

QEEG REVEALS INTERACTIVE LINK BETWEEN THE PRINCIPLES OF BUSINESS, THE PRINCIPLES OF NATURE AND THE WHOLE-BRAIN STATE

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INTRODUCTION

At first glance, neuroscience and business may seem an odd juxtaposition. Our involvement in the investigation of these two topics began in 2001. Working for many years with a colleague at Arizona State University, including the leadership research done at the United States Military Academy at West Point, the connection between neuroscience and business received worldwide recognition. This work yielded evidence those successful leaders, whether military or civilian, used their brains differently than less effective leaders, and was featured in a September 20, 2007 article (*This Is Your Brain on the Job*) that appeared in the Wall Street Journal. Many other articles followed, appearing in national and international publications. We offer new research and insights, along with an effective applied leadership process that has been time-tested to create *sustainable success*.

DEFAULT MODE NETWORK

In recent years, a series of papers presented insights, derived from qEEG investigations, into the operation of a more efficient *default network* in effective vs. less effective leaders.

The understanding and acceptance of the existence of the brain's default network has helped us better understand that there are regions of the brain characterized by decreased neural activity during goal-oriented tasks. We have come to know the relationship of these regions as a "default mode" of brain function. Studies suggested that the brain's default mode supports *self-referential* mental activity. To quote Marcus E. Raichle, whose research group in 2001 first identified the default mode network "When healthy people engage in a very focused activity, they in a sense, lose themselves. If you really are engaged in something, you kind of forget yourself, and that loss of self corresponds to the deactivation we observe in brain scans of the default networks {Dryden, 2009 1}".

In a follow up fMRI study, Raichle and colleagues identified a group of individuals whose brain images indicated that they were unable to "lose themselves" in work, music, exercise or other



activities that enable most healthy people to get "outside" of themselves, and interestingly, it turned out that these were highly stressed, depressed individuals, people whose emotions and thinking maladaptively colored their response to their environment, the task at hand, or the people around them {Sheline, 2009 2}. So perhaps Raichle's results give us a hint regarding the significance of the more efficient default mode network in the qEEG leadership study: Simply put, the ability to maintain effective relationships with others, begins with a healthy relationship with self; begins with a healthy relationship to thoughts, beliefs and emotions which subconsciously influence our own behavior and judgment (*see figure 1*).

The literature related to the default network indicates brain activity that offers an awareness of autobiographical self, stimulus independent thought, mentalizing, and most recently self-projection. Damien Fair (2008) ³ explains that

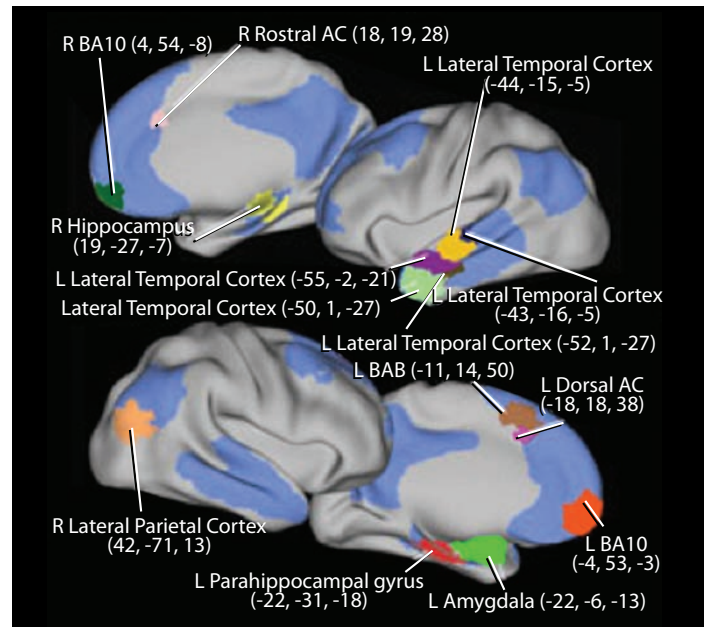


Figure 1: Default mode network illustrated in blue. Note high degree of overlap with additional colored regions reflecting maladaptive sustained activation during task in depressed individuals. {Sheline, 2009 2} Free via Open Access: OA.

these regions integrate into a cohesive, interconnected network.

