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ORIGINAL PAPER

Understanding the Function & Formation of Memory and the Application of Neurolinguistics programing to Reduce Fears, Traumas and Phobias.

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Abstract

This research is based on the idea that a link exists between memories and phobias, fears and traumas and mainly they can be reduced in one's life by manipulating negative memories, the encoding process, and by using NLP as a therapy and its techniques like the Swish Technique or the Visual-Kinesthetic Dissociation Technique to overcome and remove those very phobias, traumas and fears. Since memory and cognition form an important part of the individual's life because of the functions it performs the focus of this articles mainly lies surrounding this topic and how NLP can prove to be useful. The encoding process in the memory takes place through different representational systems that are a part of Neuro-Linguistic Programming (NLP). Since NLP lists visual, auditory, kinesthetic, olfactory and gustatory as a part of this system, an attempt is made to explain how through these systems and its sub modalities (finer distinctions of the representational system) memories are formed and how emotions play a role in determining the retrieval of a particular memory and how that in turn leads to the formation of phobias, irrational fears and traumas like the fear of heights, water, etc. or a traumatic event like the death of a loved one due to a disease or accident and in order to achieve all of this secondary researches, data analyses and information tools were used.

Keywords: Memory, Phobias, Traumas, Emotion, NLP, Therapy, Modalities

Firstly, think about a vivid memory from your yesteryears that you cherish and at the same time think about what you had for dinner five weeks ago on Wednesday. In most of the cases the latter question will be difficult to answer. "Why should this absolutely God- given faculty retain so much better the events of yesterday than those of last year, and, best of all, those of an hour ago? Why should repeating an experience strengthen our recollection of it?"

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In this article we will get an answer to some of the most intriguing aspects of memory as well as some for the questions posed by William Jones in the above quote. Since the ability to learn serves as a key to survive in this modern world, we as individuals cannot learn unless we remember. Therefore, memory serves as an important aspect to lay our focus on. To begin with, perhaps the best way to define memory is that it is an active system that receives information from the senses, puts that information into a form that is usable, organizes it while

storing it away, and then retrieves the information from the storage. (Baddeley, 1996, 2003). So then the question that arises is that how are memories formed and why do we forget about some?

According to Dr. Catharine Young the numerous experiences that we go through in our daily lives are transformed into a pulse of electrical energy that moves along a network of neurons to something which is known as the short term memory and from thereon to our long term memory (a relatively permanent information storage system) through the areas of the brain like the hippocampus and then ultimately to multiple storage regions across the brain. If two neurons communicate repeatedly, it results in an efficient channel of communication to form between the two. This process called long term potentiation given by Terje Lomo (a Norwegian physiologist) is considered to be a crucial mechanism responsible for memories being stored for longer durations.

To make this sound easier we'll illustrate the same biological process through an example. Suppose that you are introduced to a person and told their name. That afternoon you see them again, clearly, you have remembered their name but how exactly did you remember it? When you were introduced, you somehow entered the name into your memory; this is called the encoding stage. On receiving an input corresponding to their spoken name, you tend to mentally covert it into the kind of code or representation that your memory accepts, and you placed that representation in your memory. You likewise transformed another physical input, corresponding to their face, into a memory and you connected the two representations. Second, you retained or stored the information corresponding to their name and face during the time between the two meetings; this is the storage stage. Third, based on the stored representation of their face, you recognized them as someone you had met in the morning and, based on this recognition; you recovered their name from storage at the time of your second meeting. All of this is the retrieval stage. On that note how do some memories vanish or not get stored? Through the same example this process can be explained. Memory can fail at any of the three stages mentioned above. Had you been unable to recall their name at the second meeting, this could have reflected a failure in encoding (you didn't properly store their face to begin with), in storage (you forgot the name somewhere along the way), or retrieval (you didn't connect their name to their face in such a way that you could conjure up one from the other). Whenever someone is influenced by some experience of the past at a later time than its original time of occurrence, its influence gets traced as a reflection of memory for that past event. This can be explained using the example of coins. We practically see and use coins throughout our lives. But how well do we remember a typical coin that we might find in our wallets or come across while exchanging it with a shopkeeper. Take a few minutes out and try to sketch out a coin of a particular denomination say rupees fifty using your memory of it. Now try to compare your sketch with the coin. How error -free and exact was your memory of that coin? For example, was the head facing the right direction? Researchers have found that most people have very a poor memory or a distorted one of known things like coins. The takeaway from this is that we mostly tend to remember the information that is most useful and relevant to us. Example, we may easily be able to recall the size or color of coins than the direction of the head or the text that is imprinted on it, simply because the size or color may be more relevant to us when we are using money (mainly for payment and exchange).

