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What is a Suggestion? The Neuroscience of Implicit Processing Heuristics in Therapeutic Hypnosis and Psychotherapy

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Abstract

Neuroscience and bioinformatics research on activity-dependent gene expression and brain plasticity in memory and learning are used to reconceptualize a fundamental question of therapeutic hypnosis, "What is a suggestion?" John Kihlstrom's cognitive-behavioral perspective of implicit (unconscious) and explicit (conscious) memory and Eric Kandel's Nobel Prize winning neurobiological research are integrated for a 30-year update of Milton H. Erickson's "neuro-psycho-physiology" of therapeutic hypnosis. Implicit processing heuristics are proposed as a more general framework for Erickson's concept of permissive indirect suggestions in therapeutic hypnosis and psychotherapy. These perspectives are illustrated by utilizing implicit processing heuristics to facilitate the four-stage creative process in converting implicit to explicit memory in a brain-damaged patient.

Keywords: Activity-dependent gene expression & brain plasticity, consciousness, implicit processing heuristics, therapeutic suggestion.

Introduction: What is a suggestion?

"What is a suggestion?" is a fundamental and highly controversial question explored by the late Andre Weitzenhoffer (2000) in his critical analysis of the clinical and research literature of hypnosis. We will re-conceptualize this question by first reviewing Erickson and Rossi's (1976/2007) perspective on psychological implication as a model of Erickson's indirect approach to hypnotic suggestion. We will update

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this perspective with new insights about the role of consciousness and attention in the formation of implicit (unconscious) and explicit (conscious) memory and learning by John Kihlstrom (2006a,b) and Eric Kandel (2006). We will outline how such research is consistent with our hypothesis that the function of consciousness in general and the focus of attention, in particular, is to turn on activity-dependent gene expression, brain, and behavioral plasticity in the normative dynamics of adaptation, problem solving, and healing, which are highly conserved during evolution at the molecular-genomic level (Rossi, 2002, 2004, 2005, 2007). We apply this neuroscience and bioinformatic framework to illustrate how implicit processing heuristics may be utilized as the most general class of permissive therapeutic suggestions for facilitating memory, learning, problem solving, and healing (Erickson and Rossi, 1976/2007).

Psychological Implication as a Model of Erickson's Therapeutic Suggestion

While Erickson used direct suggestion, particularly during the early, experimental stage of his career, he later emphasized that attempting to directly program people without understanding their individuality was "a very uninformed way of doing therapy" (Erickson & Rossi, 1979/2008, p. 288). In our first collaborative effort to describe his use of indirect suggestion we found that Erickson's "implied directive" was the most useful for conceptualizing therapeutic suggestion. Erickson believed that implication contributed to therapeutic suggestion because it is not what the therapist says that is important as much as what the patient does with what the therapist says (Erickson & Rossi, 1976/2007).

> An understanding of how Erickson uses implication will provide us with the clearest model of his indirect approach to hypnotic suggestion. Since his use of implication may involve something more than the typical dictionary definition of the term, we will assume that he may be developing a special form of 'psychological implication.' For Erickson, psychological implication is a key that automatically turns the tumblers of a patient's associative processes into predictable patterns without awareness of how it happened. The implied thought or response seems to come up autonomously within patients, as if it was their own inner response rather than a suggestion initiated by the therapist. Psychological implication is thus a way of structuring and directing a patient's associative processes when they cannot do it for themselves. The therapeutic use of this approach is obvious. If patients have problems because of the limitations in their ability to utilize their own resources, then implications are a way of bypassing these limitations.
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> It is important in formulating psychological implications to realize that the therapist only provides a stimulus; the hypnotic aspect of psychological implications is created on an unconscious level by the listener. The most effective aspect of any suggestion is that which stirs the listener's own mental processes into automatic action. It is this autonomous activity of the listener's own associations and mental processes that creates hypnotic experience.
>
> There are, to be sure, crude and mostly ineffective uses of implication in everyday life, where the speaker in a very obvious manner attempts to cast negative implications or aspersions on the listener. In

> such crude usage the implication is obviously created entirely by the speaker. In our use of psychological implication, however, we mean something quite different. In the psychological climate of the therapeutic encounter the patient is understood to be the center of focus. Every psychological truth is consciously or unconsciously received by the patient for its possible application to himself. Psychological implication thus becomes a valuable indirect approach to evoking and utilizing a patients own associations to deal with his own problem. (p. 59-60, italics added here).

Erickson wrote that the most effective aspect of therapeutic suggestion is that which stirs the listener's own mental processes into creative activity that generates the so-called "miracle" of healing as follows (1964).

> In each instance, hypnosis was used for the specific purpose of placing the burden of responsibility for therapeutic results upon the patient himself after he himself had reached a definite conclusion that therapy would not help and that a last resort would be a hypnotic "miracle." In this author's understanding of psychotherapy, if a patient wants to believe in a "hypnotic miracle" so strongly that he will undertake the responsibility of making a recovery by virtue of his own actual behavior and continue his recovery, he is at liberty to do so under whatever guise he chooses, but neither the author nor the reader is obligated to regard the success of the therapy as a hypnotic miracle. The hypnosis was used solely as a modality by means of which to secure their cooperation in accepting what they wanted. In other words, they were induced by hypnosis to acknowledge and act upon their own personal responsibility for successfully accepting the previously futilely sought and offered but actually rejected therapy . . . a long series of similar cases are reported here to illustrate the use of hypnosis as a technique of deliberately shifting from the therapist to the patient the entire burden of both defining the psychotherapy desired and the responsibility for accepting it." (pp. 62-65, italics added).

