

In search of the golden skill

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Abstract

Athletes devote their lives to practicing their chosen sport so as to attain the highest level of skilled performance. A perennial question is why are some athletes better than others? Most debates on this issue reduce to genetics (natural abilities) vs differences in accumulated deliberative practice. In contrast, the target article under discussion here reports on a study that identified psychosocial factors (obsessiveness, ruthlessness) and early life experiences (trauma or loss) that distinguished those athletes at the Olympics and World Championships that medaled over those that did not. The interpretation seems to be that other factors and not just skill make true winners. The point will be made here, however, that psychosocial factors might just predict more devotion to practice at the expense of everything else. If this is true then perhaps the most successful athletes really are just the most skilled.

Keywords

Skill, Practice, Athletes, Motor, Winning

Motor skill has long been of interest to neuroscientists and experimental psychologists, and usually studied under laboratory conditions using simplified tasks. For example, a subject may be asked to generate a sequence of finger movements as fast and accurately as possible. Such tasks seem like a far cry from the multifaceted and complex requirements of a sport. A clue to the fundamental differences between sports and the motor skill tasks studied in laboratories is suggested by the target article “Great British Medallists: A Psychosocial Enquiry,” (Hardy et al., 2017).

Experimental psychologists seek algorithmic and computational descriptions of the components of motor skill and characterize acquired motor skills with respect to how they are best assessed, trained, and retained. Neuroscientists share many overlapping interests with the psychologists but are particularly interested in the neural implementation of the processes associated with skilled behaviors. Thus, it is possible to distinguish, when it comes to the study of motor skill, between an emphasis on the rules of behavior vs the properties of neurons, circuits, and brain networks.

Almost all of this work can be, and mainly has been, done on rats, monkeys, and garden-variety undergraduates, rather than Olympians.

The reason why most people would not compare a trained rat to an athlete is because they intuit that being the best of the best as an athlete encompasses more than having a very high level of motor skill after a lot of training. But then what is the special “X factor” that only the very top athletes possess? What did Muhammad Ali have over his rivals? The target article attempts to answer this question by looking for psychosocial differences between Super-Elite athletes, those who have won multiple medals at world championships, and Elite athletes, those who had the requisite skill to also compete at world championships but nevertheless did not medal.

Every month it seems a new book on the science of athletic prowess and sporting success comes out. I would venture that this is because sport is perceived to lie at the interface between bottom-up and top-down accounts of human achievement, and because physical abilities may be more amenable to various forms of performance enhancement. By bottom-up I mean reductionist scientific accounts that discuss molecules, drugs, genes, and circuits. By top-down, I mean explanations that depend more on psychological and behavioral concepts. The bottom-up perspective is epitomized by David Epstein’s book “The Sports Gene” (Epstein, 2013). Whereas the top-down perspective is exemplified by Anders Ericsson’s book “Peak,” in which he summarizes his large body of work showing that it is the amount of deliberative practice that determines the best at sport rather than genetically determined abilities (Ericsson and Pool, 2016). Innate ability and deliberative practice accounts of elite performance are not necessarily alternatives to the psychosocial factors that the target article is about. This is because the psychosocial factors identified could, in their *effects*, reduce to the lower level factors that experimental psychologists and neuroscientists are more familiar with. For example, one finding reported in the target article is that Super Elite athletes show more obsessiveness and perfectionism than Elite athletes. But perhaps these traits have a genetic basis and just lead to more time spent practicing. Indeed Ericsson states in his book; “I suspect that genetic differences—if they exist—are most likely to manifest themselves through the necessary practice and efforts that go into developing a skill... Some people might, for instance, be naturally able to focus more intently and for longer periods of time than others...” Thus, seen this way, psychosocial factors might exert their effects via deliberative practice, i.e., more time-on-task. If this is the case then it is not clear that the study of super elite or elite athletes is going to add much to the neuroscience and psychology of practice and skills. General principles of practice and the neural correlates of skill may be discoverable at any level of expertise and not require either the study of extreme skills or examination of the psychosocial make-up of elite athletes.