Memory plays a continuous role irrespective of our intentions to learn or not. Mostly we keep performing the mundane tasks on a daily basis however if, in this routine, something salient or unusual happens then certain already established physiological as well as psychological processes begin operating and we as people tend to remember these very events quite distinctly and vividly. Like for example, most of us many a times cannot recall where exactly did we leave our car in a huge parking lot or area but if an accident had occurred and damaged our cars in the same parking area then certain 'fight or flight' mechanisms are activated, thus ensuring that we recollect and remember such events (your car's parking spot) fairly well for a longer time.

Different Memory Modalities

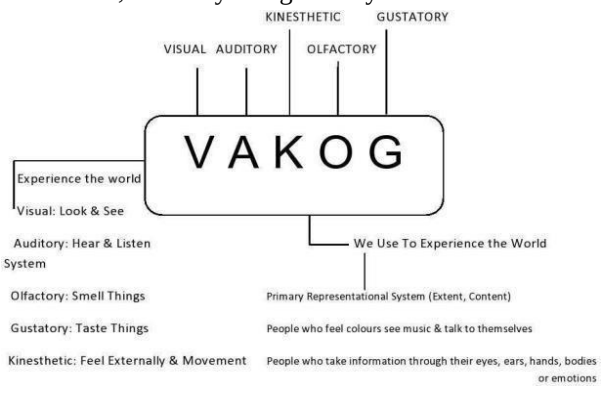
After having understood the different stages of memory, when a person tries to analyze how the memory that they encoded in the form of information comes to them as and when they want to recall or retrieve that particular piece of information, they are thinking about the different memory modalities that exist. Now, in order for memory to be formed, the first important step is to encode the information correctly. The numerous ways in which we take in information varies from person to person and these are called modalities in the context of memory. For

example, suppose in a group setting, a question is asked that how does each one of them recall telephone numbers? Some of them will answer that they recall a number by the sound while others will say they recall it in script or print. Therefore, the most widely accepted modalities in memory are known by the acronym VAKOG: Visual (V), Auditory (A), Kinesthetic (K), Olfactory (O) and Gustatory (G).

- ***Visual:*** Known to be the most widely used modality in NLP, a person with a preference for visual modality will encode information in the form of images mostly. They visualize in order to store and retain information. For example it is much easier for them to recall an image in their head when they have to retrieve information rather than to remember what someone said instead.
- ***Auditory:*** This modality consists of hearing and then reciting that information. The focus is more on the phonological aspect of communication. Example: Some people understand pieces of information better when they read it aloud or hear someone speak it aloud.
- ***Kinaesthetic:*** A person with this kind of modality encodes information through body language, gestures or expressions. Example: While studying for a test, the student walks back and forth to learn the material.
- ***Olfactory:*** These individuals take in information through the sense of smell. They connect a particular smell with a specific memory as that memory holds importance to them.
- ***Gustatory:*** This modality is known to be the least common out of all. It consists of encoding information by associating it with a particular taste.

Figure 1: Illustration of NLP Representational Systems

Note: This Diagram represents the VAKOG model in NLP. The ways in which we encode information is mainly through five senses which are visual, auditory, kinesthetic, olfactory and gustatory.



