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## **The 7 Laws of Neuroplasticity**

By Kelly Howell

When I first heard of the science of neuroplasticity, the word struck me as a rather odd way to describe the brain. ‘How could the brain be plastic?’ But as I delved into the sea of astonishing research, I realized that scientists referred to plastic as a malleable substance that can be stretched, flexed, shaped, reshaped, molded and transformed easily. The more I researched the subject, the more proof I found that we’ve been living under the influence of false scientific beliefs. Beliefs about our mental capacity to change, shape and transform the structure, function, and ultimate potential of our brains.

Most of us were raised with faulty ideas about the human brain. Ideas like: IQ is fixed at age 5, brain cells diminish yearly, memory deteriorates as we get older, and that learning ability inevitably declines with age. These self-limiting beliefs, based on the scientific understanding that was prevalent in the 1950’s, are now proven to be myths—dangerous myths that impact the health and fitness of our brains as we age.

Just as Copernicus overturned the myth that the earth was at the center of the universe, the new science of neuroplasticity has overturned and revolutionized our understanding of the mind, the brain and its power to change. We now know that the brain is not as was once thought: a compartmentalized, hardwired static machine whose parts eventually wear out. Instead, it is a highly adaptable, malleable and dynamic organ, capable of generating new neurons with the potential of changing and improving throughout life. Lifelong personality traits can be changed. Learning disorders can be cured. Aging brains can be rejuvenated. Damaged brains can recruit other regions to regain full functioning. Sounds like science fiction right? Wrong. It’s the leading edge of neuroscience.

Neuroscientist Marco Iacoboni, M.D., Ph.D., of Ahmanson-Lovelace Brain Mapping Center at UCLA states, “The brain has an almost boundless capacity for reshaping itself over the years, for adapting, for expanding its power, while accumulating knowledge and recording experiences. Modern neuroscience tells us that the aging brain is no longer the declining brain, but rather a learning organ whose limits are still unexplored.”

We now know:

- Our mental abilities, including memory, are designed to improve throughout life.
- Thoughts can change the function and structure of the brain.

- People of average intelligence can raise I.Q., improve memory, and sharpen intelligence.
- We can generate new brain cells in a process call Neurogenesis. (Thus far, we know that oxygen and novelty seem to contribute to the creation of new brain cells. Research is ongoing.)

In researching neuroplasticity for my book, *Brain Power: Improve Your Mind as You Age*, I came across these 7 Tenets of Neuroplasticity in an excellent PBS documentary called Brain Fitness. I've added my own clarification. When applied, these 7 tenets can help you harness the power of brain plasticity.

Change can occur only when the brain is in the mood. This means that while you learn, you need to be fully engaged, interested and focused. According to Neuroplasticity pioneer, Michael M. Merzinich, Ph.D. “training must be incremental, and just a little bit taxing. The brain will build itself best on a sense of consistent accomplishment.”

Change strengthens the connection between neurons engaged at the same time. Newness and novelty excite the brain and create a stronger connection between neurons.

Neurons that fire together, wire together. This is also known as the Hebbian Rule, coined by Dr. Donald Hebb. You've heard the phrases “Use it or lose it!” “If at first you don't succeed, try, try again”, “practice makes perfect”, and “repetition is the mother of all learning”. These are no longer just expressions, they are neurological facts. Every time you have a new experience a new synaptic connection forms. The more you use that connection the stronger it gets. If you stop using the connection the neurons are pruned away.

Strong emotions strengthen the connections. Emotions help imprint patterns and fortify neural networks. This can work for us or against us depending on the emotion, memory and experience. The brain is made up of billions of nerve cells called neurons. Neurons have tiny branch like structures that reach out and connect with other neurons. The connection point between neurons forms a “synaptic connection.” These connections link with other neurons to formulate thoughts, ideas and memories. A neural network is essentially a radiant pattern of connection between other neurons—like a mind map. There can be anywhere from a few hundred to upwards of two hundred thousand synaptic connections to each neuron.

Emotionally charged experiences can be indelibly etched within our consciousness, creating a wider neuronal network. Presbyterian Minister, Carl W. Buechner famous for his quips said, “They may forget what you said, but they will never forget how you made them feel.”

Brain Plasticity is a two way street. The brain can change in both positive and negative directions. We can unwittingly program ourselves for failure through our attitudes, expectations and even the language we use regularly. In 1975, Becca Levy, PhD, surveyed 650 people about their expectations regarding the aging process. Subjects

responded to statements such as “Things keep getting worse as I get older” or “I am as happy now as I was when I was younger.” Based on their responses, Dr. Levy categorized test subjects as either negative or positive in their attitude toward aging. Twenty years later, she discovered that the group with optimistic expectations about aging outlived the negative, pessimistic group by an average of more than seven years.

Tip: Delete these expressions permanently.

“I’m having a senior moment.”

“I can’t remember anything anymore.”

Memory is crucial for learning. This is obvious, but it’s important to keep in mind that when we are learning, the brain is creating new synaptic connections (new memories) and calling upon old synaptic connections (old memories) as we make associations. Unused connections die off, while connections that get used repeatedly become more efficient.

Motivation is a key factor. The desired goal must be interesting. If you have a goal of living in France for 6 months, practice and study becomes a fun affair to savor. Your ability to learn is far more robust than if you’re only taking French lessons as a credit requirement.

And so, the brain is no longer the declining brain, but rather a learning organ whose limits are still unexplored. It’s never too late to change your brain and improve your mind.

Kelly Howell is the founder and creator of Brain Sync® audio technology. With almost three million CD’s in print, she is renown for her pioneering work in healing and mind expansion. Over the years, Kelly has worked in cooperation with eminent medical professionals to develop meditation and brain optimization programs used in hospitals, biofeedback clinics and by hundreds of thousands of individuals worldwide. She is the co-author of *Brain Power: Improve Your Mind as You Age* with Michael Gelb.

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