Title: **Four findings from neuroscience that expand and explain NLP techniques. Part I: Reconsolidation and fast consolidation mechanisms**

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Recent systematic reviews of the literature in search of the neural mechanisms underlying NLP techniques including the RTM-VK/D protocol, The Brooklyn Program and anchoring procedures have uncovered several features of neural circuitry and functional neuro-anatomy that explain why certain NLP techniques work as well as they do and provide indications for the design of other techniques and interventions. This paper also makes contributions towards the linking of NLP practice to the growing body of Neuroscience research.

A body of recent work points to the mechanism of reconsolidation as a plausible mechanism for the RTM -- VK/D model in the treatment of PTSD and phobias (Gray, 2010; Shiller & Phelps, 2011, Schiller, Monfils et al., 2010). Perhaps more importantly, the mechanism outlines a syntax for change that NLP has long understood but until now has been unable to specify a supporting mechanism rooted in well-established principles of Neuroscience.

Canonical neuroscience has held that the transfer of long term memory from hippocampal stores to permanent cortical networks takes approximately thirty days (Morris, 2006; Tse et al., 2008). Preclinical work by Morris and his team has shown in principle that new learnings can be integrated into previously established long term networks in about 24 hours by taking advantage of protein synthesis generated in the activation of those older, related networks. This provides a neural base for NLP techniques including reimprinting, the new history generator and other patterns.

Olaf Sporns (2010) and other researchers have described neural organization in terms of small world networks. Feil et al. (2010) has suggested that meaning and behavioral salience are often determined by which circuit defines the behavioral context. This work represents a neural base for the phenomenon of context dependent memory effects. It also suggests a mechanism for reframing, meta-stating and Erickson's (1954) whole life reframe.

Finally, during the last fifteen years research into functional circuits in the brain has led to the identification of the default mode network (Greicius, Krasnow, Reiss, & Menon, 2003; Raichle & Snyder, 2007; Smallwood, Brown et al., 2011). This circuit, consisting of the ventro-medial prefrontal cortex, the anterior and posterior cingulate giri, medial temporal lobe and the precuneus, are highly activated during internally directed activity and largely inactive (as an independent circuit) during externally oriented activity. Insofar as the functional areas associated with the circuit are related to evaluation, self control, memory, prediction of future behavior and empathic understanding of others, their importance in understating the effects of inward oriented focus as in trance, meditation, and altered states of consciousness cannot be overestimated. It is suggested that when the activation of the circuit is made accessible by a classically conditioned anchor, it may represent a behavioral off-switch for problem behaviors.

One of the problems with classical memory theory, the idea that memories move from a short term phase into permanent, long term storage, is that the traditional position does not provide a sufficient explanation for how memories are updated to reflect new circumstances and or how memories fade or become corrupt. Reconsolidation has been described as a mechanism that makes sense in evolutionary terms. It solves two problems: the limited capacity of the brain to store events and associations and the need for living organisms to have a flexible, updatable storage system that allows for rewiring as necessary (Coccoza, Maldonado, & Dilorenzi, 2011; Nadel, Hupbach, Gomez, & Newman-Smith, 2012; Schiller, Monfils, Raio, Johnson, LeDoux, & Phelps, 2010).

Although the brain has an almost inconceivable number of elements and connections between those elements –current estimates suggest 86 billion neurons with from one to ten thousand connections between them—the continuous stream of living experience is equally vast. If the brain's networks were as static as the classical description suggests, we would soon be lost in detail like Luria's mnemonist who was unable to create abstractions or separate knowledge from the data of experience or we might face the problem of systemic overload (Herculano-Houzel, 2009; Kroes & Fernandez, 2012).

Reconsolidation

When a memory is created, it passes through several stages. After varying time frames, including as little as 24 hours for emotional memories (in higher organisms), the 'memory trace' becomes solidified as an assemblage of synaptic connections. Late phase long term memories may be characterized by the growth of new neural traces. This is memory consolidation (Amaral, Osan, Roesler, & Tort, 2008; Kandel, 2001; Schiller, Monfils, Raio, Johnson, LeDoux & Phelps, 2010).

