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Prospective memory in preschool children: Influences of agency, incentive, and underlying cognitive mechanisms

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ABSTRACT

Prospective memory (PM) is remembering to perform an action in the future and is crucial to achieving goal-directed activities in everyday life. Doing so requires that an intention is encoded, retained during a delay interval, and retrieved at the appropriate time of execution. We examined PM ability in preschool children by manipulating factors related to agency and incentive. We further explored how metacognition, executive functioning, and theory of mind—factors known to account for individual differences in PM—influenced performance on these PM tasks. A sample of 31 preschool children were asked to carry out a delayed intention or to remind an adult to carry out an intention that was of high or low incentive to the children. Findings indicated that individual differences in theory of mind were related to individual differences in preschoolers' performance on low-incentive PM tasks, independent of executive functioning contributions, whereas individual differences in executive functioning were related to performance on the high-incentive tasks. These findings suggest that changes in theory of mind and executive functioning are important to consider in models of PM and that different PM tasks (e.g., high vs. low incentive) may involve different cognitive requirements for young children.

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Introduction

Prospective memory (PM) is remembering to perform an action in the future and is crucial to achieving goal-directed activities in everyday life. PM is most parsimoniously conceptualized as a three-phase model. During the first phase, an intention is formed and a representation of this intention is encoded. The second phase entails the storage of this intentional representation, and the third phase involves a “switch” from the ongoing task at the appropriate time or event to execute an intended action (see, e.g., Ellis, 1996; see also Kliegel, Martin, McDaniel, & Einstein, 2002; McDaniel, Glisky, Rubin, Guynn, & Routhieaux, 1999, for alternative models that include fewer or more phases). Event-based PM tasks involve carrying out an intention in response to the occurrence of an external event, for example, picking up milk while shopping at the grocery store. These tasks are contrasted with time-based PM tasks that involve completion of a task at a designated time, for example, attending a meeting at 3 p.m.

Failure of PM is the most common memory problem among adults (Crovitz & Daniel, 1984; Kliegel & Martin, 2003) and children (Winograd, 1988) and, thus, has garnered substantial attention in cognitive psychology (e.g., Kliegel, McDaniel, & Einstein, 2008). Although PM is critical to functional life as an adult, young children must also begin to remember to do things on their own and are sometimes relied on to remind others to complete tasks, particularly once they enter school (e.g., “Remember to do your homework,” “Remember to have your mom sign the permission form,” “Don’t forget to remind your teacher about your allergy”). Children who develop poor PM abilities are likely to experience difficulties in interacting with parents, teachers, and peers (McCauley & Levine, 2004; Meacham & Leiman, 1982). As such, interest in the development of these abilities has increased within the past decade (see Kvavilashvili, Kyle, & Messer, 2008, for a review) and has important educational and social implications.

Here, we examined preschool children’s competency to perform different types of PM tasks. In addition, we explored how individual differences in metacognition, theory of mind (ToM), and executive functioning (EF) influence PM performance. Metacognition is the understanding of one’s own mental processes. It is one’s ability to reflect on and deliberately monitor one’s knowledge, mental processes, motives, and intentions (Flavell, 1978). ToM (Premack & Woodruff, 1978; Wellman & Liu, 2004) is the capacity to predict and interpret behavior as the result of mental states such as one’s beliefs and desires. Although there is overlap in these two concepts, traditionally “metacognition” is used to describe reasoning about one’s own mental states, whereas “theory of mind” describes reasoning about another’s mental state (cf. Kuhn, 2000, 2001; Lockl & Schneider, 2007; Misailidi, 2010). In the context of PM, monitoring one’s own prospective intentions may rely on metacognitive awareness, whereas monitoring the delayed intention of another would also rely on ToM. We investigated how these abilities may subservise a child’s success in creating and executing delayed intentions of high or low incentive that either require reminding an adult to complete the task or require the child to complete the task on his or her own. EF refers to the suite of cognitive abilities involved in planning and problem solving, including working memory, inhibition, attention, and task switching (Miyake & Friedman, 2012). We examined how these processes influence performance on event-based PM tasks during early childhood.

Studies show that young children are more likely to complete a PM task if they find it of interest or are incentivized to do so (Guajardo & Best, 2000; Somerville, Wellman, & Cultice, 1983). For instance, Somerville and colleagues (1983) were the first to document event-based PM in preschool children (2–4 years of age). In a naturalistic setting, a child’s caretaker instructed a child to remind him or her of a task to be completed at a specified time in the future. This task required the child to later recognize the appropriate target event and then recall and perform the task. Somerville and colleagues varied these tasks in two ways: (a) the incentive to the child (high vs. low incentive as determined by the caretaker) and (b) the delay between the instruction and the cue to remind (short delays were less than 5 min; long delays were morning to afternoon or evening to next morning). For example, the child was told, “Remind me to bring in the wash after we eat,” a task of low incentive across a short delay, or “Remind me to buy candy at the store when we go tomorrow morning,” a task of high incentive across a long delay. Somerville and colleagues found

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