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There are certain recurring patterns that NLP pays special attention to. These include sensory experience and the 4-tuple, outcomes, rapport and ecology. Some of the others are structural principles that that arise from the linguistic roots of NLP. Here we would like to begin with two ideas, recursion and the TOTE model.

Recursion refers to the property of self reference. It is ubiquitous in nature. It appears in the Fibonacci series that orders the growth of plants and spiral shells. This is a recursive number series that grows by adding ~~the~~ each number in the series to the sum of itself and the previous number. It is recursive because each number is generated by reaching back to the last two numbers in the series to create the next.

For example: 0+0=0, 0+1=1, 1+1=2, 1+2=3, 2+3=5, 5+3=8, 3+ 8=13, 8+11=21 … . This yields the series, 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, and so on. When plotted as spiral it creates the logarithmic spiral found in the nautilus and the snail as well as the whorled pattern of seeds in the sunflower.

Recursion is responsible for the chaotic flow of fluid as dynamic flow patterns feedback on one another. Recursion is also the secret of linguistic diversity. Fractal patterns depend upon this same principle of recursion.

In linguistics, Chomsky showed that the reason we can create a theoretically infinite linguistic capacity from a relatively limited number of sounds is because the system feeds back

on itself, it is recursive. Each pattern of syntactic relationships becomes the source of a hierarchy of interrelated patterns that enclose many more details. This feeds directly into the Cognitive linguistic roots of NLP, there are patterns that feed back on themselves.

Piaget spoke about humans as structured and ordered systems in which one level of information builds recursively on another. Structure is the expression of a continuously evolving system in which structure blends seamlessly with system construction. It is recursive. Form and content are seen by Piaget as different levels of analysis within the same structure. He notes: "... there is no "form as such" or "content as such," ... each element ... is always simultaneously form to the content it subsumes and content for some higher form." (Piaget, 1970, p. 35)

One of the important contributions to the basic NLP model was an insight from L. Michael Hall in his 1996 book, *Meta States*. Here he made the important observation that self-reflection, recursion, is a crucial part of what it means to be human. He noted that part of the richness of what it means to be human is rooted in: 1. our self-reflexive consciousness; our awareness of our awareness and 2. our feelings about our feelings, what he called meta-states. In this ground-breaking work he points to how we can learn to apply feelings to feelings in order to take control of present states.

Hall makes the following statement about the effects of the recursive practice of metastating:

> Sometimes a state about a state will **negate** the first; sometimes it will create a **paradox** and send a person into a state of **confusion**; sometimes it will **amplify** the first state; sometimes it will **distort** the first state and turn it into something wondrously useful or destructive (fear about fear—paranoia, belief in belief—fanaticism). (1996, p. 44-emphasis in original)

In computer programming (this *is* Neuro-linguistic PROGRAMMING), one of the most common elements is a loop. The recursive loop cycles though a certain sequence of actions over and over until a certain criterion is reached. When the criterion is reached, the loop ends.

On the most basic level, we see this same pattern in the TOTE model. TOTE is an acronym, it refers to Test, Operate, Test, Exit and is derived from a seminal publication in

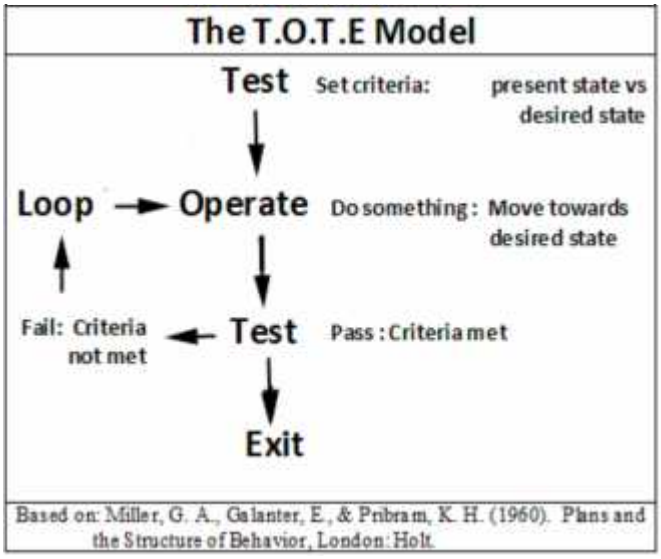
cognitive linguistics by Miller, Galanter and Pribram (1960), *Plans and the Structure of Behavior.*

This book, often called the first book to apply a computer metaphor to human behavior, set forth the idea that behaviors in complex systems that have no defined end (like do this five times and stop) need to have some guiding process that allows them to know what to do and when to stop doing it. This means that behaviors in living organisms can be usefully compared to a computer program that sets a criterion, operates on the data, and tests to see whether the criterion has been met. If the criterion has not been met, the program loops through again. If the criterion has been met, the program ends.

