Remembering to Remember (*And Remembering Other Stuff Too!*): Incidental Encoding in Prospective Memory

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Abstract

Attention allocation in prospective memory (PM) can be adjusted according to PM and ongoing task (OT) demands. The present investigation examined how these flexible adjustments influence both OT performance and incidental memory for nontarget items. Across two experiments, participants completed a nonfocal PM task, with instructions manipulating their trial-by-trial expectations of encountering a PM cue, followed by a surprise recognition test for nontarget items. Participants showed greater OT interference costs (slower response times) during high, relative to low, PM expectation trials. Although OT performance was impaired when PM expectations were high, participants subsequently recognized more of the nontarget items encountered from high expectation trials. These results suggest that participants adjust their attention allocation policy in preparation for PM cues, diverting attentional resources away from the OT, and toward the PM task, improving item encoding. Incidental memory for nontarget items is discussed as a measure to understand the mechanism underlying OT interference costs.

Interference Costs in Prospective Memory

- Maintaining a prospective memory (PM) interferes with ongoing task (OT) performance ([1, 2]). These *interference costs* can be interpreted as either:

1. Shared limited-capacity between PM and OT tasks
   - Attentional resources are divided between the PM and OT tasks as a function of the demands of the task set ([3, 4, 5]).
2. Delayed OT responses
   - OT and PM responses compete in "horse-race" fashion, so OT responses are intentionally *delayed* to allow PM evidence to accrue ([6, 7]).

- Interference costs are reduced when participants know the *context* in which PM intentions can be executed ([2, 8, 9, 10]).

The Present Study

*What are the **attentional consequences** of knowing the appropriate PM context?*

- If trial-specific attention is enhanced when participants notice a contextual cue, they should have *better incidental memory* for nontarget items, relative to trials without a contextual cue.

*Can incidental nontarget memory reveal the **underlying mechanism** of interference costs?*

- If interference costs are produced by delayed OT responses, then incidental nontarget memory should be positively correlated with OT response times.

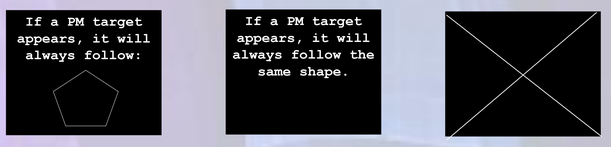
General Method

1) Ongoing task: Color-matching ([8])
   - Four *different* shapes, and five *different* colors.

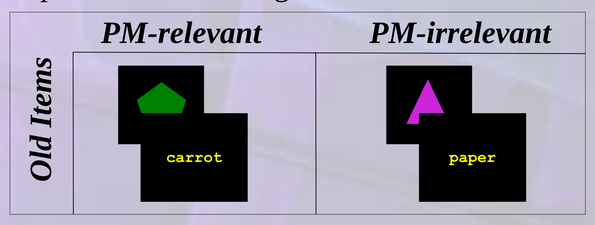
Participants made a *different* response to PM targets:
- **Experiment 1**: Items ending in *–ion*.
- **Experiment 2:** *Corn* and *Dancer.*

PM targets always followed the ***same* shape**. This contextual knowledge was manipulated between-groups:

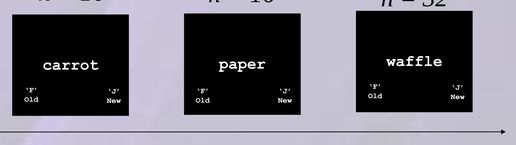
Specific ***Semi-Specific*** ***Nonspecific***



2) *Surprise* old/new recognition test :

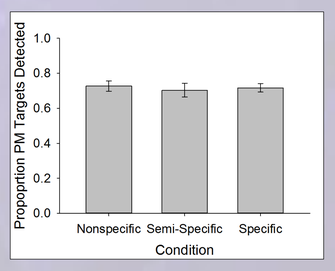


n = 16 *n = 16* *n = 32*



Results Exp. 1

PM Detection

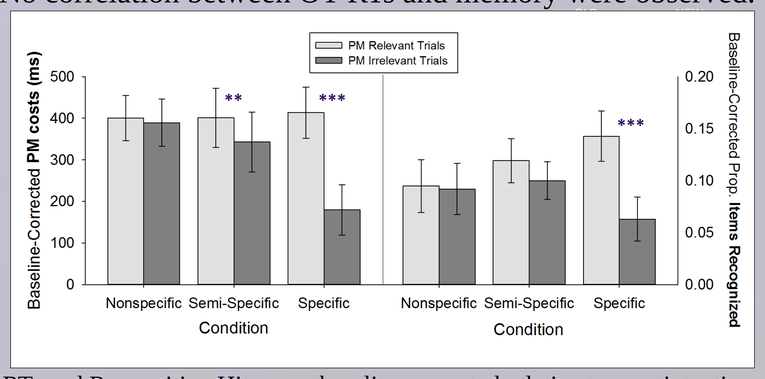


No effect of shape knowledge.

