

## Insight – The ‘Aha!’ Experience

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In a lecture during post-graduate studies in NeuroLeadership it felt like the pieces of a puzzle were coming together. As mediator I aim to assist parties in problem solving and decision-making. Never had it occurred to me until now to consider that a difference in approach to “insight” and “analytical” problem solving may be the most important piece of the puzzle for a mediator. For the first time I was able to understand why some decisions made in mediation are powerful and moving while others are ‘matter of fact’ and common sense compromise. While both may meet the objective of ‘mutually agreeable solutions’ there has been an unexplained void between a truly satisfactory and a generally successful outcome.

By citing an example of a mediation, I will try to reflect my understanding of how information presented in this particular lecture seems to be relevant to problem solving in mediation. The context is a commercial mediation I facilitated between a plaintiff and a defendant, for which I have exchanged all identifiable information with fictitious facts, names and subject matter.

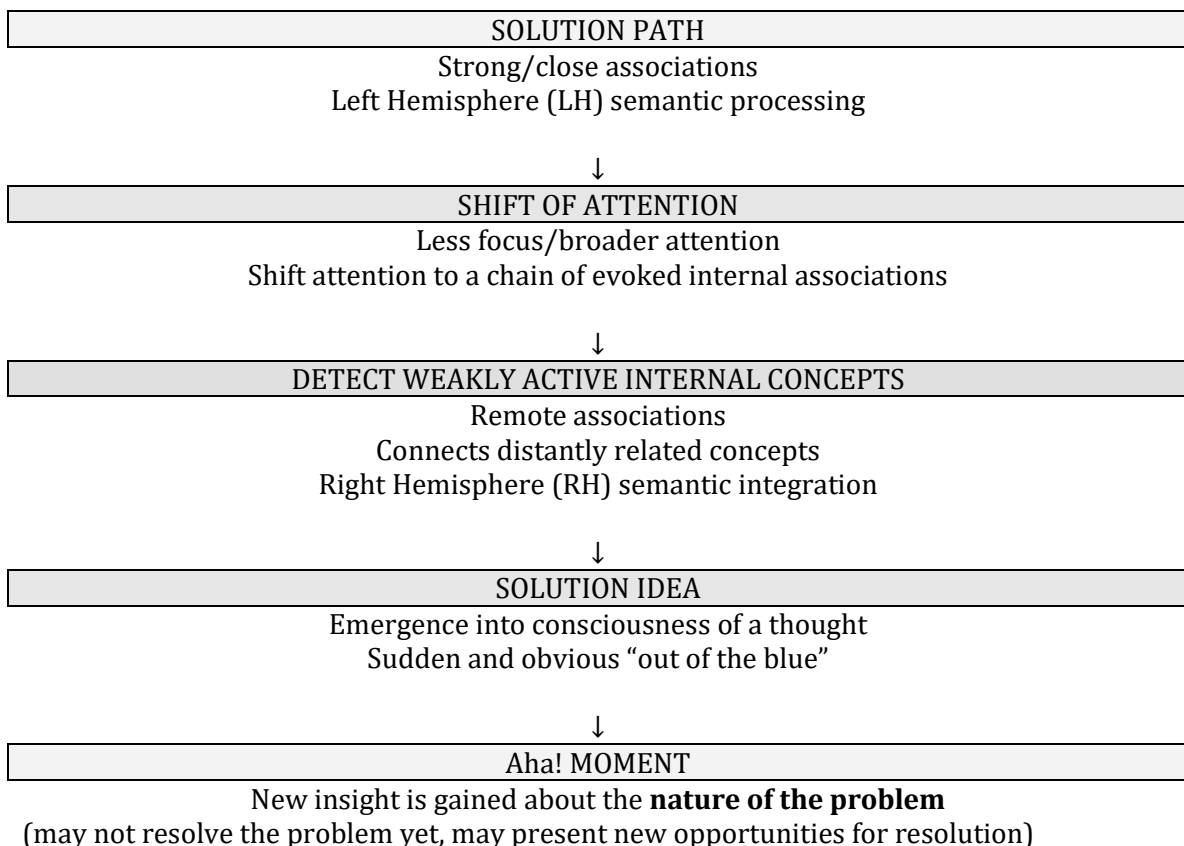
The parties in dispute spent close to three hours in mediation sharing information partially to recall the situation as it was already known to both and partially introducing new information which broadened and deepened their understanding of the dispute. It required parties to spend a considerable amount of time to dedicated analysis revealing the critical elements of the problem. The parties agreed that the defendant owed to the plaintiff several thousand dollars for web design services rendered by the plaintiff. Information was shared which revealed that the defendant’s company accepted full responsibility for an unpaid invoice, however, the company had declared bankruptcy and there was no future earning potential by the company to pay the plaintiff. The dialogue was exhaustive and bankruptcy was clearly a roadblock to a possible resolution. Common understanding of the situation did not present a practical solution to the problem, not even a compromise to make a partial payment, a future payment or any other form of payment plan. Parties were at an impasse.