Using resting-state functional connectivity MRI (rs-fcMRI) mapping to characterize the development of the brain's default network, Fair and his colleagues found that the default regions are only sparsely functionally connected at early school age (7–9 years old); over development, these regions integrate into a cohesive, interconnected network.

Fair and his group of researchers consider the default network as a functionally interconnected default system that is required for internally directed mental activity. They explain that it stands to reason that the default system should demonstrate a mature, or near mature, pattern of functional connectivity at a time in development when internally directed mental activity is demonstrable. We would contend that the research they present regarding the *autobiographical self, stimulus independent thought, mentalizing, and self-projection* is another way of describing subconscious beliefs, and their potential impact on a leader's way of relating to others ³.

RIGHT HEMISPHERE AND EMOTIONAL ENGAGEMENT

Previous work by the Arizona State University group also included insights into the crucial role which engagement of right hemisphere empathetic networks play in effective leadership. In a subsequent study involving 46 senior leaders, those who scored highest for their charismatic, visionary and socialized communication style demonstrated increased engagement of right frontal networks, suggesting a capacity to engage empathically in motivating their workgroup ⁴.

This work helps to understand the internal mechanisms that enable some people to be effective leaders and lent further support to the idea that neuroscience will help us to know how some people can form effective leadership relationships, and why some people can sustain their effectiveness and others cannot ⁵.

Goleman, Boyatzis & McKee, (2002) in their book *Primal Leadership* and *Resonant Leadership* (Boyatzis & McKee, 2005), synthesized their research to help us understand and to support their idea that effective leaders build resonant relationships with those around them. They also say that less effective leaders or those that are more one-sided in their leadership style seem to create dissonant relationships ⁶.

In Boyatzis' exploratory fMRI study (2011), preliminary observations revealed that recalling specific experiences with resonant leaders significantly activated 14 regions of interest in the

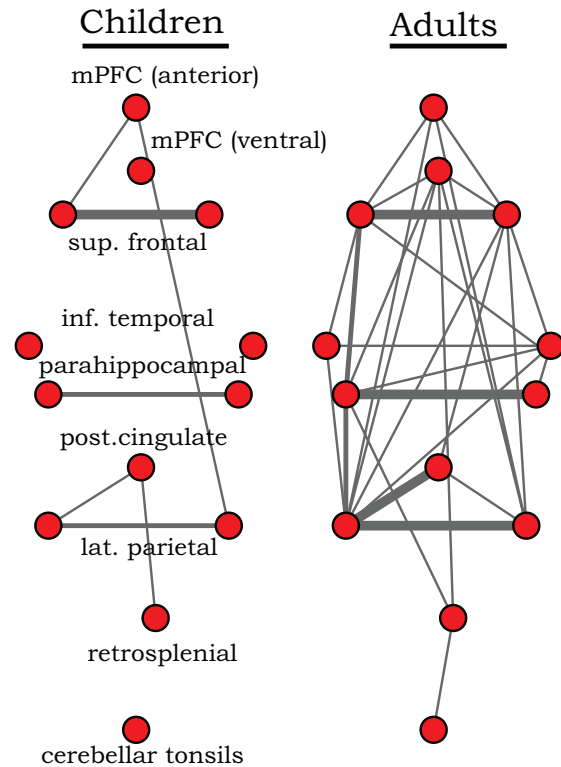


Figure 2) Default regions are only sparsely connected in children aged, 7-9 years old, but become a highly integrated network by age 21. Fair et al 2008. Free via Open Access: OA

brain, while dissonant leaders activated 6 and deactivated 11 regions. These experiences with resonant leaders activated neural systems involved in arousing attention (i.e., anterior cingulate cortex), the social or default network (i.e. right inferior frontal gyrus), mirror system (i.e., the right inferior parietal lobe), and other regions associated with approach relationships (i.e., the right putamen and bilateral insula). Meanwhile, dissonant leaders deactivated systems involved in social or default networks (i.e., the posterior cingulate cortex), the mirror system (i.e., the left inferior frontal gyrus), and activated those regions associated with narrowing attention (i.e., bilateral anterior cingulate cortex), and those associated with less compassion (i.e., left posterior cingulate cortex), more negative emotions (i.e., posterior inferior frontal gyrus). He also points out that we can begin to understand *how* they may be affecting our moods and cognitive openness. The authors of this article would have you understand that from our most recent research presented here identified as the *whole-brain* state (a bi-lateral, symmetrical brain wave pattern) allows access to positive mood and cognitive openness ⁷.

