Hoping My Rhythm-less Brain Can Beat It

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John Iversen and Ani Patel, biologists at the Neurosciences Institute in La Jolla, study how music affects the brain.

I am pretty sure I have no rhythm.

I can't dance, can't tap my foot along with a song, and whenever I'm in a gospel-style sing-and-clap situation, I always end up accidentally clapping at the wrong time. While I've always seen my lack of rhythm as a detriment to my social life, when I mentioned it to Ani Patel and John Iversen, biologists at the Neurosciences Institute in La Jolla, their eyes lit up.

"Really? That's very interesting," Iversen told me. "Maybe you could participate in some of our experiments."

Patel and Iverson's interest in my rhythmical challenges isn't just for their own amusement. For the past 13 years, they've been at the forefront of an emerging research field, studying the neuroscience of music.
Although the study of music and the mind might sound frivolous, Patel and Iversen use their work to lay the foundation for a deeper understanding of how the brain processes language, rhythm and movement, which can aid in the treatments for a variety of diseases, including Parkinson's, Alzheimer's and language disorders.

Music is a handy tool to help build this base understanding of the brain because it has a wide range of impacts on the brain, causing auditory, motor and emotional responses, Patel said.

"It's a two-way street," Iversen said. "We're trying to understand what music is and how it affects the brain, but it also helps us study how the brain works."

Much of Iversen and Patel's work focuses on how the brain perceives and processes rhythm. And although Iversen said they have not yet found anyone without an innate sense of rhythm, I set out to be the first. I met him in a small conference room in the Theory Center, the main Neurosciences Institute building on the edge of the Scripps Research Institute campus, for a series of rhythm tests on his laptop.

Iversen started simply, testing my ability to hit the "S" key on his keyboard in time with a steady beeping noise. I passed this first test, but when we switched to actual music I immediately began to have trouble. Although I could hear the beat and tap along with "One Singular Sensation" from A Chorus Line, I was hopeless with The Black Crowes' "Hard to Handle."

While Iversen said I was no worse than some of his test subjects, I'm no match for Snowball, a sulphur-crested cockatoo that Patel and Iversen found could bob his head and tap his feet in sync with a variety of musical tempos.

Next Iversen brought me to a lab on the Scripps campus where a machine would measure the magnetic fields produced by my brain's electrical activity. Because the machine's readings would be thrown off by any movement or metal on my body, I changed into hospital scrubs and a hairnet and lay down in a soundproof booth while Lacey Kurelowech, one of the study's coordinators, taped electrodes to my hands, face and chest. She then placed earphones in my ears and lowered the machine's magnetic detector, which looked like a large helmet, onto my head.

Over the next hour, I tried to lie completely still and not blink while attempting to tap out a rhythm from a series of convoluted beeps that sounded like a Pac-Man game. It was not easy.

Even though each set of beeps began with a steady rhythm to guide my attempts at drumming, when the rhythm turned irregular I quickly became distracted and was sure my timing turned off. Toward the end of the hour, I developed a strategy: I ignored the irregular beats and tried to keep my timing with a waltz-like count of four.

As it turns out, my strategy ties in to one of Iversen and Patel's rhythm theories. Iversen said they use that test to measure the brain's auditory and motor responses to a perceived rhythm, and are finding the brain may respond to a beat even when the body is not moving at all. This suggests people -- and maybe cockatoos -- have an internal sense of rhythm.

While this finding might be comforting for those as rhythmically challenged as me, it also has broader applications. Jessica Grahn, a neuroscientist with the Medical Research Council in Cambridge, England, said Patel and Iversen's work has informed her own studies of beat-processing in patients with Parkinson's.

She said their work on how people reproduce rhythms they hear helps explain why Parkinson's patients, who have difficulty creating a sense of timing in simple movements like walking, can move more steadily when they walk to music.

Ashley Vanstone, a psychology researcher at Queen's University in Canada, said Patel's research on the relationship between music and other brain functions, especially language, helps lay a foundation that informs a broad spectrum of neuroscience work.

While Patel and Iversen are happy their work helps, they said it's not their primary motivation.

"People often lump science and technology together, where technology is about solving a problem that gives us products," Iversen said. "Science overlaps with that, but it also has a component of simply understanding how things work with the faith that with that understanding comes power.

"If you do everything with a specific goal in mind, you'll never have those happy accidents that help you discover new things."

Instead, both Patel and Iversen said they were driven to their studies of music and the mind largely because of their own interest in music. Both began playing instruments at early ages, and both played in bands after college (Iversen in a neopsychadelic funk band called Zen Panick and Patel in a band of marine biologists). And while both said they loved playing, neither dreamed of becoming a professional musician.

"We were paid in beer, and you can't make much of a career on that," Patel said.

Still, they see their passion for music as significant.

"So many people have such a deep connection to music, and I wondered why, and how it affects the brain," Patel said.

While I couldn't argue that most people love music and moving to its beat, I was still sure my rhythmic sense was missing. But after my tests ended and I was released from the soundproof booth, Iversen told me what he'd seen in my brain activity.

I was anticipating the next beat before it actually occurred.

"That means that although you may not be aware of it, you definitely have a beat," he said.
So my brain can anticipate a beat. But I still don't think I'll be able to dance or clap well any time soon.

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