Under certain circumstances, when the memory is activated after its consolidation as a long term memory trace, the chemical processes that created the neural trace are reactivated. If the circumstances are similar to the original event, the synaptic connections are maintained or strengthened. If, however, the situation has significantly changed, the connections themselves can change. In the first case the memory is strengthened, in the second it may be modified or erased. The repeated strengthening or weakening of the memory connections through the reactivation of protein synthesis is called reconsolidation because it repeats the original process by which the trace was consolidated. For emotional memories, the emotional impact of the memory may be eliminated or changed so that after a reconsolidation-based treatment, the client can discuss the traumatizing situation without upsetment (Alberini, 2005; Coccoza, Maldonado, & Dilorenzi, 2011; Finnie & Nader. 2012; Forcato, Rodrıguez, & Pedreira, 2011; Hupbach, Hardt, Gomez, & Nadel, 2008; Kroes & Fernández, 2012; Labar, 2007; Lee, 2009; Loftus & Yuille, 1984; Nadel, Hupbach, et al., 2012; Tronel et al., 2005 Schiller & Phelps, 2011; Schiller, Monfils, Raio, Johnson, LeDoux, & Phelps, 2010; Schwabe, Nader, et al., 2012).

When the memory has been activated for a sufficiently short period and interrupted before its full expression, the reconsolidation phenomenon opens a temporal window during which new versions of the experience may be introduced, the emotional impact of the event can be changed or, (theoretically) the memory may be erased completely (Kindt, Soeter & Vervliet 2009; Schiller et al., 2010).

It is important to understand that reconsolidation is not available upon every recall of a memory but only in those circumstances where there is something new to be learned. Prediction error, that is, a mismatch between a remembered reward or outcome and the current situation seems to be crucial. The stimulus that evokes the recall must provide a cue that circumstances have changed (Finnie & Nader, 2012; Forcato et al., 2009; Kindt & Soeter, 2011; Kroes & Fernández, 2012; Lee, 2009; Nadel, Hupbach, et al., 2012; Pedreira et al., 2004 ; Schiller, Monfils, Raio, Johnson, LeDoux, & Phelps, 2010; Schiller & Phelps, 2011; Schwabe, Nader, et al., 2012). Other authors have shown that without change or novelty, multiple repetitions may be necessary to evoke reconsolidation (Forcato, Rodrıguez, Pedreira, 2011).

Kindt and Soeter (2011) found that whereas interfering with reconsolidation of a fear memory using an extinction protocol disrupted some parts of the fear memory, it did not block recovery of fear related responses including startle, skin conductance response and US expectancy. When the targeted memory involved semantic memory, memory for words or lists or concepts, reconsolidation was enhanced when the subject was instructed to remember the new information

Kindt & Soeter, 2011; Kroes & Fernández, 2012; Lee, 2009; Nadel, Hupbach, et al., 2012; Pedreira et al., 2004; Schiller & Phelps, 2011; Schwabe, Nader, et al., 2012). Without the instruction, newly added information was often confused, not integrated with older information.

Reconsolidation in NLP

Reconsolidation is the operative mechanism in the RTM/VKD protocol as it works for PTSD and phobias. When the old memory is evoked in a novel way—on purpose, so that it is interrupted before major symptoms arise—the brain responds with an outpouring of the proteins that originally stabilized the memory. These make the memory subject to change. If we have a piece of new information that is in some way relevant to the original schema, such as the same movie running in black and white and seen from a third person perspective, that information is incorporated into the experience. Our memory is changed. Having changed the memory on two levels already, the brain becomes susceptible to meta-plasticity. That is, it learns after several examples (voluntary control of the memory, dissociated recall of the memory as a conversational postulate, controlling the submodality structure of the movie and observing it from a third (or fourth) person perspective) that this is a kind of place where new learnings are available and the system becomes much more susceptible to updating (Finnie & Nader, 2012).

This should be familiar to NLPers in the oft repeated statement that if we repeat an action or recall a memory several times, the brain understands it as a pattern. This is also reflective of the finding that memories that are recalled several times without change are also labilized. In these cases, however where no change has occurred, the original learning is strengthened. Thus, Forcato, Rodrıguez and Pedreira (2011) after teaching their subjects to remember lists of nonsense syllables, showed that multiple partial recalls of those memories, were sufficient to strengthen the memory even when there was no further practice, just a reminder of the memory itself. This suggests that just a few reminders—remember when we talked about this?—scattered through a conversation should be enough to strengthen a memory; one, however, is never enough.

