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Permalink
https://escholarship.org/uc/item/2hn9v6jk

Journal
Proceedings of the Annual Meeting of the Cognitive Science Society, 43(43)

ISSN
1069-7977

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Publication Date
2021

Peer reviewed
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.