In the language of NLP we begin with an outcome. The first test in the Test-Operate-Test-Exit strategy is the comparison of our present state to a desired state—an outcome. If they fail to match, we perform some operation in hope of changing percepts, behaviors or the world in the direction of our stated outcome. The second test in the algorithm again compares the present state to the outcome. If the outcome criteria have been met, the process ends; we exit the process. If, however, the outcome has not been met, we loop back through the test-operate procedure until it does (Dilts, 1983; Dilts & Delozier, 2000; Dilts, Grinder, Bandler & Delozier, 1980; Wake, 2010).

In line with what we have already discussed the model begins with an outcome. This suggests that we are aware of our current state or the state of our client and have decided that there is something better or more important than the current condition. This emphasizes the creation of an outcome and sensory awareness.

The operations in this model specify how we can get there from here. You may remember that well-formed outcomes end with a specification of the steps that allow us to get there. In even the simplest model, some behavior must be specified.



The second test represents calibration. How do we know that the criteria have been met? We look, we listen, we feel, taste and smell. In general, we use sensory based information to compare our outcome against the present time reality. If they match, the process ends. If they do not match, we continue to work.

As the model returns to operations, we find that the organism has the opportunity to modify its behavior. This allows us to work more effectively. It also allows us to learn from our errors—there is no such thing as failure, only feedback.

The model was originally created as an extension of the behavioral model of the reflex arc. One of its innovative extensions was the addition of room for flexibility. If what we are doing doesn't work, or hasn't worked the way we want, we can do something else.

As it appears in NLP, the model usually specifies that testing happens in the sensory modality most relevant to the issue. A carpenter hammering nails might use sight or feel—a hammer hitting a nail off-center feels very different from one that has hit the nail correctly. If the task is driving down a narrow street, vision, hearing and feeling might all be used. Vision predominates as the feedback mechanism as one determines that the spaces between your car and those parked on the sides is sufficient. Sound and feelings provide the test criteria if the visual test fails and you crash into the parked cars (Dilts et al., 1980; Dilts & Delozier, 2000).

Let's think about tuning a guitar. The guitar player has a reference note, either memorized or from an external device, like a pitch pipe. In the initial *Test* he compares the tone of the string;

let's say that it's the D string, against the reference note. The test either passes or it fails. The tone of the string either matches the reference note or not. If it matches, he exits and moves on to the next string. If it does not match, he does something to the guitar; he turns the peg to change its tone. He then *tests again*, he plucks the guitar string and, *listening*, he compares the sound of the guitar to the reference pitch. If it matches the reference tone, he goes on to the next string. If it doesn't match, he repeats the cycle.

Because vertebrates are wily creatures, the guitarist may change his technique and continuously pluck the string as he turns the peg up and down. Here he has merged the operation and the test into a continuous behavior. It is still part of the same pattern, test, operate, test, exit but it happens as a smooth sequence. The newbie, turns the peg a few notches at a time and tests the tone at each change. As the process develops, the test is refined to reflect the guitarist's growing experience of the relationship between the tone of the string and the cranks of the peg. Feedback (recursion) changes the structure of the operation.

This model can be used to describe simple behaviors, like hitting a nail with a hammer and it can be used to build complex hierarchical models of much more complex behaviors. If we imagine that a basic TOTE can be used to assemble a set of rudimentary skills that are necessary to a larger task, we can imagine that larger and larger tasks can become unified wholes using the same model. Let's go back to the guitar player.

The guitar player is just learning to play. His first task is simply learning how to hold down a string so that it gives a pleasing tone rather than a thunk or a buzz. He knows how the note should sound; this is his criterion for the first test. He presses down the string with the tip of one finger and plucks the string--his first operation. Listening to the result (test), he can determine whether it is a pleasing note or not. If it is a note, he can try a few more. If it is a thunk or a buzz, he can try making the note again until it sounds better.

