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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.