Boyatzis' research claims that negative emotions are stronger than positive emotions ⁸. He says that the contagion of negative emotion would ignite a stronger neural sequence than positive emotions. This may serve evolutionary functions but, paradoxically, it may limit learning. As a consequence, arousal of strong negative emotions stimulates the *Sympathetic Nervous System* (SNS), which inhibits access to existing neural circuits and invokes cognitive, emotional, and perceptual impairment ^{9, 10, 11}.

The benefits of a leadership style arousing positive emotions over negative (P/N) ones have been demonstrated by Fredrickson and Losada and others {Fredrickson, 2005 ¹²}. They found that a powerful indicator of what is possible for a system is the positivity/negativity ratio of feedback; that is, how many instances of positive vs. negative feedback we can observe in a human interaction process, such as a team meeting or in a couple's conversation. P/N is measured by counting the instances of positive feedback (e.g. "that is a good idea";) vs. negative feedback (e.g. "this is not what I expected; I am disappointed"). Marcial Losada found that high performance teams have a P/N ratio of 5.6; medium performance teams have a P/N of 1.9 and low performance teams have a P/N of 0.36 (there is more negativity than positivity). These ratios determine the level of connectivity that a team or workgroup can reach {Losada, 2004 ¹³}. They developed an empirical model demonstrating that the ability of a leader to project a positive emotional tone directly corresponds to the flexibility and creativity of these teams; medium performance teams have dynamics that correspond to a transient limit cycle that eventually settles into a fixed-point attractor, representing the inability to escape limiting routines; and low performance teams have dynamics that correspond to a fixed-point attractor, representing even less flexibility, and leading to a dead-end situation from which it's very hard to escape.

Some researchers are beginning to hypothesize that this positive or negative impact of leadership style on workgroup creativity actually has a neural basis.

They argue that the sustainability of leadership effectiveness is directly a function of a person's ability to adapt and activate neural plasticity. The *Sympathetic Nervous System* (SNS) and *Parasympathetic Nervous System* (PNS) are both needed for human functioning. They each have an impact on neural plasticity. Arousal affects the growth of the size and shape of our brain. Neurogenesis allows the human to build new neurons. The endocrines aroused in the PNS allow

the immune system to function at its best to help preserve existing tissue ¹⁴.

Boyatzis explains that a contagion of positive emotions seems to arouse the PNS, which stimulates adult neurogenesis (i.e., growth of new neurons), a sense of well-being, better immune system functioning, and cognitive, emotional, and perceptual openness ^{15, 16, 17}. By contrast, there are suggestions in the neuroscience literature that anxiety-inducing, or negativity based leaders may not only undermine morale but may actually impede the workgroup's capacity for new learning and creative growth at a neural level. Elizabeth Gould a Princeton University psychology professor has demonstrated, in rats and primates, the detrimental effects of chronic stress on "neurogenesis" or the brain's capacity to create new neuronal connections ¹⁸. Ronald Duman (2004) offered similar findings in human subjects that suggests that chronic stress debilitates dendrites and inhibits cell production which causes atrophy of the hippocampus, a part of the brain essential for learning and memory and also implicated in mood disorders, whereas access to a nurturing adult contributed directly to the development of healthy brain structure and function ¹⁹.

In Dr. Bruce H. Lipton's bestseller, *The Biology of Belief*, he says, "Our positive and negative beliefs not only impact our health, but also every aspect of our life." He goes on to say, "Your beliefs act like filters on a camera, changing how you see the world. And, your biology adapts to those beliefs." ²⁰

Obviously, the optimal state of consciousness is to have the qualities and attributes of both hemispheres operating simultaneously, in order to have the full response potential of the mind/brain system available to us, on an ongoing basis. This state of being can beneficially influence an individual's own state of consciousness, and consequently his or her own performance. This positive influence extends to other individuals.

A study reported in 1988 in the *International Journal of Neuroscience*, by researchers at the Universidad Nacional Autónoma de México, suggest that synchronized 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 (brainwave) patterns between the pairs of communicators developed. Furthermore, the experimenters noticed, “The subject with the highest concordance [hemispheric integration] was the one who most influenced the session.” In other words, the EEG patterns of the individual with less synchrony between the brain hemispheres would come to resemble the EEG pattern of the person whose two sides more closely resembled each other ²¹.

