Understanding the cognitive mechanisms behind groupitizing in early education

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Abstract

Groupitizing, the ability to use perceptual grouping to facilitate enumeration, appears with schooling and predicts math achievement (Guillaume et al., 2023). Our study (Spring 2025) investigates the cognitive mechanisms underlying its development and enhancement during early education.

We propose that groupitizing among young children involves two core processes: (i) subitizing to identify the numerosity of small subgroups and (ii) using perceptual grouping to perform mental arithmetic, such as addition or multiplication.

To test this hypothesis, children from kindergarten through second grade will perform an enumeration task involving dot sets organized into various grouping structures (subgroups with equal or differing numerosity) and various grouping patterns (subgroups with consistent or varied shapes). Response times and error patterns will be analyzed, alongside children's counting knowledge, arithmetic skills and math achievement.

Our results aim to elucidate the cognitive mechanisms underlying groupitizing across development, and the links between foundational perceptual skills and higher-order mathematical reasoning.

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