neuronal activity*" (p. 13030, italics added).

These elevated levels of gene expression and neuronal activity in the human brain remind us of the heightened psychological experiences of focused attention (*monoideism*) and *fascination*, which were key concepts in early descriptions of the psychophysiology of therapeutic hypnosis by James Braid (1855/1970) outlined in his book, *The Physiology of Fascination*, as follows:

"With the view of simplifying the study of reciprocal actions and reactions of mind and matter upon each other...the [hypnotic] condition arose from influences existing within the patient's own body, viz., the influence of concentrated attention, or dominant ideas, in modifying physical action, and these dynamic changes re-acting on the mind of the subject. I adopted the term 'hypnotism' or nervous sleep for this process...And finally as a generic term, comprising the whole of these phenomena which result from the reciprocal actions of mind and matter upon each other, I think no term more appropriate than 'psychophysiology'." (Tinterow, 1970, pp. 369-372, italics added).

The Psychosocial Genomics of Therapeutic Hypnosis, Psychotherapy and Rehabilitation

Figure three illustrates my thought experiment about how our new conceptual approach of psychosocial genomics could clarify the foundations of therapeutic hypnosis and psychotherapy (Rossi, 2004b). Figure three is my juxtaposition of Aldrich & Bernstein's (1987) circadian profile of hypnotic susceptibility (the cognitive-behavioral level), with a typical profile of body temperature (the physiological level, which Aldrich and Bernstein hypothesized as underlying hypnotic susceptibility) with the profile of the *Thra* and *Perl* gene (the genomic level) (Storch et al., 2002). Aldrich & Bernstein (1987) summarize their result in figure 3A.

“Figure [redrawn here as figure 3a] shows the distribution of mean HGSHS: A scores for each hour at which groups were hypnotized. The distribution is bimodal *with peaks at 12:00 noon and 4:00–6:00 p.m. and a local minimum at 2:00 p.m.* (p. 143, italics added)... *The results provide preliminary evidence that hypnotizability may be related to the circadian rhythm of body temperature.*” (p. 144).

Aldrich & Bernstein hypothesize their results provide preliminary evidence that hypnotizability may be related to the circadian rhythm of body temperature at the physiological level. As may be seen, the circadian profile of core body temperature in Figure 3b is also bimodal and closely approximates the circadian profile of hypnotic susceptibility in Figure 3a. Figure 3c illustrates the circadian expression profile of the *Thra* gene, which is also bimodal and resembles the circadian profiles of hypnotic susceptibility and body temperature. The *Thra* gene, coding for the thyroid hormone receptor- α , is itself induced by the thyroid hormones T3 and T4, which are fundamental in regulating the physiological work of metabolism and *body temperature* (Storch et al., 2002). *This could explain the warmth and heat that “Fig” Newton, Milton Erickson, and David Cheek found their patients experiencing during the intensity of their emotional crises during hypnotherapeutic work by turning on the Thra gene. I hypothesize this may be an example of how mind, cognition, and emotions are causal in turning on gene expression to facilitate “mind-body” healing via therapeutic hypnosis and psychotherapy.*

Figure 3d illustrates the circadian expression profile of the clock gene *period (per 1)*, which is associated with many daytime activities in humans, and resembles the circadian profiles of hypnotic susceptibility and body temperature even more closely than the *Thra* gene. Notice how the circadian profiles of the *per1* and *Thra* gene are similar in having a peak of expression about 90-120 minutes before the peaks of core body temperature and hypnotic susceptibility around noon. This is consistent with the fact that the 90-120 minute *Ultradian Basic Rest-Activity Cycle* is typical for many genes to be expressed via gene transcription and translation into the proteins that ultimately generate their physiological and cognitive-behavioral profiles of circadian expression (Lloyd & Rossi, 1992, 2008; Rossi, 1992). *It is also consistent with the fact that Milton H. Erickson's therapeutic sessions also lasted about 90-120 minutes.*

Figure 3d also illustrates the circadian profile of the *bmal1* gene associated with the sleep state (*the opposite of the per1 and Thra gene profiles associated with being awake*). Storch et al.'s (2002) research on the circadian modulation of gene expression related to body temperature, psychosocial stress (the glucocorticoids), and the immune system (tumor necrosis factor alpha) are of great interest for a psychobiologically oriented approach to therapeutic hypnosis and psychoneuroimmunology at the genomic level. The *ad hoc* assemblage of matched bi-modal circadian profiles of figure 3 is consistent with, *but certainly does not yet prove*, that there are causal and reciprocal relationships in the complex interactions between the cognitive-behavioral level of hypnotic susceptibility, gene expression, and brain plasticity. Such proof would require many novel types of integrative bioinformatic research by the hypnosis community, which is illustrated in the next section.