These conclusions support the proposition that our thoughts, even 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.

Noted physicist David Bohm based his analysis of the nonlocal field on empirical evidence of quantum theory ²². By 1987, Pribram agreed with Bohm’s idea that there is an *implicate order* to the universe that pertains to all matter. As it pertains to brainwave activity he proposed that there are holonomic overlapping patches of holographic structures in the cortical surface layers of the brain, which would transform inputs from perception and thoughts into slow electrical potentials presented in EEG brain wave patterns. Bohm also suggested that several different types of fields, each operating at many spatial and temporal frequencies may well be involved. He said that the characteristics of the particular type of *oscillation* would partially determine the range and resolution of the potential information transfer; this has yet to be understood. Quantum fields do not diminish as quickly over distance as electromagnetic fields do in the brain ²³.

The early work described above, set the stage for additional investigations, by the authors of this article, not affiliated with ASU. The authors of this article crossed paths in January of 2010, brought together by a mutual interest in human performance and a shared scientific curiosity about human consciousness.

The opportunity to scientifically test the efficacy of the author’s hypothesis related to their collective understanding and examine a belief change process, already used worldwide, in a more controlled environment presented it when the neuroscientific technology was available to do so. Both authors were surprised, as well as pleased and encouraged with the results, and what those results may mean for the collaboration of neuroscience and business, now and in the future. As a society we are facing many difficult challenges in the world today, e.g. political, ecological, social, and economic. The authors believe that, used properly, this collaboration between business and neuroscience can help individuals develop *creatively different*

solutions to many of those challenges.

The current nature of business on a global scale, demonstrates unprecedented challenges and undesirable consequences that many companies face, bringing into question the very survival of current *business principles and practices*, as well as the belief systems that drive them. Regrettably, fear and avarice are too often primary driving forces in business, and if unaddressed, will virtually ensure the destruction of our *global economy*. Ignorance of the complexity and interdependency of our environment virtually ensures the destruction of our *global ecology*. Both are *potentially lethal* to our entire civilization. The basic solution to this problem was succinctly stated by business leader, Peter Senge when he said, “*It’s not about doing what we are doing more efficiently. It’s about doing something different*” ²⁴.

It seems that for decades, business practices from around the world, brought us to this critical point in history. We stand on the brink of an unstable precipice desperately hoping that things will get better. If we are to avoid this unstable and destructive future, we must heed the words of business visionaries such as Peter Senge when he says, *...we must do something different*. This article and the research associated with this writing offers the argument that, in the main, business principles and practices are misaligned with those needed to create *sustainable success*, and *only a significantly visionary realignment will create something different*. The authors of this paper offer a different point of view based on new research in biology and human consciousness. The emerging field of epigenetics is fast replacing the older concept of genetics. It is apparent from the failure of the genome project that genes do not possess self-emergent properties that cause the gene to express potentialities originating in the brain. Instead, it is the epigenetic signals (signals above the genes) that trigger such events ²⁵. Analogously, the authors are suggesting that activity in the brain is largely triggered by epigenetic signals (signals outside of the brain, e.g. mind/consciousness field), creating subsequent biochemical and physiological responses. Consequently the authors are offering an alternative hypothesis that may seem “*astonishing*” to the reader. However, it is based on the more current scientific revelations in various fields of science, including, neuroscience, biology, psychology, and quantum physics. The essence of this new hypothesis is incorporated in this paper, and constitutes what the authors call the *mind/brain interface*.

We suggest that the data from our own studies and the research of others show that it is our thoughts and beliefs that drive our actions and

create the results we are getting. By changing our conscious thoughts and *subconscious beliefs*, we facilitate changes in our behaviors and consequently in the results we experience.

We will present research related to the process of changing subconscious beliefs. Some conventional thinking would offer the notion that changing brainwave patterns that affect subconscious processing is a lengthy process and occurs slowly over time. This article will offer data that suggest that the brain has the ability to reorganize brainwave energy, creating the *whole-brain state*, and thus allowing for more optimal performance of subconscious belief patterns. The research further suggests that the process is not lengthy, nor must occur over a long period of time. Once the possibility of rapid change in our beliefs is established, it is possible to move to the consideration of *what is worth changing* as it relates to subconscious beliefs that drive our thought processes and behaviors.

