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Nonsense, common sense, and science of expert performance: Talent and individual differences

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ABSTRACT

Controversies surrounding nature and nurture determinants of expert/elite performance have arisen many times since antiquity, and remain sources of concern in the present day. Extreme positions on this controversy are fundamentally silly — *both* nature and nurture are necessary determinants of expert/elite performance, but neither alone represents a sufficient causal factor. The central issues surrounding the so-called "talent myth" and the "deliberate practice theory (also referred to as the "10,000 h rule") are reviewed. Also provided is a discussion of the science of individual differences related to talent, the fundamental characteristics of talent and the role of talent in predicting individual differences in expert/elite performance. Finally, a review of the critical psychometric and statistical considerations for the prediction of individual differences in the acquisition of expert/elite performance is presented. Conclusions focus on how these various issues fit together, to provide an integrated view of the importance of talent, but also the limitations of talent identification procedures for discovering which individuals will ultimately develop expert/elite levels of performance.

1. Introduction

Recent discussions in the popular literature and in some scientific circles have generated quite a lot of nonsensical statements, and similar amounts of misinformation about the nature of individual differences in talent and development of expertise across a wide array of domains. So, this paper starts with a review of the extant claims, and then follows with a review of the science that is at odds with such claims.

2. Nonsense

Extreme positions for either nature or nurture represent decisively discredited views throughout the scientific study of intelligence, expertise and elite performance (for succinct overviews of the untenability of either extreme view, see Anastasi, 1958; Anastasi & Foley, 1948).

2.1. Environmentalism/nurture

The most extreme current exemplar of the environmentalist viewpoint is Ericsson's position regarding deliberate practice and the development of expertise. Ericsson, Krampe, and Tesch-Römer (1993) stated that "Our theoretical framework can also provide a sufficient account of the major facts about the nature and scarcity of exceptional performance. Our account does not depend on scarcity of innate ability (talent).... We attribute the dramatic differences in performance between experts and amateurs-novices to similarly large differences in the recorded amounts of deliberate practice." (p. 392). More recently, Ericsson (2007) stated that "... it is possible to account for the development of elite performance among healthy children without recourse to unique talent (genetic endowment) — excepting the innate determinants of body size." and "Consequently, the development of expert performance will be primarily constrained by individuals' engagement in deliberate practice and the quality of the available training resources" (Ericsson, 2007, p. 4).

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Generally, it is fair to summarize Ericsson's theory as stating that: Expert performance is attained by lengthy (e.g., 10,000 h), deliberate (structured, coached, etc.), and motivated[1] practice. Conceptually, it would be easy to falsify such a universal statement (e.g., of the quality "All swans are white"), by finding a single exemplar of an individual who had attained expert performance without meeting one or more of these conditions (e.g., Observation of a single black swan renders the universal statement to be factually false). Indeed, observations of a few world-class elite sports figures indicate that the statement, as it stands, is certainly false as a universal truth (e.g., Donald Thomas became world high jump champion after 8 months of training; Helen Glover, "who had no rowing experience whatsoever when she was chosen in 2008, but was a World Championships silver medalist just two years later in 2010;" Crissie Wellington, British Ironman Triathelete didn't even compete professionally until age 30, and then won multiple world championships in short order; and so on. (Source: David Epstein, personal communication, October 13, 2011; see also Epstein, in press).

More insidious, however, is the corollary to the universal statement, namely: If an individual has appeared to have devoted lengthy, deliberate and motivated practice to a task (e.g., sport) and *not* achieved expert performance, one must attribute the failure to one or more of these three factors (i.e., not enough practice, not sufficiently deliberate practice, and/or not sufficiently motivated practice). In this framework, for example, an adequately coached individual who has expended the requisite thousands of hours of deliberate practice, must have failed to become an expert performer because he or she was not sufficiently motivated to achieve expert performance. The theory does not allow for individuals who simply do not have the requisite 'talent' to succeed in becoming an expert performer. With the only stated qualifications of body size and "health" (not more precisely specified), Ericsson only admits a few qualifications, for example "… some specific practice activities appear to change anatomical characteristics in an irreversible manner during certain critical developmental periods. For example, ballet dancers' ability to turn out their feet… " (Ericsson, 2007, p. 19).