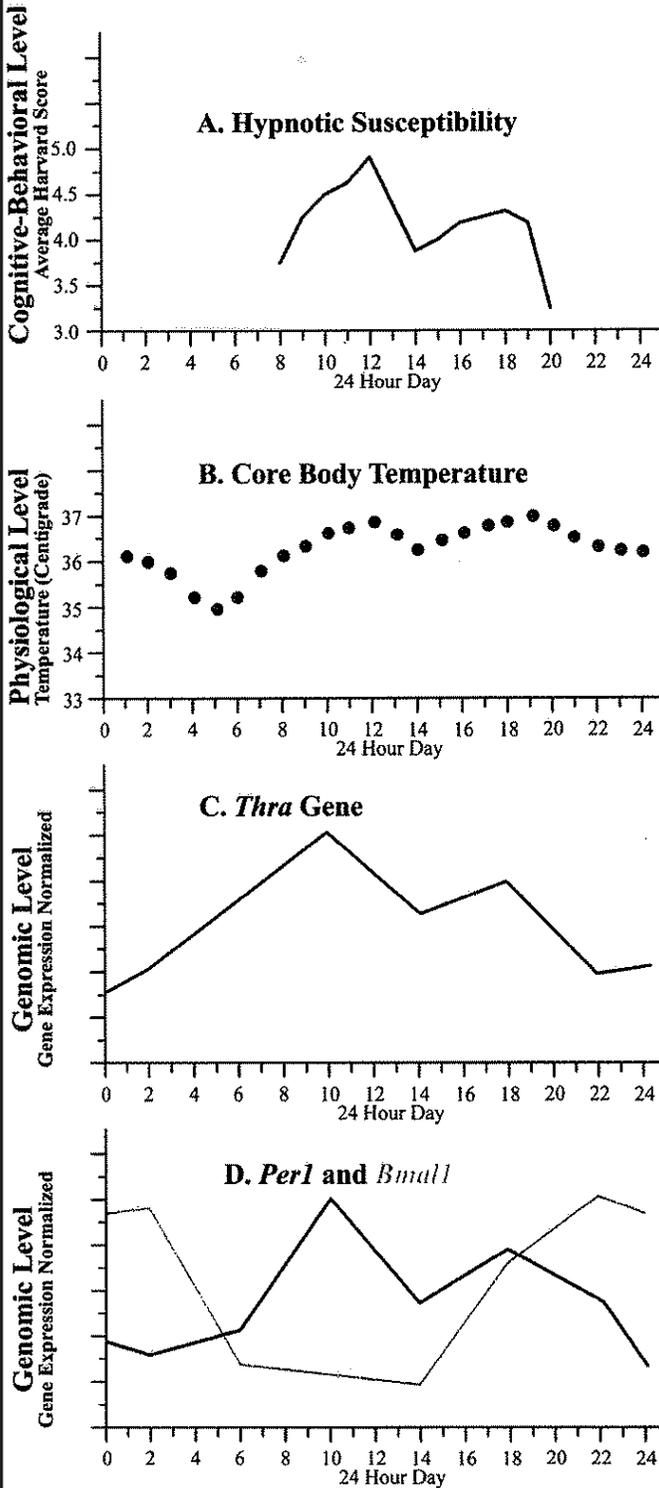


Figure 3: The bioinformatics of hypnotic susceptibility across all levels from mind to gene.