SUBCONSCIOUS BELIEF PATTERNS

US News & World Report presented a special issue February 28, 2005, entitled, *The Secret Mind*, featuring an article, *How Your Unconscious Really Shapes Your Decisions*. The posit of the article revealed, "According to cognitive neuroscientists, we are only conscious of 5 percent of our cognitive activity, so most of our decisions, actions, emotions and behavior depends on 95 percent of our brain activity that goes beyond our conscious awareness"^{26, 27}. The subconscious mind consists of all involuntary processes and functions including *thoughts, beliefs, emotions, memories, skills, instincts*, and *behaviors* of which we are not consciously aware. They are generated by the subconscious mind, while the effects occur in the brain and body. Many of the processes and functions of the subconscious mind involve implicit memories. Implicit memories drive much of our subconscious abilities such as, habits, skills, behaviors, reflexes, conditioned responses and emotional reactions, which we automatically demonstrate or engage in without much or any conscious awareness or thinking. If we want to change any of these subconscious implicit memories, like a recurrent automatic emotional reaction to a situation, a self-limiting or potentially self-destructive belief, or perhaps a negative attitude towards someone or something that limits our capacity to interact constructively, we must interface with the subconscious mind. Often we try to use conscious processes such as visualization, will power, and positive thinking to create the desired changes. Experience, all too often, demonstrates that

these processes, when used alone, have a limited effect on creating lasting change. Using our "mind over matter" conscious adaptability is a process that generally works only in the conscious realm. We have to enter the realm of the subconscious mind to create lasting changes.

Further explanation of the significance of subconscious belief patterns suggests that our beliefs, usually subconscious, are the cumulative effect of life-long "programming." As a result of past conditioning, we sometimes think and behave in self-defeating ways. *Conscious thoughts* can be readily changed, by simply receiving information: reading an insightful book, having a compelling conversation, seeing the unarguable results of scientific research, etc. However, if conscious information were all that was needed to lead satisfying and successful lives, most of us would already be doing that. Unless changes are made at the *subconscious level*, repeating undesired reactions and behaviors will likely continue. Subconscious beliefs have far reaching consequences, both positive and negative, in every aspect of life. They affect our moods, relationships, job performance, self-esteem, and even physical health. Our contention is that it is imperative to know how to change self-limiting beliefs into self-enhancing beliefs that support our goals and aspirations.

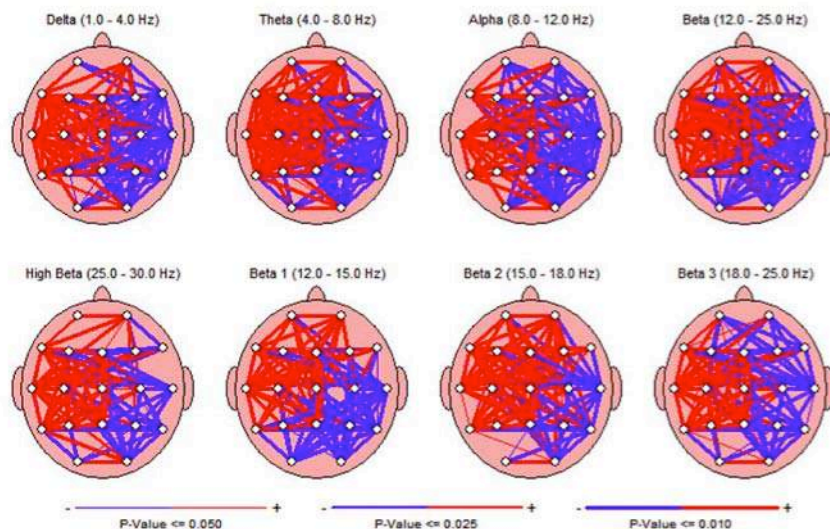
QEEG AND THE WHOLE-BRAIN STATE

Our research gathering documented one hundred twenty-five (125) cases, with data gathered over 12 months in three different locations, utilizing 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 data was established for each case. Using EEG caps calibrated by Electro-Cap International, standard procedure was to inject each of the 10-20 international systems for electrode placement with standard electro-gel making contact with the scalp and the electrode. Ensuring that the dc-offset voltages were within acceptable range, three (3) baseline readings of five (5) minutes each was 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® (corporate version is identified as PER-K®) practices. This is a *process for subconscious belief change* to achieve the *whole-brain state*. Following the intervention of the PSYCH-K® change process (aka a *balance*), a post-intervention EEG was recorded in the same manner as the EEG baseline stated above. The *balance* took

