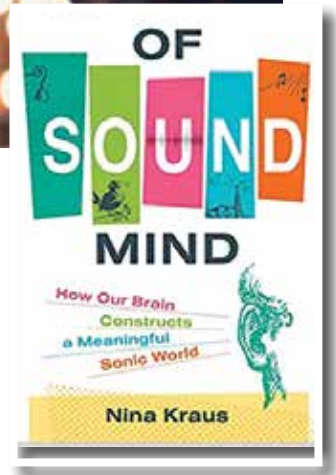


BOOK NOOK

REVIEW BY LARRY HERBERT



Of Sound Mind—How Our Brain Constructs a Meaningful Sonic World

by Nina Kraus (MIT Press, September 2021)

A musician friend prefers listening to music on vinyl or CD through his premium speakers or headphones, eschewing the low fidelity, compressed files of music conveniently available on his smartphone. A swing dance friend with a musical background hears and anticipates a “break” in a particular song—and plays with the music. Musician brains are more attuned to the rhythms, beats and intervals of music—the nuances of sound that often escape me. Why is that? Are they just more naturally talented or has playing a musical instrument tweaked their brain’s auditory responses?

Why do I feel happy when I sing “Sweet Caroline” and belt out “so good, so good, so good?” Why does a powerful love song bring tears to my eyes? Why do dementia patients who struggle to converse in everyday conversations, frequently remember lyrics and associated memories when they listen to music?

These questions, and many others about how our brains process sound, are the focus of Nina Kraus’ new book, *Of Sound Mind—How Our Brain Constructs a Meaningful Sonic World*. Kraus is a neuroscientist and professor at Northwestern University who founded the Brainvolts Laboratory some 30 years ago to research the biological foundations of sound. There she has explored the amazing connections between sound signals and our brain’s processing—making sense of what we hear.

The sound mind of musicians gets top billing in her book, in part because it has a tremendous effect on our speech and language development. In a chapter titled, “Music is the Jackpot,” she writes:

“Making music is arguably one of the best ways to foster cognitive strengths such as attention, working memory, and creativity. Remarkably these strengths are not just musical, but transfer to other activities, most notably speech... Music activates the reward circuitry of the brain... Musicians have stronger cortical responses

to musical sounds than nonmusicians. Musicians’ brains more readily register a change in a sound pattern or dissonant or mistuned chords.”

Kraus maintains that taking up an instrument even in our later lives can improve our sound minds—though it won’t rival the sound minds of those who have played an instrument their entire lives, but still, it makes a difference.

She devotes a chapter on rhythm, stating that, “it connects us to the world. It plays a role in listening, in language, in understanding speech in noisy places and even in our feelings toward one another.”

Those who speak another language, and athletes typically have better “sound minds,” too, and outperform monolinguals and nonathletes in speech in noise tests. Kraus’ research has shown that “bilinguals excel at suppressing impulsivity, which is key to being able to avoid distractions and pay attention to what’s important.”

And Brainvolts researchers looked at the response to sound relative to background neural noise in 500 athletes at Northwestern University, and at the response in 500 nonathletes. They found that the “sound to noise” ratio was larger in the athletes—suggesting that athletes have a quieter brain with keen sound minds that do a better job of blocking out background noise.”

Her research has shown that an improved sound signal leads to better reading skills. Brainvolts conducted an experiment that provided assistive listening devices to children for an entire school year. “Children with the listening aids showed greater improvements in their reading ability and phonological awareness (the ability to identify and manipulate the sounds of English) compared with children who had not worn the devices.” The devices provided improved sound to children with reading deficits.

Kraus also devotes sections of her book to her research on autism and the sound mind; to using sound

to diagnose concussions; to tinnitus; to the noisy world that surrounds us in the 21st century; to auditory training for older adults; to the sound mind in dementia patients; and even to birdsong—and she does so with a scientific curiosity and a humble recognition of how much we don't know.

I had to read her chapters on sound ingredients several times—as I am a nonmusician and I find understanding sound a bit too theoretical. Similarly, her chapter on the auditory pathway in the brain is a bit daunting for the lay person and has a textbook feel to it at times. But she does clearly show that the auditory system is not a straight hierarchical pathway, but one that engages the feeling, thinking, moving and sensing regions of the brain. She breaks down sound components and explains how the movement of molecules is received by the ear and eventually transduced into a series of electrical impulses. Her metaphor of the brain as a giant mixing board automatically adjusting faders to make sense of sound in mind boggling speed (microseconds and milliseconds) was helpful.

I have a newfound appreciation for speech pathologists, audiologists and neuroscientists—and for musicians,

bilinguals and athletes—and for the power of “sound” in our lives. It's no surprise that Kraus advocates for initiatives in music, foreign language, and physical education in our schools. As Kraus contends, “we have abundant evidence to trust that sound is a force shaping our minds.”

It's time for me to sign up for guitar or piano lessons. I need to improve my sound mind so I can hit those breaks when I am swing dancing. I also need to buy a turntable and get my old LPs out of the attic. **HL**



Larry Herbert is retired and lives in Richmond, Virginia. A member of the HLLA Greater Richmond Chapter, he currently leads efforts to promote hearing loops in the community. His interest in assistive listening technology was initially sparked when he helped his father communicate via text and email. He is a graduate of the University of Virginia and can be reached at lawrence.herbert@gmail.com.

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