Sub modalities & Memories

The finer distinctions or the subsets of modalities (also referred to as representational systems) mentioned above are known as sub modalities. They are the building blocks that allows us to code, order attach meaning to the experiences. They are basically the means through which we shape our experiences.

Like how do you distinguish between what you believe in and what you don't? That's possible only when one code two different beliefs in different sub modalities.

Table 1
Sub modalities (finer distinctions) and its examples

Modality	*Visual (sights and images)*	*Auditory*
Examples of Sub modalities	• size of the image • distance and location: how close or far is it and where exactly is it located • brightness and color: whether the image that they are visualizing is colorful or black and white and as to how bright it is • movement: whether it is a still or moving image that they are seeing, etc.	• whether the voice that they are hearing is that of one person or many • pitch • rhythm • clarity • tone of the voice • location that the voice is set in.

We then begin to develop meaning by using the different kinds of sub modalities to code and give meaning to our experience. Example, we as humans can easily differentiate between someone we like and dislike. The more attention we pay to the different sub modalities and the finer our distinctions, the more distinctly, creatively and with great clarity can we move towards shaping our future. The following table with the help of examples will give you a better understanding of the concept of sub modalities:

Note: This table represents the finer distinctions or sub modalities of the representational systems (VAKOG) along with the examples of those very sub modalities that NLP uses in therapy and its various techniques.

Modality	*Kinesthetic*	*Olfactory*	*Gustatory*
Examples of Sub modalities	• the texture on which the movement is taking place whether it is smooth or rough • the temperature: hot or cold • location of the movement • pressure • vibration	• Consists of different types of smells.	• Consists of the various different types of tastes.

Emotion and Memory

According to the Oxford Dictionary, emotion is defined as a strong feeling derived from one's circumstances, mood, or relationships with others. We, as human beings go through various emotional experiences that are

important and critical as emotions modulate virtually every aspect of cognition.

Everything that we perform as functions in our life encompasses different emotional states like, happiness, sadness, etc. and these very emotions in turn affect one's ability to encode, store as well as retrieve information. Thus, we need to understand the link that exists between emotion and memory. Emotions do play a crucial role in telling us whether we can recollect and recall a memory that we stored at the time when we try to reach and relive it in our heads by revisiting it It appears that it can result in long lasting memories of a particular event or an experience. When we experience feelings of happiness, resentment, anger or other emotionally charged situations, the ones with vivid recollections are often the ones we can revisit quickly than during daily mundane situations that are not so emotionally fueled and lack an emotional attachment to an event or experience.

Figure 2
Illustration of an Emotional Stroop Test Experiment

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important and critical as emotions modulate virtually every aspect of cognition. Everything that we perform as functions in our life encompasses different emotional states like, happiness, sadness, etc. and these very emotions in turn affect one's ability to encode, store as well as retrieve information. Thus, it is important for us to understand the link between emotion and memory. Emotions play an n important role in telling us whether we can recall a memory that we stored at the time we try to revisit it. It shows that it can lead us to create lasting memories of a particular event.

Memory and Phobia, Fears & Trauma

After having learnt the connection between emotions and memory, we now move on to understand how memory and phobias, fears and trauma is linked.

"Memories of dangerous events are essential for individuals' survival, but are potentially harmful and maladaptive once they cause excessive fear and anxiety". Fear is considered to be a conscious state comprising of associative and non- associative components, caused by the exposure to real or imagined threats (Costanzi M, Cannas S, Saraulli D, Rossi- Arnaud C, Cestari V, 2011). Now the question proposed is how does the brain create a "fear memory" that links a traumatic event to a particular situation? It is said that a pair of researchers (Jun-Hyeong Cho and Woong Bin Kim) at the University of California, Riverside, have found an answer to this question. By using a mouse model, the study's author Jun Hyeong, said it has been hypothesized that fear memory is formed by strengthening and re-strengthening the connections between the hippocampus which responds to a particular stimulus and encodes it, and amygdala which triggers various defensive behaviors, including responses to certain fears He then went on to explain that the human brain is easily capable of forming fear memory that is associated with a situation and in turn subsequently predicts how danger is highly adaptive and results in individuals avoiding certain dangerous situations in the future. For example, imagine you met with a car accident at a certain location and ended up being severely injured. You would then eventually develop a fear of accidents or sometimes even of a similar place/location like the one where it occurred long after you've recovered from the physical injury, This happens because our brains tend to form a strong memory that associating the accident with the situation where the trauma was originally experienced.

