Gobet, F. (2012). Deliberate practice and its role in expertise development. In N. M. Seel (Ed.), Encyclopedia of the sciences of learning. New York, NY: Springer.

Deliberate practice and its role in expertise development

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Synonyms

Practice, training

Definition

According to the deliberate-practice framework, the way to reach high levels of expertise is to carry out practice that is consciously intended to improve one's skills. Deliberate practice involves goal-directed activities, which tend to be repetitive and to enable rapid feedback. Preferably performed individually, these activities tend to be effortful and not enjoyable. They can be carried out just for a few hours a day (but not so often that they become inefficient or even hurtful). This framework limits the role of inherited factors to motivation, general activity levels, and height in sports. No role is given to talent with respect to cognitive abilities. The deliberate-practice framework has been influential in the field of expertise research, and a large number of studies have been conducted to understand the role of practice in areas such as sports, games, the arts, and the professions. There have also been controversies surrounding this framework.

Theoretical Background

The importance of practice has been recognized for decades, first by proponents of behaviorism and then by psychologists more interested in cognitive mechanisms (e.g., De Groot, 1946/1978). Practice was given particular emphasis in Simon and Chase's (1973) classic study of expertise in chess, which concluded that grandmaster level can only be obtained after about 10 years of dedicated practice and study. This corresponds to between 10,000 and 100,000 hours of hard work. The deliberate-practice framework (Ericsson, Krampe, & Tesch-Romer, 1993) has taken this position to its extreme by proposing that innate individual differences do not limit the top levels of performance, but that these can be further increased by dedicated practice. The deliberate-practice framework rejects innate talent as an explanation for cognitive abilities, arguing that the evidence for it is flimsy at best. Rather, it proposes that expert performance is a monotonic function of the amount of practice. Thus, this framework takes the clear and extreme position that deliberate practice is not only a necessary, but also a sufficient condition for expertise.

Deliberate practice consists of training activities. The goal is to improve performance by optimizing feedback and thus the correction of errors. These activities are typically effortful and not enjoyable. Thus, it is not sufficient to play the piano just for enjoyment, even if one devotes a considerable number of hours doing so. It is crucial to use training techniques whose deliberate goal is to improve one's performance. Moreover, these training activities can be carried out for just a few hours a day. Excessive practice increases the risk of injuries and burnout (especially in sports). Another important prerequisite is the presence of a favorable environment, and in particular strong family support. The proponents of deliberate practice do acknowledge the involvement of inherited factors, but these are limited to motivation, general activity levels, and, in some sports, height. Importantly, the involvement of genetic factors is explicitly excluded for explaining individual

differences in high levels of cognitive abilities. Finally, emphasis is given to individual practice rather than group practice, as the former increases the efficiency of the activities characteristic of deliberate practice.

One of the clearest evidence for the role of deliberate practice (and concomitantly, the lack of involvement of talent) was provided by longitudinal experiments where college students with average memory span were trained in the digit-span task. When they devoted sufficiently effort and practice, these students could perform better than individuals that were thought in the literature to enjoy special, inherited talent. The role of deliberate practice has also received support from many domains, including games, music, science, and medicine (Ericsson, Charness, Feltovich, & Hoffman, 2006). A large amount of data has also been collected in sports such as karate, soccer, hockey, skating, and wrestling. In these studies, participants are typically asked to estimate retrospectively how many hours they have spent in diverse types of activities, and the results are correlated with their skill level. The results typically show that the higher skilled individuals engage more in deliberate practice.

However, some studies, while partly supporting the role of deliberate practice, also suggest the importance of other factors. A good example of this is the study carried out by Gobet and Campitelli (2007) with chess players. (The game of chess has the great advantage that there is an official, reliable, and quantitative measure of skill – the Elo rating.) They asked players to estimate the number of hours devoted in their career to a number of activities, including studying chess alone and practicing with others (this comprised playing competitive games). As predicted by deliberate practice, a strong correlation was found between chess skill and the number of hours of individual practice. However, contrary to prediction, an even stronger correlation was found between chess skill and the number of hours of group practice. Another result inconsistent with the deliberate-practice framework was the high level of variability. Some players became masters with relatively few hours of deliberate practice (as low as about 3,000 hours), while others needed considerably more time (up to about 24,000 hours) – that is a 1:8 ratio. Finally, some players devoted more than 25,000 hours to chess study and practice, but failed to become masters. This study also uncovered two results that suggest that other factors in addition to deliberate practice are in play. First, there was a correlation between final skill level and starting age, in that the players starting younger were more likely to become masters. This correlation held even after the contribution of deliberate practice was controlled for. Second, the proportion of mixed-handedness was higher with chess players than in the general population. These results tend to suggest that practice is a necessary, but not sufficient condition for reaching high levels of expertise.

Important Scientific Research and Open Questions

The deliberate-practice framework has generated much research but also much controversy (e.g., Sternberg, 1996). For example, there is considerable evidence from the fields of personality and intelligence that there exist large individual differences between individuals, and it is plausible that at least some of these differences might affect the acquisition of high levels of expertise. Similarly, individual differences exist with respect to learning, attention, and working memory. In addition, the research on deliberate practice is mostly correlational and rarely uses control groups (i.e., individuals that tried but failed to be experts), and it is thus difficult to draw conclusions about the causal role of talent and (deliberate) practice. For example, it could be the case that, following self-selection, more gifted individuals remain in the domain and thus log in large numbers of hours of practice. Challenges for the deliberate-practice framework include the development of better methods for estimating the respective contributions of practice and talent, and a more differentiated theoretical account for explaining the large inter-individual variability and other factors such as starting age that affect the development of expertise.

Cross-References

→ Chunking mechanisms and learning

→ Development of expertise

→ Individual differences in learning

→ Learning in practice

→ Learning in the CHREST cognitive architecture

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Definition

Deliberate practice: Framework proposing that the efficient acquisition of domain-related knowledge and skills, and thus exceptional performance, is primarly due to goal-directed, effortful and inherently not enjoyable practice.