From our current neuroscience perspective it is the patient's own creative activity that evokes activity-dependent gene expression, brain, and behavioral plasticity, and the so-called "miracles of mind-body healing." It is the deeply meaningful and creative replaying of the listener's own mental processes that creates hypnotic experience, problem solving, and healing. The locus of healing is within the patient; the therapist has no mysterious or extra-ordinary powers of control or healing. Patients heal themselves when they are fortunate enough to receive appropriate "therapeutic suggestions," that function as "implicit processing heuristics." This evokes numinous experiences of novelty, enrichment, and activities that generate activity-dependent gene expression, brain plasticity, and mind-body healing (Rossi, 2007).

Many years after the concept of the implied directive and psychological implication as important keys to Erickson's successful use of therapeutic hypnosis (Erickson & Rossi, 1976/2007) were described, the central role of implication became recognized in neuroscience. Squire and Kandel (1999), for example summarized the role of categorical learning (Rossi, 1963, 1964; Rossi & Rossi, 1965) and implication in understanding the difference between conscious (explicit or declarative knowledge) and unconscious (implicate or non-declarative knowledge) in the dynamics of memory and learning.

> The question of interest is: What kind of memory underlies the ability to knowledge about categories? The surprising answer is that at least some kinds of category learning are non-declarative. Category learning can be independent of and parallel to declarative memory, rather than simply derivative from it. *People can acquire knowledge about categories implicitly even when their declarative memory for the instances that define the category is impaired." (p. 183, italics added).*

Recent research efforts to assess the value of Erickson's approaches to psychological implication in therapeutic suggestion remain controversial, however. Some researchers failed to find any superiority of indirect suggestion over direct suggestion (Matthews, 2000), but many clinicians dispute the validity of the research methods used (Peter & Revenstorf, 2000). Erickson's indirect approaches to therapeutic suggestion involved the patient's "experience of re-associating and reorganizing his own experiential life that eventuates in a cure, not the manifestation of responsive behavior, which can, at best, satisfy only the observer" (Erickson's, 1948/2006). The research that purports to demonstrate that indirect suggestion was not superior to direct suggestion, however, used the so-called objective measures of responsive behavior on standardized scales of hypnotic susceptibility that typically restricted the creative replay and reconstruction of the subject's subjective associations. When investigators compared the subjective perceptions of subjects to their own hypnotic experiences with the objective behavioral measures of direct and indirect suggestion, however, they came to these interesting conclusions (Matthews et al., 1985).

> While the behavioral data failed to show significant differences between the two methods, however, *subjects did report feeling more deeply hypnotized during the indirect procedure than during the direct procedure. This result is in support of an Ericksonian view...of indirect suggestion in that wider latitude for responding is offered to subjects than is typically available with direct suggestion.* Thus, the subject's unique responses to indirect suggestions can be interpreted by them to be an indication of trance depth. If subjects fail to perform in accordance with a direct suggestion, however, there is some likelihood that they may perceive themselves as less deeply hypnotized."(pp. 222-223, italics added).

It is precisely this "wider latitude for responding in the subject's unique responses to indirect suggestions that Erickson wished to facilitate as a creative experience of re-associating and reorganizing their own experiential life that eventuates in a cure." While indirect suggestion can facilitate the creative replay, re-association, and re-synthesis of subjective experiences, indirect suggestion is not necessarily useful in the manipulation and control of the subject's objective behavior as it is assessed with standardized scales of hypnotic susceptibility. Even with research that demonstrates the efficacy of indirect suggestion in facilitating the subject's personal creativity, the misperception that Erickson & Rossi's (1976/2007) indirect hypnotic suggestion is a covert method of programming the patient with the therapist's goal remains an important issue in professional practice as well as public perception. Polczyk and Pasek (2006, p. 394), for example, recently clarified these difficult and easily confused issues from another perspective in the history of hypnosis research where "direct suggestions are 'outspokenly expressed,' that is, the intention to influence is overt. In contrast, indirect suggestions are masked, that is, the intention to influence is concealed."

In a more recent paper, however, Kihlstrom (2006a) has clarified how this "direct-indirect dichotomy" fails to account for what is most interesting about the "explicit-implicit distinction" as follows:

> In the final analysis, both the 'direct-indirect' and 'intentional-incidental' dichotomies fail to capture the essence of the explicit-implicit distinction–which is that explicit memory is conscious recollection, and implicit memory is unconscious memory, of the past. But if implicit memory is unconscious memory, why not simply call it that? The answer is more likely to be found in sociology than psychology, as those who would make a science of unconscious mental life have sought to avoid the taint of Freudian psychoanalysis... Still, *what makes implicit memory interesting is not that implicit tests provide indirect, possibly surreptitious, assessments of what a person remembers; nor that implicit expressions of memory occur involuntarily. What makes implicit memory interesting is that it represents the dynamic influence of memory in the absence of conscious recollection.* (In Press, italics added here).

