



Beautiful Minds

Creativity Is Much More Than 10,000 Hours of Deliberate Practice



Creators are not mere experts. Instead of deliberately practicing down an already existing path, they often create their own path for others to follow

By [Scott Barry Kaufman](#) on April 17, 2016

In his new book "[Peak: Secrets from the New Science of Expertise](#)", psychologist Anders Ericsson and journalist Robert Pool distill an impressive body of research on "mastering almost any skill." Indeed, deliberate practice can help you master new skills. Deliberate practice involves a series of techniques designed to learn efficiently and purposefully. This involves goal setting, breaking down complex tasks into chunks, developing highly complex and sophisticated representations of possible scenarios, getting out of your comfort zone, and receiving constant feedback.

But as they note midway through their book -- and I believe *this is a really important caveat*-- the techniques of deliberate practice are most applicable to "highly developed fields" such as chess, sports, and musical performance in which the rules of the domain are well established and passed on from generation to generation. The principles of deliberate practice do not work nearly as well for professions in which there is "little or no direct competition, such as gardening and other hobbies", and "many of the jobs in today's workplace-- business manager, teacher, electrician, engineer, consultant, and so on."

And may I also add: *almost any creative domain!*

Deliberate practice is really important for fields such as chess and instrumental performance because they rely on consistently replicable behaviors that must be repeated over and over again. But not all domains of human achievement rely on consistently replicable behaviors. For most creative domains, the goals and ways of achieving success are constantly changing, and consistently replicable behaviors are in fact *detrimental* to success. While Kobe Bryant showcasing the same slam dunk and Tiger Woods getting a hole in one will reliably induce public applause, scientists can't keep publishing the same paper over and over again, and writers can't keep writing the same critically acclaimed novel over and over again and expect the same acclaim.

Artists are under constant pressure to surpass what they and others have done before, and it is precisely this pressure that drives them toward ever increasing originality. Artistic products can lose their "shock value" quickly. How many times would Lady Gaga have to consistently wear her

meat dress without people getting bored? If people applied the techniques of deliberate practice to create a meat dress and wear it for Halloween, would those individuals be lauded for their creative genius? Probably not.

While creativity often draws on a deep knowledge base, creative products, by definition, are much more than expert products. This is because creativity must be original, meaningful, and surprising. Original in the sense that the creator is rewarded for *transcending expertise*, and going beyond the standard repertoire. Meaningful in the sense that the creator must satisfy some utility function, or provide a new interpretation. This constantly raises the bar of what is considered useful, and puts immense pressure on creators to find new meanings. Finally, creative products must be surprising in that the original and meaningful creative product must be surprising not only to oneself, but to *everyone*. This is exactly how the United States Patent Office evaluates new applications. Original and meaningful ideas that could have been created by any expert in the field are considered "obvious" and are therefore unpatentable. Creative products-- such as the discoveries of Galileo and Leeuwenhoek-- are surprising to *everyone*, novices and experts alike.

Over the past 50 years or so, there have been many systematic studies of the career trajectories of creative people, the traits that predict creativity, and the life experiences of creative people. This wealth of research on creativity contradicts the notion that deliberate practice is the sole-- or even the most important-- aspect of creativity. Below I will summarize 12 of these findings.

1. **Creativity is often blind.** If only creativity was all about deliberate practice. We could all just practice our way to creative acclaim. But in reality, it's impossible for creators to know completely whether their new idea or product will be well received. Oftentimes, the public isn't ready for an idea. The creative product has to fit the "spirit of the times". Although developing a feel for what people will like is certainly a skill that can be honed through experience, there will always be a certain degree of "blindness" or uncertainty to the creative process. As Simonton notes, "Only someone with almost infinite wisdom could figure out that the time is most ripe to conceive an experiment rather than a theory, to write a poem rather than a play, to paint a portrait rather than a landscape, or to compose a symphony rather than an opera."
2. **Creative people often have messy processes.** While expertise is characterized by consistency and reliability, creativity is characterized by many false starts and lots and lots of trial-and-error. There are many examples of a creative genius producing a masterpiece, only to be followed by a hugely unpopular product. For instance, Shakespeare's most popular plays were created when he was about 38 years old. Around this time, he produced *Hamlet*, which is surely a treasure. However, soon after *Hamlet*, he wrote *Troilus and Cressida*, which is not nearly as popular. If creativity was merely a function of deliberate practice, you would expect that with increasing deliberate practice would come increasing creativity. But that's not what you find when you look at the career trajectories of creators. Instead, you see a lot of trial-and-error, and peaks around mid-career, not towards the end of their careers when they presumably have acquired the most expertise.
3. **Creators rarely receive helpful feedback.** When creators put something novel out into the world, the reactions are typically either acclaim or rejection-- not nearly as useful feedback as making a foul shot to audience applause or checking your weight on a scale to see if you're

