Science You Can Use: Neuroscience for Understanding and Expanding NLP Practices

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Recent 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.

RECONSOLIDATION

Classical memory theory: memories move from a short term phase into permanent, long term storage. It does not explain how memories are updated to reflect new circumstances and or how memories fade or become corrupt.

Reconsolidation 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.

The brain has 86 billion neurons with from one to ten thousand connections between them butthe continuous stream of living experience is equally vast.

If the brain's networks were static as in the classical description we would soon be lost in detail: Luria's mnemonist was unable to create abstractions or separate knowledge from the data. we might also face systemic overload.

Reconsolidation

Under certain circumstances, when a 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 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.

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.

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.

Reconsolidation is not available upon every recall of a memory but only when there is something new to be learned. Prediction error: 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. Without change or novelty, multiple repetitions may be necessary to evoke reconsolidation.

Reconsolidation in NLP

Reconsolidation is the operative mechanism in the RTM/VKD protocol. When the old memory is evoked in a novel way—on purpose and 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 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.

If we repeat an action or recall a memory several times, the brain understands it as a pattern. This also reflects 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. 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.

Memory serves a predictive function; it provides a baseline for understanding what we may expect and how to deal with it. Novelty, 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.

Nick Kemp and the introduction of novelty and confusion into the therapeutic context invokes the mechanism of reconsolidative updating and so restructures the problem behavior.

Kemp (2008) and kitchen-sinking. Someone expressing rage, 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. 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. If you can stop them, as they begin to describe one specific complaint in detail, the chain of complaints falls apart and they forget the remainder of the rant. What happened?

Memories are organized in schemas, patterns of action and perception. Some schemas are organized as sequences of action, others in terms of meanings and perceptions as categories and organizing principles, still others 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.

In Nick's example, the rant is organized by emotion. As the schema arises, as long as there is no change --more of the same response--, 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. Once the pattern of the original response has been changed, it cannot be resurrected except through a complete retraining (Schiller, et al., 2010).

The NLP pattern interrupt . 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.

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.

Another 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. 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.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 assembled in the hippocampus and then transformed into long term or late phase memories that are no longer dependent upon the hippocampus and are distributed across the cortex. Successive layers of such memories are thought to produce more abstract semantic representations of events and relationships by averaging out the differences between them. New memory are compared against the schemas in long-term cortical stores and hippocampal 'indexes'. If it matches the pattern, the new material is incorporated into the store in short order, sometimes less than 24 hours. If the material is brand new, it passes through the longer hippocampal encoding process.

If you awaken a memory schema, and have an experience that is related to it, that memory can quickly become part of it. 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 this and applied it in the building of memory palaces and other such schemas that allowed them to assemble huge quantities of information into pre-memorized structures (eg, the Tree of Life, I Ching, tarot cards).

NLP applications Loops and reminders.

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.

Bandler opens loops that labilize memory structures as expectations. So, related information is made part of those structures. Did I ever tell you about…

John Overdurf uses incomplete movements to open expectations as anchors for altered states of consciousness.

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:

> 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 has often cast anchoring as a species of one shot learning. 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. 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.

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.

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.

THE BRAIN FUNCTIONS IN TERMS OF NETWORKED ASSOCIATIONS

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 sparse 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. It is resistant to failure and persists over time.

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Huh? Behaviors are linked chains of elements. VAKOG sequences assemble into behaviors, behaviors assemble into patterns, patterns into strategies and strategies into roles and identities. Each set of linkages can be completely separate from any other set. We often find ourselves absorbed, not even conscious of other possibilities. This happens in addictions, it happens at work, it happens with old friends and families. It happens when you go the class reunion and suddenly you're stuck in the role you had at 18.

Networks can be evoked by assembling resource states that evoke feelings about futures that link to past hope or deep directions. Stacked anchors can evoke patterns of behavior and perception that evoke specific kinds of directions. When practiced, these roles and directions can give rise to well-formed outcomes that can redirect life patterns as whole life reframes.

- Why we orient in one direction or another-- North or South.
- Why we suddenly move to a different restaurant or set of friends
- How Walther's permissions work
- How the geographical cure works
- How Merilu Henner's method for memory enhancement works
- Consider the six step reframe: each part is a place in a network. The old pattern is the current path and the creative part is the new path that unites the other nodes—the positive intentions.

Collect resources associated with something you used to do that relates to something that you want to do but don't get around to. This is not something that you've outgrown, just something that you can't get to. Enhance those resources but do not lose content or context. Add more resources as you practice them. What direction arises? How do your directions change?

Focus on a positive memory of a time about which you would like to remember more. Enhance that memory using submodalities. Gently turn your attention to some facet of that memory that may relate to other events. Make it central, turn up the focus, make it bigger and brighter, etc. What new memories come to mind. Follow the chain.

Imagine a time when you arranged your life around another set of activities and associations that might be useful today. Begin to recall how you ordered your day. How was your route different? What places and people did you enjoy? Pick three or four and amplify one particularly useful and empowering example of each. Amplify them, make them very present.

DMN: A BEHAVIORAL OFF-SWITCH.

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.

- The baseline center of consciousness independent of action
- The center of reflection and self-guided prediction.
- Organizing past experiences to plan for the future, to navigate social interactions
- A center of feeling and thinking and empathy.
- It is where we experience second position as distinct from rapport Nature Wastes nothing. The DMN makes use of downtime.

It is where we understand others' feelings by reflecting on our own. Even though the DMN normally decreases in activity when we focus on external behavior, it remains much more active when the

external behavior is emotional—when we connect with others, consider their feelings or attempt to predict how they feel.

It is strongly activated in trance and meditation.

It is the locus of Erickson's (1954) self-referential processing

> *Unconscious fantasies* ... are not accomplishments complete in themselves, nor are they apart from reality. Rather, they are psychological constructs in various degrees of formulation, for which the unconscious stands ready, or is actually awaiting an opportunity, to make a part of reality. They are not significant merely of *wishful desire* but rather of *actual intention* at the opportune time (p. 421).

The DMN builds hypothetical future scenarios and allows for their replay and exploration. Ever been lost in thought? Caught up in daydreaming? What happens when we exercise this function? How does it relate to well-formed outcomes.

Notice the difference between an imagined outcome and an abstract outcome. Notice how it affects your client's adjustment.

Erickson left people in trance for long periods as he unconscious solved their problems. If this is where he sent them, what can we expect from the same?

Notice the difference between second or third position and simple rapport. What effect does the consistent practice of second position have on consciousness? What must change? What faculties must you exercise to maintain second position?

If you take a psychopath or a sex offender, what effect would long trance exposure have?

Bechara (2005) suggests that part of the problem with drug addiction is a lack of frontal function. What happens when you put dope fiends in trance and leave them there to explore a set of intense positive states?

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