Montage: LinkEars

FFT Coherence Independent t-Test (P-Value)

**Figure 3:**

Following PER-K® balance, this executive demonstrated a statistically significant shift in hemispheric coherence patterns, which was reflected behaviorally in increased access to emotional resources and integrated, “whole brain” relationships with her workgroup.

approximately 10 minutes to complete. Raw EEG data was artifacted to eliminate eye movement, tongue movement, swallowing or other unwanted disturbances in the EEG. Standard EEG artifacting criteria was used and accomplished by an experienced qualified EEG technician. A minimum of 1 minute of artifacted *clean* data was used (although data presenting at .90 or above is considered acceptable; standards for artifacted data for this study must meet or exceed .95 in both *Split-Half* examination and on *Test-Retest* examination). Statistical analysis was performed by NeuroStat, a function of the NeuroGuide program from Applied Neuroscience. 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 if there are differences in the dominant brain function, consider the discussion of Shannon’s method. Simply, his theory explains if we divide measurements into 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 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 and provides the basis by which the relationship can be understood, such as the depiction of the whole-brain state seen in Figure 3. The legend is the same in all of the depictions shown in the illustration.

The RED represents the dominant brainwave pattern prior to the facilitation of the PSYCH-K® balance. The BLUE represents the dominant brainwave pattern after the balance had been facilitated. The thickness of the line, indicates level of P-factor, see legend at bottom of Figure 3.

The whole-brain state is considered to be the combination of RED; condition A, dominance prior to balance process, and condition B, 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 individuals 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 means, as well as providing intriguing hints as to the nature of its potential. Singularly, the most significant information to come from this research, in 98% of the cases measured, presented 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 that it is being activated, so the person can take full advantage of it in a given situation. Sometimes secondary gain issues, or other subconscious belief patterns may need to be addressed in order to activate and/or allow the person to use the whole-brain state effectively.

SUMMARY

Clearly there is more to learn and understand in this robust field of study. More scientific articles are

forthcoming to better identify the nature and results of this work, as well as its relationship to neuroscience. A greater understanding of the relationship between the oscillation of the quantum field and brainwave resonance is an area for continued research. In addition, more research needs to be done to discover the significance of thought and its effect on subconscious belief patterns.

SUBCONSCIOUS BELIEF PATTERNS CIRCUMSCRIBE OUR PERCEPTION AND DRIVE OUR BEHAVIORS.

Subconscious belief patterns circumscribe our perception and drive our behaviors. Knowing how changing perception at the subconscious level of the mind can transform a subconscious belief pattern can now be depicted in brainwave energy and the creation of the *whole-brain state*. Continued research in this area will assist in recognizing and adopting applications that will be beneficial in academics, personal health, professional performance, and virtually every area of human life. Practical applications of changing subconscious belief patterns have existed for over two decades; today we can measure them and graphically demonstrate their efficacy, lending to further understanding and utilization of this important aspect of human existence, in virtually all walks of life.

Aligning the principles of business with the *Principles of Nature*, in order to achieve *sustainable success*, and effect significant thought patterns and behavioral changes in individuals who make decisions that determine the fate our world, are critical to creating a sustainable future for ourselves, and for generations to come. Our very existence, as well as the existence of this planet, is made possible and sustained by the intelligent design of Nature's Principles. Nature has millions of years of experience in creating *sustainable success*. Our presence here is testimony to the wisdom and practical application of those Principles. Some of the most salient Principles of Nature include; *adaptability, resiliency, harmony, balance, collaboration, growth management, diversity*, and more. These Principles, when anthropomorphized from Nature are applicable in business, leadership *and* in our personal lives, although sadly they are frequently lacking in all these areas.

Our concern that business practices, as well as human civilization in general, are going down a path of *misalignment* with the Principles of Nature, speaks to a sense of urgency in making this aspect of neuroscience a high priority. If we are to make a significant difference in the way we conduct business and our personal lives, we must start

refining and applying our knowledge about how the human mind/brain interface operates regarding subconscious belief systems, as well as how those belief systems affect the *global field of consciousness*, via *quantum entanglement*. As Nobel Physicists Erwin Shrodinger puts it, "*The total number of minds in the Universe is One.*"

Subconscious belief systems are the driving force

for changing our thoughts and actions. By better understanding the mechanisms of changing subconscious beliefs, we may well be able to ameliorate or even avoid the otherwise probable economic, ecological, and cultural maelstrom we are facing now, and in the future.

