

When sands sing and rocks ring - and when they escape the ear

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Trevor Cox, an acoustic engineering professor in Great Britain, will go to any length to capture a unique sound. Looking for the most reverberant space in the world, he heard about a gargantuan oil complex, secretly dug into a Scottish hillside in the 1930s in preparation for the coming war. To get inside one of its big tanks, twice as long as a football field, Cox lay down on a trolley and was pushed through a narrow pipe into the tank "like a pizza being put into a deep oven," as he put it. There his companion fired off a pistol loaded with blanks, and Cox recorded a reverberation that lasted almost two minutes, an eternity in the sound game and a world record.

It may seem odd to learn about sound by silently reading nearly 300 pages of text, but Cox's breezy and amusing prose helps you share his experience as he searches for the sonic wonders of the world: sands singing in the Mojave desert, rocks ringing in Virginia, Mayan pyramid stairs chirping in Mexico, galleries whispering in England and a road playing music as you ride over its corrugated asphalt in California. While the sounds created by the landscapes, buildings and objects are vividly described, there's also a site (www.sonicwonders.org) where you can listen for yourself.

Cox's enthusiasm for his specialty is contagious. We learn how movies vary cricket sounds to convey an emotional tone; how snapping shrimp in the sea, crackling away like a roaring fire, can interfere with hearing an enemy sub; and how firing a gun at the entrance of a cave can help you map its subterranean layout from the echoing sounds, a trick used at one point to hunt down Osama bin Laden.

Along the way, Cox also provides an introduction to basic acoustic-engineering principles. For example, there's a reason we tend to use hushed voices in a cathedral; vast in size, these chambers rapidly amplify sound, creating "an ungodly cacophony" if speech is loud, which forces us to quiet down. Gothic architects knew just the structure to create an atmosphere of spirituality.

And the sound made by a drop falling into water comes not from water meeting water but from the vibration of the air bubble caught inside the drop. The larger the bubble, the more "bassy" the plink. Waterfalls simply magnify this response. "In the cascade," Cox writes, "the combination of millions of random plinks creates a vast bubble orchestra, which fizzes and roars." And, fortunately for us, all are in the range of frequencies where our hearing works best.

"I have noticed that keeping an ear out for extraordinary sounds," Cox says, "has made me . . . take more notice of everyday sounds. It was in the Mojave Desert that I first really noticed how evergreen trees whistle. Now, as I walk home, I listen for the rustling plane trees lining the streets."

As tourists, cameras in hand, we're usually on the lookout for the most engaging sight. Cox has made me a convert to better use my sense of hearing when out and about. Three of his sonic wonders, in fact, are located just a short car ride from me: Boston Symphony Hall, a mecca for hearing classical music; Echo Bridge in Newton, Mass., where dogs are driven crazy by their own barks, as seen on YouTube; and the Mapparium, a hollow globe of the world drawn on stained glass, which serves as an acoustical funhouse for Bostonians. I'll now be keeping my ears wide open for the soundscape, both at home and away.

Reading "The Sound Book" made "I Can Hear You Whisper" all the more poignant for me. In the latter book, journalist Lydia Denworth is on a far different journey regarding sound; she is searching for answers as her young son Alex is diagnosed with a severe loss of hearing that allows him to perceive only the loudest sounds. Denworth didn't realize right away that her soothing bedtime stories, lullabies and sweet "I love yous" weren't being heard.

An unusually quiet and observant boy, Alex had been slow to reach important milestones after his birth; he was late sitting up and late in talking. Once Alex's disability was confirmed at the age of 11 / 2, Denworth made it her job to learn all she could about his options. In doing so, she entered a world of controversy that goes back to the 18th century: Should Alex learn to speak, today with the help of cochlear implants, or should he become fluent in sign language, once shunned as an unfit substitute until a deaf civil rights movement emerged in the latter half of the last century? To these defenders, deafness is not a handicap at all but rather a unique culture - with a silent, balletic language - to be cherished and supported. Cochlear implants threaten the survival of this society. "Tellingly, the [American Sign Language] sign developed for COCHLEAR IMPLANT was two fingers stabbed into the neck, vampire-style," Denworth reports.

Writing with clarity and style, Denworth serves as a capable guide to a world that few with full hearing are fully aware of. She talked to a host of people closely tied to these issues, from doctors and medical researchers to inventors and educators. A skilled science translator, Denworth makes decibels, teslas and brain plasticity understandable to all.

Of most concern to her was her son's acquisition of language. "The first year of life is largely a silent rehearsal," as one expert put it, which is why hearing loss, if undiscovered at birth, can have a profound effect on learning language. Studies have shown that the more words a child hears around him (or learns via signing) in his first few years, the higher his IQ and the larger his vocabulary in later life. Alex was on a deadline.

While Denworth ably reports on the history of early deaf education and the science of hearing, the book really comes alive when focused on Alex, a story that is both heartbreaking and heart-warming. In the end, the author does choose the world of sound for her son, which is understandable given that both parents and Alex's two older brothers are fully hearing. Just before he turned 3, once his hearing aids no longer sufficed, Alex was fitted with a cochlear implant, a device that converts sound into a signal that passes along electrodes implanted within the ear to the auditory nerve. This technology doesn't restore full, natural sound but provides a form of hearing (many new users compare it to the sound of Donald Duck) that is understandable with training.

On the weekend of his seventh birthday, Alex and his mother traveled to Colorado for some special tests. How was his brain processing the acoustic signals he was receiving through his implant? The results were not positive for everyone, but for Alex it was impressive; his auditory cortex was receiving enough sound that his measured responses matched those of a hearing child. "As if to prove it," Denworth writes, "that same night, at a noisy Mexican restaurant . . . Alex insisted we play Whisper Down the Line, his new favorite game. He was terrible at it, mangling the words that I passed on to him. . . . But still . . . who would have ever thought? He could hear me whisper."

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THE SOUND BOOK

The Science of the Sonic Wonders of the World

By Trevor Cox

Norton. 331 pp. \$26.95

I CAN HEAR YOU WHISPER

An Intimate Journey Through the Science of Sound and Language

By Lydia Denworth