

Rethinking the Potential of the Brain in Major Psychiatric Disorders

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I. Questionable Theories

The human brain is likely the most complex structure in the Universe. Even though it produces our understanding of the world, we are still in our infancy of understanding it. Even so, technological advances in the past few decades have produced images that allow researchers to observe different parts of the brain reacting to stimuli in real time, and also to measure variations in brain structures to compare populations. Alongside these developments, the field of psychiatry has increasingly sought after and put forth biological explanations for psychiatric disorders. With the influence of billions of advertising dollars from pharmaceutical companies,¹ these theories have been simplified and sold to laypeople in the form of “mental illness is caused by a chemical imbalance in the brain.”²

For someone who is newly diagnosed with a major psychiatric disorder, such an explanation can provide relief. It offers a reason for extreme behavior that s/he may find shameful or bewildering, and it assures family members that they are not at fault. Blaming the brain also discredits the self-denigrating notion that one’s inability to cope with psychological problems is connected to weakness of character.

Yet there are serious repercussions for endorsing these theories. People who believe that chemical imbalances underlie psychiatric disorders are likely to believe that medication *must* be used as a corrective measure, often for life. They are also likely to overlook the causative influence of socio-cultural factors and histories of trauma and abuse. Even when theorists do acknowledge that environmental stressors play a role in the development of psychiatric disorders, they often refer to them as “triggers” of the underlying biological problem. In other words, the problem still originates from and remains *within* the diagnosed person. Finally, according to a recent study,³ associating psychiatric disorders with faulty brain chemistry actually *increases* public stigma: “Biogenetic causal beliefs and diagnostic labeling by the public are positively related to prejudice, fear and desire for distance.”

Underlying the debate of whether brain-based theories are helpful or harmful are far more important questions to ask: Are these theories even true? Are psychiatric disorders

caused by brain diseases and chemical imbalances? And if they are, can the brain change, heal, and grow out of them?

Answers to these questions deeply influence whether workers – especially psychiatrists and medically-oriented professionals – believe that people with diagnoses can make complete recoveries, and they equally influence the hopes and aspirations of people who are diagnosed. However, as a layperson, it can be extremely difficult to investigate such material. Most people are not educated in the neurosciences, nor do they have the will or resources to explore the vast research literature that informs psychiatric practice. Furthermore, since science is equated with truth in Western society, and since doctors are equated with science, many people are conditioned to entrust psychiatrists with providing accurate and tested information. Thus, questioning medical wisdom is somewhat deviant, and attempts at challenging psychiatric theories may be quieted by self-belittlement – “What do *I* know?” – or rejection from social groups who endorse the dominant paradigm – “Doctor knows best.”

Yet as the consumer/survivor/ex-patient movement increasingly demands that mental health workers perceive clients as harboring untapped potential, so must workers and clients make efforts to re-examine their assumptions about the brain.

II. A New Science, A New Brain

Traditionally, the adult brain was considered relatively hard-wired and fixed, a prognosis that lowered expectations about the possibility of curing the alleged brain problems that underlie psychiatric disorders. Thus, in the medical world, schizophrenia and bipolar disorder have been conceptualized as life-long, incurable brain pathologies that a person can learn to manage, but never completely resolve. However, these hypotheses have always been problematic, for longitudinal studies have demonstrated again and again that a significant amount of people diagnosed with schizophrenia completely emerge from psychiatric symptoms and no longer use medications.⁴ These individuals pose this challenge to neurobiology: if their previous symptoms were in fact due to a broken brain, are their brains now fixed?

The simple answer is yes, and a new area of science is explaining how and why. (It should be noted that scientists could obtain a wealth of information from comparing PET and

fMRI scans of people who have completely recovered with people who are still experiencing similar psychiatric symptoms, but that more research is needed). This area of science is called neuroplasticity, and its findings are rapidly reversing old myths about the potentiality of the brain.

