Neurons That Fire Together Wire Together: Optimizing Your Brain Chemistry

“Neurons that fire together, wire together.”-Donald Hebb

One of the most exciting developments in human behavior over the past 10 years is the new interest in the field of neuroscience, the scientific study of the brain and the nervous system. We’ve long had theories about how learning takes place and how humans develop new behaviors and attitudes. We now have visible evidence not only of what happens inside the brain, but how to facilitate the acquisition of new skills, ideas, values, and behaviors. While the scientific literature can get quite complicated at times, it doesn’t have to.

If you follow this blog regularly, you know that I am constantly looking for ways to simplify
complex ideas in ways that are useful for the layman. When it comes to brain chemistry and neuroscience, I consider myself to be in that category as well. I often tell my clients that, “There is no behavioral change, emotion, feeling, attitude, or any sensation that you’ve ever felt that is not a product of your brain chemistry. Without a change in brain chemistry, there can be no experience that we can call change.” As a result, there can be no change in our lives, positive or negative, that are not the result of changes in the neurochemistry of the brain.

If you pay attention while watching TV or reading on the Internet, you’ll often come across commercials for educational games for adults designed to improve brain functioning, taking advantage of what is being called the “science of neuroplasticity.” While the efficacy of these games is controversial, the concept of neuroplasticity is not. The brain is quite malleable, constantly changing and evolving throughout the lifespan. An understanding of the link between behavior and neuroplasticity is important for counselors, coaches, and therapists, but also for the average person who would like to change their behaviors and attitudes, improving their lives in the process.

The quote, “Neurons that fire together, wire together,” is a brief summary of the ideas of Canadian psychologist Donald Hebb, adapted from his book written in 1949 called *The Organization of Behavior*, in which he introduced his theory about the neurological basis of learning. This theory, which has become known as Hebb’s Law, has since been proven as factual. Hebb proposed that learning is not something that happens to a passive brain, but is a process whereby the cellular structure of the brain is permanently altered and modified. To put it quite simply, behavior and action are the best ways to initiate permanent behavioral and cognitive change in any living being.

A metaphor for how behavior creates changes in brain chemistry was offered by neuroscientist Alvaro Pascual-Leone in a book called *The Brain That Changes Itself,*in which he compared the brain to a snowy hill in winter. When we first go down a hill in a sled, we can be flexible because we have the option of taking various paths through the soft snow each time. If we begin to favor certain paths they become speedy and efficient, guiding the sled swiftly down the hill. Changing these paths becomes increasingly difficult, as we literally become stuck in the ruts that we have created. Human behavior operates upon the same principle. Our behavior creates preferred pathways in our brains that make these behaviors almost automatic and these behaviors become our preferred ways of doing things.

We must be aware that there are ways that we can change long held beliefs and behaviors through conscientious actions optimizing the way that we learn and acquire new information. A metaphor that I like is one that compares our neurology to our muscular system. We can all accept that if a muscle is used systematically and efficiently it can improve strength and functioning at almost any stage of the life span. Thinking of our neurology in the same way is helpful, giving us a model for change that we can process and understand. The body’s muscles strengthen and grow while resting, after stress has been applied. In order to increase muscular size and strength the muscles must be taxed, allow to rest and recuperate, taxed again, followed by more rest and recuperation. During the recuperative phase, it is very important to obtain adequate rest and proper nutrition. As the cycle repeats, theoretically muscle capacity improves each time. Changes in brain chemistry occur almost in the same manner. (See also [http://mindbodycoach.org/mind-muscle-connection/ )](http://mindbodycoach.org/mind-muscle-connection/%20%29)

How can this be applied to changes in our neurology? The “exercise” occurs when we encounter new or unknown challenges, the “recuperation” occurs when we learn to accept and become more comfortable with these challenges. Recuperation phase acceptance can be worked on through cognitive behavioral therapy, journaling, introspective self-help exercises, or working with a counselor or coach. As we become more relaxed, adjusting to the stressors, our brain restructures itself, storing its new found knowledge. The key component in this process is the way that one mentally processes the stressor. Focusing on positive self talk, realistic as opposed to catastrophic thinking, and accepting unbiased feedback from a therapist or coach allows one to accept the changes, making them permanent.

The mental recuperation phase is where the magic can occur. It’s also where catastrophic associations can inadvertently be made if one is not aware of how this process works. Over the past 18 years I’ve seen hundreds of clients who have been lifelong victims of childhood trauma. After traumatic events, they were left alone to figure out and make sense of those traumas. It is quite common for trauma victims to blame themselves, stuff down their feelings and emotions, and process them in a maladaptive way. The therapeutic work done in psychotherapy is to get them to open up and process the events, allowing acceptance and healing to occur. Quite often healing occurs through subtle cognitive changes such as identifying the self as a “survivor” rather than a “victim.” These changes in reference create new, more rational, attitudes and behaviors allowing a person to move forward by consciously choosing a different path.

Studies done on the brain chemistry of taxi drivers illustrates how this takes place. Taxi drivers, whose job requires them to memorize mental maps of city streets, have thickened neural layers in their hippocampus, the region of the brain that creates visual spatial memories. These drivers have new tissue they have created there, much like the over developed forearms of a carpenter or mechanic. Similar studies showed that mindfulness meditators had a thicker prefrontal cortex, a part of the brain that controls attentiveness, and research subjects that participated in studies to improve their relaxation skills also showed increases in parts of the brain that control self regulation. These studies suggest that your experience and actions matter profoundly, making a difference not just in the moment but for the lasting impact it has on brain chemistry.

It is important to realize that every single day our thoughts and behaviors are creating our brain’s connections and thus our life experiences. Becoming aware of this is a critical component to learning how to optimize your neurochemistry. You can literally “train your brain” by becoming aware of your self talk, focusing your thoughts, and engaging in positive behaviors. You simply cannot avoid the fact that your brain is constantly creating pathways, your goal should be to be more aware of the pathways that you are creating.

What you choose to pay attention to and what you focus on will be the primary influence on how your brain develops. Naturally, some things will grab your attention first – health problems, worries, and legitimate fears. How you choose to process, reframe, and work through these fears will be the deciding factor in how your brain chemistry ultimately settles as a result of these experiences. Focusing on optimistic thoughts, things which are controllable, and working on acceptance and gratitude are things that you must consciously take responsibility for. Doing so will create a brain that is wired for strength, resilience, optimism, and emotional flexibility. (See also [http://mindbodycoach.org/best-state-live/ )](http://mindbodycoach.org/best-state-live/%20%29)

Keep in mind the expression “neurons that fire together, wire together.” Become more aware of when you are staying with a negative emotion longer than is necessary. Catching yourself in this negativity, consciously working to change that mindset, and moving forward in a more positive direction is the most important part of training your brain in this manner. Whether you are naturally optimistic or pessimistic, consciously seeking where to place your focus and attention is a must if you want to maximize your brain’s ability to create your reality and the quality of your life.

“I am not what happened to me, I am what I choose to become.”-Carl Gustav Jung

John

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