

Understanding the heterogeneity in learning mental actions

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Abstract

Individuals who can easily learn from the consequences of their mental actions are more likely to benefit from Cognitive Behavioral Therapies, which seek to replace maladaptive mental behavior with adaptive mental behavior. Although learning the optimal mental (cognitive) action is harder than learning the optimal motor (overt) action in general, not all individuals show this trend (Hitchcock & Frank, 2024). In this study, our goal is to understand the source of this heterogeneity so as to facilitate the targeted deployment of CBT to individuals who are most likely to benefit from it. To address our goal, the original task (Hitchcock & Frank, 2024) was modified with the aim of improving the internal consistency to allow measuring individual differences more robustly. We also collected data on candidate individual differences—working memory capacity, and traits such as perseverative thinking, the need for cognition, inattentiveness, and cognitive ability—to investigate whether these measures could predict differences in performance. Split-half reliability improved for most conditions in the current task and remained the same for one condition compared to the original task. Although participants were better at learning the optimal overt action compared to the optimal cognitive action in both training ($p < 0.001$) and test phases ($p = 0.006$), replicating the original results, performance in the cognitive condition was numerically higher than overt condition in 37% of the participants in the training phase and 38% of the participants in the testing phase, indicating similar heterogeneity across participants as in the original study. The need for cognition measure predicted higher accuracy in the cognitive (than overt condition) in the training phase ($p = 0.046$) and in the test phase ($p = 0.001$). This finding, if replicated, has important clinical implications as it could help identify patients who are most likely to benefit from interventions that rely on learning adaptive cognitive actions.