It is now accepted by many researchers, that on an evolutionary level, memory serves a predictive function; it provides a baseline for understanding what we may expect and how to deal with it (Nadel, Hupbach et al, 2012; Kroes & Fernandez, 2012). The introduction of novelty into a previously learned context, that is, when the current circumstances do not match our learned expectation, is one of the conditions for the labilization of the old memory for updating. This provides new meaning to the NLP presupposition: If what you're doing doesn't work, do something different (Coccoza, Maldonado, & Dilorenzi, 2011; Finnie & Nader, 2012; Forcato et al., 2009; Kint & Soeter, 2011; Hardt, Einarsson, & Nader, 2010; Kroes & Fernández, 2012; Nadel, Hupbach, et al., 2012; Nader & Einarsson, 2010; Lee, 2009; Schiller, Monfils, Raio, Johnson, LeDoux, & Phelps, 2010; Schiller & Phelps, 2011; Schwabe, Nader, et al., 2012; Pedreira et al., 2004; Sevenster, Beckers, & Kindt, 2012).

Nick Kemp is a growing presence in the world of NLP through his re-introduction of Provocative Therapy, based on the work of Frank Farrelly (Farrelly & Brandsma, 1974) and his own brilliant contributions. An important part of his interventions is the introduction of novelty and confusion into the therapeutic context. In so doing, he invokes the mechanism of reconsolidative updating and so restructures the problem behavior.

Kemp (2008) has an intervention for kitchen-sinking. That's the behavior where someone expressing rage and begins a rant that throws up every possible transgression that their target has ever made. The accusations come in quick succession as if they were all one single episode. His intervention is to have the target ask the complainer to stop, honor their upsetment, and then ask them to focus on one complaint at a time so that they can understand each one individually and work through them effectively. He finds that if you can stop them—which is often no small task, as they begin to describe one specific complaint in detail, the chain of complaints falls apart and, after describing one or two of the complaints in detail, they forget the remainder of the rant. According to Nick, not only does it stop the rant, but the complainer is now unable to rant in the same manner. What happened?

Memories are organized in schemas, patterns of action and perception. Some schemas are organized as sequences of action. Some are organized in terms of meanings and perceptions as categories and organizing principles. Other schemas are organized in terms of emotion. When emotion is the organizing principle for memory, state dependent memory effects make the recollection and linkage of events with similar emotional tone more likely (Chambers, Bickel & Potenza, 2007; Feil, Sheppard, Fitzgerald, Yücelc, Lubman, & Bradshaw, 2010; Holland & Kensinger, 2010; Lewis, Kritchley, Smith, & Dolan, 2005).

In Nick's example, the rant is organized by emotion and possibly emotion carrying a specific tone: betrayals, lies or physical injuries. As the schema arises, as long as there is no change in its expression, no reason for the person complaining to believe that they will not get the same response that they have always gotten, it continues unabated. When, however, something different happens, when the pattern is broken or interrupted, the memory trace becomes susceptible to reprogramming. The old pattern has labilized and new information can be inserted into the schema that can change the nature of the associations. Just as the PTSD intervention rewrites the emotional response elements of the traumatizing experience, so now the interruption combined with the novel, unpredictably conciliatory response of the target, changes the schema so that the rant may now be limited to one reasonable complaint at a time. Like the pattern of reconsolidation observed in humans and across species, once the pattern of the original response has been changed, it cannot be resurrected except through a complete retraining (Schiller, et al., 2010).

NLP has practiced the pattern interrupt since its earliest formulations (Bandler and Grinder, 1975a, 1975 b, 1979; Andreas, C. & Andreas S., 1989). It lies at the heart of the handshake interrupt trance induction (Bandler & Grinder, 1975b) and often stands as a sufficient intervention for all kinds of issues (Andreas, C. & and Andreas, S., 1989; Bandler & Grinder, 1979). In light of the above, there are two things that need to be remembered; 1. The interruption of the pattern sets the stage for new learning about that situation. 2. The closer the content of the new information relates to the previously learned information, the more readily it will be incorporated into the pre-existing schema. If it is irrelevant you may get trance but not much else.