Thus associative memory plays a huge role in triggering strong emptions of fear is us that ultimately makes us avoid any threatening situations in the future.

According to Cho, during such incidents, the brain processes a set of multisensory circumstances around the traumatic event, such as visual information about the place, auditory information such as a loud crashing or rumbling sound, and smells of burnt materials or surroundings from damaged cars. The brain then glues together and integrates these various sensory signals and

forms a persistent memory that associates the traumatic event with the context.in which it occurred.

Moving onto Phobias next, they are extreme and persistent fears of certain objects, situations, activities, or persons. Like acrophobia, is the fear of heights, hemophobia, is the fear of blood, etc. Studies have revealed that the amygdala is crucial for encoding and storing associations between harmful or threatening and neutral stimuli, and that stress hormones and mediators such as cortisol and norepinephrine play a crucial role in the forming threat associations. For example, after receiving burns from a hot stove, a child will most likely never go near a stove or even try and operate it in order to avoid the painful caused by the heat earlier. Similarly, by this process phobias are formed.

A Pilot Study was conducted to display the link between Memories and Phobias

According to the study, individuals with social phobia often reported experiencing negative, distorted images when appearing in social situations. Negative images implied seeing their worst or biggest fears being realized Individuals with a fear of blushing or their face turning red for e.g. may recurrently visualize their face in a state appearing much larger and more flushed than it actually is.

Clinically, such recurrent flashes of images can be interfering for a number of reasons. Firstly, patients often end up believing that their negative images are a true reflection of how they appear in reality to people which further distorts their self-image. They might also think that they come off much worse than they actually do, which gives a permanent way to their social anxiety. Secondly the negative self-images seem to reinforce problematic behaviors to use selfprotective strategies that end up doing more harm than good, such as covering one's face to hide a blush. Such behaviors prevent patients from disconfirming their fears (Salkovskis, 1991) and may also have the consequence of contaminating the social interaction by making patients appear unfriendly and aloof (Clark & Wells, 1995; Rapee & Heimberg, 1997).

The study was a preliminary attempt to identify whether imagery with re-scripting focus on early memories would be helpful in tackling social phobia if presented to a random unselected group of patients in a strict controlled manner. This in turn showed that a link exists between memory and phobias and many need to be treated to overcome these fears. The results suggest that re-scripting unpleasant memories Linked to distorted self-images may be a useful adjunct in the effective management of social phobia.

Lastly, Traumatic memories can easily imprint themselves after a threatening experience boosts stress hormone levels and emotional arousal levels. Various researches have shown how memory capacity, and memory processes directly affected by traumatic events could transition to the development of several disorders, thus showing how the brain shapes a traumatic memory by linking it to a particular situation that predicts danger or harm. It is believed that traumatic memories are conditioned threat responses. Ex. For a person who survived a major bike accident, the sight of a fast approaching speeding truck closely resembling the one that crashed into their bike at the time of the accident may instill fear and anxiety in them instantly just by the mere sight of the truck. These responses are initiated automatically regardless conscious or unconscious recollections of trauma.

About NLP and How It Works "Neurolinguistic programming is a way of changing someone's thoughts and behaviors to help them achieve their desired outcomes." In the 1970s, NLP was developed at the University of California, Santa Cruz by its primary founders - John Grinder, a linguist and Richard Bandler, an information scientist and mathematician. From there on, the popularity of NLP has increased massively with each passing day. Among its many uses it is also used in effectively treating phobias, anxiety disorders, etc. To form a wholesome understanding of it, NLP is considered to be a psychological approach that involves analyzing several strategies used by successful individuals and applying them to reach a personal goal. This involves relating to thoughts, language, and patterns of behavior, learned through experience to specific outcomes. Proponents of NLP assumes all human action is positive.

