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Unexpected problem recognition task reveals semantic differences in arithmetic word problem representations

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Abstract

Recent evidence suggests that non-mathematical world knowledge influences the semantic encoding of arithmetic word problems (Gamo, Sander & Richard, 2010; Gros, Thibaut & Sander, 2017). We used isomorphic problems that could be encoded in two distinct ways to investigate this issue. Depending on the world knowledge evoked by the elements described in the problem statement, we made the hypothesis that different mathematical relations would be made salient in the encoded representation. We tested this hypothesis by presenting participants with an unexpected problem recognition task following a problem solving task. Participants tended to erroneously recognize modified problems in the recognition task when they had been rewritten so as to explicitly describe the relation that could have been inferred from world knowledge, but not when the world knowledge evoked during the encoding did not make this relation salient. This highlights the crucial influence of world knowledge on arithmetic word problems representations.