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With a Song in His Head

Neuroscientist Daniel Levitin works to learn why we all know music.

BY JOEL YANOFSKY

- ◆ FEATURES
- ◆ RED ALL OVER
- ◆ FARM REPORT
- ◆ News
- ◆ Sports
- ◆ DEPARTMENTS
- ◆ CLASS NOTES
- ◆ SHOWCASE
- ◆ COLUMNS
- ◆ CLASSIFIEDS
- ◆ CONTACT US
- ◆ BACK ISSUES

IT'S A COLD NIGHT in Montreal and Daniel J. Levitin, a cognitive psychologist and neuroscientist, is moonlighting. He's joined 10 of his colleagues at McGill University on a makeshift stage to do a couple of sets of rock 'n' roll—James Brown to Tracy Chapman—for an audience of students and friends. Onstage, Levitin's responsibilities are numerous and varied. He plays the saxophone, guitar, drums, sings a few songs (including one he's written), and every now and then double-checks the sound level. He's doing all this because he's a self-confessed ham—he enjoys lecturing to 700 students, too—and because he's always been in a band, including one at Synergy House when he was a Stanford undergrad.

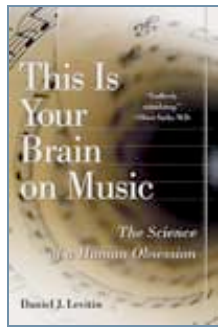
"We were called Quality Mart, because we were 10 percent off most of the time," says Levitin, '79, who now runs the Laboratory for Music Perception, Cognition and Expertise at McGill. The McGill band, called The Diminished Faculties, is very loud and, by their own admission, a little under-rehearsed. Everyone's having fun; no one's giving up their day job.

Levitin already did that. He went from being a music producer, with 16 gold and platinum albums to his credit, to teaching and doing research in cognitive psychology. But Levitin's two career paths converge in his lab, a place visited by both the Talking Heads' David Byrne and *Awakenings* author Oliver Sacks. It's in the junctures of music and science, popular culture and esoteric research that Levitin has found an outlet for his restless curiosity. His research has led to a popular new book, *This Is Your Brain on Music: The Science of a Human Obsession* (Dutton). In its introduction, Levitin writes, "This is the story of how brains and music co-evolved, what music can teach us about the brain, what the brain can teach us about music, and what both can teach us about ourselves."



SAX-LINKED TRAIT: Former music producer Levitin tested people not with experimental tunes, but with hits. Humans' great accuracy with melody, tempo and pitch implies that music is innate in the ways language is.

Arsénio Corôa



"Dan is world-class at both popularizing science and doing it," says Martin Grant, McGill's dean of science and a guitarist in The Diminished Faculties. "For Dan, cutting-edge science must also broadly speak to and involve people."

According to Levitin, one of the problems with research into how the brain processes music is that it hasn't dealt with real music, particularly the way people experience it. In his earliest experiments, Levitin tested musical memory not by playing little experimental tunes, but by stopping people on the street and asking them to sing a favorite hit song, which they did with surprising accuracy. They knew the melody and also got things like tempo and pitch right—even though few would have been able to define those concepts. Thus they demonstrated what may be Levitin's most intriguing theory—that music, like language, is innate. We're all born experts.

By studying people with differing brain disorders, he's found some clues that 'there may be a cluster of genes that influences both outgoingness and musicality.'

He's continued to explore basic but profound questions about music and the brain through neuroscience, a field he says is "at the intersection of psychology and neurology." He has shown through brain imaging and the use of MRIs, for instance, that what we hear is directly linked to the amygdala, the place in the brain that is "the heart of emotional processing." He has looked for answers as to why some songs move us and others don't; why we react differently to music we just hear as opposed to music we see performed; and the genetic underpinnings of musicality.

He has explored why people with Williams syndrome, a severe developmental disorder, often have extraordinary musical abilities, and compares them with people who have autism spectrum disorders. Levitin writes that with Williams syndrome, "we have a population who are highly social, gregarious and highly musical." With autism, "we have a population who are highly antisocial and not very musical. The putative link between music and social bonding is strengthened by complementary cases such as these, what neuroscientists call a double dissociation. The argument is that there may be a cluster of genes that influences both outgoingness and musicality."

