

PEAK



SECRETS FROM
THE NEW SCIENCE
OF EXPERTISE

Anders Ericsson
and Robert Pool

THE RISE OF EXTRAORDINARY
PERFORMERS

In 1908 Johnny Hayes won the Olympic marathon in what newspapers at the time described as “the greatest race of the century.” Hayes’s winning time, which set a world record for the marathon, was 2 hours, 55 minutes, and 18 seconds.

Today, barely more than a century later, the world record for a marathon is 2 hours, 2 minutes, and 57 seconds — nearly 30 percent faster than Hayes’s record time — and if you’re an eighteen- to thirty-four-year-old male, you aren’t even allowed to enter the Boston Marathon unless you’ve run another marathon in less than 3 hours, 5 minutes. In short, Hayes’s world-record time in 1908 would qualify him for today’s Boston Marathon (which has about thirty thousand runners) but with not a lot to spare.

That same 1908 Summer Olympics saw a near disaster in the men’s diving competition. One of the divers barely avoided serious injury while attempting a double somersault, and an official report released a few months later concluded that the dive was simply too dangerous and recommended that it be banned from future Olympic Games. Today the double somersault is an entry-level dive, with ten-year-olds nailing it in competitions, and by high school the best divers are doing four and a half somersaults. World-class competitors take it even further with dives such as “the Twister” — two and a half backward somersaults with two and a half twists added. It’s difficult to imagine what those early-twentieth-century experts who found the double-somersault dive too dangerous would have thought about the Twister, but my guess is that they would have dismissed it as laughably impossible — assuming, that is, that someone would have had the imagination and the audacity to suggest it in the first place.

In the early 1930s Alfred Cortot was one of the best-known classical musicians in the world, and his recordings of Chopin’s “24 Études” were considered the definitive interpretation. Today teachers offer

those same performances — sloppy and marred by missed notes — as an example of how *not* to play Chopin, with critics complaining about Cortot's careless technique, and any professional pianist is expected to be able to perform the études with far greater technical skill and élan than Cortot. Indeed, Anthony Tommasini, the music critic at the *New York Times*, once commented that musical ability has increased so much since Cortot's time that Cortot would probably not be admitted to Juilliard now.

In 1973 David Richard Spencer of Canada had memorized more digits of pi than any person before him: 511. Five years later, after a rapid-fire series of new records set by a handful of people competing to claim the memorization title, the record belonged to an American, David Sanker, who had committed 10,000 digits of pi to memory. In 2015, after another thirty-plus years of gains, the recognized title holder was Rajveer Meena of India, who had memorized the first 70,000 digits of pi — an accumulation that took him 24 hours and 4 minutes to recite — although Akira Haraguchi of Japan had claimed to have memorized an even more incredible 100,000 digits, or nearly two hundred times as many as anyone had memorized just forty-two years earlier.

These are not isolated examples. We live in a world full of people with extraordinary abilities — abilities that from the vantage point of almost any other time in human history would have been deemed impossible. Consider Roger Federer's magic with a tennis ball, or the astounding vault that McKayla Maroney nailed in the 2012 Summer Olympics: a round-off onto the springboard, a back handspring onto the vault, and then a high, arching flight with McKayla completing two and a half twists before she landed firmly and with complete control on the mat. There are chess grandmasters who can play several dozen different games simultaneously — while blindfolded — and a seemingly unending supply of young musical prodigies who can do things on the piano, the violin, the cello, or the flute that would have astonished aficionados a century ago.

But while the abilities are extraordinary, there is no mystery at all about how these people developed them. They practiced. A lot. The world-record time in the marathon wasn't cut by 30 percent over the course of a century because people were being born with a greater talent for running long distances. Nor did the second half of the twentieth century see some sudden surge in the births of people with a gift for playing Chopin or Rachmaninoff or for memorizing tens of thousands of random digits.

