# Lure Interference in Event-Based Prospective Memory

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## Background

People form a multitude of different intentions.  The focus of our study concerns only event-based prospective memory in which cues in our environment potentially trigger or remind us that we earlier formed to a memory to complete some activity.  In everyday life, we might form the intention to buy pet food at either the grocery or the pet store; and accordingly, see either store front may serve as an effective cue that the intention can be completed.  In the laboratory, the standard analogue to such a real-world situation is to ask people to respond either to certain cues, or a class of cues, while they are busily engaged in some ongoing activity that is not directly related to their intention to respond.

One understudied aspect of such event cuing of intentions concerns those cases in which an intention is linked to a distal context (but see Marsh, Cook, & Hicks, 2006).  In addition, the concept of how related cues that are encountered in the wrong context affect cognitive processing has received very little attention as well.  We do know that having an intention can cause task interference which has been operationalized as a cognitive slowing to completing ongoing activities (see Marsh et al., 2002).  Presumably, attention is diverted away from ongoing processing in order to maintain the intention in some state of awareness.  By contrast, cue interference occurs when people notice a cue related to their intention; and such slowing occurs presumably because people notice, verify the context, and retrieve what action they are supposed to perform. We know that task interference can be eliminated over an intervening context if an intention is linked to a distal context.  We do not know much, if anything, about how cues encountered in that intervening context affect cognitive processing.

Thus, our study linked an intention (respond to animals beginning with the letter C) to a distal context.  We expected to see task interference when the distal context had been reached in the experiment.  Our fundamental question concerned what would happen to cue interference when related information was encountered in the proximal context that preceded the time when the intention was to be fulfilled.  On the one hand, seeing a grocery or pet store prior to needing to fulfill one's intention (or at an inopportune time) might not evoke the intention and no slowing should be observed.  On the other hand, encountering cues relevant to one's intentions out of the appropriate context may nevertheless trigger retrieval the intention as evidenced by reaction time slowing.  In the study that follows, we used a three phase paradigm (see the schematic) in which the intention was to respond to C-animals during the third phase.  During the first, intervening phase we embedded several different kinds of related words (hereafter called lures) to see if they attracted prospective memory attention outside of the context associated with the originally formed intention.

### Schematic of the Procedure
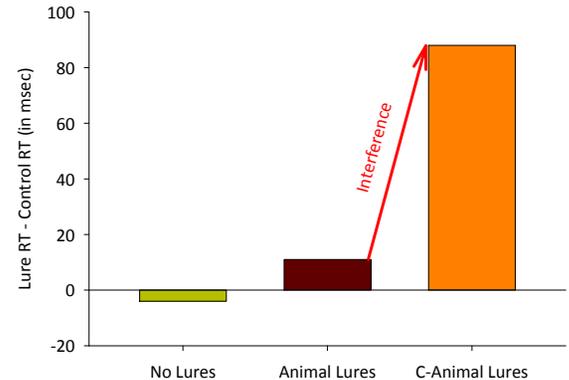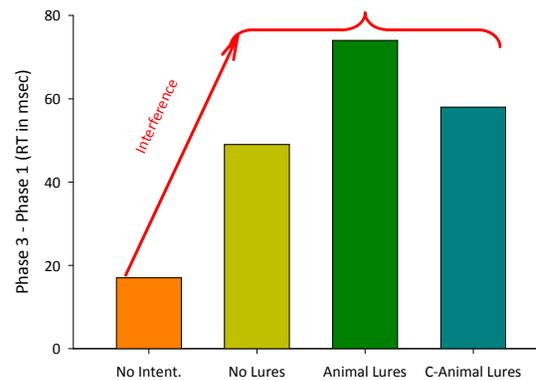


### Task Interference



### Lure Interference
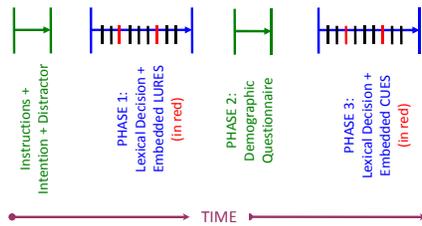


## Method

- Refer to Schematic

- Three Phase Paradigm
  - 105 Lexical Decisions (word-nonword judgments) in Phase 1
  - Demographic Questionnaire in Phase 2
  - 105 Additional Lexical Decisions  in Phase 3

- Four Conditions
  - No Related Lures
    - ❑ No intention control (to assess task interference)
    - ❑ Intention but unrelated matched "lures" in P1 (e.g., CLOCK)
    - Related Lures
    - ❑ Intention with non C-animal lures in P1 (e.g., HORSE)
    - ❑ Intention with C-animal lures in P1 (e.g., COBRA)

- There were 4 of each:
  - Lures in P1
  - C-animal words in P3

- Control Matched Words Included for Both Cues and Lures

- Participants instructed: Make LDT response, then PM response

- All reaction times were to making a word response

## Results

We present two figures of the results.  The first pertains to task interference which is the slowing that accrues from holding an intention.  In the first, we have subtracted the overall latency to words in Phase 1 from the comparable data in Phase 3.  The relevant aspect of the data is indicated by the red arrow.  There was no increase in latencies in Phase 3 when people had no intention.  By contrast, each of the three conditions that had the intention to respond to C-animals in Phase 3 significantly slowed down when they reached that distal, Phase 3 context.  Thus, the data indicate no task interference in Phase 1 regardless of condition, but a significant task interference effect when the appropriate context to respond with an intention was encountered.  This outcome replicates previous work and it indicates that the paradigm is sound for examining our fundamental question.

The novel aspect of the results is presented in the second figure of results.  We have eliminated the no-intentional group because this figure depicts the reaction time to lures during Phase 1 subtracting off the time to control-matched words.  The first red line demonstrates that animal words not beginning with C in the wrong context did attract a small, albeit nonsignificant amount of attention.  By contrast, the second red line demonstrates that perfectly matching cues in the wrong (earlier) context attracted a significantly large amount of attention as indicated by slowed reaction times.  We have not displayed a figure of overall cue detection performance for successful completion because all three conditions had high and equivalent performance hovering at 90%.  Moreover, we have not reported latencies to the actual cues in Phase 3 because these outcomes replicated what Marsh et al. (20XX) have already reported (and such results are ancillary to the primary goals of this study).

## Conclusions

We have replicated the fact that an intention linked to a distal context does not cause task interference over an earlier, intervening context.  The more consequential finding is that "lures" (i.e., related information) encountered in this earlier context can affect cognitive processing.  More specifically, less closely related information still evoked slowing which is a clear indication that intention-related cognitive processing was activated.  Perfectly related information (exact cues matching the intention) evoked tremendous slowing even in the wrong context when the intention was specifically related to a different context.  These outcomes are important for both practical and theoretical reasons.  On the practical side, related information may remind people of intentions that they possess and increase the probability that intentions will ultimately be completed (see Mäntylä, 1994, on retrieval sensitivity).  On the theoretical side, there are two distinct implications.  First, the cognitive processes associated with cue detection may be invoked even in the wrong context, regardless of how an intention was formed. Second, the data may suggest that cue detection can be a relatively automatic process because no attention should be devoted to cue detection in what is otherwise an irrelevant context.  Obviously, finer-grained experimental designs should ultimately inform how real-world cues facilitate this form of prospective memory.