Hence, if the plan fails or is obstructed by any unexpected turns, the experience is neither good nor bad it simply becomes a way of obtaining more useful information. Modelling, action, and effective communication are considered to be some of the key elements of NLP. Often certain behaviors protrude from some of our self-limiting beliefs which induce negativity in us. NLP techniques take a deeper look at changing the beliefs while

understanding its negative implications. For example, a belief can stem from a negative statement that you've repeatedly said in your head over time: "I can't acquire the skill of dancing", "I can never cook". NLP presuppositions are a way to bring about useful changes by demystifying and replacing these beliefs.The belief is that if an individual can well understand how another individual accomplishes a certain task, the process may replicated with others and thus communicated further so they too can accomplish the task. Advocates of this school of thought believe that senses are extremely vital for processing the available information and that the body and mind influence one and another. Hence, if one is willing to understand an action, they must perform that same action to learn from that experience. These naturally form the hierarchies of learning, change and communication.

There are six logical levels of change:

Purpose: It is a form of engagement with something larger than oneself, such as religion, ethics, etc. This is considered to be the highest level of change. ***Identity:*** Is how one perceives themselves to be and includes one's responsibilities and roles. ***Beliefs:*** These comprise of your personal belief and value systems and things that matter most to you.

Capabilities: Consists of your abilities, skills and desire to offer something to the world or your surroundings.

Behaviors: The specific actions you perform or carry out.

Environment: It is the setting/space you inhabit, including the persons around you. This is considered to be the lowest level of change.

The main purpose of each level is to direct and organize the information in a sequential manner further down. According to the NLP theory, any change in the higher level will simultaneously result in changes in the lower levels. During therapy the subject goes deep into their unconscious mind and sifts through layers of beliefs and perceptions to become aware of an experience in early childhood that is responsible for a behavior pattern.

Case Study on How NLP can be used to reduce fears, traumas and phobias:

A war veteran successfully overcame the traumatizing flashbacks and severe panic attacks he suffered for a long time of 20 years after a horrific experience during his service in the navy, with the help of NLP. Keith was a49 year old Falkland's veteran who experienced three terrifying events. A missile hit HMS Antelope exploded 24 hours later. Keith had to pull out bodies from the water while helping his colleagues off the ship. As a result of these events,) Keith rated his wellbeing as 5 out of a possible 50 before taking therapy (NLP). 7 to 10 days later as he reported, "The frightening memories don't seem to bother me anymore. I'm not fearful. I've had a wasted life these past 20 years. I finally feel joyful". The question is how did such a magical yet surprising transformation take place in such a short time span? The answer to this lies in the fact that although Keith was thoroughly trained and experienced in using the debriefing model. Only then he learned and grasped the rewind technique that he fully realized that his trauma could be treated both reliably and quickly.

The rewind technique, also called as the fast phobia cure, was evolved from the technique developed by NLP Founder Richard Bandler. Simply explained, this works by allowing the traumatized individual, when they are in a safe relaxed state, to reprocess and resurface the traumatic memory so that it temporarily gets stored as an ordinary memory, although an unpleasant memory than one that continually triggers a trauma response.

This is achieved by enabling the memory to be shifted in the brain from the amygdala to the neo-cortex. The role of the amygdala is to alarm us of any detected danger and stimulate quick bodily reactions. Usually, all initial sensations that are associated with a threatening experience are passed to the amygdala which then is passed on to the hippocampus and from there to the neo-cortex where the experience is translated into a narrative or verbal memory and thus stored. But when an event resurfaces, there can be a sudden information overload and instead of being passed on, the sensory memories can get trapped in the amygdala, where the trauma memory has no identifiable meaning. It can only be re-experienced in the sensory forms like panic attacks or flashbacks. Therefore, this rewind technique allows the sensory memory to be converted into narrative, which can then be easily put into perspective for reflection.