As historically understood, the pattern interrupt is either sufficient in itself or sets the stage for another intervention. When the interrupt introduces novel but relevant information and in so doing allows the response or memory to be changed (updated), it is suggested that this is an instance of the phenomenon of reconsolidative updating. It is crucial, however, that in order to achieve the most impact, the new information or behavior must be relevant to the initial memory schema.

So, to return to an example from Nick Kemp (2008), a person with a specific problem recites the problem: My brother makes me nuts. In so doing the problem state is briefly evoked and interrupted by an absurd suggestion, presented as an answer to the problem: Have you thought about standing in water with your hands in the air? This meets two of the criteria for reconsolidative updating, there is a reminder of the memory—it is briefly evoked—and then novel information that is relevant to the memory is presented. The novelty of the response ensures two things: 1. It ensures that the memory is labilized and, 2. Because it is presented as an answer to the problem, it changes the structure of the memory.

It is not possible to underestimate the power of novelty in structuring these interventions. Insofar as the client gets the same response or a predictable response, labilization and a real opportunity for change will not occur. Again, it is important to emphasize that a mismatch between expectation and experience during the reminder is often crucial for the labilization of the memory. Other so-called boundary conditions, suggest that older memories might need more than one reminder much like the multiple efforts sometimes required to trigger the PTSD response. Commonly occurring stimuli may need more than one reminder and reminders may need to be specifically tailored to the person and the problem in order to be effective (Coccoza, Maldonado, & Dilorenzi, 2011; Finnie & Nader, 2012; Hardt, Einarsson, & Nader, 2010; Nader & Einarsson, 2010; Sevenster, Beckers, & Kindt, 2012)

One of the important prospects that emerges from this research is the identification of a behavioural syntax originally articulated by Gray and Liotta (2012) and further articulated by Gray (2011). The syntax consistently appears in NLP interventions from the basic pattern interrupt, to collapsing anchors and the RTM-V/KD procedure: evoke the problem state, interrupt it before it is fully expressed, introduce the amnestic or transformative stimulus (Gray, 2011c). We believe that this constitutes a well-formedness condition for memory-based interventions rooted in emotional experiences (Schiller et al., 2011). The following table is based on Gray (2012):

A Syntax For Behavioural Change in Emotional Memory: Well-formedness conditions for memory-based interventions					
The application of reconsolidation for the rewriting of experience.					
Formulation	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Behavioral/ Neurological	Reminder of previous learning	Termination of Response	Pause	Apply amnestic stimulus	Test
NLP Pattern Interupt	Briefly evoke problem state	Pattern interrupt	Pause	Elicit desired or alternate behavior	Test
RTM PTSD Protocol	Briefly evoke phobic response	Dissociate or evoke dissociated anchor	Pause	Dissociated movie Reversed movie	Test
*NLP Allergy Procedure	Anchor allergic response	Anchor neutral but similar response	Pause or anchor neutral response	Collapse Anchors	Test
*Collapse Anchors	Anchor Negative Response	Anchor resource state		Collapse anchors	Test
*These procedures do not follow the pattern exactly but they may depend upon a similar syntax.					

One Shot Learning and Integration of new memories

Classical memory theory holds that episodic memories are typically assembled in the hippocampus and that over a period of time are transformed into long term or late phase memories that are no longer dependent upon the hippocampus (there is discussion as to whether early memories are stored in or integrated by the hippocampus, or both) but are distributed across the cortex. Successive layers of such memories, often related to the vMPFC are thought to produce more abstract semantic representations of events and relationships by essentially averaging out the differences between them. It is now thought that when a new memory is encountered, it is compared against the schemas in long-term cortical storesand hippocampal 'indexes'. If it matches the pattern, the new material is incorporated into the store in short order, sometimes less than 24 hours. In cases where the material is new, it passes through the longer hippocampal encoding process (Kroes & Fernandez, 2012; Nadel, Hupbach et al, 2012; Tse, Langston, Bethus, Wood, Witter, & Morris, 2008).

