



Leading-Edge Neuroscience Reveals Significant Correlations Between Beliefs, the Whole-Brain State, and Psychotherapy

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The latest understandings in neuroscience are revealing important information for psychotherapists. This article is designed to inform you about some of the key elements of those new understandings, including the importance of subconscious beliefs, the Whole-Brain State, and the basic mechanisms of the mind/brain interface—all of which can assist you in being more effective with your clients.

Let's begin by defining two key terms in this article. The first is *belief*. The dictionary defines belief as *something one accepts as true or real; a firmly held opinion or conviction*. From our perspective, the origin of beliefs can be traced back to conclusions drawn from past experience, i.e. fire can hurt me because I have had an experience with fire that demonstrated that truth. Beliefs can be conscious and/or subconscious.

The second term is *Whole-Brain State*. This is a state of coherency in the brain marked by a bilateral, symmetrical brain wave pattern, allowing for maximum communication/data flow between the left and right hemispheres of the brain.

So, what do these terms have to do with psychotherapy? The surprising answer is ... *everything!* If we accept that the overall goal of psychotherapy is to produce fully functional human beings, then being able to optimise belief systems and brain function is a major factor in accomplishing that goal.

The Role of Beliefs

Consider the role of beliefs in our lives. Beliefs are like filters on a camera. What the camera 'sees' is a function of the filters through which it is viewing its subject. In other words, how we 'see' the world is a function of our beliefs and profoundly influences personality. As a result of our beliefs, we define ourselves as worthy or worthless, powerful or powerless, competent or incompetent, trusting or suspicious, belonging or outcast, self-reliant or dependent, flexible or judgmental, fairly treated or victimised, loved or hated. Your beliefs have far-reaching consequences, both positive and negative, in your life. Beliefs affect your moods, relationships, job performance, self-esteem, physical health, even your religious or spiritual outlook. Most psychotherapists deal with one or more of these issues on a regular basis with their clients. Clients are often plagued by beliefs that are self-limiting. Consequently, the ability to help individuals change self-limiting beliefs into self-empowering beliefs is of great value in a psychotherapeutic environment.

Conscious or Subconscious

Beliefs can be conscious and/or subconscious. We are using the word *conscious* in its ordinary sense, as awareness of the environment. We are using the word *subconscious*, as awareness below the conscious level. Like a hard drive in a computer, this is where most of the belief-system 'software' is stored and, like a computer memory, the data are stored not *in the central processing chip* itself but, rather, *in*

the energy field that surrounds and interpenetrates the chip. There is an analogous relationship with the brain and mind, respectively. This 'software' is largely responsible for our habitual thoughts and behaviours. Advances in neuroscience have provided important information about the subconscious mind. For example, in a study cited in Harvard Professor Emeritus Gerald Zaltman's book *How Customers Think*, neuroscience reveals that at least 95% of our thoughts and decisions originate at the subconscious level of the mind (Zaltman 2003). That leaves a very small percentage of our decision-making capacity for the conscious mind to exercise. These subconscious beliefs create the perceptual filters through which we respond to life's challenges. So, while we may be mostly unaware of their influence on us, our subconscious beliefs largely 'direct' our observable actions and behaviours. They form the basis for our actions and reactions to each new situation in our lives.

Another important quality of the subconscious mind is its processing capacity. In his book *The User Illusion, Cutting Consciousness Down to Size*, Tor Nørretranders, provides important information about the processing capacity of the conscious and subconscious minds (Nørretranders 1991).

As remarkable as it may seem, the conscious mind processes information at an approximate rate of 40 bits of information per second. While the subconscious mind processes approximately 40 million bits of information per second. Ironically, most standard approaches to psychotherapy address only the 40-bit processor (i.e. the conscious mind). While the enormous power of the 40 million-bit processor, (i.e. the subconscious mind), is largely unused.

What about the Whole-Brain State?

A great deal of research has been conducted for decades on what has come to be called 'brain dominance theory' (also known as split-brain research). The findings of this research indicate that in general, each hemisphere of the cerebral cortex tends to specialise in and preside over different functions, process different kinds of information, and deal with different kinds of problems.