Because of this confusion between (1) programming and control by the therapist with direct suggestions versus (2) creative inner work by the patient via indirect suggestions, we need to make a special effort to distinguish between them. In their first book, Erickson and Rossi (1976/2007) emphasized how the classical, directive concept of hypnotic suggestion could be complemented with indirect suggestion. Because of the ambiguity of the concept of "indirect suggestion" and its possible negative connotations of surreptitious manipulation and programming of the subject, however, "indirect suggestion" is now being replaced with the concept of "implicit processing heuristics" wherever appropriate in the recent commentaries on Milton H. Erickson's Complete Works on CDs (1948/2006). Implicit processing heuristics designate how permissive and positive suggestion in every day life as well as therapeutic hypnosis, psychotherapy, and rehabilitation can facilitate the implicit processing of memory and learning during "offline processing" (sleep, dreaming, etc) via gene expression, brain plasticity, and mind-body healing within the subject. We now need brain imaging and DNA microarray research to document the full range and limitations of implicit processing heuristics in modulating the molecular-genomic pathways of therapeutic hypnosis and other approaches to mind-body healing and rehabilitation. Eric Kandel's (2006) recent summary of his lifetime of research on implicit and explicit memory provides an updated neuroscience database for our explorations of memory and its facilitation with implicit processing heuristics.

Kandel's Implicit and Explicit Memory, Gene Expression, and Brain Plasticity

In an incisive chapter titled, "Attention must be paid!" Kandel (2006) recounts the history research on the role of attention in memory and learning that began with William James' Principles of Psychology (1890/1981). James maintained that there are two classes of attention: involuntary and voluntary. Involuntary attention is an automatic neural process activated by the external world by big things, bright things, and moving things, or blood that is evident in implicit memory. Voluntary attention such as reading this sentence, by contrast, is a characteristic of explicit memory activated by a self-directed internal need to learn and remember. Kandel describes his research in this context as follows:

> James argued that voluntary attention is obviously a conscious process in people; therefore, it is likely to be initiated in the cerebral cortex. Viewed from a reductionist perspective, both kinds of attention recruit signals of salience, such as modulatory neurotransmitters, that regulate the function or configuration of a neural network.

Our molecular studies in Aplysia [a marine snail] and mice support James's contention that these two forms of attention, involuntary and voluntary, exist. One of the key differences between them is not the absence or presence of salience, but whether the signal of salience is perceived consciously. . . the determining factor in whether a memory is implicit or explicit is the manner in which the attentional signal for salience is recruited.

In both types of memory...conversion of short-term memory to long-term memory requires the activation of genes, and in each case modulatory transmitters appear to carry an attentional signal marking the importance of a stimulus. In response to that signal, genes are turned on and proteins are produced and sent to all the synapses. Serotonin triggers protein kinase A in Aplysia, for example, and dopamine triggers protein kinase A in the mouse [and humans]. But these signals of salience are called up in two fundamentally different ways for the implicit memory underlying sensitization in Aplysia and the explicit memory required to form the spatial map in the mouse [and humans].

In implicit memory storage, the attentional signal is recruited involuntarily (reflexively), from the bottom up: the sensory neurons of the tail, activated by a shock, act directly on the cells that release serotonin. In spatial [explicit] memory, dopamine appears to be recruited voluntarily, from the top down: the cerebral cortex activates the cells that release dopamine, and dopamine modulates activity in the hippocampus."(p 313-314, italics added here).

Figure one illustrates how Kandel's contrasts the neural pathways and neurotransmitters of implicit and explicit memory on the unconscious and conscious levels respectively. Note, however, how the dynamics of both implicit and explicit memory stimulate activity or experience-dependent gene expression, which generates the growth of new synaptic connections (brain plasticity in the marine snail Aplysia, mice, and humans.)

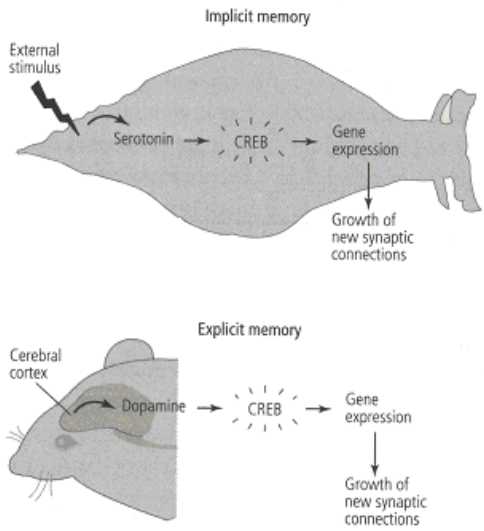

Figure 1: How Implicit and Explicit Memory Turn on Activity-Dependent Gene Expression and Brain Plasticity. In implicit (unconscious) memory, an outside stimulus automatically and involuntarily triggers a salience signal (the neurotransmitter serotonin), which turns on activity-dependent gene expression and brain plasticity (growth of new synaptic connections). In explicit (conscious) memory, the cerebral cortex voluntarily recruits a salience signal (the neurotransmitter dopamine), which focuses attention modulating activity-dependent gene expression and brain plasticity in the hippocampus and eventually the cerebral cortex.