Morris (2006) discovered this while exploring one-shot learning in rats. Morris proposed that every experience that draws our attention is recorded by the hippocampus but not all information is retained. He considered that the mechanism that selects memories for long term retention an important element for understanding how memory works. In order to test how memories are transformed from short term to late phase—or long term memories, he set up a one shot learning paradigm in which rats were given one opportunity to learn a food location association. Each day, over the length of the experiment, he taught rats that a taste of a certain kind of food associated once with a distinctive marker would allow them to find that food in a similarly marked place, and each day he showed them a new and distinctive set of associations for a distinctive flavor. He found that each day he could teach them a new pattern of associating new flavors with distinctive stimuli. Although the responses were weak at first, as he repeated the pattern—each day with a distinctive set of flavors and visual stimuli—the rats increased the accuracy and speed of their learning. So, after practicing these one shot learnings for several days, he was able to add a new flavor and a distinctive locus that had not been associated with some other flavor and the rats would look around, compare the stimuli, find the new one and go directly to it; it was immediately integrated into his experience.

For humans, this means that once we have built a schema or a structure in experience, whether conscious or unconscious, we have a structure that can accelerate learning and the integration of new materials. The renaissance mnemotechnologists understood how to use this and applied it in the building of memory palaces and other such schemas that allowed them and modern memory champions to assemble huge quantities of information into pre-memorized structures. The

Kabbalists used in the tree of life as a master glyph for the integration of new information. Mystics of all varieties use similar systems, the I Ching, tarot cards and so forth beginning with a preexisting set of associations and meaning that makes associations pop, provides a pre-existing structure for the collection of information and observation and establishes a frame for intuitive leaps about the nature of a situation or a person. It may be that the emotional impact of this almost effortless incorporation led practitioners of these techniques to attribute to them magical properties (Foer, 2011; Yates, 1966).

On a practical note, this suggests why it is that eyewitnesses are so bad at remembering a piece of new information that seems relevant is easily added to the structure. Elizabeth Loftus has shown repeatedly why it is that a suggested word can change the memory of what happened. In the description of a car accident, asking what happened when the cars bumped; when the cars crashed or when the cars smashed into one another evokes a very different set of memories. This is all because a suggestive word can easily be integrated into an already learned structure (Loftus & Palmer, 1974) .

Both Morris (2006) and Tse et al. (2008) have shown that the preexisting memory structure may be activated either before exposure to the new memory or perception or after. When the preexisting memory structure is activated it labilizes, when this happens, the proteins that will serve to reconsolidate the older structure become available to new and perhaps unrelated experiences. The new element will take advantage of the stream of reconsolidating proteins and if it is related, it will become part of the long term structure. Even if it is not incorporated into the structure itself, it is likely to consolidate as a long term memory.

When people are asked to recall where they were when 9/11 happened, they will often remember both things related to the event and things unrelated to the event with the same clarity. Some are incorporated into the structure of the event, while others are consolidated by exposure to the same neural environment. This suggests that the act of remembering facilitates remembering other things. This is not practice, but the effect of a change in the chemical environment as older memories labilize and are reconsolidated.

Memory serves a predictive function it primes perspective and understanding (Nadel, Hupbach et al, 2012; Kroes & Fernandez, 2012, Williams & Bargh, 2008). Because experience assimilates to preexisting schemas more efficiently than when learned de novo, we are often controlled by our previous experiences or the currently active perceptual set (Bargh, 1997; Chambers, Bickel & Potenza, 2007; Feil, Sheppard, Fitzgerald, Yücelc, Lubman, & Bradshaw, 2010; Holland & Kensinger, 2010; Lewis, Kritchley, Smith, & Dolan, 2005; Morris, 2006; Tse, Langston, Bethus, Wood, Witter, & Morris, 2008; Williams & Bargh, 2008).).

On some level, priming takes advantage of this phenomenon. A brief reminder initiates labilization in a pre-existent network and relevant information is either incorporated into it, or we attempt to force fit it.

My daughter used to live in the western part of Monmouth County, NJ and I live on the shore. Traveling from my home to hers usually included a journey through farm country. As you drive West on route 520 from Route 34, the road rises to a high point at Conover Road and then descends. Just to the East of the high point, there is a farm on the north side of the road.