At this point I (the mediator) made a spur-of-the-moment decision. I opted to paraphrase and to give an overview of what I had heard so far. While I knew that both parties had shared their views of my impartial summary, it seemed to be of value to allow them to sit back, go inward, and listen to my voice. I intentionally spoke quietly and slowed down the pace of conversation. I am not sure if they heard everything I said but I do know that they were ‘induced’ to relax and take a break from the intensity of analyzing information. I concluded my paraphrase by offering that in similar cases, which I had mediated parties came up with amazing ideas that involved creative forms of payment. It was then – only moments later – that the defendant exclaimed, “I *know* what we can do – *air miles!* I can pay you in air miles....?” The plaintiff’s face showed a ‘twinkle’ in his eyes and he responded, “Hmmm, let me call my wife. It sounds like a do-able solution. We are planning our 10<sup>th</sup> wedding anniversary and we do have a family time share in Hawaii; perhaps this would work.” We took a break for the plaintiff to call his wife and upon her acceptance of this offer, both the defendant and plaintiff made a call to the air miles carrier and confirmed that a transfer of several thousand dollars in air miles was executable and the transaction occurred immediately.

I understand that most problems worth solving require more than a single aha! moment. They require focused analysis to fully understand critical elements of the problem before an aha! moment is possible. There has to be some form of knowledge about the subject matter. In my example there was new information introduced which changed the plaintiff's view from an assumption of 'unwillingness' to pay the full amount to the fact of 'inability' to pay. Furthermore, an aha! moment may deal with the nature of the problem and require further analysis afterward. This was indeed the case when the nature of the problem switched from a 'lack of money' to an insight equating 'value for money.' The decision to accept air miles instead of money required further analysis such as transfer regulations and tax and legal implications for their respective businesses.

In this next segment, I will focus on the path to an aha! moment and show how *insight* problem solving differs from the path of *analytical* problem solving in the context of a commercial mediation.

The following diagram is a brief overview of the path to an Aha! Moment as it happens in the brain:



## **Solution Path**

Beginning the mediation session, the mediator uses a logical, sequential process to create a safe environment. Parties' semantic processing of information mostly occurs in the left hemisphere of the brain. The human brain consists of the left and the right hemisphere each playing different (often dominant) roles in a person's behavior patterns. Brain dominance refers to what a person will pay attention to and make meaning of, connect more quickly with, and what meets their need for 'speed' to process information. Dominated by the brain's left hemisphere, parties may appear defensive for the sake of safety and order; or they may seem unfeeling and feel helpless because they cannot connect with other dimensions of human experience. They seek rational information about what will happen - predictability, structure, and clarity are important, as is safekeeping, and how the approach of mediation will assist them in problem solving. They prefer a process that is step-by-step, orderly, and risk avoiding. The preference is for analytical, technical and logical thinking. If there is left hemisphere dominance, there is little right hemisphere thinking and, consequently, parties without reaching a logical conclusion arrive at an impasse. They have strong association with one 'train of thought' and they lose sight of the bigger picture. They cannot step outside their narrow view and visualize or imagine the opportunity for future relationship - traits that are dominant in the right hemisphere.