making progress toward your weight goals. Deliberate practice is really helpful when it comes to well-structured domains, but for most creative domains, you are working, often in solitude, for a *very long time* writing that novel or coming up with that mathematical proof, with very little immediate feedback. To muddy the waters even more, critics often disagree amongst each other, making it difficult for the creator to know which feedback is really helpful and which stems from other factors, such as obtuseness, jealousy, or bitterness. As Kuhn noted, the standards for artistic and scientific products are constantly changing. What may be considered a "revolutionary" best-selling book at one moment in time, may be considered utter drivel by future generations. This surely makes it hard to deliberately practice your way to a revolution!

4. **The "10-Year Rule" is not a rule.** The idea that it takes 10 years to become a world-class expert in any domain is not a rule. While Ericsson didn't present the variability statistics in his original paper on deliberate practice amongst musicians*, other psychologists have done such an analysis. For example, Simonton conducted an analysis of 120 classical composers and found that while on average, nearly a decade of compositional practice was important before the first major works appeared, the *standard deviation was almost as large*, with the range exceeding three decades! Many composers took less than 10 years and even more took longer than 10 years. Creativity doesn't have an expiration date. Creativity seems to happen when it's ready to happen.
5. **Talent is relevant to creative accomplishment.** If we define talent as simply the rate at which a person acquires expertise, then talent undeniably matters for creativity. Some people clearly get more bang for the buck out of a given training regimen. When Simonton looked at his sample of 120 classical composers, he found that the most lauded creators were those who took the *least* time than the average to acquire the necessary expertise. This may be an inconvenient truth, but it does counter the idea that creativity is only about deliberate practice. Expertise acquisition appears to be the least interesting aspect of creativity as creators tend to be in a hurry to learn what exists so that they can *go beyond what exists*.
6. **Personality is relevant.** Not only does the speed of expertise acquisition matter, but so do a whole host of other traits. People differ from one another in a multitude of ways. This includes general and specific cognitive abilities (IQ, spatial ability, verbal reasoning, etc.), personality dispositions, interests, and values. At the very least, research has shown that creative people do tend to have a greater inclination toward nonconformity, unconventionality, independence, openness to experience, ego strength, risk taking, and even mild forms of psychopathology. These effects are not trivial (for instance, openness to experience is robustly predictive of creativity), and can't just be explained away by deliberate practice. Of course, each creative domain will feature its own "X-Factor" of abilities and traits that are most essential for creativity in that domain. Physics may require a higher IQ than the visual arts, for instance. Nevertheless, there do appear to be some traits that are conducive to creativity across domains.
7. **Genes are relevant.** Ericsson often pits deliberate practice against "innate talent". But here's the thing: modern behavioral genetics has discovered that virtually every single psychological trait-- *including the inclination and willingness to practice*-- is influenced by innate genetic endowment. This doesn't mean that genes *determine* our behavior. It just means that genes are *relevant* influences on our behavior, including our creative behaviors. Assuming that all of the individual

differences that contribute to creativity have some genetic influence, Simonton estimated that somewhere between a quarter and a third of the differences in performance can be attributed to genetic factors. But it's also important to emphasize that this doesn't mean that environmental factors are unimportant.