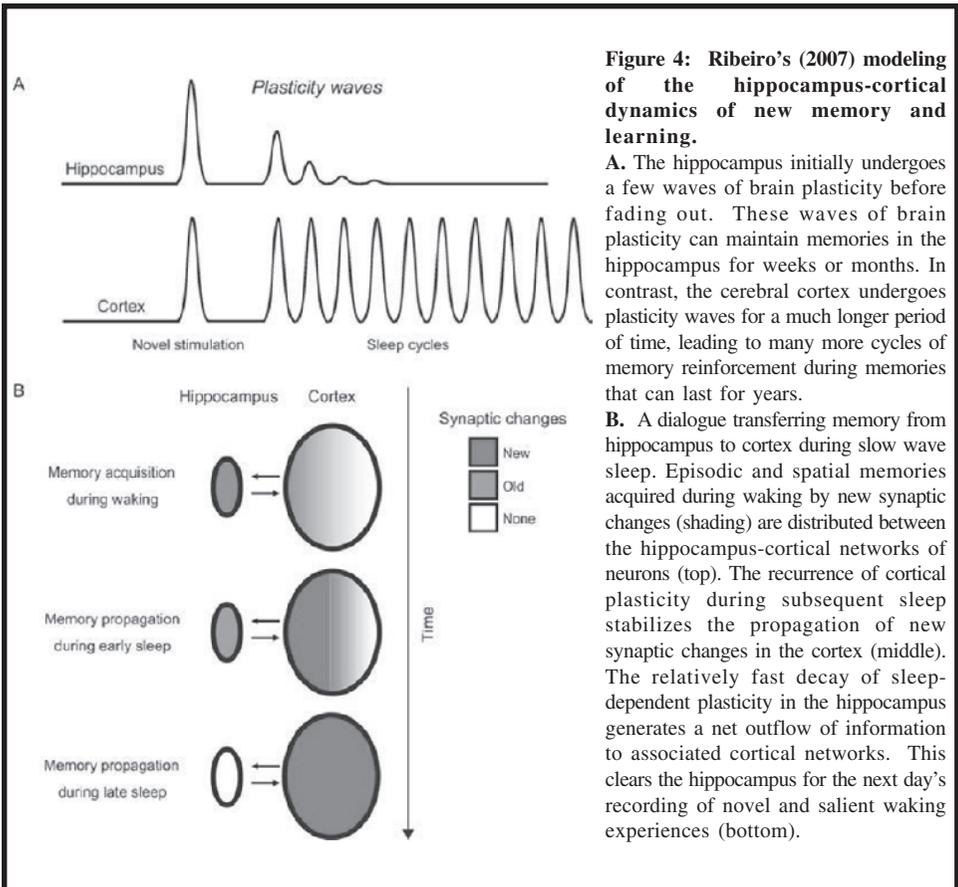
A. The bimodal circadian profile of Hypnotic Susceptibility is similar to

B. Core Body Temperature
 C. *Thra* gene expression, and
 D. *Period one (Per 1)* gene expression (Nestler, E., 2008).

Psychosocial Genomics 101:

Activity-Dependent Gene Expression, Brain Plasticity, and Memory Processing as a Neuroscience Model of Creative Therapeutic Hypnosis and Psychotherapy

Milton Erickson described his therapeutic hypnosis as the *utilization of naturalistic processes of mind and body*. Today, neuroscience is exploring these naturalistic processes with brain imaging and the molecular-genomic methods of DNA microarrays. This is well illustrated by figure 4 which is from Ribeiro et al. (2007) neuroscience model of how the human cortex and hippocampus engage in a daily dialogue to update new memory and learning in the brain. *Please note how profound this is for understanding the deep psychobiology of therapeutic hypnosis and psychotherapy!* Many people still believe that genes are active only during biological reproduction and physiological activities. We now know, however, that special classes of genes called, “activity-dependent” (or “experience dependent”) are activated or “turned on” by many normal, creative, stressful life experiences (e.g. PTSD), and associated psychiatric conditions such as major depression, bipolar disorder, and schizophrenia (Couzin, 2008; Lin et al., 2008). *The psychological level can turn on the biological activity of gene expression and activity-dependent brain plasticity in our physical brain. This is the essence of psychosocial genomics and top-down mind-body therapy!* This is how modern neuroscience has validated the essence of James Braid’s (1855/1970) prescient statement about “the reciprocal actions of mind and matter upon each other” quoted above.