It could be envisaged, however, that there is more to Super Elite athletes than those psychosocial factors that map onto propensity to practice more and better than Elite athletes. The obvious difference between the simple motor tasks studied in the lab and sports is the notion of winning. Once we talk about winning, we unavoidably cross a threshold conceptually, scientifically, and philosophically. This is because while it might be possible to conceive of a continuum between how humans and

nonhuman animals improve with practice, the desire to defeat an opponent and to win glory are both categorically in the domain of *human* psychology. For example, even in a sport as seemingly beholden to anatomy and physiology as sprinting, a nervous athlete may start out of the blocks slowly and lose despite being a faster sprinter. Such a distinction cannot be explained away by positing that one can practice not being nervous. The critical point is that for any given level of long term practice-related skill there are additional short-term modulating effects that can enhance or depress skill at that moment or in that game. For example, reward and knowledge can have instantaneous augmenting effects on skill (Galea et al., 2015; Wong et al., 2015). There is almost certainly meaning to the idea of having an “off day”—perhaps a Super Elite athlete has fewer of them than an Elite athlete, even though they have comparable skills. The ability to take advantage of short-term positive modulators of skill and suppress the effects of negative modulators may relate to different psychosocial factors from those that lead to more practice per se. This way of framing the question, however, was not pursued in the target article.

In fact, I find surprisingly little in the target article to suggest that the capacity to win, in this case medals, dissociates to any large degree from mastery of a skill as acquired through practice. This assessment may appear to be contradicted by the finding that dedication to practice was not different between Super Elite and Elite athletes, as this might suggest that both groups attain similar mastery. If this were true then something else would need to break the tie, which opens the possibility of psychosocial factors that affect the ability to win independent of level of skill, i.e., which do not reduce to just having practiced more. What makes winning-specific factors difficult to identify, however, is the finding that differences in psychosocial factors may lead to differences in the *content* of practice, even if the amount is the same. Indeed Anders Ericsson’s concept of practice has always been somewhat fuzzy with respect to what counts as deliberative, which means that one can always state somewhat unsatisfyingly that certain psychosocial factors may make practice by Super Elite athletes more deliberative than Elite athletes. Luckily, the target study revealed something more concrete than this, namely, that almost all of the Super Elite athletes placed an emphasis on both mastery and outcome (winning), whereas the Elite athletes focused for the most part on winning, i.e., beating their opponent. There is a paradoxical implication here—you are more likely to beat your opponent when you focus on self-mastery rather than on actually beating them. The reasons for this are unclear but one possibility is that exploring your ability to master a sport (leaving no stone unturned) is more likely to lead to your true optimum performance, as compared to finding a local optimum in the smaller space of opponents.

The only performance advantage in Super Elite athletes compared to Elite athletes not potentially reducible to effects on practice was performing better under pressure, which the authors related in part to what is called the *counterphobic attitude*. The idea here is that Super Elite athletes are drawn to and thrive in high-anxiety-provoking but controlled sporting encounters in order to avoid the low-level uncontrollable anxiety of their everyday lives. This counterphobia might be causally related to the most troubling finding of the study, which was that the

Super Elite athletes, as compared to the Elite athletes, had a negative critical life event in their primary developmental years. It is notable that the negative life event also seems to relate to other factors in the Super Elite athletes: ruthlessness, selfishness, obsessiveness, and the prioritizing of sport over other domains of life. It is likely no coincidence that the hero origin story in countless movies involves loss of parents followed by finding a mentor or mission—think Luke Skywalker, Spiderman, and Batman. That said, elimination of promising athletes' parents early on in their lives by coaches or scouts is not likely to become a widely adopted practice.

Overall the target article seems to have mainly identified those psychosocial factors that maximize dedication to optimal deliberative practice. It is not clear, however, that these factors inform as to how practice itself increases skill, and therefore, the article may not be of greatest use for understanding the neuroscience of practice and skill acquisition. By analogy, failing to wash one's hands, stress, and sleep deprivation may increase one's chances of catching a cold but do not fundamentally inform as to how cold viruses cause upper respiratory symptoms, i.e., epidemiology and virology are separate disciplines. The article's main contribution may be to find ways to train athletes to win gold medals without the need to experience negative early life events or develop some of the unpleasant personality traits identified.

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