LEFT Hemisphere

- uses logic/reason
- thinks in words
- deals in parts/specifics
- will analyse/break apart
- thinks sequentially
- identifies with the individual
- is ordered/controlled

RIGHT Hemisphere

- use emotions/intuition
- thinks in pictures
- deals in wholes/relationship
- will synthesise/put together
- think simultaneously
- identifies with the group
- is spontaneous/free

It should be obvious from the qualities and characteristics described above that ideal brain functioning would be the ability to use both sides of the cerebral cortex simultaneously. However, life experiences often trigger a dominance of one side over the other when responding to specific situations. The more emotionally charged the experience (usually traumatic),

the more likely it will be stored for future reference, and the more likely we will automatically over-identify with only one hemisphere when faced with similar life experiences in future. As a psychotherapist, the ability to help clients achieve a balanced identification with *both* hemispheres of the brain (i.e. the whole-brain state) with respect to past traumatic experiences is paramount in helping them to achieve a new perspective of their past. This new perspective can free them from the habitual perspective, held in the subconscious, which can make a past trauma into a *current* nightmare. By re-perceiving a *past* traumatic experience with new Whole-Brain 'filters', clients can be freed from the automaticity of past perceptions that limit their happiness and wellbeing.

In addition to its usefulness as a tool for dealing more effectively with life's challenges—past, present, and future—the Whole-Brain State has another major benefit. It can be used as a foundation for quickly and effectively changing self-limiting subconscious beliefs. The research that follows, used PSYCH-K®, a popular system for subconscious change. This system has been used by psychiatrists, psychologists, social workers, professional performance coaches and others for over 23 years. This is a testament to its versatility. In the hands of a professionally trained psychotherapist, it is an effective therapeutic tool. In the hands of a sports performance coach, it is a way to dramatically enhance athletic ability. Used as a tool by educators and parents, it can significantly help students raise their level of academic achievement.

Healer, Heal Thyself ... and Your Clients Too!

The powerful influence of the whole-brain state was demonstrated in a study reported in 1988 in the *International Journal of Neuroscience*, by researchers at the Universidad Nacional Autonoma de Mexico (Grinberg-Zylberbaum & Ramos 1987, cited in Ferguson 1988). It suggests that synchronised brain states significantly influence nonverbal communication. The study was done with thirteen paired subjects. The subjects were tested in a darkened and soundproof Faraday cage (a lead-lined, screened chamber, that filters out all outside electromagnetic activity). Each pair of subjects was instructed to close their eyes and try to 'communicate' by becoming aware of the other's presence and to signal the experimenter when they felt it had occurred. The brainwave states of the subjects were monitored during this process. Experimenters reported that during the sessions, an increase in similarity of EEG (electroencephalogram) patterns between the pairs developed. Furthermore, the experimenters noticed, "*The subject with the highest concordance [hemispheric integration] was the one who most influenced the session.*" In other words, when you are in a whole-brain state, your brain wave pattern can automatically affect your client in a very positive way, even before you communicate verbally.

These conclusions support the allegation that our thoughts, even when nonverbally expressed, can influence others. In fact, the more whole-brained we become, the more we influence others toward that state of being as well. The therapeutic benefit of this kind of influence on therapists, as well as on their clients, is self-evident.

QEEG and the Whole-Brain State

This research used standard electroencephalography (EEG) equipment and techniques; along with another computer program to convert raw EEG to Quantitative EEG (QEEG) tomography for processing the research findings. Our research gathering documented one hundred twenty-five (125) cases, with data gathered over 12 months in three different locations, using different EEG technicians, using two different types of EEG equipment; the result of this investigation produced a p-value of ≤ 0.010 .

A baseline of EEG (electroencephalogram) data was established for each case. Three (3) baseline readings of five (5) minutes each were recorded; five minutes eyes open, five minutes eyes closed, and five minutes with the brain on task (silently reading a magazine).

