In a new book, Daniel Levitin of McGill University offers a crash course in the electrochemical effects music has on the brain.

He's rocking the world of neuroscience

Author explores how the brain processes music

By James Sullivan

As an undergrad at MIT during the late 1970's, Daniel J. Levitin once played music so loudly in his dorm room that he set his speakers on fire.

His best friend at the time — "ironically, a guy who later became a loudspeaker designer," Levitin says — actually tested the limits of Levitin's current stereo system. He bumped the speakers out the window into the snow, narrowly missing some pedestrians.

"I left the school shortly afterward," says Levitin with a sheepish grin.

A lifelong audiophile who has worked as a musician, producer, engineer, and rock concert sound man, Levitin also has a long, intermittent history with the city of Boston. In addition to his stint at MIT, he studied guitar at Berklee. He mixed his first blockbuster concert — the Eagles on their "Long Run" tour — in 1979, at the old "Gal-den-

In his more recent role as a scientific researcher, last spring he conducted an experiment with Keith Lockhart and the Boston Symphony Orchestra, wiring the conductor, several musicians, and some audience members to gauge their physiological reactions to the music.

And Levitin wrote several chapters of his new book, "This Is Your Brain on Music," while sitting on the Medina porch of a good friend, Tufts provost Jamshed Bharucha. The home, Levitin says, is the "Grandmother's House" that made famous in the traditional childhood song "Over the River and Through the Woods." (The river in this song is the Mystic.)

Levitin, who now runs the Laboratory for Musical Perception, Cognition, and Expertise at McGill University in Montreal, has immersed himself in music as deeply as he humanly possible. He began asking scientific questions about the nature of his beloved obsession — "What does creativity come from? What goes into making a song memorable?" — in the late 1980's. He began asking his peers and role models in the music business and publishing those conversations in magazines such as Billboard and Mix.

"It wasn't long before Levitin realized that even the most musically inclined among us are often incapable of explaining precisely how music affects our emotions, and why. That lack of articulation isn't unique to music, Levitin says: "If you asked Michael Jordan how he shoots a layup, I don't know if you'd get a coherent answer.

"So he set out to formulate some answers, beginning his research in cognitive neuroscience at Stanford University and eventually composing notes with some of the world's leading experts. More than a decade later, his new book is a culmination of that study.

"I was determined to teach the physics of sound, the neuroscience of auditory perception and music theory," says Levitin, sitting in a Cambridge hotel room on a recent afternoon. The book is impressively scholarly and readily accessible to my readers — a balance achieved through conscious effort, says the author.

"There was a real concern that the book have a page-turning quality," he says.

With that in mind, "This Is Your Brain on Music" segues deftly from a crash course in pitch, timbre, tempo, melody, and other music characteristics to the electrochemical processes of the brain and the elucidation of such topics as "ear worms," those insipid jingles and pop songs that get infuriatingly stuck in our heads.

The reviews have been harmonious, "Levitin helps quantify some of music's magic without breaking its spell," wrote Mark Coleman in the Los Angeles Times. In a starred rave, Publishers Weekly declared that the book "will leave people thinking about the contents of their iPods in an entirely new way."

Along the way, Levitin recounts his personal history as a music fanatic and his encounters with Stevie Wonder, Paul Simon, and other modern-day musical giants.

"I don't consider myself particularly smart," he says, "I've just had these cool experiences."

One such event was the time the pioneering sound engineer John R. Pierce, then 50, asked his young friend to explain rock music for him. Pierce, who had never paid attention to rock 'n roll, wanted to hear six songs that would encapsulate the essence of the music.

Six songs? Levitin protested, "I wasn't sure I could come up with six songs to capture the Beatles, let alone all of rock and roll," he writes. He accepted the challenge, choosing songs by Little Richard, the Beatles, Jimi Hendrix, Eric Clapton, Prince, and the Sex Pistols and playing them for his older colleague over dinner one night.

It's a parlor game quality that makes "This Is Your Brain on Music" a compelling read even for those of us whose neuroscience remains as baffling as well, brain surgery.

More so than other art forms, the author says, music is inextricably linked with memory. We need the repetition of notes and phrases to recognize songs, and we need new music to refer to familiar melodies in order to get our bearings.

"The point is," he says, "if we didn't have memory, we wouldn't have music." And if we didn't hear music, our lives would be a lot less memorable.