

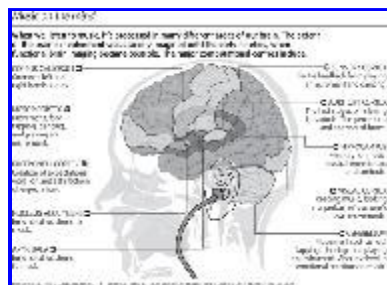
## Oliver Sacks, the thinking man's neurologist, talks to Robert Everett-Green about how music can enslave - and save - us

My mother's second husband was a professional flute player, who practised every day in a music room in the basement. For months after he moved out, my sisters, my mother and I would sometimes look at each other and say, "Do you hear it too?" We could still hear him practising.

I thought of our phantom flute player while reading *Musicophilia*, Oliver Sacks's new book about music and the brain. His chapter on musical hallucinations includes several clinical tales of people who hear persistent music from what they first imagine to be an external source, before realizing they're tuned to the mind's own radio.

"The original part of memory is the memory of actions and procedures and sequences, starting with crawling and walking," said Sacks, during a phone interview from his New York office. "This part of memory also includes musical and textual sequences." It seems to be involved in the way some tunes replay themselves in our minds even after we're tired of them. It may also account for the way that musical and textual memory tends to work best with long units of information - on whole phrases in sequence, rather than on individual notes and words.

We tend to think of hearing as something that works more or less well, and that an ear for music is something you're born with or never acquire. But Sacks's book is full of stories of people whose experience of sound and music is dramatically changeable. A doctor, after being struck by lightning, develops a craving for music so intense that he teaches himself piano and becomes a composer. An elderly woman begins to sing all day long, so compulsively that she can't maintain a conversation for more than a minute or two.



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Sacks, the author of such books as *Awakenings* and *The Man Who Mistook His Wife for a Hat*, has been meeting and treating such people for decades in his daily practice as a neurologist. He has touched on some of their experiences in his previous books, and now has devoted a volume to the many ways in which music can save or enslave us.

It's a topic that has earned itself firm footing in pop culture - *Musicophilia* comes on the heels of last year's successful *This Is Your Brain on Music*, by Daniel J. Levitin, the paperback edition of which has been on The New York Times bestseller list for five weeks. *This Is Your Brain* offers a beginner's guide to concepts such as pitch and rhythm, and a rough guide to which parts of the brain seem to be involved in musical memory, pitch placement and timbre recognition. Levitin considers such puzzles as why we like repetition in music, why many people's musical tastes are formed for life by the age of 20, and how we recognize a Beatles song even when played at different speeds by a bluegrass band or on a pennywhistle. He wants to know the origins of musical preference, how our brains suppress or extrapolate musical detail, and why some people are more musical than others.

Sacks's book deals with people of unusual deficits and abilities, including those with Williams syndrome, a rare congenital disorder associated with low IQ and poor spatial sense, but also with high sensitivity to music. He writes of people who develop epileptic reactions to music, of those (including the composer Michael Torke) for whom some sounds and keys are permanently fused with colours, and of a few (Che Guevara was a case in point) who are deaf to both musical pitch and rhythm. He describes a composer with Tourette's syndrome who regards his musicality as "a congenital disorder," and a French neurologist who, when he heard music, "could say only that it was *The Marseillaise* or that it was not."

On many of the book's pages, music appears as a lifeline for patients who can otherwise scarcely react to their surroundings or retrieve memories. The Parkinson's patients Sacks wrote about in *Awakenings* (and to which he returns in *Musicophilia*) were for the most part "frozen in a trance-like state" when he first encountered them in 1966. But when music was played, patients who could barely walk or speak on their own initiative would begin to dance or sing "with full vocal force and a normal range of expressiveness and tone." For the duration of the music, they were returned to their former capacities, and to aspects of themselves that had been buried by their illness.

Years ago, I attended a one-man performance by the actor and playwright Joseph Chaikin, who had suffered a stroke that made him aphasic - unable to put words together in speech. He performed his text smoothly and dramatically, though when I met him after the show for an interview, he could barely speak. Had he been around today (he died in 2003), he might have benefited from a recently developed type of music therapy described in *Musicophilia*, in which songs are used as a bridge back to language use for aphasic patients.