On this day, I was driving westward and saw that the hilly fields of the farm were populated with herds of some kind of animal. From a distance, the grayish brown blobs looked like they could have been goats. But as I watched for the expected emergence of *goatness*, the identity would not stick. They were not goats. I continued to drive closer, still curious about what I was seeing. Before my eyes, what I had thought could be goats became herds of grayish brown blobs that seemed to float in the air. Whatever they were, they were arranged like living things and they seemed to move like living creatures. Whenever I came up with a possible identity, however, my eyes were unable to confirm the label, and they stubbornly persisted as herds of living blobs.

Finally, as I drew nearer, I watched as new parts began to materialize. The blobs began to develop long necks as the larger blobs connected to smaller blobs that I hadn’t seen before: heads and necks appeared. At almost the same time, the large blobs sprouted extensions that reached down to the ground as legs. As the head and legs appeared, I realized that they were Emus, a large flightless bird that is now often raised for meat.

Pre-existing schemas also facilitate understanding of relevant information. The fact that we have extensive experience in reading our native languages in multiple fonts means that we have abstracted perceptual schemas that allow us to abstract text from non-textual data making the interpretation of what might otherwise be nonsense fully intelligible. Note the following:

7H15 M3554G3
53RV35 7O PR0V3
H0W 0UR M1ND5 C4N
D0 4M4Z1NG 7H1NG5!
1MPR3551V3 7H1NG5!
1N 7H3 B3G1NN1NG
17 WA5 H4RD BU7
N0W, 0N 7H15 LIN3
Y0UR M1ND 1S
R34D1NG 17
4U70M471C4LLY
W17H 0U7 3V3N
7H1NK1NG 4B0U7 17,
B3 PROUD! 0NLY
C3R741N P30PL3 C4N
R3AD 7H15.
PL3453 F0RW4RD 1F
U C4N R34D 7H15.

Similarly:

> I cnduo't bvleiee taht I culod aulaclty uesdtannrd waht I was rdnaieg. Unisg the icndeblire pweor of the hmuan mnid, aocdcrnig to rseecrah at Cmabrigde Uinervtisy, it dseno't mttaer in waht oderr the lterets in a wrod are, the olny irpoamtnt tihng is taht the frsit and lsat ltteer be in the rhgit pclae. The rset can be a taotl mses and you can sitll raed it whoutit a pboerlm. Tihs is bucseae the huamn mnid deos not raed ervey ltteer by istlef,

but the wrod as a wlohe. Aaznmig, huh? Yaeh and I awlyas tghhuot slelinpg was ipmorantt! See if yuor fdreins can raed tihs too.

NLP, one shot learning and schema utilization

When we consider that abstract memory schemas work as top-down organizing structures, we begin to understand how it is that experience helps to form individual maps of the world. Varela, Thompson and Roush reported in 1991 that up to 90 percent of our perceptual stream is generated by the brain itself: less than ten percent of what we experience is generated by the external world. This observation has been borne out by modern neuroscience; generalities abstracted from past experience control perception and expection. (Nadel, Hupbach et al, 2012; Kroes & Fernandez, 2012, Williams & Bargh, 2008).

Besides providing a radical confirmation of the NLP presupposition that the map is not the territory, it provides implications for framing, and a reconfirmation that the brain is always sorting for new or novel material.

NLP has often cast anchoring as a species of one shot learning (Dilts, Grinder, Bandler & Delozier, 1980; Bandler and Grinder , 1979; Dilts & Delozier, 2000). It is more often a species of classical trace conditioning that depends upon several repetitions and sufficient sensory acuity on the part of the operator to determine whether or not the learning has occurred. In light of the work of Morris (2006) and Tse et al. (2008), we can understand that if the anchor stimulus and the generated response correspond in a meaningful way to an active memory schema, they may be incorporated into that schema in short order.

Suppose for example, a client indicates that a specific kind of touch was always particularly soothing in times of stress. With the client's permission, the operator could effectively seek to replicate that touch and in so doing create a powerful, almost immediately learned anchor. It would update the original experience through reconsolidative labilization and it would incorporate the present experience of the similar touch into the schema in a more or less permanent way. When anchors are constructed in such a way that they naturally evoke or correspond to an already extant schema, they can be installed as one shot learning.

Insofar as memory controls perception, we come to the phenomena of framing, priming and language patterns more generally.