In my example, parties were focused on a business meeting with a business problem. They were distant and guarded in their behavior towards each other. Parties were asked to give a brief recap of "what they were here to resolve". Using his long-term memory capacity, one party implicitly stated that a 'quote' for a contract always varies from final billing by 30-50 %; he has done web designs for ten years and "*it always works that way*". An 'estimate', on the contrary, fluctuates by no more than 10-15%. "*Everyone understands the difference.*"

How does he create such memory? It seems that he was retrieving information from non-declarative memory which is implicit, procedural memory. Procedural memory is stored in basal ganglia, our habit center; he repeats the same procedure again and again because it's the right (customary) way to give quotes and estimates in his profession.

In mediation, he was diverted by the mediator from procedural memory retrieval to pay attention to one specific contract only. During the recovery of experiential or episodic detail, which he stores in declarative (explicit) memory, he is processing a memory trace involving the hippocampus. The Para hippocampus first assembles the "what, where, when" information about the event. The hippocampus links these elements of the episodic memory. Linkages are then integrated back into the various cortical areas that represent the details of each type of information. It all comes back together and individual neurons form a new association.

To summarize, the brain appears to process different kinds of information in separate ways. Memory circuitry allows the entire cortex to have access to the *hippocampus*, a part of our limbic brain, with the implication that it can bind each and every thought, feeling, and context. This is not just a playback of experiences. We want memory to help us adapt, extrapolate and generalize to new situations. Hippocampus activity during an experience generalizes from a past experience to a novel situation.

However, we often run on habit and use *basal ganglia* instead, which are part of non-declarative memory and knowledge of how to do something. Non-declarative knowledge is

implicitly expressed in skilled behavior and learned habits (procedural, motor and cognitive skills-based).

Back in the mediation room, the defendant remembers meeting the plaintiff at a Better Business Bureau event. Their interaction revealed their passion for music and their common interests as hobby guitarists. He recalls making a verbal deal that night that would allow him to demonstrate his creative and technical abilities in web design and elevate the defendant's business opportunities beyond those of his competition. There was no concern over cost, only talk about 'going all out' with the design. They both were enthused as they visualized prosperous possibilities with an interactive web presence. Based on this invigorating encounter the plaintiff's perspective of his new client was a financially rewarding relationship. This kind of affective forecasting is known to mediators to have caused many failed undertakings. The emotions of the moment, light-hearted exaggerations over a few glasses of wine, do not give consideration to other factors (for example, the cost of high-tech web design, work load, or time constraints) which will affect the overall satisfaction of the future contract.

At first, parties were processing the experience that brought them to civil mediation from a shallow, sensory aspect: each presented his emotionally charged account of the facts as the true story of what had happened, discounting the other side of the story. The amygdala plays an important role in emotional aspects of memory, attaching emotional significance to otherwise neutral stimuli and events. They expressed and shared their views in a phonological exchange of verbal deletions, distortions and generalizations of information (a concept created by Noam Chomsky's doctoral dissertation on Transformational Grammar in 1956). Their implied views and perspectives came from learned habits and procedural and cognitive skills-based behavior, using unconscious basal ganglia memory retrieval.

For a mediator to question what is important about a particular habitual behavior requires a safe environment for parties to open up and expose vulnerability. It is a useful step in mediation to elicit such vulnerability as it consistently creates a reflex of inhibition (of aggression) in the opposing party, thereby minimizing personal attacks and anger directed towards each other.

As mediation progressed, parties moved from respectful to emotional while addressing each other. They took turns responding to the mediator's probing questions which moved away from episodic and semantic memory (the intent and facts of their actions/behaviors) to focus on the *present impact and effect* of their unique experiences.

Conscious decision-making can be difficult in mediation due to parties' faulty forecasting, 'miswanting' and underestimating events that influence future feelings and thoughts<sup>i</sup>. As parties start to reflect on the situation they may be distracted by their default networks<sup>ii</sup>.

Detailed descriptions of the steps involved in *insight* problem solving prior to the phenomenon of an aha! moment include a shift of attention<sup>iii</sup>, detection of weakly active internal concepts<sup>iv</sup> and the emergence of consciousness of a 'solution idea'<sup>v</sup>.

