

# Genius at Work

*It takes ten years of intensive training and study before world-class performance is possible.*

By Dan Falk

We live in awe of genius, of those few individuals capable of producing the *Mona Lisa*, *The Tempest*, or the *Fifth Symphony*, or the theory of relativity. What makes the mind of a genius different from yours or mine? It is a question that philosophers, historians, psychologists, and educators have wrestled with for more than 2,000 years, with no truly satisfying answer.

Even defining genius is no trivial matter. It is certainly more than just intelligence or at least more than the narrow facet of intelligence measured by IQ tests. The physicist Richard Feynman's IQ was just 122, while biologist Francis Crick's was 115 – still above average, but hardly suggestive of Nobel-worthy mental abilities.

Yet we have no problem whatsoever picking out the geniuses from the great line-up of history. When asked to name a genius, we always cite the same few examples: Einstein, Mozart, Newton, Freud, Darwin, Shakespeare, and Leonardo da Vinci.

Our difficulty is not in identifying geniuses but in pinning down the qualities or attributes that allowed them to achieve what they did. We want to decide whether geniuses are born or made; whether they come into the world with some special “gift” or achieve genius-level greatness through some combination of family influence, early environment, and hard work.

Good genes certainly don't hurt. The Bach family produced such a wealth of musical high achievers that one cannot help but consider the role that genes may have played. On the other hand, Newton, Shakespeare, and Michelangelo have no illustrious or even talented ancestors that we know of. And just because you are a genius doesn't mean your children will be.

Einstein wrote: “I know perfectly well that I myself have no special talents. It was curiosity, obsession, and sheer perseverance that brought me to my ideas...Exploration of my ancestors therefore leads nowhere.”

Nor is genius necessarily recognizable in childhood. Sure, Mozart was a prodigy. But Darwin showed no special talents as a child. He was once told off by his father: “You care for nothing but shooting, dogs, and rat-catching, and you will be a disgrace to yourself and all your family.”

A look at Mozart's early years may be instructive. His father, Leopold, recognized his son's latent talents, and devoted himself with gusto to building young Wolfgang's career.

One of the most thorough examinations, or deconstructions one might say, of Mozart's youthful achievement can be found in a book published in 2001 by the late British psychologist Michael J.A. Howe, called *Genius Explained*. He begins by running through the standard list of Mozart's accomplishments – the masterly playing, the composing of music at an impossibly early age, the nearly superhuman feats of memory.

It turns out that Mozart's early compositions were competent, but nothing more. The first one to be considered a masterwork (Concerto no., 9 for Piano) he wrote at age 21 when, Howe reminds us, he had been composing concertos for a full decade.

Howe cites a study by John Hayes, who examined the work of 76 well-known composers, and concluded that in nearly every case, no major work was produced before the composer had been at work for at least 10 years. There were just three exceptions, in which composers had produced substantial work after nine years.

And Mozart's performance skills? Howe reminds us that Mozart practiced longer and harder than just about anyone, thanks in large measure to his father, who pushed his son to the limits, subjecting him to “an arduous and unusual regime”. According to Howe, Mozart's father made him practise for an average of three hours a day from the age of three.

By the age of six, he would have logged a staggering 3,500 hours of practice – what today's musicians need in order to reach the level of public performance.

The notion that Mozart and most of his fellow musicians had 10 years of practice behind them when they produced their first unambiguously great works fits well with a broader idea known to historians and psychologists as the “ten-year rule” – the idea that a person makes a world-class contribution to a given art or science only after 10 years of intensive training and study.

By the time Einstein published the first part of his relativity theory, he had spent the better part of a decade teaching himself mathematics, reading the latest scientific literature, and contemplating the nature of the physical world. According to Michael Shara, an expert on Einstein, “This was not someone who would idly consider this interesting problem for five or ten minutes. This was someone who for nearly ten years really thought of little else.” Einstein himself said, “It's not that I'm so smart, it's just that I stay with problems longer”.

This unrelenting drive is seen in nearly every great thinker or creator that one can name, seemingly in accord with Edison's famous dictum about genius being 99% perspiration. Mozart said that composing was his “sole delight and passion”. Beethoven would often spend more than 16 hours a day composing. Picasso said, “I have only one thought: work.”

Of course, history is often less interested in documenting the laborious process of creation than in celebrating its results, and so “genius” often appears to come out of the blue.

*(Adapted with permission from “Totally Genius” in The Walrus, June 2005. Mr. Falk is a science journalist and the author of Universe on a T-Shirt: The Quest for the Theory of Everything)*