Some of the related features of attention, implication, heuristics, memory, and suggestion are listed in table one. To these we would add the important contributions of Warrington & Weiskrantz (1968) and Schacter (1987) on the role of priming on episodic and implicit memory described by Kihlstrom (2006a, in press) as follows.

> In 1968, Warrington and Weiskrantz reported an experiment in which amnesic patients were asked to study a list of familiar words. Compared to control subjects, the patients performed very poorly on standard tests of recall and recognition. However, when they were presented with three-letter stems or fragments, and asked simply to complete the cues with the first word that came to mind, amnesiacs and controls were equally likely to complete the cues with items from the studied list.
>
> *This is a priming effect, in which the processing of one item influences the processing of another item. In positive priming, the prime facilitates processing of the target; in negative priming, the prime inhibits processing of the target*. In this instance, the priming effect indicates that the studied items were encoded in memory, retained in storage, and influenced performance on the completion test. *The fact that equivalent levels of priming occurred in neurologically intact subjects, who remembered the priming episode normally, and amnesic patients, who had very poor memory, indicates that priming can be dissociated from conscious recollection.* On the basis of evidence like this, Schacter distinguished between two expressions of episodic memory [autobiographical memory for events that have occurred in our personal past]: explicit and implicit (Schacter, 1987). *Explicit memory refers to conscious recollection of a past event, as exemplified by performance on recall and recognition tests. By contrast, implicit memory refers to any effect of an event on subsequent experience, thought, or action. Priming is, of course, just such an effect. The dissociation between priming and recall in amnesic patients indicates implicit memory can persist in the absence of explicit memory.* (pp. 5-6. italics added here).

Table One: Related Concepts of Attention, Implication, Heuristics, Memory, and Suggestion on the Unconscious and Conscious Level

Memory & Learning	Unconscious	Conscious
William James	Involuntary Attention	Voluntary Attention
Milton Erickson	Indirect Suggestion	Direct Suggestion
Ernest Rossi	Implicit Heuristics	Explicit Heuristics
Daniel Schacter	Implicit Memory	Explicit Memory
Eric Kandel	Implicit Memory	Explicit Memory

We propose that while history has given these processes different names, from an evolutionary perspective they are all related on the molecular-genomic and neuro-psycho-physiological levels. Kandel summarizes his research on the molecular mechanisms of implicit and explicit memory and learning by emphasizing the differences in the brain dynamics of men and women as follows.

> Consistent with this idea that similar molecular mechanisms are used for top-down and bottom-up attentional processes, we have found a mechanism that may be involved in stabilizing the memory in both cases. The hippocampus of the mouse [and humans] contains at least one prion-like protein similar to the one Kausik Si discovered in Aplysia. Martin Theis, a postdoctoral student from Germany, and I found that, in much the same way that serotonin modulates the amount and state of the CPEB protein in Aplysia, dopamine modulates the amount of the prion-like CPEB protein (CPEB-3) in the mouse hippocampus. This discovery raised the intriguing possibility – so far just that – that spatial maps may become fixated when an animal's attention triggers the release of dopamine in the hippocampus and that dopamine initiates a self-perpetuating state also mediated by CPEB.
>
> The importance of attention in stabilizing the spatial map raises another question: Is the spatial map, a map formed by learning, similar in all of us? Specifically, do men and women use the same strategies to find their way around an environment? This is a fascinating question and one that biologists are just beginning to explore. [There are] clear differences in the way women and men attend to and orient themselves to the space around them. *Women use nearby cues or landmarks. . .Brain imaging shows activation of different areas in men and women as they think about space: the left hippocampus in men and the right parietal and right prefrontal cortex in women.* These studies point out the potential benefits for group effectiveness of optimizing both strategies (pp. 314-316, italics added).

Just as Kandel found simple model organisms to differentiate between implicit and explicit memory and learning, so we need to differentiate between the implicit and explicit components of therapeutic suggestion to better facilitate problem solving and healing (Erickson & Rossi, 1976/2007, In Press). We will illustrate how implicit processing heuristics may evoke, focus, and facilitate the patient's own specific associations, life experiences, and inner resources in active, patient-centered, creative work that is sometimes so intense that the patient feels hot and actually sweats with effort (Rossi & Cheek, 1988). This is in striking contrast to the diffuse, non-specific, and continuous singsong "hypnotic patter" that is commonly observed in professional hypnosis training workshops when the therapist is apparently doing most of the active work by talking, which attempts to cast a "hypnotic spell" over the apparently passive patient who is merely receiving. The implicit processing heuristics illustrated in this case, by contrast, allow patients a great deal of free time for self-directed inner work during which they can find their own words, cognitions, and feelings to actively express their own creative impulses in their own way rather than attempting to passively imprint and follow the therapist's words. Implicit processing heuristics empower

the patient to activate, explore, and focus their own approaches to problem solving and healing wherein they create their own metaphors, behavioral prescriptions, and neuro-psycho-physiological pathways.