The process illustrated in figure four begins while we are awake when we experience the three types of behavior that turn on “activity-dependent” gene expression and brain plasticity: *novelty, enrichment, and exercise, mental as well as physical* (Rossi, 2002, 2004a, 2007). The hippocampus activates gene expression and brain plasticity to make a temporary neural network recording of novel and highly salient interactions with the environment. *Think of this as the patient having a novel and numinous emotional experience narrating her story and getting some new insights about her life during therapeutic hypnosis.* Later during sleep the hippocampus repeatedly replays this novel experience to the cortex during slow wave sleep (SWS), which stimulates the cortex to turn on “activity-dependent gene expression and brain plasticity” to update the brain/mind in an evolutionary adaptive manner during rapid eye movement (REM dream) sleep. Ribeiro et al. (2007) found that two brain plasticity-related immediate-early genes, *arc* and *zif-268*, are central to this process of consolidating new memory and learning. *Think of this as the post-hypnotic process of how the brain/mind utilizes the therapist’s permissive suggestions (which I now call “implicit processing heuristics”) to facilitate mind-body healing as illustrated in figure four.*

Figures 5, 6a & 6b, and 7 illustrate the dynamics of activity-dependent gene expression and brain plasticity, which underpin the creative process of therapeutic hypnosis, psychotherapy, and the arts and sciences (Rossi, 2002, 2004a, 2007).

