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Proceedings of the Annual Meeting of the Cognitive Science Society

Title

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Permalink

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Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 42(0)

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Publication Date

2020

Peer reviewed

Algebra decoded: individual differences in strategy selection when solving for 'x'

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Abstract

Understanding variables and solving algebraic equations are essential to advanced mathematical thinking. Missing-operand problems (e.g., $x + 3 = 5$) are solvable via two strategies: 1) pattern-matching, or direct arithmetic fact retrieval (e.g., $2 + 3 = 5$), and 2) algebraic symbol-manipulation, or performing the inverse operation (e.g., $5 - 3 = 2$). U.S. undergraduates made speeded verifications of arithmetic sentences like $2 + 3 = 5$ and $5 - 3 = 2$. They then solved missing-operand problems like $x + 3 = 5$. We decoded individual differences in strategy choice by whether speed on missing-operand problems was better predicted by speed on verifying direct- or inverse-matched arithmetic facts. We found individual differences in strategy choice, although these were not significantly associated with mathematical achievement.