The Hip-Nose Doctor, Brain Damage, and the Hidden Tickets: Converting Implicit Memory to Explicit Consciousness

A more comprehensive presentation of this instructive illustration of the psychosocial and cultural factors involved in facilitating the conversion of implicit memory to explicit consciousness in a brain damaged patient was published previously (Rossi, 2003). In the 1970's, when the senior author was first exploring new variations of Milton Erickson's hand-levitation approaches to hypnotic induction and suggestion, the phone rang in his office.

"You hip-nose doctor?" the woman asked. From the sound of her voice and street argot she sounded like a debilitated person.

"Excuse me?"

"I say, you hip-nose doctor? You memory doctor?"

Rossi thought for a moment, trying to figure out what the woman was saying. Then it hit him. "You're wondering if I do hypnosis?"

"Thas right, a hip-nose doctor to find my tickets. You dat ?"

Because her speech was slurred Rossi wondered whether she might be on drugs or have organic brain damage. When Mabel arrived at her appointed time, however, she was dressed appropriately, in neat, clean clothes but her hair appeared to be slightly askew and disheveled.

"So," Rossi began, "you mentioned something on the phone about wanting hypnosis for memory loss." Mabel grinned and nodded her head so vigorously that her wig slipped to the floor to expose a huge scar running from the side of her head to the front. As she picked up the wig and replaced it on her head without the least embarrassment, she explained how she had recently been in a car accident and her memory just wasn't the same any more. Her problem was that she could not remember where she had hidden some very expensive tickets to a Michael Jackson concert about a month earlier after a man hand-delivered the tickets to her in her home.

Priming Before Hypnotic Induction

As a first step, Rossi tried to have her use her normal everyday consciousness to recall her steps through her house after she received the tickets to possibly recover the memory of where she may have hid them. Throughout this initial exploration, however, Mabel kept repeating that she "only remembered hiding the tickets in a safe place where nobody could find them." The whole family had already devoted hours on a treasure hunt, practically taking the house apart to find the tickets. Rossi was trying so hard to do a good job that he lost track of time. He kept asking her apparently futile questions about her life and family, when abruptly she sat back, shook her head sadly and asked dubiously, "You not hip-nose doctor?" Rossi glanced at his watch and saw there were only ten minutes left in the session, so he quickly reassured her and proceeded with the 4-stage creative approach to activity-dependent hypnotic induction and suggestion utilizing a series of implicit processing heuristics to facilitate her memory as follows (Rossi, 2002, 2004). From our current perspective, however, we can now recognize that this apparently futile preliminary period of explicit questioning - before any hypnotic induction - was actually a period of priming her implicit (unconscious) level of processing. In the following account the dynamics of implicit processing heuristics are noted in brackets and italics.

A 4-Stage Activity-Dependent Hand Mirroring Induction with Implicit Processing Heuristics (IPH)

Stage One: Hypnotic Induction with Heightened Sensitivity & Therapeutic Dissociation

Therapist asks patient to hold her hands up with her palms facing each other. [*Therapist silently, slowly, and impressively demonstrates with his own hands to focus her attention and possibly activate her mirror neuron systems as she stares in fascination at him.*] He softly and slowly suggests that she would notice when one of her hands begins to feel warmer or cooler indicating that her inner mind was starting to experience "real hypnosis." [*Pause, as she mirrors the therapist's hand placement with her own and focuses her attention on them*] Or, one hand might feel heavier than the other and start to move slowly downward more or less all by itself to signal that some part of her knew where the tickets were hidden. [*An IPH facilitating a possible therapeutic dissociation (hand "move slowly downward more or less all by itself") and ideodynamic signaling as she begins a memory search.*] One of her hands begins to slowly and hesitantly move downward with a slightly jerky motion. Her eyes flutter spontaneously for a moment or two and then remain closed with an apparently involuntary and very fine, rapid, vibratory activity of the eyelids frequently reported in the early historical literature of therapeutic hypnosis (Tinterow, 1970). [*We speculate that this very rapid eye activity may be associated with heightened neural activation and activity-dependent gene expression and activity-dependent brain plasticity on an implicit level*].

Stage Two: Incubation

As her hand moved downward very slowly a variety of eye movements and shifts in her facial expression take place as her head hesitantly shifts from one direction to another. [*We can only speculate that she is replaying her implicit memories as one hand moves slowly downward with slight pauses now and then as she apparently searches through her house.*] The therapist supports the process with occasional implicit processing heuristics such as, "That's right, searching carefully everyplace for these wonderful tickets." [*Pause as this IPH implies she can re-experience her memory here and now*.]

After a few moments a worried look of apparent stress crosses her face to which the therapist solicitously and sympathetically responds with a supportive IPH, "Yes, do you have the courage to continue all by yourself for a little while longer until…?" [*Pause as this incomplete question implies further inner search with an attitude of positive expectancy*.]

