

Hacking My Kid's Brain: How a Child's Neurons Were Rewired

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Photo: Mark Woodman

Three months ago I took my 7-year-old son through a neurological treatment designed to hack his brain. It's been 90 days since his treatment ended, and I am happy to report the hack has made a huge difference.

Friends and family inevitably ask, "Did it work?" While a simple "yes" might suffice, the specifics of Caleb's results show just how effectively a brain can recalibrate itself. Caleb is experiencing the world in a whole new way.

As a child diagnosed with sensory processing disorder, or SPD, Caleb doesn't experience senses the way other people do. Stimuli from his environment and body are sometimes misinterpreted or ignored altogether. In addition to the obvious physical difficulties manifested with this neurological disorder, it also diminishes the ability to learn, think and even socialize. Behaviors we take for granted, like eye contact and maintaining a polite distance, are often huge challenges for people with SPD.

The month-long Sensory Learning Program in Boulder, Colorado, was designed to recalibrate Caleb's reception of sensory input, reorganizing the neural pathways that process information. Caleb's visual and auditory perception is now within normal ranges and his visual-motor skills have significantly improved. The only area where Caleb still shows appreciable deficits is in proprioceptive

awareness -- the sense of one's own body -- so we have turned to occupational therapy to help in this regard.

The Sensory Learning Program focuses on three modalities: vision, hearing and balance. The effectiveness of this "sensory intervention" is measured by a series of tests administered before the treatment, directly after the treatment, and once more at the end of three months.

The Auditory

Prior to the treatment, the program's creator, Mary Bolles, tested Caleb's hearing acuity. We discovered he was particularly sensitive to certain frequencies, making it difficult or even painful to hear certain sounds or voices. In addition, his hearing was not balanced; one ear was more sensitive than the other in some ranges. We were advised that due to his struggle with SPD, Caleb's hearing irregularities were probably neurological in origin.

One of the remarkable aspects of the program is that a patient's brain will continue to rewire itself even after the treatment has stopped. One month after the treatment, tests showed that some of Caleb's hearing irregularities had balanced out. The improvements were subtle, but encouraging. Three months after the treatment, his hearing test showed a nearly ideal profile of balance and sensitivity. His hearing is now quite normal.

Now that he can perceive sound correctly, Caleb is learning to listen in a whole new way. He is learning how to cope with noisy environments like his classroom, and his own speech has become more nuanced. He's even trying new phrases and turns of speech, much to our amusement. At dinner he recently remarked, "I'm tired of that. I hope it goes out of fashion soon."

The Visual

The next part of the testing involved measuring Caleb's field of vision. Although his eyes are physically healthy, his brain has been effectively ignoring his peripheral vision. This virtual tunnel vision has caused problems with everything from detecting social cues to navigating the aisle of a grocery store.

His vision has also shown steady improvement since the program ended. After one month, Caleb's perception range was nearly normal in both eyes. At three months, his visual field has expanded outward even more, and he now has usable peripheral vision. Already, I have seen signs of better situational awareness. I used to constantly pull him out of harm's way on sidewalks and in store aisles. Now he can walk with me with barely any guidance or redirection needed.

Our society is filled with visual social cues, and Caleb can now see some of them for the first time. He has started to read people's expressions to understand their emotions, and has also become much more aware of his own emotions. As a kid

who also has Asperger's Syndrome, this is still a tough area for him; we have to coach him in picking up on cues that most kids learned by instinct years ago.

Another interesting "side-effect" is that Caleb has begun to guess peoples' motives by observing their behavior. For example, he and I like to play a computer game where the setup involves naming several robots. One night I picked names like "Chocolate Chip Cookie" and "Ice Cream." He chuckled at me and said, "You're just naming desserts because you're on a diet and can't eat any of that stuff." A few months earlier he would have never made such a connection.

The Visual-Motor

Visual-motor skills help us translate what we see into appropriate motor responses. This covers everything from copying a sentence out of a book to kicking a soccer ball. Because sensory integration is the key problem for those with SPD, a visual-motor test can provide tremendous insight into the severity of the disorder.

Before the treatment began, we tested Caleb's visual-motor skills using the Beery-Buktenica Test. This well-regarded test comes up with a score by comparing the performance of thousands of people in the same age range. It's fairly straightforward: You copy various shapes drawn for you in a booklet, and your score depends on how accurate you are. Your score depends on the shape to be copied, your ability to reproduce shape intersections, angles and symmetry.

Although Caleb is very bright, his pre-treatment Beery VMI score put him in the 32nd percentile in visual-motor skills. The interesting thing about the test is that it provides a very tangible, practical metric to see how well the Sensory Learning Program is working for an individual. Seeing more is good, better hearing is good. But a measurable improvement in visual-motor acuity means the brain is really rewiring itself to integrate the senses more efficiently.

Three months after the treatment, the Beery VMI tests have revealed dramatic changes in Caleb. His VMI score increased from the 32nd to the 47th percentile, his visual perception climbed from the 58th to the 82nd percentile and his motor coordination started in the 70th and is now in the 94th percentile. In all, his "functional age" has gone from six months behind his chronological age to several years ahead of it.

One notable effect has been on Caleb's penmanship and writing abilities. A month ago it took him 45 minutes to write four sentences on lined paper in his best penmanship. Recently he wrote a thank-you card to his teacher in less than five minutes. The card had no lines on it, and he wrote more neatly than he did on those sentences last month. His progress in this area has been astonishing.

The Unknown

Despite the encouraging results, the program isn't a quick fix for sensory processing disorder. Proprioceptive awareness is still pretty tough for Caleb. His brain may be getting the right information now, but he still has to learn how to use it for the first time. We hope that he now has the neurological wiring needed to eventually catch up with his peers in social areas. The intriguing aspect of this whole experiment is to see evidence that my son's brain continues to reorganize itself around the sensory information. Caleb is experiencing the world in new ways, and only time will tell what comes of it.

Several clinics across the United States administer the Sensory Learning Program, and thousands of people have had similarly dramatic results. Many of the people who go through the program are in the autistic spectrum, since SPD is a common issue for autistic people. A Study published in February by the Centers for Disease Control and Prevention shows that the prevalence of autism has increased to one in 150 people. Because of this trend, sensory interventions like this program may become mainstream through sheer necessity.