

The Brain: A Clump of Play-Doh or a Hardwired PC

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In *The Brain that Changes Itself*, Norman Doidge challenges one of the hottest topics in neuroscience. Rather than a hardwired, unchangeable machine with permanently connected circuits, he argues that the brain is actually a structure capable of experiencing the amazing phenomenon of neuroplasticity. Like molding Play-Doh, the brain exhibits the ability to change its own structure and function through thought and activity. Although this concept is initially difficult to wrap one's mind around (for hundreds of years, mainstream science upheld the idea that brain anatomy was fixed), Doidge effectively and awe-inspiringly supports this important breakthrough in neuroscience through remarkable stories of real-life people, scenarios, and discoveries.

Doidge, M.D. (psychiatrist, psychoanalyst, and researcher on the faculty at the Columbia University Center for Psychoanalytic Training and Research in New York and the University of Toronto's department of psychiatry) certainly did his homework before exploring such an amazing concept. He first hooks his audience via Cheryl Schiltz, a woman whose sensory organ for the balance system does not work, causing her to feel like she is perpetually falling. As a result, she does fall, and readers sympathize with the woman who can barely walk on her own, who lost her job as a result of her condition, and who has a rare form of anxiety. So how is it that Cheryl is no longer considered a "wobbler" after wearing a construction hat with holes in it and licking a thin plastic strip with electrodes on it? This incredible machine, constructed by Bach-y-Rita, one of the great pioneers in comprehending brain plasticity, replaces her vestibular apparatus by sending balance signals to her brain via the electrodes on her tongue. What is even more astounding is the fact that Cheryl experiences residual effects even after she takes off the hat. She confidently stands, walks, and starts to envision a normal life. Bach-y-Rita explains that Cheryl's damaged vestibular (balance) system is disorganized and sends off random signals, blocking any signals sent by healthy tissue. As the brain is composed of hundreds of billions of neurons that connect and work with each other, the machine recruits, exposes, and strengthens secondary neural pathways. This new way of organizing is virtually one way in which the brain is thought to be plastic.

The remainder of Doidge's book uses a similar approach to argue for neuroplasticity. He covers a multitude of topics, including plasticity in relation to sexual attraction, love, obsessions, compulsions, memory, learning problems, and a variety of illnesses. It would be difficult to get through the first twenty pages without truly considering the brain as such a flexible structure. Even the most skeptical readers cannot help but challenge the doctrinaire localizationism idea, stating that each hemisphere is genetically hardwired to have its own specialized function. Doidge nonchalantly introduces Michelle Mack, a woman born with only half her brain. Michelle's case is not one to set aside; her right hemisphere completely took over for her left, moving essential mental functions such as speech and language to

her right. Moreover, Doidge emphasizes the normalcy and even extraordinary features of the woman's life. She speaks normally, has a part-time job, and has phenomenal calculating skills. Although Michelle shows some difficulties in everyday life – she cannot comprehend abstract thought and easily gets lost in unfamiliar surroundings – her loss of brain tissue occurred when she was in the womb, when her brain was still developing. Plasticity is thought to be at its peak in the earliest years, and Michelle's right hemisphere did not develop a significant commitment to any tasks. Nonetheless, one cannot help but root for Michelle in a world where she would normally be perceived as disabled or hindered. However, with a greater understanding of how plastic the brain can be, Doidge, other scientists, and even the rest of the population can easily see otherwise. While she is blind in the right visual field, for example, stealing french fries from her right side is something her brothers should reconsider. Michelle's brain has made up with this disability with supercharged hearing – another phenomenon of plasticity.

Indeed, miraculous examples of neuroplasticity flood *The Brain that Changes Itself*. The book, however, is more than just a good read. Doidge strategically weaves in concepts that are applicable to virtually everyone, from the fetus developing in the womb, experiencing some of its most important moments of plasticity, to the average elder who wishes to improve his or her memory. The author adds an element of "self-help," although he does so without the Dr. Phil-esque approach.

Take Cheryl and Michelle's cases, for example. Many of us would initially feel sorry for the woman whose life was negatively affected by the continuous feeling that she was falling, and even more of us would most likely applaud her success story. But how many of us experience symptoms similar to Cheryl's? Likewise, how many of us, like Michelle, are missing fifty percent of our brains?

Bach-y-Rita notes that a majority of old people fear falling and that one-third of them actually fall quite frequently. Hence, they remain in the safety of their homes, do not exercise their limbs, and become physically weak and fragile. Despite their failing vestibular senses, Bach-y-Rita proposes that the same machine that helped Cheryl can also help the elderly.

Furthermore, I could not help but think of my own grandfather when Doidge introduced the "use it or lose it" principle. Plasticity exhibits the Darwinian survival of the fittest idea – it is competitive, and if, for instance, we stop exercising our mental skills, we not only forget these skills, but our brain map space for these skills is taken over by the skills we practice more frequently. As we age, we practice our professions until we retire, and we master certain skills as we reach the top of our game. In reality, however, we have hit a roadblock; we do not engage our brains during new activities in order to perpetuate our brain's plasticity. Thus, it is no surprise that my grandfather, now approaching his late seventies, has difficulty recalling words, remembering names, and even playing our family's favorite card game. By sitting in his house all day, he does not challenge his brain to learn new skills. He does not use certain connections in his brain, and it is clear that he is losing them. As stubborn as Grandpa Ahlstrand can be, I could not help but encourage him to start a puzzle and even to learn a new language in the hopes of him developing new neuronal networks and strengthening his overall mental health.

*This author wrote this paper for Biology 362: Mechanisms of Brain Dysfunction taught by Dr. Shubhik DebBurman.

If you are looking for an interesting approach to evaluating such a revolutionary idea, *The Brain that Changes Itself* is the perfect addition to your reading list. Even if you are not a psychologist, doctor, or neuroscience major in college, this book shares ideas applicable to almost all aspects of life. Like I did so myself, I encourage any reader to not only appreciate and enjoy this book, but also to stop his or herself mid-read and share with anyone in close vicinity the amazing plasticity of the brain.

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References

World Health Organizations (2007, February 7). Neurological disorders affect millions globally: WHO report. Retrieved from <http://www.who.int/mediacentre/news/releases/2007/pr04/en/index.html>