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IDEAS

Music on your mind

DAVID ROTHENBERG

This Is Your Brain On Music:

The Science of a Human Obsession

By Daniel J. Levitin

Dutton, 256 pages, $32.50

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Will science ever be able to figure music out? Those chords, tunes and beats that touch us so -- can biology explain why we care so much about them? Can neuroscience tell us just what goes on in the brain when we can't get a song out of our heads?

Daniel Levitin has the ideal résumé to answer this question. Once producer or engineer for famous pop records by Steely Dan, Blue Oyster Cult, Jonathan Richman and Chris Isaak, he is now Bell Professor of the Psychology of Electronic Communication and director of the Levitin Laboratory for Music Perception, Cognition and Expertise, at McGill University. He's one of few people to have had such illustrious careers in the industry and the academy, so he brings a rare mixture of street and lab cred together in this accessible and fascinating book on the cutting edge of music psychology.

From the outset, he urges us not to be afraid of asking tough questions about how music works on us. Don't worry, we will still love punk rock even after we try to figure out what part of the brain turns on when we hear it. There are enough mysteries about what music does to our brain to keep us dancing in the unknown for centuries. That song stuck in your head? It's called an "ear worm," from the German *Ohrwurm*. Little research has been done on this topic, but what scientists have found is that people who don't profess to have perfect pitch are usually able to repeat such songs in the correct key over and over again. We have an unconscious ability to remember absolute pitch.

This is Your Brain On Music is full of fascinating scientific tidbits. Babies have an innate preference for the same kind of music they heard while in the womb. All human cultures, despite many different tunings, scales and names for musical pitches, tend to realize that the notes repeat as we move up from one octave to the next. Even though the world's musical scales have many microtones (pitches in between the black and white keys on the piano), Levitin reports that no culture divides the octave into more than 12 notes at a time. When men and women speak in unison, their voices are usually one octave apart, with children speaking either one or two octaves higher than adults. What does the cognitive scientist in him say about what's going on inside us? "An exquisite orchestration of brain regions . . . a precise choreography of neurochemical release and uptake between logical prediction systems and emotional reward systems."

With his unique history, Levitin takes us through his recollections of odd encounters between his different worlds: At Stanford University, he has the strange task of explaining rock and roll to John Pierce, inventor of the transistor and who was, at the time of their meeting in 1990, 80 years old. Pierce wanted to hear the six songs that could encapsulate all of rock and roll, a music he did not understand. Levitin's list included *All Along the Watchtower*, by Jimi Hendrix, and *Anarchy in the U.K.* by the Sex Pistols. It was all a revelation to Pierce. "The sound of a distorted electric guitar wasn't all that was new to him. The ways in which instruments were combined to create a unified whole . . . that was something he had never heard before. Timbre was what defined rock for Pierce."

As the book progresses, Levitin shows us just how hard musical genres are to define. What exactly is heavy metal? Power chords, sweating shirtless singers swinging the mike around like it's on the end of a rope, ümlauts in the groüp's name? "This list of definitions is easy to refute. . . . We say something is heavy metal if it resembles heavy metal," he says, echoing the rather circular theories of philosopher Ludwig Wittgenstein.

Perhaps the climax of personal encounters presented in the book is Levitin's meeting at the Salk Institute with Francis Crick, co-discoverer of DNA. Here they have a hushed, deep conversation on what emotions might mean for the development of human consciousness. "They motivate us," Crick whispers, as he urges Levitin to look deep into the workings of the brain. Consciousness can't be pinpointed, but emerges from the synchronous firing of our neurons. "Look at the connections," Crick says. Where in the brain is music happening? Not in exactly the same places as language. Says Levitin: "Far more than language, music taps into primitive brain structures

involved with motivation, reward, and emotion."

At the edges of pop-music savvy and experimental precision, Levitin brings empiricism to the heart of the beat: "Effective music involves subtle violations of timing. Just as the rat has an emotional response to a violation of the rhythm of the branch hitting his house, we have an emotional response to the violation of timing that is groove. The rat, with no context for such violation, experiences it as fear. We know through culture and experience that music is not threatening, and our cognitive system interprets these violations as a source of pleasure and amusement."

Pleasure? Amusement? Is that enough to explain why humans spend so much time and effort singing and dancing? How useful is this to our evolution? Toward the end of the book, Levitin tackles Steven Pinker's "auditory cheesecake" hypothesis, which states that music is essentially useless as an adaptive force in natural selection. Levitin retorts that music can have many functions, from unifying human societies through rhythm and ritual, and by expressing fitness and attracting mates, the way bird song is supposed to work.

These are reasonable arguments, but I think Levitin misses a major line of argument worth considering: If the theory of natural selection can't explain music, there may be something wrong with the theory, not the song. I would like to hear what he has to say about archeologist Steven Mithen's recent work, *The Singing Neanderthal*, which suggests that our recent ancestor may not have had language, but knew only music as its primary means of vocal communication. So, Mithen says, Neanderthals were far more immersed in music than we can ever be. It's all the communication they had. Only with Homo sapiens did it evolve into language.

But that's a fairly radical view. The mainstream of evolutionary theory is not so easily able to account for the blues, for jazz, for heavy metal or the classical symphony. Nor can it explain the vast diversity and complexity of bird songs, which are sung much more than a functionalist view of birds mating and fighting would allow. There's too much complexity, too much joy, too much at stake in the music itself. Only birds, whales and humans are able to learn to make different sounds than they are born with. What does Levitin think of this evolutionary convergence?

I would have liked Levitin to be more daring, to suggest that cognitive science has something to learn from music, the human art that so touches us in feelings nearly impossible to describe. He seems too willing at the end to succumb to the rationalizing dogmas of cognitive science, rather than remind us how the most beautiful aspects of our lives often elude explanation. I would have liked more personal stories of Levitin going back to his old rock-and-roll cohorts, showing them what he is doing now and hearing what they have to say. John Pierce got the whole history of rock and roll in six songs, why not go back to Stevie Wonder with six inventions to define the mechanization of the 20th century, and see what he would say to that?

Your Brain On Music takes the reader to unexpected places. It is a rare blend of science, art and speculation, and raises far more questions than answers, as any good journey should.

David Rothenberg is a philosopher, a jazz clarinetist and the author of Sudden Music and Why Birds Sing, which is currently being made into a television series for the BBC.