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The Role of Compositionality in Children's Creating Representations of Large Exact Numbers: A Case Study of the Number Five

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Abstract

Compositional capacity (i.e., chunking four objects as two sets of two) can extend 12- to 14-month-old infants' working memory capacity from three to four1,2,3. Here we ask whether numerical composition supports 3- to 4.5-year-olds' creating representations of large exact numbers such as five. In a non-verbal object-tracking task (See Fig1a), subset-knowers and most young CP-knowers failed to track exactly five objects. In two experimental manipulations, we provided children with spatiotemporal, linguistic, and/or color chunking cues. If tracking sets of five as a composition of two and three is within children's compositional capacities, they should perform better than children from baseline. We found no evidence that 3- to 4.5-year-olds can represent exactly five by composing representations of two and three (Exp.1: $F(4, 133) = 5.69$, $\beta = -0.03$, $p = .509$; Exp.2: $F(4, 143) = 4.94$, $\beta = -0.03$, $p = .587$).

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