Having learned how to hold down the stings so that he can make the guitar sound properly, he may move on to making a chord. He now has two sets of criteria. The first is the visual pattern he has found in the sheet music or the chord book that he is using. The second is whether or not he can make the chord sound good. He operates on the guitar by pressing his fingers over the strings according to the pattern in the book. He may test this first by arranging

his fingers on the guitar string and comparing them with the book. If this test matches, he will strum the guitar (Operate) and test again by listening for a nice chord or the deadly thunks and buzzes that tell him to try again. When he has successfully played one chord, he can then go on to learn several others.

When those chords begin to play with a minimum of thunks and buzzes, he can then try stringing those chords together to play a song. In this case, his criteria will expand to include the sheet music for the tune, his internal representation of how the song should sound, and a sense of whether the rhythm and speed of his playing are appropriate. Each of these builds upon the other until he has developed the complete and essentially unified behavior of playing the song.

Now, it may seem that all of this is about something that is obvious to almost everyone. That is true; however, as we learn to specify how people do things, one step at a time, we learn several things. First we learn to observe their behavior; a habit that cannot be over emphasized. Second we learn how that behavior is structured; the small pieces that they had to master in order to gain the skills. Third, by learning how they did it, we can find out how to do, or not do, the behavior that they display. This is the essence of modeling (Dilts, 1998; Gordon & Dawes, 2005).

One of the keys to learning how to change behavior is learning how people are able to do what they do when they do it. This is not necessarily why they do it but how. It is a very useful pattern. Richard Bandler has recommended the cultivation of a spirit of curiosity about behavior, rather than a judgment. 'Wow, how do you do that?' is much more useful than, 'What's wrong with you' (Bandler, 1998, 2008)?

When I worked for the federal government doing drug treatment, I became curious about how people changed their minds about doing drugs. How did they develop the skill of making different choices about whether or not to use drugs? One of the things that I found was that when people had more important or more rewarding things to do—as they understood them—they would often put off using or stop completely.

It appeared that when people had an outcome that was more important than getting high, they would use that as a criterion for how they wanted to feel. They would compare this to the drugged state and their operation was to continue doing the alternate behavior. As long as the

alternate provided a better experience than using drugs (test), they would continue to do that other thing (operational loop). When that other behavior ceased to be sufficiently rewarding (test) they would exit sobriety and return to substance use (exit).

For one client, the alternate behavior was motherhood. She was using $300 a day in speedballs (heroin and cocaine). When she discovered that she was pregnant she found that she would feel better if she gave her child a healthy body and life style. Within three days of discovering her pregnancy, she stopped completely. For the next year she found herself quite content (test) to fulfill the role of mother (operate). After a year, motherhood became less rewarding (test) and she exited sobriety (exit).

One client, a mafia lawyer, had an intractable cocaine habit. Nothing worked. I asked him what he needed in order for cocaine to no longer be a problem for him. He eventually replied that if he went back to church, he would no longer need to use. When he finally began attending church he stopped using cocaine in short order. His original criterion seemed to be that his life could continue as it was, as long as he was not committed to the church: no church (test) continue to use cocaine (operate). But when he returned to church (test), he had to stop using cocaine (exit).

As we consider the structure of plans and behaviors, we come to the conclusion that NLP is implicitly systems theoretical, that is, it is built on the principle that larger elements of behavior are built of smaller chunks as an organized whole. However, that assembly is not just additive, it is emergent.

The emergent property of a complex system is a whole whose properties could not be predicted from the parts. In NLP we regularly note that the whole is more than the sum of its parts. This is important because even though we talk about the fine grained structure of behavior, as the parts come together we find something much more than we would have expected. In NLP this is often called streamlining.

There are several formulations of systems theory (Bertalanffy, 1968; Fidler, 1982; Gray, 1996; Piaget, 1970). All of them reflect some of the same basic ideas. The most common of these are: emergence, centraton, transformation and self regulation.

~~The first is~~ E*mergence* is the concept that complex systems are composed of subsystems that retain their own character and function as they subserve the whole. Our guitar player learned how to press the strings, make the chords and play the song. As the behavior streamlined, all of these parts coalesced into a coherent whole. None of them lost their character, function or value, but all were merged into the larger skill of musical expertise.