Since stage two is typically beset with doubts, conflicts, and uncertainties the therapeutic bond is supported further with the IPH, "Knowing you can share with me a word or sentence or two about what your experiencing at any time, but only what I need to hear to help you further." [*A permissive but carefully focused and constrained IPH that limits any impulse to speak to exactly what further IPHs she may need from the therapist to facilitate her memory.*]

Stage Three: Illumination, Problem Solving, and Healing

Just about the time her hand almost reaches her lap, she suddenly stiffens. Her mouth starts to open as if she wants to speak but she seems to be in conflict as if she did not want to disturb her inner focus and concentration. Facial tension now seems to drop away as a tentative and barely perceptible smile becomes very slowly evident. Such smiles after an experience of arousal and stress in stage two typically signal that some sort of crisis has been resolved and she may be moving into stage three of the eureka experience.

The therapist attempts to help her recognize and focus on this positive possibility with an open-ended IPH, "You're receiving something pleasing [pause] surprising [*pause]*, interesting, [*pause*], are you not?" [*Erickson believed that the close apposition of linguistic opposites with questions such as "Your are, are you not?" structured a permissive tipping point facilitating whatever the patient was engaged with. We speculate that the open-ended IHP introduces a mild confusion that could momentarily de-construct a rigid and blocking conscious (explicit) mental set so that an unconscious (implicit), fragmentary, and still nascent bit of brain plasticity and new consciousness could become manifest. (Rossi, 1972/1985/2000)*]

Mabel barely nodded her head to signal, "yes," very carefully, as if she didn't want to upset anything that was going on within her. "You are going to continue remembering it, aren't you?" Rossi implied further.

Again Mabel nodded her head, "Yes."

"You can really see exactly where you put those tickets."

Head nod, yes.

Mabel slowly opened her yes with a fixed expression. Her body didn't move. Her hand was still in mid-air. She was apparently still in trance, staring directly into Rossi's eyes with a fixed stare. [*It is important to recognize that while she opens her eyes she does not manifest the typical non-verbal cues of reorienting to full awareness by stretching, readjusting her body orientation, etc.*]

Stage Four: Verification and Post Hypnotic Suggestion

"Okay, that's great. In a couple of minutes, when you are absolutely sure that you know where the tickets are, and you can tell me where they are, what is going to happen?" [*Pause for these strongly directive reinforcements to consolidate her emerging explicit memory of the hidden tickets. The ambiguous open-ended question tacked on the end gives locus of control to her implicit dynamics. She slowly and spontaneously closes her eyes again.*] "Will your eyes remain closed when you tell me?" "Or are your eyes going to open so you can fully awaken first when you tell me?" [*Options implying many possibilities of converting implicit to explicit memory and awakening that are satisfactory.]*

"Closa," she said, mumbling the word indistinctly. "Tickets in de lina closa. [*Linen closet*]" A broad grin now spreads softly across Mabel's face, she opens her eyes, stretches a bit, and pats her wig as she reorients to the room realizing she now remembers where she had put the tickets. [*These non-verbal behavioral cues indicate she is now re-orienting to full awareness.*] She tells the story of how only she had the key to the linen closet of her home where many the important household items were kept so no one could intrude. It somehow seemed only natural to this family that everyone should avoid the linen closet during the search for the tickets. The next day, Rossi heard a message on his answering machine from one of Mabel's family members thanking him profusely for helping grandma remember where she hid the tickets.

Limitations and Scope of Implicit Processing Heuristics

The primary limitation of implicit processing heuristics is that they are not useful for the covert manipulation, programming, prediction, and control of anyone's mind or behavior. The second limitation is there are no truly adequate models for the experimental validation of implicit processing heuristics at this time. This has not been for want of trying. The entire history of the theory, research and practice of hypnosis has focused intensely on the questions and conundrums of, "What is a suggestion?" with but little critical success (Weitzenhoffer,

2000). Although Rossi (2004) proposed "64 More Research Projects" to assess permissive suggestion to supplement the previous 64 research projects proposed in David Cheek's pioneering clinical applications of finger signaling (surely another set of implicit processing heuristics) there have been but few uncontested published clinical-experimental studies to date that reported modest success (Pratt, 1996; Rossi & Cheek, 1988). A third limitation is that the mouse model of figure one, while adequate for illustrating the highly conserved molecular-genomic basis of activity-dependent gene expression and brain plasticity that are engaged in implicit memory and learning, it does not address the full complexity of human brain neurotransmission that is now known to involve at least 1100 proteins in the postsynaptic membrane (Pennisi, 2006). This means that we are still at an early stage in unraveling the dynamics of implicit heuriatics, memory, and learning.

Given these limitations it is ironic to contemplate the expanding horizon and scope of our emerging concept of the utility of implicit processing heuristics. Converting implicit into explicit processes is the essence of all consciousness studies. In the widest sense IPHs encompass the entire range of hints, crafts, and techniques in the arts and sciences of education, linguistics, philosophy, and research of all sorts (Hofstadter, 1979, 2007). Although it is impractical to list all possible IPHs, table two is a partial 30-year update of the "hypnotic forms" listed in the original Hypnotic Realities (Erickson and Rossi, 1976/2007, p. 312).