A Certified PSYCH-K® Facilitator used standard PSYCH-K® practices. (The corporate version is identified as PER-K®.) *This is a process for subconscious belief change* to achieve the whole-brain state. Following the intervention of the PSYCH-K® change process (called a 'balance'), a post-intervention EEG was recorded in the same manner as the EEG baseline stated above. The balance took approximately 10 minutes to complete. Raw EEG data were artifacted to eliminate eye movement, tongue movement, swallowing, or other unwanted disturbances in the EEG. NeuroStat, a function of the NeuroGuide program from Applied Neuroscience, performed statistical analysis. NeuroStat allows for individual independent t-tests to be performed. The following is an example from the base of 125 cases examined for the whole-brain state. The independent t-test compares condition A to condition B and shows whether there are differences in the dominant brain function. When we consider Shannon's method of statistical analysis,* we understand that when we measure two groups, A and B, (such as pre-balance and post-balance) each of them having a well defined probability distribution, respectively, as well as a joint probability distribution, then the mutual information between A and B is defined. The concept of mutual information can easily be extended to quantum systems of entanglement. This leads us to understand that having quantum mutual information, which, for a general state of either A and/or B is now defined, provides the basis by which the relationship can be understood. A sample depiction of the whole-brain state is seen in Figure 1.

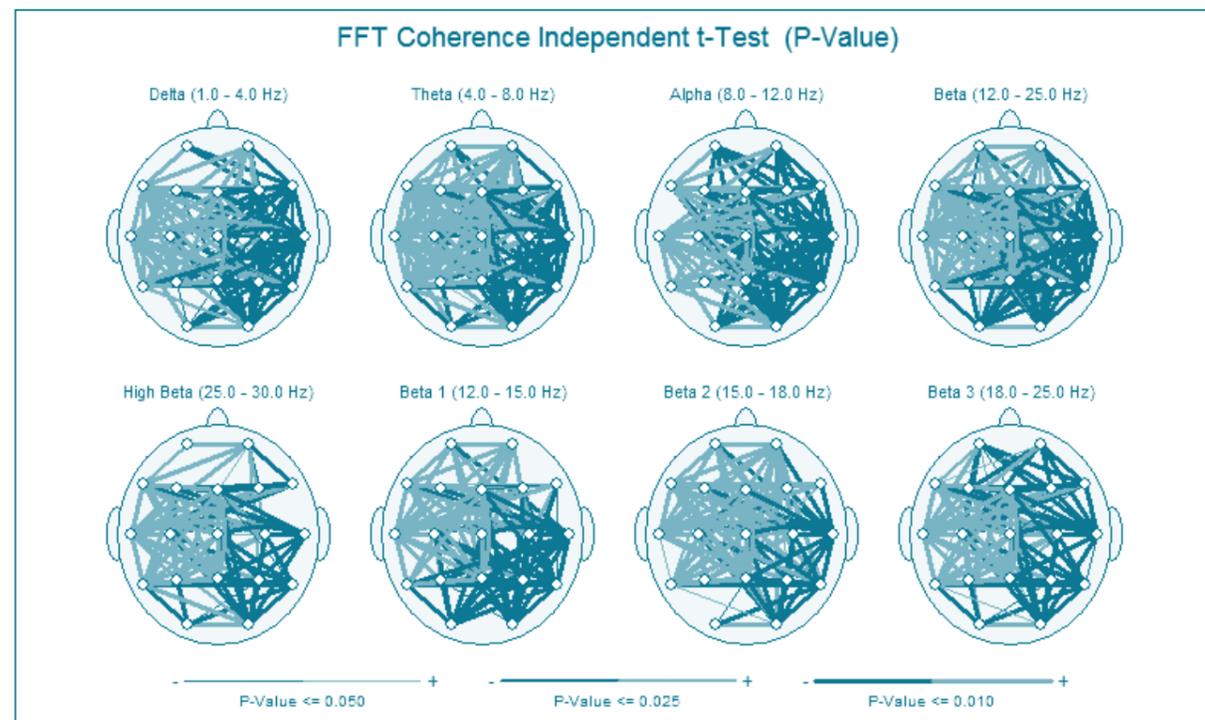


Figure 1: Following a PSYCH-K® balance, this person demonstrated a statistically significant shift in hemispheric coherence patterns, which were reflected behaviourally in increased access to emotional resources and integrated, 'whole-brain' behaviours and relationships.