In systems, any part can become the center of function for the whole as long as the function of that part is crucial to the system. This is the principle of *centration.* Steve Andreas (2004) calls this heterarchy and gives the example of the Israeli Defense Force (IDF). In the American armed forces, rank is absolute, it has nothing to do with expertise; it is hierarchical. In the IDF, the soldier with the essential level of expertise takes command for the situation where her skill is paramount. When that crisis ends, normal order is restored.

Our guitar player can invoke any of the systemic skills as the center of his attention, whenever he needs to. As he learns a new chord or a new riff, making individual notes one at a time may become the center. In another context, whole chords may dominate while in others, entire songs will be the center of his attention.

In organisms, perceptions and actions are controlled by needs and desires. At any moment, one sensory system, dominated by one need, may determine what the action criteria are in that context. ~~In organisms, our perceptions and desires are controlled by our needs and desires. At any moment, one sensory system, dominated by one need, may determine what the action criteria are in that context.~~ The most salient outcome determines the choice of behavior. Sometimes we refer to these centers as *parts* because we can characterize them as having a mind of their own.

Systems are dynamic, they transform and change but all of those changes are determined by the capacities of the individual. This is the principle of *transformation.* Living systems change and people change over time. The only people who do not change are dead people. In NLP we understand that, apart from actual physical and developmental deficits, a human being can become anything that they imagine.

Our guitar player can use his skills in various contexts and with various constraints. He can change the style of his paying from blues to samba to folk. He can even play his guitar

behind his head. Having learned the guitar, he may transfer those skills to the bass guitar whose four strings share the same tuning as his guitar. He might even transfer his skills to the color coded strings of a harp; once he knows the color code, he can find the same chords and notes on that instrument as he does on the guitar.

Complex systems also have the property of *self regulation*. This means that people remain people, horses remain horses and you remain who you are. Even when we make radical changes in beliefs and behaviors, the characteristics that define you continue to operate.

We see this in NLP as the unconscious tends to correct ecologically unsound behaviors that have no strong compulsive elements. When a behavior has not been practiced so as to become automatic and it is not associated with significant external reinforcement, it will often fade away leaving the original structure of personality and behavior intact. Behaviors that resonate with the deep structure of the individual are easily assimilated and can quickly become part of the individual's standard behavioral repertoire. For this reason, once more, ecology is a major consideration in any kind of change work. In general, we continue to be who we are.

Review

- Patterns in living systems are often recursive, by feeding back onto their own structure, they generate new levels of meaning as hierarchies.
- Meta-stating is the NLP process of applying one feeling to another feeling or process and paying attention to the result—how you feel about the feeling or behavior.
- The TOTE model was the first computer metaphor applied to human behavior. It represents a strategy for controlling behavior by monitoring actions upon the environment (internal or external) to determine whether the operations (actions) were successful.
- TOTE is an acronym that stands for Test, Operate, Test, Exit. It represents a looping structure that sets a criterion for change (Test) that is distinct from present conditions (present state vs desired state). It then performs some action or operation upon the environment to move the present condition towards the desired

state (Operate). It then compares the newly changed condition to the criterion (Test). If the criterion has been met, that is if the present state now matches the desired state, the behavioral loop ends (Exit). If the criterion has not been met, the process continues with further operations and tests until it does.

- The TOTE model lies at the heart of much of what is done in NLP. It is the explicit core of modeling.

- TOTEs are often built up into systems in order to create more complex behaviors. These more complex behaviors coalesce into streamlined behaviors and represent more than the sum of their parts.

- NLP is implicitly systems theoretical. That is, it applies the principles of General Systems theory as originally formulated by Bertalanffy in the 1960s.

- The systems principals are: 1. emergence--the whole is more than the sum of its parts; 2. centration—any subsystem can become the controlling center of the system depending on the present-time needs of the system; 3. Transformation—complex systems are dynamic and they change over time and in accordance with circumstances; 4. Self regulation—systems retain their identity independent of the changes they go through.

- In NLP, these principles appear as follows: 1. Emergence—in all change there is a difference that makes a difference, one transformation that can reconfigure the entire system; 2. Centration—most behaviors are constrained by ecology, in any context any resource may become the center of the system (e.g, shifting perceptual preferences); 3. Transformation—more choices are generally better than fewer choices, the organism with the most options controls the conversation; 4. Self regulation—change can only go so far, you will always remain who you are; this is an expression of deep ecology.

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