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A new similarity measure to reveal individual differences and growth in implicit number conceptions

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Abstract

How are numbers represented in peoples minds? Previous work has used pairwise similarity judgments among numerals to reveal development in individuals conceptions of number, from exclusively encoding magnitude in elementary school to including properties like shared factors in adulthood (Miller & Gelman, 1983). We extend this observation to develop a new, expanded measure comprised of two 10-item sets exemplifying multiple mathematical concepts (e.g., squares, primeness), which can ultimately be used as a subtle pre- and post-test surrounding concept-specific education or interventions. Initial multidimensional scaling analyses reveal individual differences in clustering of numerals based on mathematical properties that are not necessarily concordant with the individuals explicit knowledge of the same properties, which we also solicited. We thus see this as a promising way to measure implicit number conceptions and track the salience of rich mathematical properties in individuals representations of number.