Figure 1 is labelled as *FFT Coherence Independent T-Test* (P-Value). To better understand the scientific significance of this report, understanding the significance of p-value will help to put this research into perspective.

In statistical significance testing, the **p-value** is the probability of obtaining a test statistic at least as extreme as the one that was actually observed. When the result falls at 0.05 or 0.01, it is said to be statistically significant. In the case of the Fannin-Williams research, a very high degree of statistical significance occurred: ≤ 0.010 . This indicates that the relationship between the two phenomena is highly significant and not a function of chance.

The colours on the independent t-test show phenomenon A (dominant brainwave pattern) BEFORE the PSYCH-K® balance is depicted in light blue, left side and phenomenon B (dominant brainwave pattern) AFTER the PSYCH-K® balance was facilitated is depicted in dark blue, right side. The *whole-brain state* is considered to be the combination of light blue, left side, condition A, dominance prior to the balance process; and condition B, right side, dominance after the balance process was facilitated.

Due to the space restriction of this article, it is not possible to provide a comprehensive treatment of this subject, or the numerous changes that a majority of subjects in this research experienced. However, the volume of data collected, and the unique properties it represents, afford us the opportunity to evaluate and continue to understand what the data mean, as well as providing intriguing hints about the nature of its potential. Singularly, the most significant information to come from this research, in 98% of the cases measured, presented very high statistically significant correlations, demonstrating the difference between baseline measures and the presence of the whole-brain state after the intervention occurred. As mentioned above, just

because the whole-brain state is present does not mean it is being continually activated so that the person can take full advantage of it in a given situation. Sometimes secondary gain issues come into play, as may other subconscious belief patterns that might need to be addressed in order to effectively activate and/or allow the person to use fully the whole-brain state.

The whole-brain state is better understood with some education regarding a few of its more unfamiliar components. Figure 1 uses the term *coherence*. This is an energy signature. In physics, *coherence* is a property of waves that enables stationary interference, a temporally and spatially constant to brainwave function. More generally, coherence describes all properties of the correlation between physical quantities of a wave. This is important in order to understand the physics of resonating wave patterns in the brain, its connection to the whole-brain state, and how it impacts our behaviour.

An additional component of the whole-brain state is identified as constructive and destructive interference patterns. If two waves are interacting with one another in such a way that they

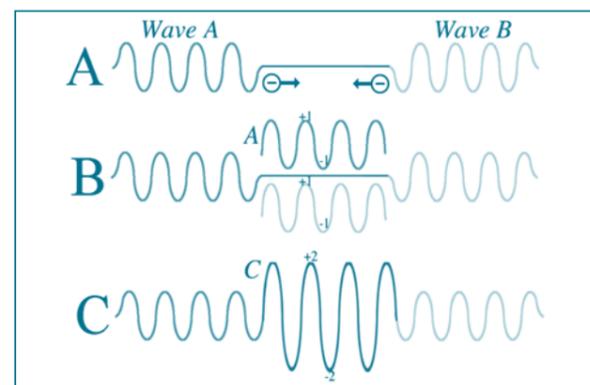


Figure 2: Constructive Interference

combine to create a wave of greater amplitude than either one by itself, the result is called *constructive interference*. Constructive interference is said to occur when waves are 'in phase' with one another. However, if the waves interfere with each other in such a way as to diminish (or eliminate) their combined amplitude, a *destructive interference* pattern is created. In this case, the waves are said to be 'out of phase' with each other. Phase is important in brainwave patterns, just as it is in other principles of physics. That is to say, two waves are said to be coherent if they have a constant relative phase (see Figure 2, the peak of each wave is moving in the same direction at the same time). The degree of coherence is measured by the interference visibility, a measure of how perfectly the waves can cancel due to destructive interference (see Figure 3). Cancellation is virtual or local since a wave cannot have negative energy.