A commonly heard statement in the business world is, "Don't take it personally, it's just business." The authors of this article suggest a very *different* perspective. *We must take it personally because it is business!* Business decisions impact and change our world every day. By aligning the principles of business with the principles of Nature, we can foster a world where *sustainable success* is an everyday reality, rather than an obscure, idealistic goal. It is our contention that the field of neuroscience can play a leading role in the creation of this generative future, if we are willing to broaden our horizons of possibility for neuroscience in today's world. By emitting loving or joyful energy vibrations/thoughts our subconscious influences others to feel the same way towards us. Thus, the energy field we are emitting moment-to-moment draws to us a similar energy field effect.

Due to the restriction on length for this article, the authors would invite you to visit www.per-k.com for more information and to download the unabridged version.

KEYWORDS:

QEEG, Quantum, Brain Mapping, PSYCH-K®, PER-K®, Thought, Subconscious, Belief Patterns, Business Principles, Whole-Brain State

RREFERENCES

[1] Dryden J. (March 4, 2009). Brain network functions differently in people with depression. Washington University School Medicine. St. Louis, MO.

[2] Sheline Y. I., Barch D. M., Price J. L., Rundle M. M., Vaishnavi S.N., Snyder A. Z., Mintun M. A., Sang S., Coalson R. S., Raichle, M. E. (Feb. 10, 2009). The default mode network and self-referential processes in depression. Proceedings of the National Academy of Sciences, vol. 106 (6), pp. 1942-1947.[3]

Fair, Damien A. et al. (March 11, 2008). The Maturing Architecture of the Brain's Default Network. PNAS. 105,10. pp. 4028-4032.

[4] Peterson, S., Balthazard, P., Waldman, D., Thatcher, R. W., Fannin, J. L. (2006). Technical Report

[5] Boyatzis, Richard. (January / February 2011). Neuroscience And Leadership: The Promise Of Insights. Leadership.

[6] Goleman, D., Boyatzis, R., & McKee, A. (2002). Primal Leadership: Realizing the Power of Emotional Intelligence. Boston: Harvard Business School Press.

[7] Boyatzis, Richard. (January / February 2011). Neuroscience And Leadership: The Promise Of Insights. Leadership.

[8] Baumeister, R. F., Bratslavsky, E., Finkenauer, C., & Vohs, K. D. (2001). Bad is stronger than good. Review of General Psychology, 5: 323-370.

[9] Sapolsky, R. M. (2004). Why zebra's don't get ulcers (third edition). NY: Harper Collins.

[10] Schulkin, J. (1999). Neuroendocrine regulation of behavior. NY: Cambridge University Press.

[11] Dickerson, S.S. & Kemeny, M.E. (2004). Acute stressors and cortisol responses: A theoretical integration and synthesis of laboratory research. Psychological Bulletin. 130(3): 355-391. Fredrickson, 2005 [12] {Losada, 2004 [13]}.

[14] Dickerson, S.S. & Kemeny, M.E. (2004). Acute stressors and cortisol responses: A theoretical integration and synthesis of laboratory research. Psychological Bulletin. 130(3): 355-391.

[15] McEwen, B. S. (1998). Protective and damaging effects of stress mediators. New England Journal of Medicine. 338: 171-179.

[16] Janig, W. & Habler, H-J. (1999). Organization of the autonomic nervous system: Structure and function. In O. Appenzeller (ed.). Handbook of Clinical Neurology: The Autonomic Nervous System: Part I: Normal Function, 74: 1-52.

[17] Boyatzis, R. E., Jack, A., Cesaro, R., Passarelli, A. & Khawaja, M. (2010). Coaching with Compassion: An fMRI Study of Coaching to the Positive or Negative Emotional Attractor. Presented at the Annual Meeting of the Academy of Management, Montreal.

[18] Gould, Elizabeth. (Fall 2006. Revised for Spring 2008). Vision

[19] Duman, Ronald. (August 2004). Nature Neuroscience.

[20] Lipton, B. H. (2005). The Biology of Belief. Santa Rosa, CA: Mountain of Love/Elite Books.

[21] Ferguson, M. (1988). The Brain Revolution and Brain. Universidad Nacional Autonoma de

Mexico. International Journal of Neuroscience, vol 13, 10a, 148.

