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Proceedings of the Annual Meeting of the Cognitive Science Society

Title

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Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 47(0)

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Publication Date

2025

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Peer reviewed

Explaining Necessary Truths

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Abstract

Knowing the truth is rarely enough—we also seek out reasons why the fact is true. While much is known about how we explain contingent truths, we understand less about how we explain facts, such as those in mathematics, that are true as a matter of logical necessity. We present a framework, based in computational complexity, where explanations for deductive truths co-emerge with discoveries of simplifying steps during the search process. When such structures are missing, we revert, in turn, to error-based reasons, where a (corrected) mistake can serve as fictitious, but explanatory, contingency-cause: not making the mistake serves as a reason why the truth takes the form it does. We simulate human subjects, using GPT-4o, presented with SAT problems of varying complexity and reasonableness, validating our theory and showing how its predictions can be tested in future human studies.