Neuroplasticity basically refers to the brain's natural ability across the lifespan to form new connections and change its structure in response to experience. This means the brain can change itself physically and functionally at any age to compensate for injury and disease and to adapt to new situations or changes in the environment. Whereas the brain was once conceptualized as a machine, it could now be thought of as more like clay, both malleable and vulnerable towards positive and negative influences. Of course, there are limits to how much the brain can change, reorganize, and heal, but these limits are not as imposing as might be assumed. Indeed, harnessing the power of neuroplasticity, people are fully recovering from massive strokes and other head traumas, overcoming learning disabilities to leap ahead in reading levels in a matter of months, rewiring obsessive-compulsive behavior out of their brains, erasing the pain of phantom limbs, restoring memory acuity and cognitive processing during old age, learning to see without eyesight, strengthening muscles just by thinking about them, meditating to create lasting neurological states that are conducive to compassion and happiness, and on and on.^{5 6}

The message here is that the brain changes. This means that it is highly likely that whatever biological correlates underlie major psychiatric symptoms can change, too. For instance, trauma and chronic stress change your brain, but the areas that are affected can be changed back or compensated for. More specifically, the amygdala, involved in processing emotion and anxiety and shown to be affected by trauma, can form new connections, including to the prefrontal lobes which helps in controlling impulses and exercising restraint.⁷ Gray matter, which has been shown to be less voluminous in people diagnosed with schizophrenia, can thicken.⁸ Serum BDNF (Brain-derived neurotrophin factor), which has been shown to be lower in people diagnosed with schizophrenia, bipolar disorder, and depression, can be raised.⁹ The hippocampus, which is shown to have shrunk for people diagnosed with depression and PTSD, can grow back¹⁰ and even produce new cells for the rest of the brain to make use of.¹¹

Certainly, neurotransmission – the release of serotonin, dopamine, norepinephrine, etc. to allow communication between brain cells – is variable and can be altered by natural means, ranging from sunlight to thinking positively. Even psychotherapy can significantly change the brain.¹²

One of the tenets of neuroplasticity is that in order for the brain to form new connections and change, it must be stimulated through activity. Whether this activity is external – such as playing a piano, or internal – such as imagining your fingers playing a piano sequence, an important factor in driving lasting brain changes is that you pay close attention to what you are doing. In fact, playing a piano and just thinking about playing a piano affect the brain in virtually the same way, as long as you are engaged. The importance of this point cannot be understated: if thoughts and imagination physically change your brain, you can therefore use your mind – especially through focused attention – to positively rewire it.¹³

Not surprisingly, this theme of mind over matter runs in recovery stories. Indeed, while people who recover often mention practical activities that helped them – such as eating well (which can even turn genes on and off¹⁴) and exercising (which produces new brain cells and has an anti-depressant effect¹⁵) – they also refer to the healing power of intangible experiences: spirituality, hope, human connection, having meaning and purpose in life, optimism, an undying will, and awareness. And it is likely that through the power of neuroplasticity, both the practical activities and the intangible experiences changed their brains.

To further illustrate this point, consider the experience of self-awareness, which seems to be particularly important for people who recover. Self-awareness refers to the awareness of one's thoughts, behaviors, and actions, and how all of these are intricately connected with one's environment. Though it is an incredibly empowering asset that most human beings – diagnosed or not – struggle to achieve, people who experience emotional and psychological turmoil may be at a unique advantage to master it, for their survival may depend on their ability to separate from and analyze the content of their minds. In any case, self-awareness requires deep attention. And deep attention to the present moment carves new pathways in the brain.¹⁶ Therefore, a person who engages in self-awareness techniques – be it meditation

or another form of non-critical observation, is creating new brain states that overtime can replace or compensate for troubling brain states entirely.

III. Changing Attitudes

Taken together, the implications and discoveries of neuroplasticity challenge the traditional framework for understanding the role of the brain in psychiatric disorders. We can no longer perceive the brain as acting on its own predetermined accord in a vacuum to create experiences. Instead, we should conceive of the brain as fundamentally inseparable from experience, so that whatever happens to someone both externally and internally has the potential to significantly alter their brain. This means that people who recover can be thought of as having likely changed their brain chemistry and functioning, thus allowing for the possibility that the faulty biology allegedly behind major psychiatric disorders is reversible. In this regard, mental health workers should seriously consider eliminating talk about schizophrenia and bipolar disorder as incurable and life-long.

In fact, there are so many problems with making the simple statement, “Mental illness is caused by a chemical imbalance in the brain,” that it should perhaps be discontinued altogether. Evidence that different structures and functions of the brain are pathological in psychiatric disorders is still highly contentious; it is also well beyond the scope of this paper. However, given the far-reaching influence of pharmaceutical companies who have a financial interest in promoting biological theories – after all, their medications are primarily justified by the claim that they “fix” biological problems – it is likely that reductionist statements of the brain will continue to prevail. Therefore, we should amend these statements. Here is an example of what a worker could tell a client: “Your brain changes in response to the experiences you have. Even though psychiatric disorders show up on the biological level as differences in the brain’s functioning, your brain is not set in stone. In fact, *you* can change it, though it will take time and effort. There is much reason to be hopeful.”