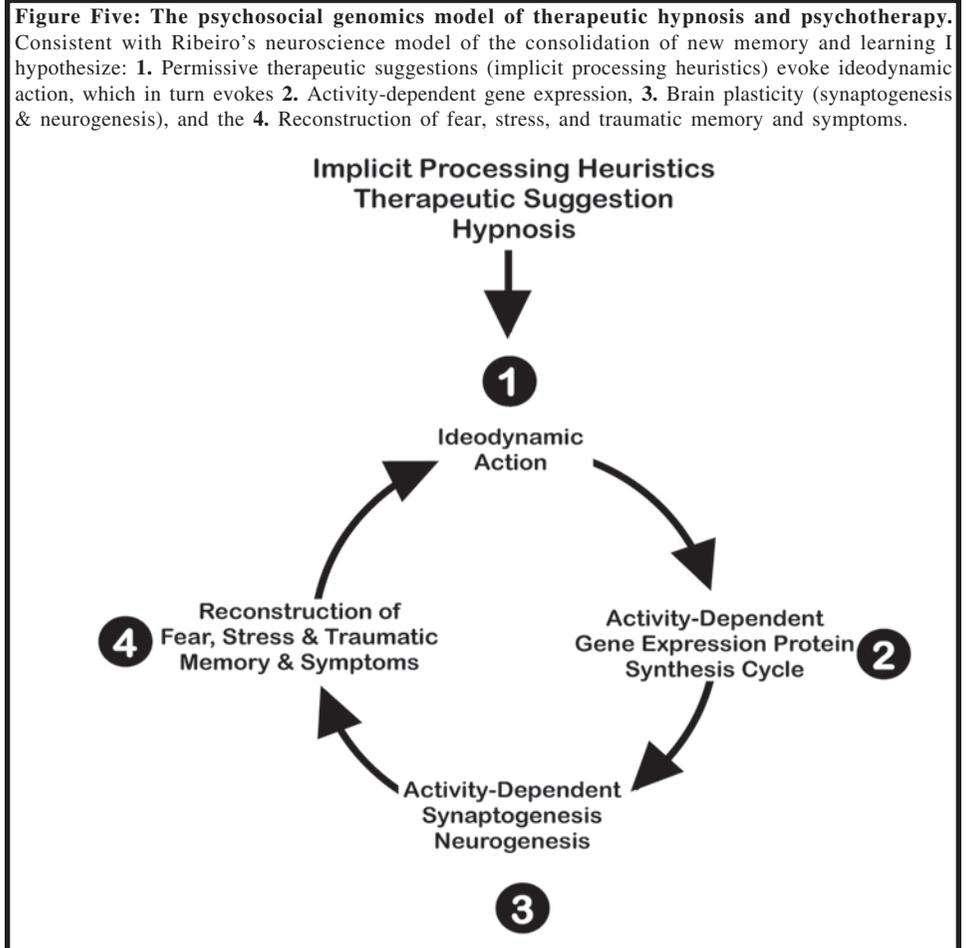


Figure 6a: Wave form profile of Erickson's neuro-psycho-physiology during the 4-stage creative process. The ultradian profile (90-120 minutes) of the 4-stage creative process on the psychological level (top most portion of the upper curve). The proteomics (protein) profile in middle curve depicts the energy landscape for protein folding within neurons of the brain into the correct structures needed for brain plasticity (Balch, Morimoto, Dillin, & Kelly, 2008; Cheung, Chavez & Onuchic, 2004). This proteomic profile arises from the functional concordance of co-expressed genes illustrated by the genomics profile below it. This genomics curve represents the actual gene expression profiles of the immediate-early gene c-fos and 10 other genes (alleles) over the typical Basic Rest-Activity (BRAC) period of 90-120 minutes (Levsky, Shenoy, Pezo, & Singer, 2002). The lower diagram illustrates how these psychobiological dynamics are typically experienced as Kleitman's 90-120 minute Basic Rest-Activity Cycle within the normal circadian cycle of waking and sleeping (Rossi, 2002, 2004a, 2007).

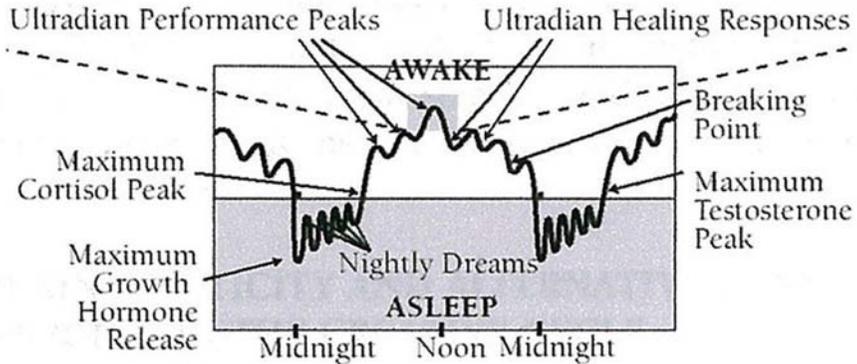
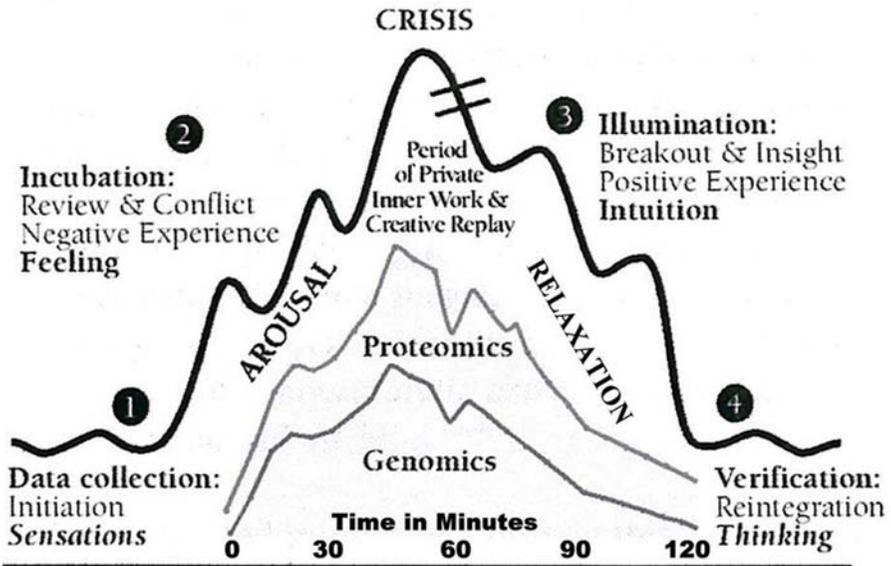


Figure 6b: Wave form profile of protein dynamics. Protein aggregation and folding required within cells for physiological processing in development, aging, and disease intervention (Top: wave form profile). Three circular networks of proteins interacting with their chaperones (Bottom circles; Balch, Morimoto, Dillin, & Kelly, 2008). Note the essential fractal self-similarity of the pyramidal wave form of arousal and relaxation of fig. 6a and 6b. While the mechanisms of psychobiological clocks may be different, the fractal self-similarity of their psychobiological time domains models how their interactions on all levels from mind to molecule (e.g. from the experiential dynamics of therapeutic hypnosis in 6a to genes and proteins in 6b) may be related (Lloyd & Rossi, 1992, 2008; Krishan & Nestler, 2008; Nestler, 2008).

