

Brain-based psychotherapy integration: Clinical biopsychology

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There has been an increasing interest in psychotherapy integration over the past 30 years and that most therapists now tend to use the label 'eclectic' when asked about their orientation. More recently, there have been discussions of neuroscience in relation to psychological treatment, although most times this has involved simply naming brain structures (e.g., amygdala) or using vague statements (e.g., 'experience transforms the brain') related to concepts and treatments that have been in existence for decades. However, it is a reasonable conclusion that a brain-based approach is the only avenue that will allow true psychotherapy integration since the brain is responsible for all behaviours, whether those are functional or maladaptive.

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I was trained in Lurian approach in neuropsychological assessment. While I was teaching a graduate course on neuropsychology in 1984, I developed a theoretical explanation of Alexander Luria's views of cortical processing based on the cortical column as the binary unit that operated in circuits – Simply think of a cortical column as a few thousand neurons operating in synchrony. However, there was not sufficient evidence at that time to support a publication on the model that was called 'speculative' and 'untestable' by peer reviewers. With technological advances leading to an explosion of neuroscience research since that time, there was sufficient support that allowed the first peer-reviewed article (Moss, 2006) on this theoretical view I called the 'dimensional systems model'. Based on that theory, I published the first article on a psychotherapy approach referred to as the 'clinical biopsychological model' the following year (Moss, 2007).

The following is a brief description of the viewpoint of the clinical biopsychological model: There are a large number of interesting aspects ties to these new theories. I will briefly discuss two. These are: (1) providing an explanation for the 'unconscious'; and (2) explaining the bases for 'giver' (Type G) and taker (Type T) interpersonal behaviour patterns. However, I want to first provide a brief overview of how the brain processes those three points.

The cerebral cortex is the outmost portion of the brain that controls our human cognitive abilities, such as language and problem solving. The right and left cortices are considered to be semi-independent functioning minds. Within the suggested parallel processing design, the side that can best respond to an ongoing situation is the one that assumes control of the ensuing response. Both hemispheres receive similar sensory input (e.g., vision and hearing). The posterior lobes (i.e., parietal, temporal and occipital) are involved with processing and memory storage tied to incoming sensory information, while the frontal lobes are involved with analysis, planning, and response initiation, as well as associated memories of such activities. The left cortex processes sensory information in detailed manner, resulting in its being slower than the right. The right cortex processes the information much faster, but in a global, less-detailed manner. There is exchange of information between the sides, although this exchange can be both excitatory and inhibitory. From a developmental perspective, there is initially only very limited information exchange between lobes with each side, and between the hemispheres. This allows each cortical area to develop fully its memories and associated processing prior to influence from other areas. Additionally, left hemisphere functions (e.g., receptive and expressive speech) will develop slower than those of the right hemisphere (e.g., non-verbal emotional analyses and responses) since there are a greater number of information units (i.e., cortical columns) and interconnections in the circuits associated with left hemisphere processing. A final point is that the right hemisphere's global processing allows for faster responses if confronted with outside danger; thus, this side is best designed biologically (i.e., for survival) to respond and assume behavioural control while in a negative emotional state.

The left cortex primarily handles language functions since this is highly detailed. Thus, the left posterior cortex is involved in comprehending (including memory storage) both spoken and written language, while the frontal lobe controls spoken language, including the motor memories of language. In contrast, the right cortex is involved in many less detailed global functions, including non-verbal emotional analyses and responses. The right posterior areas are involved in comprehending (including memory storage) non-detailed emotional behaviours shown by others, as well as storage of external (e.g., sight and sound) and internal (e.g., visceral responses) sensory memories tied to emotions. The right frontal lobe is involved in emotional expressions involving prosody and body language, including the motor memories of such expressions.

Conscious vs unconscious

I originally referred to the left hemisphere being involved with all verbal thinking, including one's internal verbal dialogue. Michael Gazzaniga (1989) similarly described the 'interpreter' of the left

hemisphere. I now use the term verbal interpreter to refer to the ventral lateral frontal region which includes 'Broca's area' (considered the speech motor planning area). Although the receptive language memories are located in the posterior lobes, the columns allowing us to actively use language are theoretically in the frontal lobe. If accurate, our internal verbal dialogue, which has often been considered synonymous with 'consciousness' or self-awareness, involves only a limited area of the left frontal cortex. Therefore, if there are no direct cortical connections to allow the verbal interpreter to be aware of specific cortical activity located elsewhere, the other activity is 'unconscious' relative to verbal awareness.

A major question is what is connected to the verbal interpreter's location? Obviously, left cortical functions are the most likely to be accessible by the interpreter, particularly in the lateral cortex that processes information from the world around us. Columns in the medial cortex process internal and self-referential information and these are less likely to connect to the verbal interpreter circuitry. This is based on the expectation that medial receptive columns are connected to their respective medial frontal columns. Additionally, right cortical connections to the verbal interpreter are very limited. It appears that frontal connections from one hemisphere connect only to the corresponding location of the opposing hemisphere. The same is true of the posterior cortical regions. This suggests that most right hemisphere processing is not directly connected with the verbal interpreter. The result is that there is inaccurate awareness of, and an inability to control, right posterior hemisphere activities by the verbal interpreter. As previously stated, non-verbal emotional processing involves the right hemisphere.

