Habitual Prospective Memory in Young Children

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Abstract

When attempting to remember tasks to complete in the future, humans often fall short (e.g., remembering to stop at the grocery store on the way home from work). Remembering to engage in a behavior at a future time is called *prospective memory* (PM). Traditional event-based PM tasks in the laboratory involve giving participants an intention (e.g., press the space bar) when a specific event (e.g., the word "DOCTOR") appears on the screen (in contrast, time-based tasks involve performing an act such as pressing the space bar after a specified amount of time has passed). In the laboratory, these tasks are usually limited to one session. However, in daily life, we often experience repeated PM tasks that can extend for as long as a lifetime. Recent research has begun to focus on this "habitual PM" (e.g., Einstein, McDaniel, Smith, & Shaw, 1998) to better approximate the real-life situations that individuals often incur. There even appear to be different brain regions involved in traditional and habitual PM, suggesting that these processes may differ substantially from one another (Meier et al., 2015). Moreover, habitual PM may also relate to psychological factors because it is positively associated with self-efficacy (Azizuddin, 2015). In order to better understand this habitual PM process, we developed a paradigm for testing habitual PM in young children that requires repeated performance of the PM task across a number of sessions spanning months. Testing children is important because it protects against some of the confounding social conditioning that adult participants would present. Following parental consent, participants, who attended a local nursery school and provided assent before each testing period, were tested on a variety of computer-based cognitive tasks approximately once per week. After being designated a card on which their name was written, participants were told to request, at the end of each test session, a stamp on their card. Once filled with five stamps, the card would yield a large prize (i.e., one larger than they typically receive for completing tasks). Participants' cards were kept in an opaque box on the same table at which the computer-based cognitive tasks were completed. To measure habitual PM, we recorded whether participants requested the stamp with no external prompts (i.e., spontaneous retrieval) or required some environmental support (e.g., being asked "Was there anything else you were supposed to remember?"). This paradigm, which includes repeated occurrences in which participants must remember to complete a task, more closely approximates the type of habitual PM tasks that humans encounter in the real world (e.g., remembering to fill up a "store loyalty card" with stamps at each visit). Moreover, this study may offer insight into what is likely to disturb or support successful habitual PM performance.

Literature Review

- ***Prospective memory* (PM):** Remembering to engage in a behavior at a future time.
- Laboratory PM tasks are often limited to one test session.
- However, in daily life, we often experience repeated PM tasks that can occur many times and extend for as long as a lifetime.
- Recent research has begun to focus on this "habitual PM" (e.g., Einstein, McDaniel, Smith, & Shaw, 1998) to better approximate the real-life situations that individuals often incur.
- There even appear to be different brain regions involved in traditional and habitual PM, suggesting a that these processes may differ substantially from one another (Meier et al., 2015).
- Habitual PM may also relate to other psychological factors because it is positively associated with self-efficacy (Azizuddin, 2015).
- Previous work has shown that children as young as 3-years-old exhibit some PM (Perdue, Evans, Williamson, Gonsiorowski, & Beran, 2014)

Present Study

- To better understand this habitual PM process, we developed a paradigm for testing habitual PM in young children that requires repeated performance of the PM task across a number of sessions spanning months.
- Testing children is important because it protects against some of the confounding social conditioning that adult participants would present.

Research Questions

1. Do children improve on PM performance over time?
2. Is PM affected by motivation?
3. Does the visibility of the main cue (i.e., whether the box is hidden) affect performance?

Method

Participants

- 15 children (age range: 4-5) attending a local nursery school.

Procedure

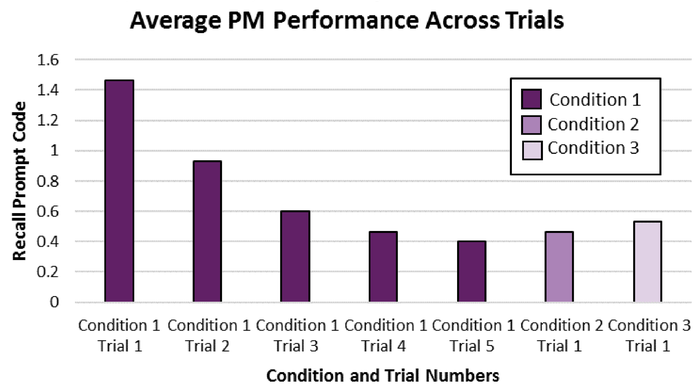
- Children were tested on a variety of computer-based cognitive tasks approximately once per week.
- They were designated a card with their name (kept in an opaque box on the same table at which the computer-based cognitive tasks were completed)
- At the end of each test session, participants were told to request a stamp on their card (i.e., because "Sometimes we forget to give you a stamp").
- Five stamps on the card would yield a large prize (i.e., one larger than they typically receive for completing tasks).

Data Analysis

- To measure habitual PM, we recorded whether participants requested the stamp with no external prompts (i.e., spontaneous retrieval = 0) or required some environmental support (e.g., being asked "Was there anything else you were supposed to remember?").
- Environmental support comprised a hierarchy of prompts to help children remember (i.e., spontaneous retrieval coded as 0, prospective cues 1-2, and increasingly retrospective cues 3+)

Results

- **PM performance over time.** Subjects required significantly fewer cues, $t(14) = 3.83$, $p = .02$, by the last two trials ($M = .433$, $SD = .15$) compared to the first two ($M = 1.2$, $SD = .19$).
- **High motivation compared low motivation.** There was not a significant difference, $t(14) = -0.25$, $p = .83$, between the last trial of Condition 1 (i.e., high motivation; $M = .40$, $SD = .63$) and the first trial of Condition 2 (i.e., low motivation; $M = .433$, $SD = .64$)
- **Effect of visibility of cue.** There was not a significant difference, $t(14) = -0.25$, $p = .81$, between the last trial of Condition 2 (i.e., visible box; $M = .467$, $SD = .52$) and the first trial of Condition 3 (i.e., hidden box; $M = .533$, $SD = .83$)



Discussion

- Participants showed a significant improvement in PM performance over five trials.
  - Repeated testing may offer more insight into the upper limits of PM ability in children.
- Motivation did not appear to significantly effect PM performance.
  - This conveys that young children have the capacity for PM, irrespective of motivation.
- Preliminarily, visibility of the cue did not appear to affect PM performance.
  - This suggests that childrens' PM did indeed become habitual.
- **Prior research.** Supporting prior research on PM in children (Perdue et al., 2014), these findings convey that young children do display habitual PM like adults (Einstein et al., 1998).
- **Applications.** This can be applied in a parental sphere by giving children autonomy to perform tasks that involve habitual PM, which could support self-efficacy development (Azizuddin, 2015).
- **Implications.** Children's habitual PM did not appear to be significantly influenced by motivation or cue visibility, suggesting habitual PM may not be as dependent on cues as traditional PM.
- **Future research.** Future research may explore when PM (i.e., active intention setting) becomes habitual (i.e., more automatic and less effortful) and how they differ.

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