"There are about 20 parts of the brain that are recruited for one's musical experience, which is more than for one's experience of language," Sacks says. The extent of the brain's involvement in music was scarcely imagined until the early nineties, says Sacks, when functional brain imaging became possible. "Before 1985, there was no neuroscience of music. One couldn't visualize the brain as people were listening to music or responding to it. And now one can.... In this book, I've really tried to bring in the latest in neuroscience."

One of the subjects in *Musicophilia* is a composer who experiences a sudden, drastic distortion in his perception of higher pitches. The change was based in a deterioration in his hearing, but through conscious training, he somehow induced an area of his brain that receives musical data to

reinterpret the sounds that the ear was misperceiving. His experience of pitch distortion gradually decreased. His case, said Sacks, illustrates the brain's ability to remap its functions (a phenomenon Levitin calls "neuroplasticity") so that defective sensory signals can be corrected even when the primary source of the dysfunction (in the composer's case, a tiny site in the ear) can't be repaired.

"This is a very hot subject, and something that was scarcely considered possible 20 years ago," says Sacks, who adds that such retunings have contributed to an enormous change in his own view of the brain. "I no longer think of the brain as a fixed entity, but as a very wily, resourceful creature that can adapt to many situations."

His books have made him the best-known of any person writing on medical matters (he was famously portrayed by Robin Williams in the film version of *Awakenings*). But Sacks, who is now 74, sees no reason to slow down his regular rounds as a practising neurologist.

"I think medical practice is endlessly fascinating, and I hope to go on seeing patients till my dying day, as my father did till well past the age of 90," he says. "I expect to be astonished, to hear things I haven't heard before, or haven't paid attention to before, or that I understand in a new way. After more than 40 years in practice, so much is about revisiting experiences and people I see, and reinterpreting information in different contexts. In this sense, I'm never finished with anything, nor do I think one should be.... My motive forces are wonder and curiosity, and I think these are good motive forces. People want to know about the wonders of the world, whether it's white tigers or the total wonderland of being human."

In Sacks's wonderland, there's no end of rabbit holes, and all of them lead to interesting places. No doubt there will be more cases to revisit, and more patients for him to write about, with a degree of sympathy that ought to be a model not just for other doctors, but for all of us who see a damaged human being who can still, through a rhythm or a song, express what otherwise can't be said.

*Oliver Sacks speaks at the Danforth Music Hall in Toronto (416-778-8163) on Nov. 12, and at McGill University's Leacock Building in Montreal (514-398-8356) on Nov. 29.*

## **MUSIC ON THE MIND**

When we listen to music, it's processed in many different areas of our brain. The extent of the brain's involvement was scarcely imagined until the early nineties, when functional brain imaging became possible. The major computational centres include:

### **CORPUS CALLOSUM**

Connects left and right hemispheres.

### **MOTOR CORTEX**

Movement, foot tapping, dancing, and playing an instrument.

### **PREFRONTAL CORTEX**

Creation of expectations, violation and satisfaction of expectations.

## NUCLEUS ACCUMBENS

Emotional reactions to music.

## AMYGDALA

Emotional reactions to music.

## SENSORY CORTEX

Tactile feedback from playing an instrument and dancing.

## AUDITORY CORTEX

The first stages of listening to sounds. The perception and analysis of tones.

## HIPPOCAMPUS

Memory for music, musical experiences and contexts.

## VISUAL CORTEX

Reading music, looking at a performer's or one's own movements.

## CEREBELLUM

Movement such as foot tapping, dancing, and playing an instrument. Also involved in emotional reactions to music.

## **From Stevie Wonder to the wonders of the brain**

Daniel J. Levitin spent the first part of his career helping musicians sound good. Then he quit the recording studios of Los Angeles, where he had worked as a consultant with Stevie Wonder and many others, and started trying to figure out why things sound good, why music matters to us, and how it is handled by the brain.

His book *This Is Your Brain on Music* is in many ways a complementary volume to Oliver Sacks's *Musicophilia*. Sacks is fascinated by the often rich musical lives of his neurologically damaged patients. For Levitin, individuals such as Sacks's patients are interesting mainly to the extent that they may help him understand the norm.

Levitin's inquiries throw off many intriguing details. In his chapter on the brain's tendency to supplement what the ear really perceives, he mentions a type of Sardinian vocal music in which, if the four male voices are balanced just right, a fifth female voice appears in the mind's ear (the Sardinian explanation: It's the Virgin Mary). Levitin is also very good at explaining how certain features of well-known songs and singers contribute to their emotional appeal. *R.E.-G.*

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