8. **Environmental experiences also matter.** Darwin's cousin Sir Francis Galton, who is mainly known for his work on the hereditary basis of genius, actually showed that highly eminent scientists were more likely to be first-born sons. So he certainly didn't neglect environmental influences on genius. Since Galton, researchers have found that many other environmental experiences substantially affect creativity-- including socioeconomic origins, and the sociocultural, political, and economic context in which one is raised. These environmental factors are most likely *larger* compared to genetic factors. Another hugely important environmental factor for creativity is the availability of role models in one's childhood and adolescent years.
9. **Creative people have broad interests.** While the deliberate practice approach tends to focus on highly specialized training and purposeful techniques designed for improvement within a specific field, *creative experts tend to have broader interests and greater versatility compared to their less creative expert colleagues*. Simonton investigated all 911 operas composed by all 59 composers who contributed to the standard classical repertoire. If creativity were solely the result of deliberate practice, you would expect that the best approach for an opera composer would be to specialize within a particular genre of opera. But Simonton found the *exact opposite*. The compositions of the most successful operatic composers tended to represent a *mix of genres*. His data suggests that composers were able to avoid the inflexibility of too much expertise (overtraining) by *cross-training*. The importance of cross-training for creativity has also been found in the sciences. In fact, highly creative scientists tend to have a lot of artistic hobbies and interests. For instance, Simonton's extensive analysis of Galileo reveals Galileo's intense fascination with art, literature, and music. As the psychologist Howard Gruber has shown, rather than a dogged single pursuit of a single research question, the most creative scientists throughout history engaged in "networks of enterprise", where they pursued a large number of loosely related projects.
10. **Too much expertise can be detrimental to creative greatness.** The deliberate practice approach assumes that performance is a linear function of practice. While this may be true for many well-defined domains of human achievement, this doesn't appear to be the case for creativity. The relationship between knowledge and creativity is best characterized by an "inverted U-shaped" curve: Some knowledge is good, but too much knowledge can impair flexibility. In fact, in some fields such as creative writing, there is an optimal amount of formal schooling, after which further schooling decreases the likelihood of writing highly creative fiction.
11. **Outsiders often have a creative advantage.** If creativity were all about deliberate practice, then outsiders who lack the requisite expertise shouldn't be very creative. But many highly innovative individuals were outsiders to the field in which they contributed. As David Henry Feldman notes, temporary exile from the mainstream may set up an "asynchrony between mind and domain such that the mind encounters significant dissatisfaction with what the domain currently offers". Many marginalized people throughout history-- including immigrants-- came up with highly

creative ideas not in spite of their experiences as an outsider, but *because* of their experiences as an outsider. Examples include composer Irving Berlin, filmmaker Ang Lee and the first female Secretary of State, Madeline Albright. These individual didn't deliberately practice down an already existing path; they created their own. Which leads us to the last key point here..

12. **Sometimes the creator needs to create a new path for *others* to deliberately practice.** The deliberate practice approach is focused on using deliberate problem solving to learn an existing set of rules within a domain. Creative people are not just good at solving problems, however. They are also good at *finding* problems. A great example is Galileo's discoveries, which have received extensive analysis. After much trial-and-error to create a new instrument for observing the night sky, Galileo was able to revolutionize astronomy. It is very clear from an analysis of his process that he didn't simply deliberate practice his way to this discovery! In fact, his discoveries had absolutely no basis in any existing scientific body of expertise. Almost everything he observed conflicted with Ptolemaic astronomy and Aristotelian cosmology. Most experts of the day rejected his ideas. The most useful expertise for him was actually his training in the visual arts! His Chiaroscuro drawings allowed him to correctly interpret what others had missed. There's no way anyone in his time could have predicted that his artistic experience would have influenced one of the most important discoveries of modern humanity, and surely if he only deliberately practiced down the already existing path of his time, he would never have made his important discoveries.

I hope I have convinced you that creators are not mere experts. Creativity does draw on a deep knowledge base, and deliberate practice can certainly contribute to many aspects of creativity, but ultimately creativity involves much more than just deliberate practice. Creators are not necessarily the most efficient, but their messy minds and messy processes often allow them to see things others have never seen, and to create new paths that future generations will deliberately practice. I have immense respect for Ericsson's body of work on deliberate practice, and do believe that deliberate practice can help you get better in virtually any skill. However, I also believe that an accurate understanding of *creativity* is important for how we recognize, nurture, value, and ultimately, reward it, across all sectors of society.

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** Thanks to David Epstein for reminding me of this point.*

Note: I drew heavily on Dean Simonton's research in this post, and owe a huge debt of gratitude to him for his important research on creativity.

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Scott Barry Kaufman, Ph.D., is a humanistic psychologist exploring the depths of human potential. He has taught courses on intelligence, creativity, and well-being at Columbia University, NYU, the University of Pennsylvania, and elsewhere. In addition to writing the column Beautiful Minds for *Scientific American*, he also hosts The Psychology Podcast, and is author and/or editor of 9 books, including *Transcend: The New Science of Self-Actualization*, *Wired to Create: Unravelling the Mysteries of the Creative Mind* (with Carolyn Gregoire), and *Ungifted: Intelligence Redefined*. In 2015, he was named one of "50 Groundbreaking Scientists who are changing the way we see the world" by *Business Insider*. Find out more at <http://ScottBarryKaufman.com>.

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