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Authors

Kalra, Priya

Lazaroff, Emma

Matthews, Percival

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Variation in surface features improves recognition of common magnitude relations

Priya Kalra

University of Wisconsin, Madison, Wisconsin, United States

Emma Lazaroff

University of Wisconsin-Madison, Madison, Wisconsin, United States

Percival Matthews

University of Wisconsin - Madison, Madison, Wisconsin, United States

Abstract

An issue in higher-order reasoning is the influence of irrelevant surface (perceptual) features in tasks involving a deep (relational) structure. Many machine learning models use feature vector representations of objects. However, the extent to which these representations predict or explain human behavior and learning is unclear. A feature vector model facilitates abstraction and transfer when weights on irrelevant features are minimized and weights on the diagnostic (relational) features are increased. The current study tested whether a feature vector model applies to human behavior in the context of magnitude relations (line ratio comparison). We systematically varied the degree of surface feature variation while maintaining relational structure. We found that, consistent with a feature vector model, participants were more accurate at recognizing common relational structure when surface features differed ($t = 4.22$, $p < .001$). This approach may be preferable to a progressive alignment approach to relational magnitude learning.