With *This Is Your Brain on Music*, Levitin takes his cue from neuroscientists like Oliver Sacks and Steven Pinker, explaining a subject we are all intimately familiar with and that, even so, most of us find baffling. *This Is Your Brain on Music* demystifies music without denying it its inherent, infinite mystery. Levitin defines terms concisely—pitch, tempo, timbre—and summarizes hard science clearly. The book is also part memoir, a summary of Levitin's experience playing, producing and analyzing music. His purpose, Levitin writes, was to bridge the "widening gap between those who love music (and love to talk about it) and those who are discovering new things about how it works." The book has become a bestseller and been named a finalist for the *Los Angeles Times* Book Prize in Science and Technology by providing both the scientific and emotional reasons for why music means so much to us—why, among other complex things, it makes us feel good.

Levitin—who's 49 and looks a little like Lou Reed, if Reed had been better behaved—wasn't thinking about such questions in the late 1970s, when he dropped out of Stanford, just shy of earning his bachelor's degree in music. He joined a country band, then a punk band, and eventually began producing records. During the 1980s, Levitin worked with artists like Blue Oyster Cult, Chris Isaak, Santana, The

Grateful Dead and Stevie Wonder. But through that heady time—"I was recording in the same studio where Simon and Garfunkel did 'Bridge Over Troubled Water'"—Levitin kept getting drawn back to Stanford. He'd sit in on lectures, mostly psychology classes, whenever he had time off. "When I was in school, music was my hobby. When I was working in music, school became my hobby," Levitin says.

By the late 1980s Levitin was becoming disillusioned with the business side of the music business. Artists he admired were being dropped from their labels for not selling enough records. Levitin decided he'd also had enough. Jim Adams, a professor of mechanical engineering at Stanford, had convinced Levitin that he was the kind of person who belonged in a university environment. "Jim said I read way too much to be out in the real world," Levitin recalls.

Adams, who retired from Stanford in 1999, remembers Levitin as a student who was "interested in everything." Adams adds, "If I talked Dan into going back to school, I didn't have to try very hard. There's a type of person who's always searching for the underlying reasons for things. Dan's that type."

Levitin wasn't sure what major to choose when he returned to Stanford, finishing his bachelor's degree in 1992. Psychiatry professor Roger Shepard "persuaded me that everything I was interested in—music, anthropology, linguistics, math—could be done in the psychology department," Levitin says. "Psychology had a broad enough mandate to encompass the many things I wanted to do. It had the whole of human experience."

Levitin's brain on music is a busy one. So busy that in 2004 when he got an offer from an academic press to write a book—"popular but not dumbed-down"—about the science of music, Levitin did everything he could to decline, including recommend other authors. Even after he agreed to write the book, he assumed his one-year deadline was just a guideline. "The day before the book was due, the editor called and said, 'So where is it?' When I told him I had half a chapter written, he said, 'No, no, really.'" Levitin had done a lot of research, but, like a student cramming for an exam, he had to finish the manuscript fast. "The actual writing took four months. I wrote every day for five hours during a teaching semester."

There was another problem; his editor wanted the book to be personal. "He said that the point of the book is not just to convey information, it's to create a narrative arc. I said, 'Nobody wants to read about me.' He said, 'You're wrong. They do.'" And what makes *This Is Your Brain on Music* such a compelling read is that it's peppered with these extraordinary personal encounters. In one chapter, Levitin is discussing "the evolutionary basis for emotions" with Francis Crick, the co-discoverer of DNA's structure; in the next chapter, he and Joni Mitchell are analyzing the unique way she tunes her guitar for songs like "Chelsea Morning." For Levitin, who has carved out a "wildly interdisciplinary" career, everything is connected—and everything connects.

JOEL YANOFSKY is a writer in Montreal; his most recent book is *Mordecai & Me: An Appreciation of a Kind*.