Some of the technique used in NLP about swish technique

Imagine a person who walks into a therapy room with a bad habit they have had for years and have struggled to get rid of it. After the session they walk out of the room completely energized and never indulge in that habit

again. This is the power that this technique holds for many and it has worked as some kind of magic. Known to be a classic NLP technique it proves to be one of the most useful techniques to help people overcome automatic habits that are hard to let go. Compulsive or obsessive behaviors like Smoking, nail- biting, overeating, etc. are few of the many swishable problems.

In this the person usually addresses or checks unwanted behavior response to a specific stimulus by changing key sub modalities as these habits are mostly linked with an underlying trigger or cue image. Once we understand the structure of our thoughts and feelings, we can change that structure. The transformation happens during the swish pattern technique when the client realizes that becoming the person they want to be is worth letting go of the bad habit. To sum it up one must be able to see themselves as happier, healthier, and much better off individuals without their bad habits

Through a Case Study we will show you how the Swish and Anchoring Technique in NLP is used to overcome anxiety, stress and depression:

These techniques were used by the author (Pummy Sheoran, 2016) for the treatment of a 24 year old female client, spanning over 5 weeks. A significant reduction in anxiety and symptoms of depression were reported following objective testing as well as subjective reporting, thus indicating the effectiveness of NLP techniques in treating guilt induced anxiety, depression and other forms of stress. The findings demonstrate that the NLP based techniques offer quick and effective interventions.

Relaxation Anchoring: In this technique, the author taught the client how to stop tightening muscle groups, in the body to pay conscious attention to the out-breath rather than the in-breath and to orient towards enjoyable and pleasant internal imagery. This technique greatly helped the twenty four year old female client in achieving complete relaxation of mind as well as body.

Swish Pattern: The client reported that she got depressed by hearing an unknown eerie voice on the left hand side, telling her that she was a sinner and that her mistake was unpardonable. The swish involved fading away of this unpleasant voice into the distance, and being replaced by her own voice, a powerful and affirming, one in contrast to the former as it found its way in rooting rational beliefs, like, “Mistakes happen.” “It is human” Nobody is perfect.” Repeating this swish several times during the session resulted in significantly reducing the guilt she had attached to her mistake.

About the Visual-Kinesthetic (V-K) Dissociation:

The Visual -Kinesthetic dissociation is a technique that is a hypnotic. It involves the person separating or dissociating the observing ego from the experiencing ego (Fromm, 1965). It is an extremely beneficial technique for those people who are trying to come to terms or overcome with past trauma. This involves the process of separating (dissociating) mental pictures (Visual) and their associated feelings (Kinesthetic). During this entire process, the patient is encouraged to find a place that is special to them (Callow, 2003) to relax as much as they can.

The patient is then encouraged to imagine watching themselves in the original trauma in a safe environment as opposed to the one where it occurred .This can be done by looking out of the window, etc. It is a good idea to encourage the patient to reframe the original scene or incident so that they are in a comfortable position. The colors, shapes and images that are elicited by the patient can also be modified: this allows the patient greater control of the setting they are a part of. By this they establish a dissociated perspective, and that as a result guides the traumatized person to reprocess and re-evaluate the traumatic memory to alter the meaning that their unconscious mind equates with that experience presently. The powerful reprogramming effect of this technique integrates new perspectives that results in a more composed nervous system that no longer triggers any unnecessary activation of the ‘fight or flight’ reaction.

Conclusion

Thus, to conclude we can answer a number of questions about memory through this article like can phobias and fears be reduced by manipulating negative memories of those phobias and fears or can the encoding process be manipulated if the person’s psychological issue is not severe and many more by understanding how memory functions, what are the underlying processes and by relying on a range of techniques that NLP has to offer.

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