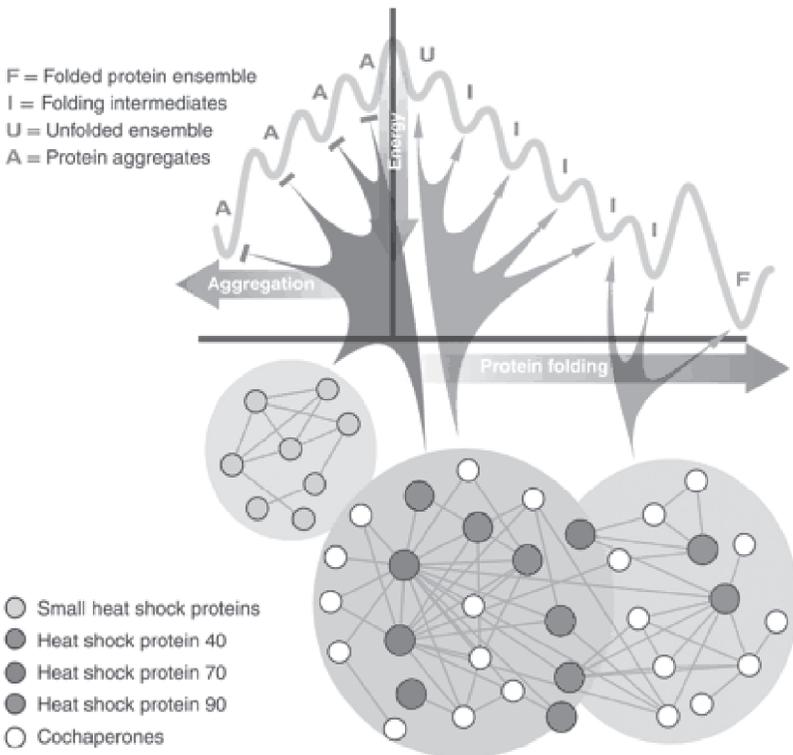


Figure 7: A cartoon of the four-stage creative process. Stage one is getting a new idea and starting to work on a problem (first two panels on the left). Stage two is the typically difficult experience of incubation, struggle, and emotional conflict trying to solve a problem. Stage three is the creative moment of getting a flash of insight. Stage four is the happy verification of the problem solution in the real world. (With permission, Tomlin, 2005)



It will certainly require decades of research to document the many genes associated with therapeutic hypnosis and psychotherapy, but a beginning has already been made (Lichtenberg, 2000, 2004; Raz, 2008; Rossi, 1986/1993, 2002, 2004a & b, 2007). I am currently consulting with a research team in Italy exploring gene expression and brain plasticity during therapeutic hypnosis and psychotherapy (Rossi, E., Iannotti, Castiglione, Cozzolino, & Rossi, K., 2008, in press). If we find the *arc*, *comt*, *DRD4*, *MAOA*, *zif-268* and many other genes are expressed during these studies, it will be another link supporting the emerging neuroscience of psychosocial genomics and a deeper appreciation of therapeutic hypnosis, psychotherapy, and creative human experience on all levels of mind and body. Figures 8a-d illustrate my current psychosocial genomic vision and open questions about how the four stages of the creative process manifested in a video recorded demonstration of therapeutic hypnosis at an Ericksonian congress, which is available from the MHE Foundation (“A Sensitive Fail-Safe Approach to Hypnosis,” code IC-92-D-V8). Chapters seven and eight of Rossi (2002) contain the entire verbatim transcription and detailed analysis of this video.

Figure 8: Four stages of the creative process in therapeutic hypnosis.



Figure 8a. Stage One: The therapist models a delicately balanced and symmetrical hand position a few inches above the lap to initiate a hand levitation approach to the induction of therapeutic hypnosis. The therapist wonders what stage of the basic rest-activity cycle (BRAC) the patient may be experiencing, whether CYP17 — the social gene — is becoming engaged as a natural manifestation of the psychotherapeutic transference, and to what extent immediate-early genes (IEGs) such as *c-fos* and *c-jun* — associated with a creative state of psychobiological arousal, problem solving, and healing—are becoming engaged.



