



Q&A Gary Marcus

The instrumentalist

Cognitive psychologist Gary Marcus researches language acquisition and the evolution of the brain at New York University. On the release of his latest book, *Guitar Zero — a personal yet scientific investigation of how people become musical* — he explains how a love of music and a computer game helped him to overcome a lack of rhythm and learn to play the guitar.

What were your early experiences of music?

As a child, I got kicked out of music class when I couldn't play *Mary Had a Little Lamb* on my recorder. Years later, Daniel Levitin, author of *This is Your Brain on Music* [Atlantic, 2007], tried to teach me the guitar, but discovered that I was so rhythmically impaired that I couldn't even follow a metronome. Then I discovered the computer game *Guitar Hero*. I was terrible at first, but luckily computers are patient. I got better at it, and for the first time felt the barest inkling of rhythm. Coupled with a love of listening to music, I was inspired to try playing the guitar for real.

How did you progress?

I taught myself to begin with, playing for an hour or two every day. After learning simple chords, I discovered the pentatonic scale, a set of notes that sound good in any order. I read every guitar book I could, worked with ear-training apps and experimented with music-creation software to get a sense of composition and arrangement. I tried to make up for limitations in my ears and fingers by developing a basic understanding of music theory. After six months I began to study with a teacher. Observant teachers target your weakest skills, as Swedish psychologist Anders

Guitar Zero: The New Musician and the Science of Learning

GARY MARCUS
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274 pp, \$25.95

Ericsson recommends. Incremental learning is key, especially for adults.

How did you improve your sense of rhythm?

I practised a lot with a drum machine, and wrote an iPhone app called Chatternome that counts each beat out loud. That really helped me to internalize a sense of rhythm.

What are your musical goals?

To discover the underlying logic of music, to improvise rather than memorize. Our brains are set up to like new information; the reward I get from learning chord progressions and techniques has kept me going.

Why is the guitar so hard to learn?

It is partly because of the demands it places on memory. Because each pitch appears in multiple places on the fretboard, and our brains don't have the kind of database memory computers do, novices are easily confused. Playing each note requires coordination between the left and right hands. One hand has to be agile and strong to play chords, the other precise enough to play complex fingerpicking patterns. You

also have to overcome the brain's natural tendency to get sloppy as you go faster.

R. FRIEDMAN

Does your academic research involve music?

With neurobiologist Ofer Tchernichovski of Hunter College in New York, I'm researching how songbirds learn musical syntax, and comparing that to how children learn language. I am also looking at how people understand music in time, and how children learn the implicit underpinnings of music theory — the latter using a game I've written for the iPad, and hope to release for free later in 2012. And, with friends, I am building a nylon-string guitar that can safely be played in a magnetic resonance imaging (MRI) machine. We know something about how people's brains function when playing the piano, but much less about what happens when someone plays the guitar.

Name a favourite music experiment.

Psychologists Bruno Repp at Haskins Laboratories in New Haven, Connecticut, and Peter Keller at the Max Planck Institute for Human Cognitive and Brain Sciences in Leipzig, Germany, asked skilled pianists to sight-read classical compositions on completely muted electronic keyboards. Later, the pianists were able to pick out their own renditions from audio playbacks of a number of performances. This highlights the exquisite way in which experts align the neural representations of their fingers, ears and brain.

Is music the product of natural selection?

I am doubtful. Proponents like to give anecdotes about how famous musicians have more children, but rarely mention all the oboe teachers who dine alone. When you look at the brain, there is no 'music module' as there is for face recognition. Music is spread throughout the brain and implemented by many regions, such as Broca's area and the amygdala, that mainly serve other functions such as language and emotion. Music is a kind of technology that has developed over time, rather than something that is built into our minds.

What's more important, talent or practice?

Neither. If you look at the data, only about half of the variance in musical skill is accounted for by the time spent practising. Some people just learn faster and reach higher peaks. Many genes have indirect effects on music, including genes that influence auditory processing, extroversion and dexterity. All of these contribute to talent. To be truly great, you need both talent and practice. To be merely good — like me — you can get away with just practice. ■

INTERVIEW BY JASCHA HOFFMAN