However, Ericsson does not make an exception for an individual who does not have the appropriate physiological make-up to become an elite ballerina, other than turnout of the hip, such as "Ligamentous laxity," "Alignment of the leg" and so on (see Hamilton, 1986). As Hamilton noted, "The orthopedic literature suggests that anterversion is genetically predetermined and cannot easily be altered to any great degree. The extent of turnout is probably complete by age 10 or 11. …a would-be ballet dancer who has poor turnout from the start probably will never be good, and the attempt to force it can create several knee problems." (p. 64). Other primarily genetic factors have been identified as critical to sports expertise — for a review see Tucker and Collins (2012), and others have suggested that there is a significant role of genetic factors in the speed of acquisition of expertise in cognitive domains (e.g., see Chassy & Gobet, 2010).

While one can certainly admit that extensive practice can and does entail physiological changes in individuals, it is patent nonsense that every healthy child or adult need simply engage in extensive, deliberate and motivated practice to attain expert performance. Ericsson uses examples from his studies of training "expert memory" to illustrate how the theory of deliberate practice works. Ericsson, Roring, and Nandagopal (2007) stated that "moreover Ericsson (2003) was unable to find any reproducible evidence that would limit the ability of motivated and healthy adults to achieve exceptional levels of memory performance given access to instruction and supportive training environments" (p. 5). However, a thorough review has indicated that neither Ericsson nor his colleagues nor anybody else has ever demonstrated these feats with *any* but reasonably highly talented individuals to start with (e.g., university students, who are highly selected on intellectual abilities and prior educational success). A similar statement can be made for any of the other studies of expert performance in chess, Scrabble(r) (Tuffiash, Roring, & Ericsson, 2007), or any other task which has substantial demands on intellectual abilities. There has not been a single study that has demonstrated the attainment of expert memory among severely, moderately, or even borderline intellectually retarded subjects, except for rare case studies of savants (which are *not* about practice effects)!

By studying only subjects who have survived successive cuts of ability/talent, and motivation, extreme environmentalists are guilty of presuming that because the only subjects they examine are not markedly different in ability/talent, then ability/talent does *not* importantly limit the probability or possibility of achieving expert performance. Such an approach is tantamount to saying that because all of the individuals who are studied have two functioning eyes, that vision is *not* important to locomotion in the real world. The proposition here is that a universal approach to expert performance in sport or intellectual domains that excludes those who either never attempt the sport or intellectual domain, or who drop out very early in learning, is nonsense.

Much has been made about Watson's (1924/1930) famous quote: "Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select — doctor, lawyer, artist, merchant-chief, and yes, even beggar man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors." (p. 104). What is less frequently noted is the following sentence in Watson's quote "*I am going beyond my facts and I admit it*, but so have the advocates of the contrary and they have been doing it for many thousands of years. [italics added]. (p. 104). The operative point is not so much the extreme environmentalism espoused by Watson, but the qualification that he was "going beyond [the] facts." At least Watson admitted that the extant data did not support his proposition.

One final point should be made about the extreme environmentalist approach. That is, as Lloyd Humphreys was fond of observing, extreme environmentalists are actually *closet hereditarians*. They believe that with the right combination

[1] Ericsson et al. (1993) repeatedly noted that "motivated" practice is a critical component of "deliberate practice," (e.g., "A premise of our theoretical framework is that deliberate practice is not inherently enjoyable and that individuals are motivated to engage in it by its instrumental value in improving performance." p. 371). To make clear the important ingredients of "deliberate practice" in the current context, the term "motivated" is included.

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