Constructive Interference as seen in Figure 2, for example, would be like two sets of ripples moving across the surface of water toward each other, as seen in depiction A. Both wave A and B are moving toward each other with their ripples in-phase, in this case both waves are leading with their negative amplitude. Their cycle patterns are aligned. The waves merge together at the interface where two ripples meet. The consequences of this merger, the waves are drawn with one above the other as seen in middle depiction B. The common expression of, *being in rapport, or in sync, or on the same wavelength* with someone, is an example of how this concept is relevant to therapist/ client relationships.

Destructive Interference, as seen in Figure 3, for example, the ripples might be best understood when thought of as waves created when a pebble is dropped into water. Wave A in depiction B, is moving from left to right. Wave B in depiction B, moving right to left, represents the ripples from a second pebble dropped shortly after the first. Since the pebbles did not enter the water at the same time, the waves will not be aligned when they merge; they will be 'out of phase'. The physics of a destructive interference pattern has wave A leading with negative amplitude and wave B leading with positive amplitude. Where they meet, the waves mirror-image each other. As shown in depiction C, the amplitude values of each wave cancel the other out (Lipton 2005: 116).

The significance of this principle of physics is fundamental to the coherence of the whole-brain state. Allowing brainwave energy to be more focused and effective at resolving problems and accessing information confers the ability to not only resonate properly to influence brain function but also to interact with subconscious beliefs.

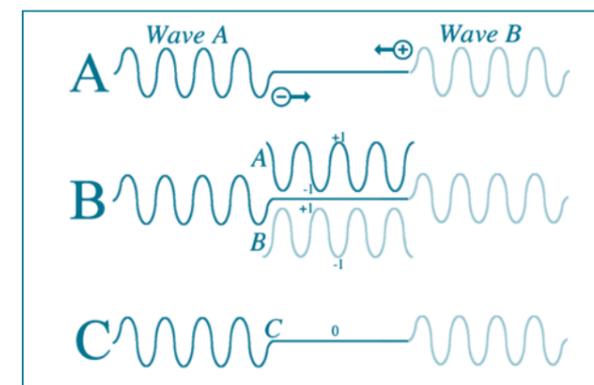


Figure 3: Destructive Interference

Emotional Engagement and Subconscious Beliefs

From a neuroscience perspective, the basis for understanding why we experience particular emotions is centred in the relationship between the *anterior cingulate cortex (ACC)* and the *amygdala*. The amygdala, usually thought of as the fear detector, also detects all other emotions. It responds to fear because it processes emotions in order of their significance, so when fear is the most significant emotion in the brain, the amygdala will respond (Whalen et al. 2001). When fear is the most dominant emotion in your thinking, it taxes the subconscious mind, which does most of the fast processing of information.

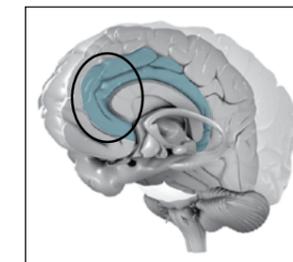


Figure 4: Anterior Cingulate Cortex (ACC). Front part of the Cingulate Gyrus



Figure 5: Amygdala - Thought of as the fear detector

For example, if a person who left a secure job to pursue her dreams, started to read statistics about the unlikelihood of success as an entrepreneur, the amygdala would likely have been stimulated, making her more anxious. As a result, her *subconscious fears* would be active even when she was thinking about other things. Scientific experiments found that when fearful facial expressions were shown so that people did not know they had seen them, the amygdala was still activated (Morris et al. 1999, Williams & Mattingley 2004, Whalen et al. 1998).

