## Excerpt from: New York Times Article Magazine – Sound and Fury – Neil Young

All of my life, I had never rid myself of the preposterous idea that someday Young would vouchsafe to me some life-altering truth, until one day it happened. My younger son, Elijah, I told Young, has a great ear for music, but his ability to process sensory information is off, which means that he has been drowning since birth in an ocean of sound. This has led to problems with language and balance and nausea. From the time he was born, his hands were also clenched into tiny fists, and they remained that way for over a year. He seemed to be in some kind of pain.

Otherwise, he is a bright, intensely curious child, who is fascinated by the workings of cause and effect and understands language at a normal 5-year-old level but repeats words with great difficulty. To compensate for his deficits, Elijah was blessed with a rock-star smile that can light up a room — a smile so bright and warm that he learned to use it to distract people from his obvious physical discomfort, in a world that was always wobbling and flipping over, and from his inability first to talk and then to pick up small objects or insert a screw into a bolt. Instead, he smiled at people. When they asked him his name, his inability to produce intelligible sounds made him turn away quickly in frustration, which was usually interpreted as shyness. He would try to build a tower out of blocks, then knock down all the blocks. Then he would turn back to them, laugh and flash that smile.

A child in pain is a tragedy and a burden that can be all-consuming, but that's not how I experience Elijah. He is my friend. He is a source of joy and love and warmth, who has also been the cause of several hundred sleepless nights, which can in turn be the source of soaring anxiety. Thanks to Elijah, I have become aware that speech is a conscious act that requires the coordination of 32 muscles in the mouth, 16 of which affect the shape and positioning of the tongue.

It could be cerebral palsy, a light case, perhaps, Young replied, in an oblique reference to his sons. It is something like that, but it's not that, so I wasn't sure exactly how to answer. It's not genetic. It's not fatal. Something was inflaming his young brain, disrupting the formation of healthy neural connections; the cause might be historical, or ongoing. Either way, there were kinks in the channels through which sights and sounds flowed. Either those channels had to be ironed out or new ones had to be opened up.

I asked Young what it does to a marriage to have a child like that. Neil has been married three times. His ex-wife, Pegi, Ben's mom, was a singer-songwriter and environmentalist but died on Jan. 1, 2019, of cancer. She had worked with Young, to whom she was married for 36 years, before divorcing in 2014, to establish the Bridge School.

"It's good for the marriage," he said firmly. "If it's a good marriage, it brings the marriage even closer together. It's one of life's great experiences. It's an enriching thing because it teaches you the value of love."

Young's immersion in a program of intensive therapy for his son Ben led him to become obsessed with new ways of hearing and modulating sound. His album "Trans" was a monument to his attempts to communicate with Ben and to find a musical language that could convey what Ben was hearing — and perhaps even serve some therapeutic purpose. As Neil put it to his biographer Jimmy McDonough, the album was "the beginning of my search for a way for a nonoral person, a severely physically handicapped nonoral person, to find some sort of interface for communication. The computers and the heartbeat all have to come together here — where chemistry and electronics meet."

In that moment, talking about our sons, I realized how all of Young's obsessions fit together: They are centered in a common understanding of experience and how it shapes us. Human development is led by our senses. Our senses exert a formative and shaping pressure on our brains. So if our experience of the world around us can damage our brains and our souls, it makes a kind of intuitive sense that music can also help us feel better. Every musician, and every music fan, believes that.

It was this belief that led me to the work of a French doctor named Alfred Tomatis, who, in the late 1940s and '50s, began manipulating sound in the hope of healing people. Among his patients were opera singers and fighter pilots, whose brains had stopped processing sound correctly as a result of work-induced auditory trauma. Because our fight-or-flight response is connected to our auditory system, any disturbances can cause a host of physical symptoms. Tomatis came up with a treatment that involved decreasing or emphasizing specific frequencies of what he believed to be particularly salient forms of music — including Gregorian chants and the music of Mozart, which is perhaps the most perfectly structured and at the same time most effortlessly fluid sound that human beings have ever made (at once the most human and the most perfect music on the planet). These interventions helped retune the muscles that control the auditory pathways through which sound makes its way to the brain.

In the 1950s, Tomatis successfully used his techniques to help opera singers whose prolonged and eventually traumatic exposure to their own vocal extremes left them unable to hear high and midrange sounds. After graduating from medical school, he worked for the French Air Force, where he noticed that prolonged exposure to certain ranges of sound produced by factory machinery and jet engines produced a range of negative physiological and psychological effects, in addition to hearing loss.

But Tomatis's methods languished in relative obscurity for the second half of the 20th century in part because they didn't align with the then-dominant machine model of our brains, which suggested the organ contained a set of parts that performed specific functions. Once broken, those functions could not be restored.

The machine model of the brain "has been a disaster clinically," says the psychiatrist Norman Doidge, who over the past decade has popularized much of the pioneering work in the science of neuroplasticity in two best-selling books. "We now know that mental and sensory experience and activity actually change the brain's 'wiring' or connections," Doidge told me. As Eric Kandel, one of Doidge's teachers at Columbia, defined it, "Neuroplasticity is the ability of the brain to change its behavior as a result of experience." In 2000, Kandel was awarded the Nobel Prize in medicine or physiology.

At dinner at a fancy Italian restaurant in Toronto, I told Doidge about Elijah. What particularly interested me, I said, was that his symptoms mirrored those of a child to whom Doidge had devoted a case history in his second book. Could he help us?

Maybe, he said. With proper reshaping of his auditory cortex, Elijah's balance might get better and his nausea might stop, which would in turn make it possible for him to develop more normally. Doidge suggested that we take Elijah to the Listening Center in Toronto for an assessment. The center is run by Paul Madaule, who was first Tomatis's patient in France, then his assistant.

Coincidentally, I added, Young experiments with masking and distorting sound contained some similar ideas. He had two sons with cerebral palsy. "He was probably on to something," Doidge said.

.....

There are plenty of neurologists who remain skeptical of the idea that sound can help rewire people's brains. What I can also tell you is this: I listen to rich audio files through a decent-quality DAC and I hear more, and it makes me feel better. Also: I don't know when or how or if certain parts of my son's brain

will get unstuck. I don't know whether he will learn to talk in a way that his friends or teachers or people besides me and my wife and his brother and sister can easily understand. I'm not even sure what degree of change is desirable. Some brains, like Neil Young's and Joni Mitchell's, are just wired differently.

That said, I will never forget watching Elijah during the first week of his therapy in Toronto, as modified Mozart was piped into his brain and he just suddenly looked down at his little fist and started opening and closing his hand for the first time — because suddenly, he could. After the second session, six weeks later, his reflexes and fine-motor skills had markedly improved, to the point where he could catch a ball or slap his mother across the face when she says "no" to his request for another marshmallow. He isn't nauseated anymore. He can walk and even run, while continuing to be a joy to be around. Just the other day, in the bath, waiting for his mother to come home, he looked at me and said, "Oh, me home, Mama!"

I listened to the tapes that Elijah was hearing, on which Mozart's perfect sound was continuously interrupted by filtering that sounded like static, before it then reasserted itself — an effect that is familiar to any Neil Young fan. The filtering effects had helped in whatever way to heal Elijah's brain. So what is the effect of engineering so much complexity out of the music we listen to, and replacing it with fake, jacked-up sounds, doing to my brain and to yours?