Table Two: A 30 Year update of the "hypnotic forms" of implicit processing heuristics in hypnotic realities. This is a partial update of the "hypnotic forms" listed in the original hypnotic realities (Erickson & Rossi, 1976, p. 312), which we now re-conceptualize as implicit processing heuristics. The up-dates are in italics.

Apposition of Opposites	Multiple & Serial Tasks
Binds & Double Binds	Music (lullaby, etc)
Body Language (Mirroring Behavior)	Negating (Implicit Priming)
Compound Suggestions	Not Doing & Not Knowing
Contingent Suggestions	Open-Ended Suggestions
Covering All Possibilities of Response	Pantomime & Non-Verbal Cues
Dissociation (Therapeutic)	Paradoxical Intention
Expectancy	Partial & Incomplete Suggestion
Hints (Implicit/Explicit)	Pauses
Ideomotor & Ideosensory Signaling	Poetry, Rhyme & Song
Implication	Priming Before Induction
Implied Directive	Questions Evoking Wonder
Inter-Contextual Cues	Surprise, Psychological Shock
Multiple Communication Levels	Truisms (Facilitating Yes Sets)
Analogy, Metaphor, Saga, etc	Utilizing Closure Need
Anecdotes, Myths, & Stories, etc	Vocal Locus & Dynamics
Humor & Jokes, etc	Yes Sets

We now need to expand clinical and experimental research on the domain of hypnosis beyond the current constraints of the cognitive-behavioral level (Kihlstrom, 2006b). We need to document how implicit processing heuristics can focus consciousness and attention during experiences of novelty (Eriksson et al., 1998), environmental enrichment (Kempermann, et al. 1997), and exercise (mental and physical) (Van Praag et al., 1999) to facilitate gene expression and brain plasticity. Research on implicit processing heuristics needs to include the practical, clinical applications of current neuroscience and the computerized technologies of bioinformatics (Davies, 2006). IPHs are active during those momentary pauses when we stare vacantly lost in contemplation and wonder in everyday life as well as during the "offline states" sleep and dreaming when activity-dependent gene expression and brain plasticity are updating our brain and consciousness (Ribeiro, 2004; Ribeiro et al.1999, 2002, 2004). Our current and future challenge in answering the question, "What is a suggestion?" is to utilize the technologies of DNA microarrays and brain imaging to explore the utilization of implicit processing heuristics to facilitate gene expression, brain, and behavioral plasticity in therapeutic hypnosis, psychotherapy, and rehabilitation.

References

Davies, K. (2006). Search and deploy. *Bio-It World*, *5*, 24-33.

Erickson, M. (1948/2006). Basic hypnotic induction and suggestion. In Rossi, E., Erickson-Klein, R. & Rossi, K. (Eds). *Hypnotic psychotherapy, The Neuroscience Edition. The Complete Works of Milton H. Erickson, M.D. on Therapeutic Hypnosis, Psychotherapy and Rehabilitation*. volume 2, p. 77, CD. Phoenix: The MHE Foundation Press.

Erickson, M. (1964/2006). The burden of responsibility in effective psychotherapy, In Rossi, E., Erickson-Klein, R. & Rossi, K. (Eds). *Hypnotic psychotherapy, The Neuroscience Edition. The Complete Works of Milton H. Erickson, M.D. on Therapeutic Hypnosis, Psychotherapy and Rehabilitation*, volume 3, p. 62-65, CD. Unorthodox Therapy. Phoenix: The MHE Foundation Press.

Erickson, M. & Rossi, E. (1976/2007, In Press). *The new hypnotic realities: The neuroscience of therapeutic suggestion*. 2nd edition. Phoenix, Arizona: MHE Foundation Press.

Erickson, M. & Rossi, E. (1979/2008, In Press). *Therapeutic hypnosis: A new exploratory casebook*. 2nd edition. Phoenix, Arizona: MHE Foundation Press.

Eriksson, P., Perfilieva, E., Björk-Eriksson, T., Alborn, A-M., Nordborg, C., Peterson, D., & Gage, F. (1998). Neurogenesis in the adult human hippocampus. *Nature Medicine*, *4*, 1313-1317.

Flanagan, O. (1992). *Consciousness reconsidered*. Cambridge, MA: MIT Press.

Geary, D. (2004). *The origin of mind: Evolution of brain, cognition, and general intelligence*. Washington, DC: American Psychological Association.

Hofstadter, D. (1979). *Gödel, Escher, Bach: An eternal golden braid*. New York: Basic books.

Hofstadter, D. (2007). *I am a strange loop*. New York: Basic Books.

Honeybee Genome Sequencing Consortium. (2006). Insights into social insects from the genome of the honeybee Apis mellifera. *Nature*, *443*, 931-949.

James, W. (1890/1981). *Principles of psychology*. Cambridge, MA: Harvard University Press.

Kandel, E. (2001). The molecular biology of memory storage: A dialogue between genes and synapses. *Science*, *295*, 1030-1038.

Kandel, E. (2006). *In search of memory: The emergence of a new science of mind*. New York: W. W. Norton.

Kempermann, et al. (1997). More hippocampal neurons in adult mice living in an enriched environment. *Nature*, *386,* 493-495.