What the second half of the twentieth century did see was a steady increase in the amount of time that people in different areas devoted to training, combined with a growing sophistication of training techniques. This was true in a huge number of fields, particularly highly competitive fields such as musical performance and dance, individual and team sports, and chess and other competitive games. This increase in the amount and sophistication of practice resulted in a steady improvement in the abilities of the performers in these various fields — an improvement that was not always obvious from year to year but that is dramatic when viewed over the course of several decades.

One of the best, if sometimes bizarre, places to see the results of this sort of practice is in *Guinness World Records*. Flip through the pages of the book or visit the online version, and you will find such record holders as the American teacher Barbara Blackburn, who can type up to 212 words per minute; Marko Baloh of Slovenia, who once rode 562 miles on a bicycle in twenty-four hours; and Vikas Sharma of India, who in just one minute was able to calculate the roots of twelve large numbers, each with between twenty and fifty-one digits, with the roots ranging from the seventeenth to the fiftieth root. That last may be the most impressive of all of them because Sharma was able to perform twelve exceedingly difficult mental calculations in just sixty seconds — faster than many people could punch the numbers into a calculator and read off the answers.

I actually received an e-mail from one Guinness world record

holder, Bob J. Fisher, who at one time held twelve different world records for basketball free-throw shooting. His records include such things as the most free throws accomplished in thirty seconds (33), the most in ten minutes (448), and the most in one hour (2,371). Bob wrote to tell me that he had read about my studies of the effects of practice and had applied what he had learned from those studies in developing his ability to shoot basketball free throws faster than anyone else.

Those studies all have their roots in the work that I did with Steve Faloon in the late 1970s. Since that time I have devoted my career to understanding exactly how practice works to create new and expanded capabilities, with a particular focus on those people who have used practice to become among the best in the world at what they do. And after several decades of studying these best of the best — these “expert performers,” to use the technical term — I have found that no matter what field you study, music or sports or chess or something else, the most effective types of practice all follow the same set of general principles.

There is no obvious reason why this should be the case. Why should the teaching techniques used to turn aspiring musicians into concert pianists have anything to do with the training that a dancer must go through to become a prima ballerina or the study that a chess player must undertake to become a grandmaster? The answer is that the most effective and most powerful types of practice in any field work by harnessing the adaptability of the human body and brain to create, step by step, the ability to do things that were previously not possible. If you wish to develop a truly effective training method for anything — creating world-class gymnasts, for instance, or even something like teaching doctors to perform laparoscopic surgery — that method will need to take into account what works and what doesn’t in driving changes in the body and brain. Thus, all truly effective practice techniques work in essentially the same way.

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These insights are all relatively new and weren't available to all the teachers, coaches, and performers who produced the incredible improvements in performance that have occurred over the past century. Instead, these advances were all accomplished through trial and error, with the people involved having essentially no idea why a particular training method might be effective. Furthermore, the practitioners in the various fields built their bodies of knowledge in isolation, with no sense that all of this was interconnected — that the ice-skater who was working on a triple axel was following the same set of general principles as, say, the pianist working to perfect a Mozart sonata. So imagine what might be possible with efforts that are inspired and directed by a clear scientific understanding of the best ways to build expertise. And imagine what might be possible if we applied the techniques that have proved to be so effective in sports and music and chess to all the different types of learning that people do, from the education of schoolchildren to the training of doctors, engineers, pilots, businesspeople, and workers of every sort. I believe that the dramatic improvements we have seen in those few fields over the past hundred years are achievable in pretty much every field if we apply the lessons that can be learned from studying the principles of effective practice.

There are various sorts of practice that can be effective to one degree or another, but one particular form — which I named “deliberate practice” back in the early 1990s — is the gold standard. It is the most effective and powerful form of practice that we know of, and applying the principles of deliberate practice is the best way to design practice methods in any area. We will devote most of the rest of this book to exploring what deliberate practice is, why it is so effective, and how best to apply it in various situations. But before we delve into the details of deliberate practice, it will be best if we spend a little time understanding some more basic types of practice — the sorts of practice that most people have already experienced in one way or another.