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Proceedings of the Annual Meeting of the Cognitive Science Society

Title

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<https://escholarship.org/uc/item/6t84z438>

Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 46(0)

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Publication Date

2024

Peer reviewed

Individually-optimal causal structure judgments in a descriptive Bayesian model

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Abstract

Causal inference plays a crucial role in humans' success in navigating the world. Fortunately then, numerous studies suggest that people are highly adept at making these inferences. Examining judgments of causal structure across numerous studies, Griffiths and Tenenbaum (2005) found that people's average judgments tracked the predictions of an optimal Bayesian model of the task. However, Tauber et al. (2017) show that aggregate behavior may appear optimal even when few individuals exhibit optimal patterns of responses. Here, I applied hierarchical Bayesian cognitive modeling approaches to a new study of causal structure judgments ($N = 80$) to examine the optimality of causal structure judgments at the individual level. Expanding the findings of Griffiths and Tenenbaum (2005), I found that the majority of participants' causal structure judgments were well-explained by an optimal Bayesian model (avg. $r = .86$). These findings suggest that human cognitive capacities are truly well-attuned to the causal inference task.