### **Aha! Moment**

With a lack of logical progression to a solution, a sudden "knowing" of an answer to a problem, unrelated to prior logical thinking, emerges. While it combines knowledge that already exists in memory, it reconfigures memory components in a new way. Such was the

case with parties in the mediation I have used as example. While parties seemed to relax and their thoughts focused inward, the defendant suddenly shifted in posture and facial expression, looking straight at the plaintiff, and made an offer that was not previously thought of, talked about or considered by anyone in the room. He was contagious with confidence and thereby showed his assurance that a good solution given the existing roadblock, his bankruptcy, was possible. How did he get to an insight?

An insight is the end product of several brain states. First, the brain requires slowing down to a resting state. Our brain fatigues rather quickly when it pays intense, focused attention for a period of time. Once the need for catharsis or venting has been satisfied, an inherent desire for peace helps inhibit attacks on the other party, who is no longer seen as an opponent (“me against you”) but rather referenced as “us against the problem”. These biological forces of harmony set the stage for a resting state of the brain. Alpha wave activity (8-13 Hz) increases in the visual cortex in a relaxed state of mind resulting in reduced external (visual) focus to lessen any distractions to a solution. It allows weakly active internal concepts to emerge from unconscious thought. This is known as the preparation stage for sensory gating prior to having an insight. Then a sudden burst of right hemispheric activity occurs in the anterior superior temporal gyrus. There is a shift from left hemispheric linear to right hemispheric holistic processing; from logical to intuitive and from symbolic to concrete processing. Alpha wave activity happens in order to get at remote associations via gamma synchrony. Gamma activity (30-100 Hz) binds all incoming information in the ACC resulting in an aha! moment. Expansively connected throughout the brain, the ACC directs all parts of attention such as memory, emotions, motivation and motor. The amygdala participates by attaching an emotional rating to the stimuli. It may also have a subconscious bias. The ACC can monitor performance to regulate behavior. It detects conditions under which errors are likely to occur rather than errors themselves.

In contrast, analytical problem solving increases visual attention. Beta activity (13-40 Hz) in the occipital lobe is an alert state and correlates with visual focus. Focus is often narrow and converges to one train-of-thought, often seen as the only right way to look at the problem.

The parties in the mediation example experienced an insight solution first-hand. The conditions of their mental states to prepare for sensory gating, a sudden burst of right hemispheric activity and the binding of remote associations via gamma synchrony, were ideal for insight problem solving and decision-making. It will take further study to evaluate the sustainability of a reproducible process culminating in insight solutions and involving different individuals (parties and mediators).

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<sup>i</sup> Parties intensely engaged in conscious thought processes with the mediator. There are a host of complexities which interact when we make conscious decisions. The tendency to process things one after the other can lead to a queue or bottleneck in the prefrontal cortex (PFC), wasting the brain’s resources. Since the PFC is limited in space, simplifying a complex idea by breaking it down into smaller pieces helps to free up space needed for re-sorting, adding or deleting parts or shifting perspectives. These chunks of information are easily recalled and recited. Decision making requires the cortex to compare and predict what is needed and in what order; it entails using cognitive components – understanding, deciding, recalling, memorizing and inhibiting. People are not good at forecasting how they’ll feel about a future event and parties in mediation find it difficult to set goals; often there is a faulty understanding of what getting to solution in mediation entails and ‘miswanting’ about liking or disliking the process can have an influence on a party’s motivation to participate.

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There is also the tendency of underestimating how other events will influence our thoughts or feelings in the future, also known as focalism. On occasion, the parties have procrastinated for a long time because they were waiting for the other party to behave as they expected, hence waiting for their affective state to arrive. In my example, prior to mediation the parties had started to negotiate the outstanding payment for web design and when they did not hear what they expected (or wanted) to hear, communication came to an abrupt halt, with verbal jargon resulting in hang-up phone calls. Both parties waited for the other to call with an apology or the like for almost a year.

ii Maintaining focus on a predetermined topic is the mediator's job. Sometimes parties arrive at mediation in a less than optimal mental state, after a day's work or distracted by another event. When parties 'check out', when a stream of thoughts and images emerges from ambient neural activity, this may be a function of the 'default network' which distracts and leads people to daydream. This can be a response to stimuli or self-referential and reflective activity that includes memory retrieval, inner speech, mental images, emotions, and planning of future events. It is important to gain some control over the default network in order to foster an "aha" experience.