Framing can be considered in terms of one of Erickson's long, exhaustive and exhausting description of some physiological process. In his famous breast enhancement series (1960), he slowly and in exacting detail describes the layers of physiological structure and function that are involved in the process. He is not simply boring the young girl into trance, but he is creating a structure for unconscious activity. Layer after layer, he builds an abstract schema of the kinds of workings that the patient is to internalize and the unconscious is to activate. With the time and effort given it, it becomes a stable structure into which suggestions may be implanted.

Framing in the RTM V/KD strategy sets up an expectation of minimal discomfort as a counter example to all of the other treatments. It sets up remembered experiences of watching black and white movies and reversed movies and may even require the client to practice them. By creating these structures, the new behaviors are facilitated on multiple levels. On one level they are directly integrated in the newly labilized traumatic memory, but by adding the framing, a familiar structure is evoked that supports the novel behaviors that are part of the intervention.

Advanced language patterns and sleight of mouth should be conceived as evoking memory structures that pave the way for fast and permanent acquisition of new expectancies and new behaviors. The subtle shifts in language that move a behavior from the present into the past, and out of automatic into choice dominated behavior, shifts the frame of the behavior. Future pacing provides the structure of a remembered future into which the new and more desirable options are set. If the structure is evoked appropriately—anchoring the feeling or noting the submodality structure of something that you used to do but no longer do—a schema is evoked into which the new behavior can immediately be assimilated.

Williams and Bargh (2008) describe a series of experiments in which the marking of points on a graph, some close, some separated by more distance affected the way people related to others and responded to written materials. Closeness added impact to emotional details and distance—as mapped on a graph that was unrelated to the materials—it affected emotional distance. In this case, the frame provided the metaphorical schema that determined the meaning of the material that was read. The structures that we evoke in clients minds, by priming, whether through language, metaphor, stories or exhaustive descriptions awaken schemas that can be used as scaffolding for the incorporation of new learning.

Botvinick, Allen, Ibara, Seymour, & Cordova (2010) showed that the repetition of different syntactical representations of means-ends relationships increased the speed of reading for similar relationships. This suggests that multiple presentations of behavioral sequences with different content but similar structure, create neurological schemas that can be used as scaffolds for new experiences. So a conversational intervention might consist or multiple examples where people succeeded at different tasks using the same kinds of means-ends relations. This would take advantage of the abstracting faculty reported by Kroes and Fernandez (2012) that derives semantic information from multiple episodic memories.

In general, these observations suggest that the abstracting function of memory in the interaction of the vMPFC and the hippocampal complex provides the basis for metaphorical extension and the development of novel and abstract modes of thought and operation. This may in fact be the root of Bateson's abduction—perceiving the pattern that connects—and the process of learning to learn in his hierarchy of learning styles (Bateson, 1972; Finnie & Nader, 2012; Kroes and Fernandez, 2012; Nadel, Hupbach et al., 2012)

The brain functions in terms of networked associations

One of the important applications of translational technology to neuroscience is the application network analysis to behavioral systems. Olaf Sporns (2010) and other researchers (Chambers et al., 2007) have described the behavioral organization of the nervous system in terms of small world networks. Small world networks are characterized by a relatively large number of nodes and hubs that organize closely related information that are interconnected across the network by relatively sparce long range connections. This arrangement minimizes the total number of paths that a signal must traverse in order to connect to any other. AS a result, the network behaves as if it were a much smaller system.

An associated idea is that behavioral networks are non-scalar, that is, they are not random but preferentially connect highly connected nodes and hubs across the network This preferential arrangement results in an organizational structure that is self--similar at every level of analysis. Synaptic networks, look very much like neural connection networks which are in turn organized very much the same as the connections between larger elements of functional neuroanatomy (Chambers et al., 2008; Sporns, 2010)

and associated Feil et al. (2010) has suggested that meaning and behavioral salience are often determined by which circuit defines the behavioral context. This work represents a neural base for the phenomenon of context dependent memory effects. It also suggests a mechanism for reframing, meta-stating and Erickson's (1954) whole life reframe
Scale-free organizations, characterized by uneven distributions of linkages between nodal elements, describe the structure and function of many life-based complex systems developing under evolutionary pressures.

Continued in Part Two

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