Figure 8b. Stage Two: The patient experiences psychobiological arousal (associated with behavioral state-related gene expression (BSGE)). She evidences surprise and confusion about her unusual sensations and involuntary movements that were *not* suggested by the therapist. The therapist wonders how to facilitate the psychosocial genomics of therapeutic hypnosis associated with the *comt* gene expression (Lichtenberg, Bachner-Melman, Gritsenko & Ebstein, 2000; Lichtenberg, Bachman-Melman, Ebstein & Crawford, 2004) to turn on immunological variables such as interleukin-1, 2, and 1β associated with Cox2 that has been implicated in rheumatoid arthritis which is the patient's presenting symptom.



Figure 8c. Stage Three: The patient experiences the playful activity-dependent exercise of shadow boxing as a creative breakout of her typically restrained hand and finger movements associated with her rheumatoid arthritis. Future research will be needed to determine if activity-dependent gene expression (ADGE) — such as the CREB genes associated with new memory and learning — as well as the ODC and BDNF genes associated with physical growth and brain plasticity are actually being engaged during such creative moments.

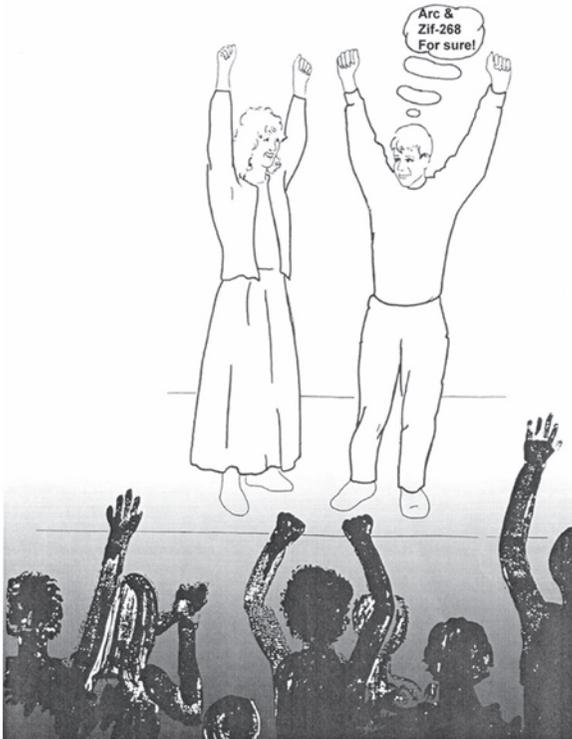


Figure 8d. Stage Four: The patient receives a standing ovation from the audience. The therapist speculates that the *arc* and *zif-268* genes may be expressed in her REM dream states tonight to encode her new therapeutic experiences with brain plasticity supported by this unusually strong show of psychosocial support. A DNA microarray data analysis of the white blood cells of three human subjects performed immediately before, one hour after and 24 hours after therapeutic hypnosis documented changes in the activity-dependent gene expression of 15 early response genes within one hour that apparently initiated a further cascade of 77 genes 24 hours later (Rossi, Iannotti et al., 2008, in press).

Summary

We certainly have come a long way from the early approaches of historical hypnosis and our teachers such as Bernauer Newton, Milton Erickson, and David Cheek. Here are a few of the emerging principles of the psychosocial genomics of therapeutic hypnosis, psychotherapy, and creativity we now need to research.

1. Normal, novel, creative, and stressful psychosocial activities in everyday life turn on patterns of activity-dependent gene expression and brain plasticity that can now be measured in real time with DNA microarrays and brain imaging. This is becoming recognized as a foundation of personalized medicine, therapeutic hypnosis, psychotherapy and rehabilitation.
2. Novel and salient activities when we are awake are replayed in dialogues between our brain cortex and hippocampus during slow wave sleep and REM dreaming to update memory and learning in an evolutionary adaptive manner. *These state-dependent neural “dialogues” are a new model for the psychosocial genomic foundations of therapeutic hypnosis and psychotherapy.*
3. Therapeutic hypnosis can facilitate our natural circadian/ultradian cycles of waking, sleep, and dreaming to evoke creative psychosocial genomic patterns of activity ranging from optimal performance to rest and healing on many levels from mind to gene.
4. Extending our culture of teaching, training, mentorship, and research in therapeutic hypnosis to facilitate these emerging principles of psychosocial genomics is a high priority for the American Society of Clinical Hypnosis. Clinicians can now explore complex genomic/environmental interactions in themselves and their patients with new personal research models available at <https://www.23andme.com> or <https://www.decode.me> etc.

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