

It Takes More Than Practice and Experience to Become a Chess Master: Evidence From a Child Prodigy and Adult Chess Players

Yu-Hsuan A. Chang and David M. Lane

Abstract

Ericsson's theory of deliberate practice and Chase and Simon's recognition-action theory both hold that the key to reaching master level performances in chess is to engage in at least 10 years or 10,000 hours of deliberate practice. Moreover, Ericsson claims that the primary source of individual differences in chess skill is deliberate practice time. Two studies were conducted to investigate whether deliberate practice or other chess-related experience is sufficient to explain individual differences in chess expertise and to investigate other factors that may contribute to chess expertise. Study 1 investigated the amount of time a young and exceptional chess player, CS, had studied alone and engaged in other chess-related experiences. CS spent little time studying alone and little time engaging in other chess-related experiences. Nonetheless, she achieved an exceptional chess level. CS's achievement is difficult to reconcile with the 10 years or 10,000 hours rule. Finally, CS performed exceptionally well on a test of visual short-term memory. Study 2 investigated factors contributing to the chess ratings of 77 adult chess players. Time spent studying alone and time spent engaging in other chess-related activities were strongly related to chess skill. However, contrary to the theory of deliberate practice, other factors including domain-general fluid intelligence, domain-specific fluid intelligence, and domain-specific crystallized intelligence all contributed substantially to the prediction of chess ratings even after controlling for practice and other chess-related activities. These findings support the view that spending time studying alone and playing chess is necessary but not sufficient for achieving a very high level of chess performance.

Introduction

Psychologists have long been interested in how people become experts. Although it is evident that there are substantial individual differences in performance across a wide variety of tasks (see Howard, 2009), there is disagreement about the relative importance of various sources of individual differences. Some researchers argue that the primary source of individual difference is natural ability, whereas others argue that the primary source is practice, with natural ability making little to no difference.

Much of the research on expertise has involved the study of chess. In this domain, Chase and Simon (1973) argued for the primacy of practice in the acquisition of skill. According to their recognition-action theory "each familiar pattern serves as the condition part of a production. When this condition is satisfied by recognition of the pattern, the resulting action is to evoke a move associated with this pattern and to bring the move into short-term memory for consideration" (Chase & Simon, 1973, p. 269). Thus, they argued that chess expertise is due primarily to the ability to recognize familiar patterns of pieces, and *experience* allows players to learn more patterns. Further, Simon and Chase (1973) argued that after from

10,000 to 50,000 hours of practice, chess players store a sufficient number of patterns in their long-term memory to play at master strength. It is worth noting that Simon and Chase (1973) did not deny the role of talent in chess expertise and acknowledged the practice interacts with talent. However, they argued that the acquisition of chess skill depends, in large part, on building up familiar chess patterns, which are acquired via practice or domain-specific experience. They summarized their view of the role of practice in skill acquisition as follows: "The overriding factor in chess skill is practice. The organization of the Master's elaborate repertoire of information takes thousands of hours to build up, and the same is true of any skilled task (e.g., football, music). That is why *practice* is the major independent variable in the acquisition of skill" (Chase & Simon, 1973, p. 279).

Evidence for recognition-action theory includes Kasparov's high-quality play in a simultaneous exhibition (Gobet & Simon, 1996) and the high correlation between

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