A clinical example will help illustrate these concepts. I used (Moss, 2015; 2016) the example of a woman who is forcefully held by her wrists during a sexual assault. At a later time, she was grabbed by the wrist by someone she trusts and experiences a panic/fear response. Based on my theory the tactile columns for the wrist lead to the activation of the column circuits where the various right cortical non-detailed (e.g., contextual aspects, voice intonations of the perpetrator, general body size and facial features of the perpetrator) sensory and emotional aspects are represented.

The victim is able to verbally state (from the left verbal interpreter) she had a panic attack that logically makes no sense based on the identity of the person who held her wrist. She is unable to describe all of the right hemisphere column circuits that were activated. In fact, the psychological treatment in which the patient verbally describes what occurred with every possible detail recalled over three to four repetitions results in her being able to recall many more specific details in the latter descriptions. As those details are discussed, the verbal interpreter circuit becomes aware as she visualises those in her right cortex. Thus, she had the memories present cortically with the verbal interpreter circuit remaining unaware. Obviously, there can be other memories present that the victim fails to recall even during the treatment process. The point is that these are clearly episodic memories, but without consciousness as defined by the verbal interpreter being initially involved.

Type G and Type T relationship patterns

I have suggested that there are two different, but basic, patterns by which individuals have learned to activate positive feelings and deactivate negative ones within relationships. These two patterns involve either the giving (Type G) or taking (Type T) of power, control, attention, and/or things. At the simplest level, this is consistent with the basic motivational rule and refers to both the sensory emotional memories (i.e., how one feels) and action (i.e., how one behaves) in relationship interactions. Although hereditary/genetic factors (e.g., temperament) play a role in the development of one pattern over another, a major influence involves each person's own learning history. This learning history involves what was most effective in acquiring positive and avoiding negative consequences with all influential people within an individual's early social system. Once developed, an individual continues to relate to

the current social system in the same basic manner of giving or taking since their earlier emotional memories define which of these patterns results in positive or negative internal states.

Type T individuals experience positive feelings in relationships by taking power, control, attention and/or things and experience negative emotions when having to give at their own expense. Therefore, they give only if something more desirable can be obtained or maintained. For a Type T desiring attention more than anything else, this same person may be willing to give up direct power and control. In such a case, this person may be very dependent and whiny, often being in the position of engaging in behaviours that would logically appear very maladaptive. In contrast, one who desires power and control more than attention may be willing to let others receive the attention publicly as long as he can 'pull the strings'.

Type G individuals activate positive feelings in relationships by giving power, control, attention and/or things, while experiencing negative feelings if they have to take things at someone else's expense. They can behaviourally 'take in' certain situations, but have to develop specific rules to do so. These rules allow them to define for themselves when it is acceptable to take from others. However, the major positive experience for this type occurs when an individual spontaneously decides to give in a way to someone, feels they have done a good job, and the person on the receiving end demonstrates a genuine appreciation for what has been done. The most negative experience is one in which the giver has to accept something from someone has typically done, has no means to repay what was done, and is made to feel guilty due to statements from others.

Given a parallel processing model of the brain in which non-detailed emotional memories are stored in the right cortex and the prime directive of the system is to maximise the positive and minimise the negative emotions being experienced, the development of the described patterns is considered logical. These patterns reflect the motivation for the behaviours seen in each type. The sensory emotional memories are the factors responsible for the way a person is able to have positive and negative emotions stimulated and, thus, are responsible for the motivation to maintain the behaviour (i.e., frontal action memories) patterns.

Emotional memories are stored very early in development and are independent of the verbal-thinking process (Crutcher, 1994). As a result, these emotional memories serve to guide the future memories that develop since there will be an attempt to maximise positive and minimise negative emotions. Obviously, the best way to maximise the positive feelings is to stimulate the previously stored positive memories and to avoid the stimulation of the previously stored negative memories. Once an individual stores memory associated with either a pattern of giving or taking to activate positive emotions, it is logical that this pattern will continue and intensify.

In the brain, the columns tied to emotional memories form circuits (Moss, 2013). Based on these emotional memories, the right and left frontal regions will develop their own circuits of columns that guide the person's actions, which, in turn, can activate or deactivate the non-detailed emotional memories based on environmental sensory input (e.g., observing another person's behaviour) to the right posterior hemisphere. Once established, it is likely that the frontal columns controlling behaviour tied to old emotional memories will be the first employed in response to new environmental stimulation that results in either positive or negative feelings. Thus, the likelihood is that similar patterns tied to what environmentally leads to desirable and undesirable emotions, as well as how this is behaviourally controlled, will be maintained.

Taking this point one step further, it is not surprising to anyone that in most circumstances, one's native verbal language (e.g., English) continues to be used in social interaction. That applies to new and old relationships, including relationships with friends, spouse, and individuals at school and work. For

example, if someone never learned to speak Chinese, why would you expect him to speak Chinese in social situations? When considering emotional communications in relationships, would it not be equally expected that one would continue to employ that learned over the course of one's developmental years?

CONCLUSION

The behavioural descriptions serve a major purpose in the emotional restructuring session which is directed toward neutralising negative emotional memories tied to problematic past and current relationships. Many other aspects exist in relation to these theories, including specific treatment approaches in dealing with influential negative emotional memories (e.g., problems tied to parents, spouse and peer bullying).

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