Possibly due to high monitoring in *Nonspecific* condition.

OT RTs and Memory

No correlation between OT RTs and memory were observed.



RTs and Recognition Hits were baseline corrected relative to a no-intention control group.

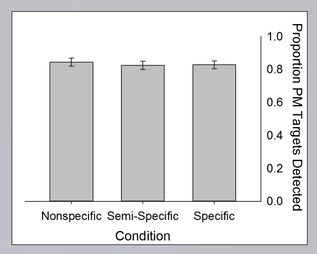
Trial Type: $F(1, 191) = 43.58$, $p < .001$, $\eta^2 = .16$
Interaction: $F(2, 191) = 19.75$, $p < .001$, $\eta^2 = .14$

Trial Type: $F(1, 191) = 7.91$, $p = .005$, $\eta^2 = .04$
Interaction: $F(2, 191) = 3.81$, $p = .024$, $\eta^2 = .04$

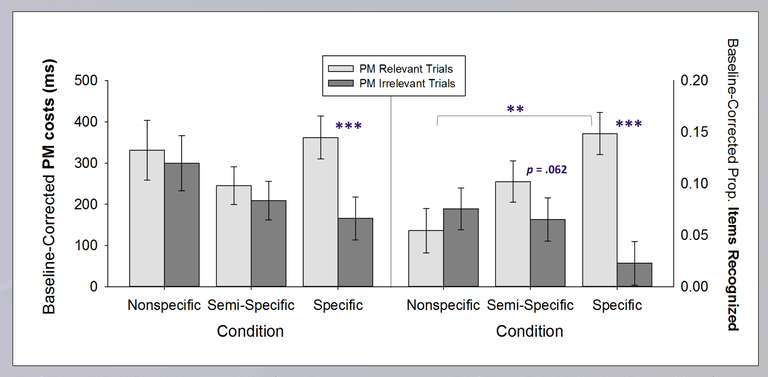
Results Exp. 2

PM Detection

PM detection increased relative to Exp. 1, no effect of knowledge was observed.



OT RTs and Memory

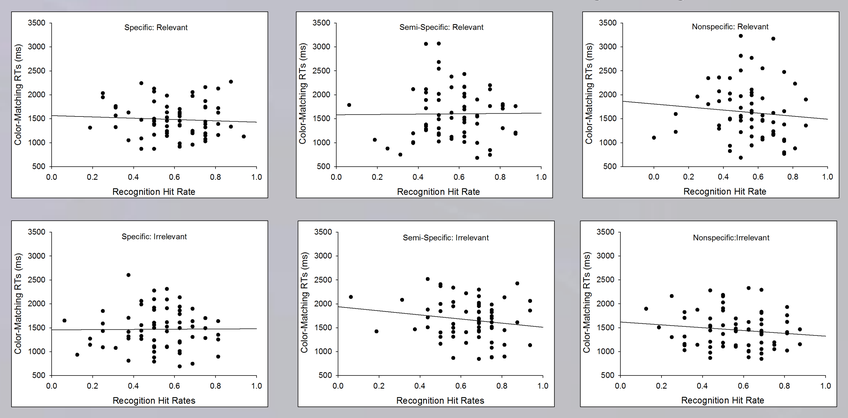


Trial Type: $F(1, 195) = 46.84$, $p < .001$, $\eta^2 = .17$
Interaction: $F(2, 195) = 19.01$, $p < .001$, $\eta^2 = .14$

Trial Type: $F(1, 191) = 14.07$, $p < .001$, $\eta^2 = .06$
Interaction: $F(2, 191) = 11.40$, $p < .001$, $\eta^2 = .10$

Correlations: OT RTs and Memory

No correlation between OT RTs and memory in *any* condition.



Discussion

*What are the **attentional consequences** of knowing the appropriate PM context?*

- OT performance is slowed, replicating prior work ([8, 9, 10]).
- As a novel extension, we also found that incidental memory is *improved* for items from PM-relevant contexts.

*Can incidental nontarget memory reveal the **underlying mechanism** of interference costs?*

- OT response time never correlated with memory performance.
  - Suggests that results are not due to encoding time.
- Incidental item encoding follows *flexible relocation of attentional resources* from the OT to the PM task ([3, 4, 5]).

***References are available on separate handout**

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