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The representation of recursive center-embedded and cross-serial sequences in children and adults

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Abstract

The ability to represent recursive structures is thought to be foundational for language, music, mathematics, complex tool use, and theory of mind. However, we do not currently know what type of computational machinery is used to represent recursive structures, or when this ability develops. Here we measure the developmental trajectory in young children using a sequence generation task. We also test two proposed mechanisms for representing these structures: a stack-like data structure a first-in-last-out structure in which only the last item can be accessed, and a queue-like data structure an ordered list that can only be accessed from its beginning. Each of these mechanisms make different predictions for what types of sequential structures should be easier to generate and have specific item-by-item response time signatures. We show evidence that both children and adults use a queue-like representational system which iteratively runs forwards searches through a stored queue.