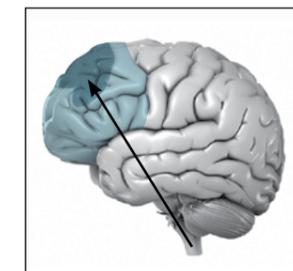


Figure 6: Prefrontal Cortex (PFC)

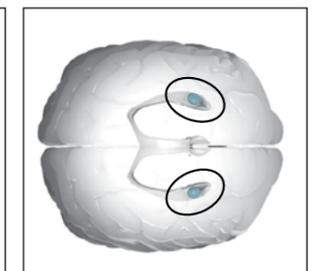


Figure 7: Amygdala

The amygdala is connected to multiple brain regions. One of those regions is the frontal lobe, where many important decisions are processed. If the amygdala is activated, the activation affects various regions in the frontal lobe, particularly the *prefrontal cortex (PFC)*, and thereafter affects decision-making, as well as emotional centres. We can recognise that we are vulnerable to fear and anxiety in such a way that it compromises our own abilities to attend to relevant content. The impact of this is that it consumes our *thinking resources*. We should also understand that the amygdala is the *emotional relevance detector* rather than just a fear detector. The amygdala-PFC connection is important because a part of it acts as short-term memory and another part as the 'accountant' in the brain, calculating risks and benefits of our thinking. Subconscious threats over-activate the amygdala

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and lead to a decline in thinking and productivity when we focus on negative statements such as:

- ◆ How am I ever going to keep up with everything? What if I fail?
- ◆ What if I can't afford food, gas, healthcare on what I make?
- ◆ The government is not doing much to help me or my family, so the odds for success are stacked against me.
- ◆ What if I get laid off?
- ◆ I'm not smart enough to be successful.

These kinds of negative thought patterns can create what could be identified as an *amygdala hijacking*. The amygdala kicks into action in preparation for 'fight or flight', creating unacceptable levels of anxiety and fear at a subconscious level that negatively impact our behaviour and productivity. This subconscious patterning becomes part of the default network and will keep us focussed on looking out for danger. The authors of this paper contend that entering into what we call the *whole-brain state* will move the brain out of the negative default mode and allow access to more resourceful thinking processes. High-speed mindset change taught in PSYCH-K® and/or PER-K® is an effective method for identifying and changing the conflict between the conscious and subconscious beliefs.

Worry is another component related to normal brain function. The brain's response to fear, it is thought of as a response of the brain to block out negative emotions that reside in the subconscious (Rhudy 2000). Some neuroscientists have suggested that worry is a strategy of cognitive avoidance in which internal verbalisation acts to suppress threatening emotional imagery. It is believed that worry leads to missing important negative information such as risk that may be relevant to making optimal decisions. This information is mostly subconscious. Worry disrupts the 'brain bridge' (corpus callosum, see Figure 8) and slows the transfer time across from the left to the right hemisphere, taking additional time for processing without creating a solution to the problem (Mohlman et al. 2009). People who are constantly worried often see this worry as an attempt to find a solution, but they may in fact be stuck in worry. That usually keeps productivity to a minimum. The whole-brain state increases communication between the left and right hemispheres of the brain and speeds up the transfer of information across the corpus callosum, thereby diminishing the capacity to worry without excluding or ignoring important information leading to more productive behaviour.



Figure 8: Corpus callosum, the 'brain-bridge'

The authors of this paper point to the research herein, which suggests that the whole-brain state allows access to the inter-hemispheric activity connecting to more efficient brain function. Further, we would have you understand that from the research presented here we identify the *whole-brain state* as

a bi-lateral, symmetrical brain wave pattern allowing access to positive mood and cognitive openness.

In conclusion, we suggest that this research demonstrates a significant connection between beliefs—especially at the subconscious level of the mind—the Whole-Brain State, and high-speed mindset change, as well as their relevant utility to psychotherapists. The data presented here strongly suggest a correlation between the state of mind of the psychotherapist and the state of the mind of the patient/client, highlighting the relevancy of doing psychotherapy from a Whole-Brain State, with the appropriate subconscious belief systems, in order to be optimally effective as a catalyst for change. ◆

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