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What Do Great Musicians Have in Common? DNA

New study shows it's a myth that a lot of practice will necessarily bring greatness

By *Bret Stetka* Aug 5, 2014

Genetics plays a powerful role in shaping our abilities

At age 13, jazz great Thelonious Monk ran into trouble at Harlem's Apollo Theater. The reason: he was too good. The famously precocious pianist was, as they say, a “natural,” and by that point had won the Apollo’s amateur competition so many times that he was barred from re-entering. To be sure, Monk practiced, a lot actually. But two new studies, and the fact that he taught himself to read music as a child before taking a single lesson, suggest that he likely had plenty of help from his genes.

The question of what accounts for the vast variability in people’s aptitudes for skilled and creative pursuits goes way back — are experts born with their skill, or do they acquire it? Victorian polymath Sir Francis Galton — coiner of the phrase "nature and nurture" and founder of the “eugenics” movement through which he hoped to improve the biological make-up of the human species through selective coupling — held the former view, noting that certain talents run in families.

Other thinkers, perhaps more ethically palatable than Galton, have argued that mastering nearly any skill can be achieved through rote repetition — through practice.

A 1993 study by Ericsson and colleagues helped popularize the idea that we can all practice our way to tuba greatness if we so choose. The authors found that by age 20 elite musicians had practiced for an average of 10,000 hours, concluding that differences in skill are not “due to innate talent.” Author Malcolm Gladwell lent this idea some weight in his 2008 book “Outliers.” Gladwell writes that greatness requires an enormous time investment and cites the “10,000-Hour Rule” as a major key to success in various pursuits from music (The Beatles) to software supremacy (Bill Gates).

However, new research led by Michigan State University psychology professor David Z. Hambrick suggests that, unfortunately for many of us, success isn’t exclusively a product of determination — that despite even the most hermitic practice routine, our genes might still leave greatness out of reach.

Hambrick and his colleague Elliot Tucker-Drob, an assistant professor of psychology at the University of Texas, set out to investigate the genetic influences on musical accomplishment using data from a study of 850 same-sex twin pairs from the 1960s. Participants where originally queried on their musical successes and how often they practiced, both of which Hambrick found to have a genetic component. One quarter of the genetic influence on musical accomplishment appears related to the act of practicing itself. Certain genes and genotypes presumably confer qualities that drive some kids to hole up in their basement and, at the expense of their family’s sanity, perfect that drum fill — traits like musical aptitude, musical enjoyment and motivation, that in turn could draw reinforcement from parents and teachers, leading to even more desire to practice. Hambrick's findings don't reveal what accounts for the remaining majority of genetic influence on musical accomplishment, though he assumes it's innate differences in faculties that would logically contribute to musical ability, such as sound processing and motor coordination.

But it gets more complicated. The new findings suggest that it's the way our genes and environment interact that is most crucial to musical accomplishment. Not only do genetically-influenced qualities contribute to whether people are likely to practice, Hambrick’s data show that the genetic influence on musical success was far larger in those who practiced more. It was previously thought that people might start out with a genetic leg up for a particular activity, but that skill derived through practice could eventually surpass any genetic predilections. “Our results suggest that it’s the other way around,” explains Hambrick, “that genes become more, not less important in differentiating people as they practice…genetic potentials for skilled performance are most fully expressed and fostered by practice."In other words, people have various genetically determined basic abilities, or talents, that

render them better or worse at certain skills, but that can be nurtured through environmental influences. Hence Hambrick is far from down on dedication: “If you want to be a better musician, practice! If you want to be a better golfer, practice!”

A similar study forthcoming in Psychological Science by Miriam A. Mosing of Stockholm's Karolinska Institute leans even heavier on the role of genes in musicality. Mosing and colleagues looked at the association between music practice and specific musical abilities like rhythm, melody and pitch discrimination in over 10,000 identical Swedish twins. They reported that the propensity to practice was between 40% and 70% heritable and that there was no difference in musical ability between twins with varying amounts of cumulative practice. "Music practice,” they conclude, “may not causally influence musical ability and … genetic variation among individuals affects both ability and inclination to practice."

Though both new studies focused on musicality, the findings can in theory be extrapolated to other skilled and creative activities. Similar data exist suggesting a genetic component to chess mastery, and Hambrick is currently analyzing the same twin data set to assess the genetics of scientific accomplishment. Not to get overly reductionist, but it could be assumed that nearly all of our talents and cognitive characteristics are least partly influenced by our respective strings of nucleotides. Complex pursuits, whether creative or technical, involve numerous communicating regions from all over the brain (in contrast to the overly simplistic and now debunked "left brain/right brain" assignments for analytical vs creative types). These structures and the brain’s general blueprint are shaped by our genetic code throughout development; also genes encode for the proteins that run our bodies and brains while plenty of data link specific genetic profiles with varying cognitive abilities.

Like all studies, Hambrick’s has its limitations. The assessments of musical practice and accomplishment were “fairly coarse” and the study subjects were primarily high-achieving students, though not specifically selected for elite musical ability. And while beyond the scope of both Hambrick’s and Mosing’s investigations, their work evokes the question of what it is to be “good” at something — how to reconcile the murky, often contentious divide between technical proficiency and creativity or artistic worth. Virtuosity can come across cold while three sloppy guitar chords can register in deep, mind-altering, meaningful ways. “No one would argue that the Sex Pistols or The Ramones — or even The Beatles or The Rolling Stones — were the most technically proficient musicians,” says Hambrick, “but they created something that, for whatever reason, resonated with people. I think it would be interesting to measure both creativity and expertise in the same sample. My guess is they are both are influenced by genes, but by different genes.”

It’s potentially unsettling that our abilities are so influenced by a genetic crapshoot. Some people people will always be maddeningly proficient at shredding through guitar solos, or blowing tubas, or winning amateur competitions at the Apollo Theater. But Hambrick sees his findings as constructive. If practicing our way to being just pretty good at something isn’t enough, we can better seek our strengths. More importantly we can avoid setting up unrealistic expectations for children: “I think it’s important to let kids try a lot of different things…and find out what they’re good at, which is probably also what they’ll enjoy. But the idea that anyone can become an expert at most anything isn't scientifically defensible, and pretending otherwise is harmful to society and individuals.”

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