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Working Memory Assessment in Preschoolers

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Abstract

Working memory (WM) is a cognitive system that temporarily holds and manipulates information. It is commonly assessed using the delayed-match-to-sample (DMTS) paradigm in early childhood. However, the standard DMTS format may impose additional knowledge-based, cognitive and verbal demands on preschoolers, making it difficult to determine whether poor performance reflects WM limitations alone or also difficulty engaging with these demands. Consequently, standard DMTS may underestimate preschoolers' working memory abilities. Causal task-framing was assumed to reduce additional demands, make the task more developmentally appropriate and allow clearer interpretation of preschoolers' WM abilities. This study examined how task framing, age and delay influenced preschoolers' performance on a modified DMTS, and whether a more developmentally appropriate, causal task-framing revealed working memory abilities that may be obscured by standard DMTS. Language-based task demands were minimised to reduce potential confounding by individual differences in language ability. Seventy-two children (2-4-year-olds) completed either an arbitrary-matching condition (n = 34) or a causally framed object-location condition (n = 38), across 2- and 8-second delays. Accuracy was higher in the object-location condition than in the arbitrary-matching condition. The effect of condition varied by age: 3- and 4-year-olds outperformed 2-year-olds in the object-location condition, but no age differences emerged in the arbitrary-matching condition. Delay-related effects were non-significant, possibly due to delay manipulation limitations. Overall, WM performance was shaped by task-framing, with a more developmentally appropriate DMTS supporting performance and potentially allowing developmental variation to emerge more clearly. Conversely, standard DMTS may underestimate preschoolers' WM abilities and obscure developmental variation by imposing additional task demands. These findings advance understanding of early WM development, highlighted the need for cautious interpretation of preschoolers' performance on non-adapted, developmentally inappropriate paradigms, and emphasise the importance of developmentally appropriate working memory assessments for improving the interpretation of preschoolers' cognitive abilities and informing educational and clinical practices.

Keywords: Working Memory; Delayed-Match-to-Sample; Task-Framing; Assessment