[22] Bohm, D. B. (1983). Wholeness and the Implicate Order. Page references to Ark Paperback Edition, New York: Cox & Wyman, Reading, England. p. 24. [23] Pribram, K. H. (1987). The Implicate Brain. In B. J. Hiley & F. D. Peat, Eds., Quantum Implications: Essays in Honour of David Bohm (Rutledge, London, England).

[24] Senge, Peter. (2011). It's not about doing what we are doing better, it's about doing something different. MIT Sloan Management Review Video Interview.

[25] Lipton, B. H. (2005). The Biology of Belief. Santa Rosa, CA: Mountain of Love/Elite Books. 143.

[26] US News & World Report presented a special issue February 28, 2005, entitled, The Secret Mind, featuring an article, How Your Unconscious Really Shapes Your Decisions.

[27] Nørentander, Tor. (1991). The User Illusion – Cutting Consciousness Down to Size. Penguin Books.

BIOGRAPHIES

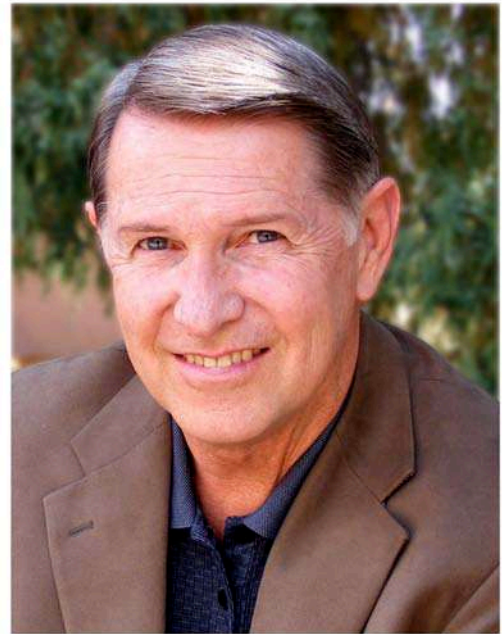
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JEFFREY L. FANNIN, PH.D.

Jeffrey Fannin holds a Ph.D. in Psychology, an MBA and a Bachelor of Science degree in Mass Communications. He has been in private practice for 15 years and owns the Center for Cognitive Enhancement. Dr. Fannin works with traumatic brain injury, stroke, chronic pain, attention deficit disorder (ADD), attention deficit/hyperactivity disorder (ADHD), anxiety disorders, depression, as well as personal performance in academics, sports and executive leadership training to improve brain function and enhance mental and emotional dexterity. His current research presents accurate measures in dealing with balanced brainwave energy identified as the whole-brain state. This research focuses on subconscious belief patterns, translating limited personal success into balanced brain performance.

Dr. Fannin was part of a research team at Arizona State University researching neuroscience and leadership; including work at the United States Military Academy at West Point. This research allowed him to co-teach a unique course at Arizona State University, "The Neuroscience of Leadership." His work has been featured in the Wall Street Journal, on Fox News, Business Week, London Financial Times, in Singapore's Weekend Edition, BBC radio and many more. Currently, he is in the process of completing a book entitled, "IF I ONLY HAD A BRAIN!"



ROBERT M. WILLIAMS, M.A.

Robert M. Williams holds a Masters Degree in Counseling and Personnel Services from the University of Colorado. He is President and Chief Executive Officer of The Myrddin Corporation, and directs the PER-K® Centre for Sustainable Success.

For 14 years Rob was a direct participant in the corporate world, holding management positions in the backpacking, energy management and telecommunications industries. His commitment to helping people lead more productive lives led him to seek a career as a professional psychotherapist. Ironically, it was his successful experience as a therapist that led him back to the corporate arena.

His unique discoveries about human consciousness convinced him that there were simpler, more effective ways to manage our minds and direct our lives, mentally, emotionally, physically and spiritually. Rob's "high tech/high touch" background has enabled him to provide a powerful and practical, "real world" orientation to his training programs and consulting services. Rob has become a nationally known presenter, specializing in personal and professional development. He is the originator of PER-K® and PSYCH-K®, a proprietary, non-invasive, interactive process of changing self-limiting subconscious beliefs. Since the creation of PER-K® and PSYCH-K® in 1988, numerous businesses and thousands of people have benefited from this remarkable process, both personally and professionally.