Recovery and hope go hand-in-hand, yet there is nothing more hopeless than believing your brain will forever malfunction without medication. There is also hardly a more

misinformed declaration about the brain in light of recent science, and especially when considering the multitudes of people who have completely recovered.

If mental health workers can derive from neuroplasticity that complete recovery is a possibility given the right elements, then they will perhaps hold themselves more accountable for the outcomes of their services, as opposed to justifying poor outcomes by dismissing or subtly ignoring some people as chronic and hopeless. In this way, rethinking the potential of the brain in major psychiatric disorders improves the efficacy of mental health services, revives the energy and optimism of workers, and ultimately restores hope to the millions of diagnosed individuals who currently see no way out.

References

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- ¹ Gagnon MA, Lexchin J. The Cost of Pushing Pills: A New Estimate of Pharmaceutical Promotion Expenditures in the United States. *PLoS Med* 5(1): e1 doi:10.1371/journal.pmed.0050001, 2008
 - ² Leo J, Lacasse JR. The Media and the Chemical Imbalance Theory of Depression. *Society* 45(1):35-45, Feb 2008.
 - ³ Read J, Haslam N, Sayce L, Davies E. Prejudice and schizophrenia: a review of the 'mental illness is an illness like any other' approach. *Acta Psychiatr Scand* 114(5):303-18, Nov 2006.
 - ⁴ Davidson L, Harding C, Spaniol L, (Eds.). *Recovery from severe mental illness: Research evidence and implications for practice*. Boston, MA: Center for Psychiatric Rehabilitation, Boston University, 2005.
 - ⁵ Doidge, Norman. *The Brain that Changes Itself: Stories of Personal Triumph from the Frontiers of Brain Science*. Viking Adult, 2007.
 - ⁶ Begley, Sharon. *Train Your Mind, Change Your Brain: How a New Science Reveals Our Extraordinary Potential to Transform Ourselves*. Ballantine Books, 2007.
 - ⁷ Bernier PJ, Bedard A, Vinet J, Levesque M, Parent A. Newly generated neurons in the amygdala and adjoining cortex of adult primates. *Proc Natl Acad Sci USA* 99(17):11464-9, Epub 2002 Aug 12.
 - ⁸ Draganski B, Gaser C, Busch V, Schuierer G, Bogdahn U, May A. Neuroplasticity: changes in grey matter induced by training. *Nature* 427(6972):311-312, Jan 2004.
 - ⁹ Merzenich, M. Brain plasticity-based "cognitive training" elevates BDNF. Message posted to <http://merzenich.positscience.com/2007/04/05/brain-plasticity-based-cognitive-training-elevates-bdnf/>, Apr 2007.
 - ¹⁰ Bremner JD, Elzinga B, Schmahl C, Vermetten E. Structural and functional plasticity of the human brain in posttraumatic stress disorder. *Prog Brain Res* 167:171-86, 2008.
 - ¹¹ Gould E, Graziano MSA, Gross C, Reeves AJ. Neurogenesis in the Neocortex of Adult Primates. *Science* 286:548-552, 1999.

¹² Bieling P, Goldapple K, Garson C, Kennedy S, Lau M, Mayberg H, Segal Z. Modulation of Cortical-Limbic Pathways in Major Depression: Treatment-Specific Effects of Cognitive Behavior Therapy. *Arch Gen Psychiatry* 61:34-41, Jan 2004.

¹³ Schwartz, Jeffrey M, Begley, Sharon. *The Mind and the Brain: Neuroplasticity and the Power of Mental Force*. New York, NY: Harper Perennial, 2003.

¹⁴ Challem J. *Feed Your Genes Right*. Hoboken, NJ: John Wiley, 2005.

¹⁵ Bjørnebekk A, Mathé AA, and Brené S. The antidepressant effect of running is associated with increased hippocampal cell proliferation. *International Journal of Neuropsychopharmacology* 8:357–368, 2005.

¹⁶ Siegel, DJ. Mindfulness training and neural integration: differentiation of distinct streams of awareness and the cultivation of well-being. *Social Cognitive and Affective Neuroscience* 2(4):259-263, 2007.