Decision making may also be habitual for many people. Two behavior patterns I refer to in my work are the motivational traits of 'problem solver' and 'visionary'. The problem solver moves away from a problem and the visionary seeks to attain a goal. A person's habitual behavior pattern may determine if s/he prefers to make a decision to avoid a loss, to gain something or negotiate towards an uncertain result (gamble).

### iii Shift of Attention

In my example, a shift of attention required the engagement of the Cognitive Control System to carry out the following functions:

1. to *detect weak neural activity* and engage a *switch of attention to a new target* bringing it into awareness ("...amazing ideas that involved creative forms of payment"; offering to think about other processes, not solutions)
  2. to **switch from one association** (sometimes a strong, but incorrect one – i.e., "cash payment") to a weak, even unconscious, one (i.e., "cash value"). Insight involves unconscious processing.
  3. to **allow other components to direct attention towards them:**
    - a. hippocampus (**memory** formation and retrieval) – "air miles = cash value"
    - b. anterior cingulate cortex (detects **competing thoughts/associations** that seem *potentially relevant*)
- My Example: "...can't pay cash but have cash value in air miles"
- c. posterior occipital-parietal cortex (**quieting or gating sensory input** [from the problem] so that solvers can better detect and switch attention to fragile internal activation which may lead them to solution.

My Example: Paraphrasing with non-verbal [auditory] cues, i.e., quieter voice, slowing down speech, nothing new, already familiar content

4. to **reinterpret the way one views the problem** (akin to a joke: a premise followed by a punch line requires us to reinterpret)

My Example: Paraphrasing what is so and summarizing the potential for what others have considered – less focus on *one* way [cash payment], broader attention [to include cash value]

5. to **reorganize memory** (once the seed of 'knowing' is planted, we can't go back to not knowing – memory now includes more options to deal with an unpaid invoice)

One thing to keep in mind is the fact that the engagement of the cognitive control system is modulated by **moods** and by **behaviors**. Moods that naturally occur or are induced (*positive* moods) and behaviors that encourage *attention to internal states* over external stimuli are more likely to contribute to an insight. In my example, both parties were optimistic towards the mediation process despite reaching an impasse with the information presented. A logical conclusion was not likely. However, there was a will and desire to solve the problem and have empathy for each other; hoping to learn from the experience and get on with life. From my observer role as mediator I recognized the need for a shift in pace and intensity of the dialog. By allowing parties to attend to their own quiet thoughts and internal reflection, an opportunity for insight was provided.

### iv Detect Weakly Active Internal Concepts

What the parties did not know was that there are two modes for preparing to solve a problem, namely analysis and insight. First, there is the analytical or non-insight approach. This approach requires increased visual

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attention and logical progression to a solution. The parties in the example mediation were actively engaged in analytical problem solving prior to the attention shift that led to an insight. First, however, they reached an impasse by getting 'stuck' following a single-focused, logical thought process.

The second mode for preparing to solve a problem is insight. This approach requires that those cognitive resources that are mobilized be diffused; and it requires the activation of temporal lobe semantic-processing areas such as the right hemisphere. As mentioned earlier, the right hemisphere is concerned with intuition, big picture viewing and with feelings and connectedness. Using the right hemisphere to prepare for creative problem solving, a person's attention becomes less focused and turns inward. In my example, I slowed down the dialog between the parties by allowing a silent pause, and then paraphrased at a deeper semantic level, summarizing the results of probing and clarifying information. A shift of attention followed the exchange of knowledge which was extrapolated from procedural (non-declarative), episodic and semantic (declarative) memory traces, and from understanding the impact of different perspectives. Reframing of (unmet) needs from negative to positive, such as a party *not wanting to be* seen as dishonest and reframed as *wanting to be* a reputable business person, also supported a shift of attention.

