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Proceedings of the Annual Meeting of the Cognitive Science Society

Title

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Permalink

<https://escholarship.org/uc/item/7wj2w4x8>

Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 41(0)

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Publication Date

2019

Peer reviewed

Metacognitive Modeling; using cognitive modeling to clarify philosophical metacognitive concepts

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Abstract

Metacognitive research is integral to understanding cognition, but a problem persists: metacognition remains poorly defined and its basic terminology contested. To address this problem, we propose a new philosophical method for understanding metacognition in a bottom up, computational way. We follow John Anderson's principle that complex problems become systematic when analyzed within a cognitive model. Researchers agree that metacognition is cognition acting upon itself. Accepting this, we first define the fundamental units of cognition and then define how these units act upon themselves. We ground this within human cognition by using the Standard Model of Cognition (Laird et al. 2017, also known as the Common Model). This model defines the mechanisms common to all computational architectures modeling human cognition. Our model is then compared to metacognitive theories within psychology, philosophy, and neuroscience. This method clarifies metacognition by grounding it both within a computational cognitive architecture and present research literature.