Kihlstrom, J. (2006a). Implicit and explicit memory and learning. In Vellmans, M. & Schneider, S. (Eds). *A companion to consciousness*. Oxford: Blackwell.

Kihlstrom, J. (2006b). The domain of hypnosis, revisited. In Nash, M. & Barnier, A. (Eds.), *Oxford Handbook of Hypnosis*, Oxford: Oxford University Press.

Matthews, W., Bennett, H., Bean, W., & Gallagher, M. (1985). Indirect versus direct suggestions – an initial investigation: A brief communication. *International Journal of Clinical and Experimental Hypnosis*, *33*, 219-223.

Matthews, W. (2000). Ericksonian approaches to hypnosis and therapy: Where are we now? *International Journal of Clinical and Experimental Hypnosis, 48*, 418-426.

Peter, B. & Revenstorf, D. (2000). Commentary on Matthews' "Ericksonian approaches to Hypnosis and Therapy: Where are we now?" *International Journal of Clinical and Experiential Hypnosis*, *48*, 433-437.

Polczyk, R. & Pasek, T. (2006). Types of suggestibility: Relationships among compliance, indirect, and direct suggestibility. *International Journal of Clinical and Experimental Hypnosis, 54*, 392-415..

Pennisi, E. (2006). Brain evolution on the far side. *Science*, *314*, 244-245.

Pratt, M. (1996). Adapting the three-step approach for use with children. *American Journal of Clinical Hypnosis*, *39*, 48-61.

Ribeiro, S. (2004). Towards an evolutionary theory of sleep and dreams. *A Mente Humana*, *3*, 1-20.

Ribeiro, S., Goyal, V., Mello, C. & Pavlides, C. (1999). Brain gene expression during REM sleep depends on prior waking experience. *Learning & Memory*, *6*:500-508.

Ribeiro, S., Mello, C., Velho, T., Gardner, T., Jarvis, E., & Pavlides, C. (2002). Induction of hippocampal long-term potentiation during waking leads to increased extrahippocampal zif-268 expression during ensuing rapid-eye-movement sleep. *Journal of Neuroscience*, *22*(24), 10914-10923.

Ribeiro, S., Gervasoni, D., Soares, E., Zhou, Y., Lin, S., Pantoja, J., Lavine, M., & Nicolelis, M. (2004). Long-lasting novelty-induced neuronal reverberation during slow-wave sleep in multiple forebrain areas. Public Library of Science (PLoS), *Biology*, *2* (1), 126-137.

Rossi, E. (1963). Associative clustering in normal and retarded children. *American Journal of Mental Deficiency*, *67*, 691-699.

Rossi, E. (1964). Development of classificatory behavior. *Child Development*, *35*, 137-142.

Rossi, E. (2002). *The psychobiology of gene expression: Neuroscience and neurogenesis in therapeutic hypnosis and the healing arts*. New York: W. W. Norton Professional Books.

Rossi, E. (2003). The hip-nose doctor finds the Michael Jackson tickets. In Kottler, J. & Carlson, J. (eds.). *The mummy at the dining room table: Eminent therapists reveal their most unusual cases*. San Francisco, Jossey-Bass, Wiley Imprint, 157-165.

Rossi, E. (2004). Discorso tra geni. In Salvador Iannotti (ed.). *A discourse with our genes: The psychosocial and cultural genomics of therapeutic hypnosis and psychotherapy.* Benevento, Italy: Editris SAS Press. [Available in Italian and English editions] New York: Zeig, Tucker, Theisen.

Rossi, E. (2005/2006). Prospects for exploring the molecular-genomic foundations of therapeutic hypnosis with DNA microarrays. *American Journal of Clinical Hypnosis*, *48* (2-3), 165-182.

Rossi, E. (2007). *The breakout heuristic: The new neuroscience of mirror neurons, consciousness and creativity in human relationships*. Pheonix, Arizona. Milton H. Erickson Press.

Rossi, E., & Cheek, D. (1988). *Mind-body therapy: Methods of ideodynamic healing in hypnosis*. New York: W. W. Norton.

Rossi, E., & Rossi, S. (1965). Concept utilization, serial order, and recall in nursery school children. *Child Development*, *36*, 771-779.

Schacter, D. (1987). Implicit memory: History and current status. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *13*, 501-518.

Schacter, D., & Tulving, E. (Eds.). (1994). *Memory systems*. Cambridge, MA: The Mit Press.

Squire, L. and Kandel, E. (1999). *Memory from mind to molecules*. New York: Scientific American.

Tinterow, M. (1970). *Foundations of hypnosis: From Mesmer to Freud*. Springfield, Illinois: Thomas.

Van Praag, et al. (1999). Running increases cell proliferation and neurogenesis in the adult mouse dentate gyrus. *Nature Neuroscience*, *2,* 266-270.

Warrington, E., & Weiskrantz, L. (1968). New method of testing long-term retention with special reference to amnesic patients, *Nature*, *217*, 972-974.

Weitzenhoffer, A. (2000). *The practice of hypnotism*, 2nd Edition. New York: Wiley.

Wilson, E. (2006). How to make a social insect, *Nature*, *443*, 919-920.