Attention exists on a continuum. The inverted "U" demonstrates the ability of the PFC to be organized, focused and responsible at an optimal functioning level and also to be distracted, disorganized, forgetful and uninhibited on the other end of the inverted "U". Therefore, too little attention causes a "wandering mind" and too much attention causes "overload" and stress. These imbalances cause the brain to shut down in order for synaptic connections related to attention to strengthen or loosen.

Attention changes the brain; it turns the rehearsal – the chaotic unsynchronized activity of the 'resting state' – into an orchestra: different neurons and separate brain regions fire together to bond. This keeps us focused on important things while we ignore distractions when in the 'state of attention'. Paying attention to stimuli results in the formation of a 'circuit'; a 40 Hz wave of electrical activity runs across the brain, called the Gamma band. The Gamma band is the binding frequency as it connects up various brain regions. According to Hebb's law, "cells that fire together, wire together". If two neurons are regularly active at the same time, the synapses between them are strengthened. This is the neurological basis for learning and memory in the brain. Only neurons that activate simultaneously cause chemical and physical changes at the synapse which leads to strengthening, which causes excitation and the desire to 'move forward'.

Something called executive organization occurs in the anterior cingulate cortex (ACC) and is critical for controlled attention during multiple stimuli. It ties attention, goals and actions together; it acts as gatekeeper to the frontal lobe and filters how much time and energy is required to deal with a problem. This is the area of prioritization. It is the central controller of the PFC with connectivity over the entire brain to orchestrate all components of attention: memory, emotion, motivation and motor. The ACC evaluates the degree of conflict and suggests a form of action. It is responsible for error detection and monitoring conflict within. The amygdala attaches an emotional value to the stimuli. If the stimuli are important, the ACC keeps the arousal going. It can regulate dopamine levels to increase efficiency of the networks. Dopamine is the 'chemical mediator' and can decrease the neuronal firing rate (if something is inappropriate) and it can make neurons *ready* to fire.

#### ▼ **Solution Idea**

Our greatest actions are born from unconscious thoughts and then tied together with our working memory. Unconscious thought is not constrained by bias or thought consistent with previous beliefs. Long-term memory capacity is greater than the short-term capacity of working memory involved in conscious thought. Unconsciousness works "bottom-up" and is creative. Unconscious thought is divergent and draws from a vast storage of information for incubation and for critical cues to surface.

Conscious decision making is incredibly complex and resource-constrained. Conscious thought is only a tiny portion of what the brain is processing at any given moment. Although conscious attention carefully checks for well-being by the whole integrative brain system, we protect the use of conscious attention by removing awareness of many unimportant areas, like focusing on the hair on the back of your neck.

To understand a person's thought process let's explore how thoughts come into consciousness. For consciousness to be able to move from one thought or idea to another, there are groups of neurons in our unconscious mind, active all together at the same time, called a neuronal assembly. There is a very narrow gateway or bottleneck that filters neural assemblies and allows them to rise to form one cohesive thought. They

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make maps of maps. Neurons within one assembly can be recruited into other groups. The interaction happens via 're-entrant' loops, patterns between maps, and between groups of neurons.

We can still only be conscious about one thing at a time. We have a multitude of unconscious thoughts, habits and routines. The basal ganglia store these mental routines and every lifetime experience we have had. If the right cues are available habits can be triggered and circuits can build representations of sequential actions. This older part of the brain is highly energy efficient and takes over; it is beneath conscious awareness. It *frees the thinking parts of the brain for more creative information to emerge*. This creative state lets us see solutions the conscious mind can't get at.

The conductor of consciousness is the thalamus. Nuclei in the thalamus receive inputs from every process in the nervous system. It is privy to what goes on in the brain at any given moment. Nuclei then synchronize the neural assemblies to general cortical activity thus creating consciousness.

With our brain always ready for stimuli to attend to, attention provides the ability to focus on sensory input and neurons decide if and how to respond. Modulators such as dopamine stimulate the value given to a particular sensory input. The brain synchronizes activity during attention, while attention creates adaptability (neuroplasticity) in the brain.



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