

## Brain Science, Myths and Developmental Disorders

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There is a problem with how lay-people understand the brain and brain science, especially when it comes to developmental disorders.

We've all heard the oft-quoted adage that we use only 10% of our brain. Most academics are generally aware that these claims are wildly exaggerated, but they don't know how this myth became so widespread. In contrast, most non-scientists are brainwashed into thinking that, if only there was a little pink "limitless" pill available, they could magically utilize 90% of their so-called dormant brain tissue. I've been told the story of how this "10% brain function" myth came about and I think our readers might enjoy the tale.

About 40-50 years ago, relatively little was known about brain function. What we did know came primarily from autopsy studies and by observing how people responded following a traumatic brain injury or stroke. In the 1970s came the advent of Computerized Tomography, or CT scans. For the first time doctors and researchers could 'see' inside the living human brain. Not with the same resolution that today's CT scans have, and not even close to what we can now determine with MRI, but the old CT scans were impressive for the time nonetheless. Also for the first time we could see the structure of the brains of individuals who do not develop typically. Individuals with hydrocephaly are one such group. When some of these people had their brains scanned by CT technology for the first time, to the amazement of neurologists and laymen alike, it was revealed that they only had, on average, about 10 mm of cortex (1 cm). Yet these people still had fairly good cognitive functioning and some even lived rich independent lives. When the stories came out about these people via news reporters, it was emphasized how 'little' brain we actually needed to function and survive. We now know that the reason why these people could function so well with so relatively few brain cells was because of hyper-neuroplasticity. That is, from a very early age, there was continuous water pressure bearing on their developing brains. This in turn would have amplified the normal pruning process that allows our central nervous system to lose brain cells and fine-tune neural connections.

At the time, this knowledge about neuroplasticity was not known. Rather, the dominant theory to explain the hydrocephalic brain in the popular press was that people only need a small amount of brain tissue to function (thereby converting the 10 mm to 10%).

In turn and over time, motivational speakers and pseudoscientists changed this to be that we only use 10% of our brain; therefore there could be ways (and money to be made) that every day folk could increase the amount of neural-power available to employ.

So is there a moral to this story? In my opinion, the moral is that we must be wary about all the claims made (mostly by the media) about the brain. We also must try to inform people about what we do as scientists and why.

It's not only the media who are at fault, but also trained (and untrained) people in the education field who are trying to sell parents the magic bullet that will increase brain power or indeed "fix" the child who has a learning problem or neurodevelopmental difficulty. These "magic bullets" include certain baby toys, games, educational programs, vitamins, brain training and so on.

Most societies today, even if they recognize developmental disorders, rarely have the funding to adequately test, treat or otherwise help children who are not typically developing. Desperate parents will try anything to help their children learn/sleep/concentrate/socialize. In my field of developmental cognitive neuroscience, I have parents contact me continuously. Many ask for my opinion on the best clinicians or programs or schools for their children. Some lament the dearth of help to assess or assist their child in the classroom. Some even ask me if I can "brain image" their child with fMRI so that they have a better idea of how their child's brain is functioning. I have to disappoint them by saying no; we still have no individualized biomarkers for most childhood disorders. If I were amoral, I'm sure I could be a millionaire by now, using my departmental EEG and fMRI for such "assessments". Indeed many parents I know have been taken-

in by false claims made by pseudoscientists. At the very least parents have wasted time and effort on ineffective tools. At most they are in-debt for thousands of dollars for programs or quick fixes that have not worked. Importantly, and regardless of cost, hopes and dreams are shattered.

The bottom line to this story is this. As academics I believe that, in addition to trying to publish our research on developmental disorders and otherwise disseminate our findings at targeted conferences and universities, we should be trying to tell the general public about our findings. We can do this by talking

at community events, to community groups, and talking to reporters. We need to increase awareness of the typical and atypical brain so that we no longer have to hear people talk about “unleashing the dormant areas of the brain” or so that we don’t hear frustrated parents cry over the lack of awareness and knowledge about (for example) dyslexia or ADHD or autism spectrum disorder. There needs to be knowledge and awareness before adequate treatment/remediation occurs. Although we risk having reporters misquote us, we also have opportunities to change people’s lives. One small voice at a time.