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Investigating the Impact of Metacognition on Working Memory and Procedural Learning Mechanisms

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Abstract

This study examined the influence of metacognition on declarative and reinforcement learning (RL) mechanisms. We collected data from 218 undergraduates using a within-subjects metacognitive manipulation of a stimulus-response (S-R) learning task created by Collins (2018). Contributions of declarative and RL mechanisms are assessed by differences in learning rate for blocks of 3 items versus 6 items, and by the rate of forgetting with an incidental post-test. If metacognition differentially affects declarative and RL, we expect a three-way interaction between the task phase (learning/post-test), block type (long/short), and metacognition (before/during). Our results showed significant main effects of phase ($F(1,217) = 143.18$, $p = 9.18e-32$), length ($F(1,217) = 541.11$, $p = 2.06e-104$) and metacognition ($F(1,217) = 19.78$, $p = 9.22e-06$), with better performance during the learning phase, short blocks, and metacognitive manipulation. A significant phase by metacognition interaction ($F(1,217) = 8.11$, $4.45e-03$) suggested that metacognition monitoring improved test performance while having little effect on learning performance.