The Influence of Noncriterial Information on Metacognitive Search Strategies

[1]Arlo Clark-Foos, [1]Gene A. Brewer, [1]J. Thadeus Meeks, [1]Richard L. Marsh, [2]Paul W. Foos, & [3]M. Cherie Clark

[1]University of Georgia, [2]University of North Carolina at Charlotte, & [3]Queens University

INTRODUCTION

The vast majority of memory research has been focused on the ultimate recall or recognition of items that were experienced at an earlier time (i.e., episodic memory). The theories that have emanated from such research have served us well to date, but they do not depict a complete picture of the retrieval mechanisms that may be involved. In the current study, we have tried to examine additional information (perhaps noncriterial to the actual test) that nevertheless underlies how carefully or how deeply people search memory on a particular occasion. More specifically, our hypothesis was that people will search memory more deeply if they have partial information for an incomplete representation of the information that they want to retrieve. Thus, this project addresses how partial information that is retrieved will affect the degree to which people will continue to search their memory for any sought-after information. We take as our starting point that all memories are bundles of features (Anisfield & Knapp, 1968; Bower, 1967). When searching memory, some of these features will come to mind and others will not. The ones that do come to mind (in number and/or kind), even if incomplete, may affect the degree to which a search of memory is continued.

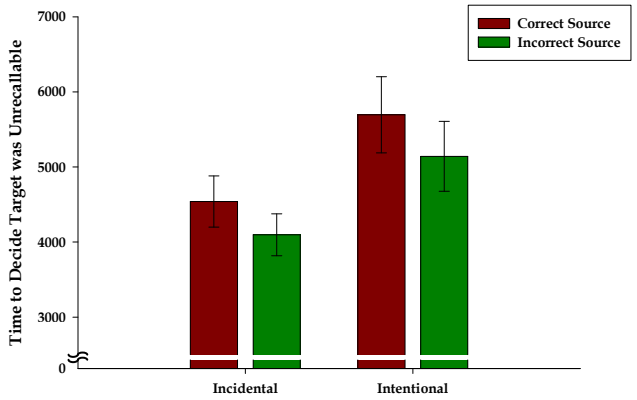
Our study lies at the interface of metacognition and mainstream memory insofar as metamemory determines how deeply we examine our memory for additional information. On the one hand, some researchers have claimed that the cues we use to access memory are most important. By this account, the familiarity of the cues being used at the moment of retrieval would determine the amount of time that people search for information (Metcalfe, Schwartz, & Joaquim, 1993; Reder & Schunn, 1996). On the other hand, other researchers have claimed that the partial information retrieved will guide additional searching in memory (Koriat, 1993). Our study was not specifically designed to disambiguate between these accounts, but rather, to examine a different variable that may shed more light on how people examine their memories. Specifically, we focus only on those cases in which memory fails, and we examine the time that people continue searching memory for information. The details follow.

EXPERIMENT 1: MOTIVATION & METHODS

In the studies that we report we used a cued-recall paradigm where participants learned paired associates; and then they had to recall the target word when given the cue word of the cue-target pair. For example, if a word pair was *garage-horse* then we wanted to know how long people would search for *horse* given the cue *garage*. To manipulate additional information available, we used a source-monitoring technique of presenting half of the word pairs in a male voice and the other half in a female voice. We later presented the intact pairs for a source-monitoring judgment and examined whether cued-recall search time for unsuccessfully recalled targets was a function of whether later source information was available. Thus, our hypothesis was that initial cued-recall search time would be affected by whether some partial information at the time of time of retrieval was available as evidenced by the later source test. To further study these effects, we manipulated whether people did or did not know that source (male vs. female) would ultimately be tested. With intentional learning, we believed that more partial information would be available during the cued-recall test as compared with incidental source encoding. Consequently, we predicted longer search times in the intentional as opposed to the incidental condition.

- 40 paired associates were presented (e.g., *garage-horse*)
  - Half in a male voice
  - Half in a female voice
  - 5 s to study on the computer monitor after the voice
- Two conditions: Incidental and Intentional learning of source
- Cued recall was administered requiring typing in the target when given the cue
  - If participants determined they could not recall, asked to hit the enter key
  - Reaction time was measured from the first keypress or the enter key
  - Self-paced
- A source test was given following cued recall
  - Pairs were represented intact
  - The decision was whether a male or female spoke the pair
  - No "catch" trials or new items given
  - Self-paced
- The primary dependent variable was reaction time to failed cued recall

EXPERIMENT 1



EXPERIMENT 1: RESULTS

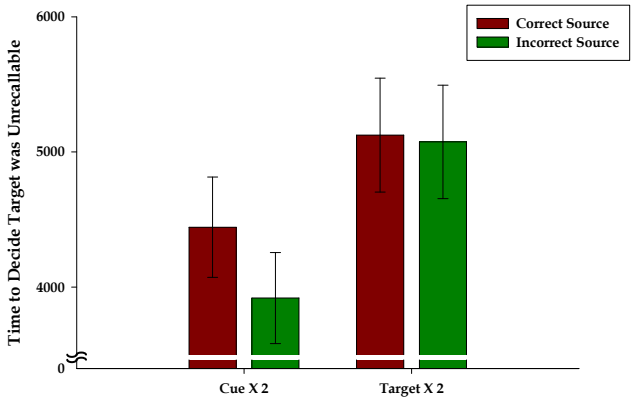
As can be seen in the figure, the incidental condition is presented on the left and the intentional source-learning condition is presented on the right. Our primary dependent variable (again) was the reaction time to press the enter key when participants cannot recall a target item when given the cue. The figure demarcates these decisions by whether subsequent source memory was correct or incorrect. Recall that our hypothesis was that when additional details were available in memory, even if incomplete, they should affect the search time during the initial cued-recall phase. As is evident in the figure, intentional encoding of source information did affect search time (i.e., it is longer than in the incidental condition). More importantly, the red bars depicting later correct source memory indicate that people searched longer in the in the initial cued-recall phase if they could recover partial information, as inferred from the later source test. Therefore, the results from this experiment strongly suggest that access to partial information (i.e., male-female information) about a memory a trace will determine the degree to which people will continue to search memory. In summary, both intentional encoding of information, and ultimately accessing the same information, affect search times in the absence of being able to immediately recall item information.

EXPERIMENT 2: MOTIVATION & METHODS

Experiment 1 clarifies the notion that access to partial information does affect the metacognitive strategy to search longer for additional, item, information. What is unclear from that experiment is whether the familiarity of the cue (Metcalfe, Schwartz, & Joaquim, 1993; Reder & Schunn, 1996) or the partial information of the target information drives this longer search decision. Consequently, we decided to manipulate the strength of the cue versus the strength of the target in separate conditions to investigate this issue. As such, one condition was pre-exposed to the cue two times whereas the other condition experienced the target two times before paired-associate learning. The methodology was otherwise the same as in Experiment 1 thereby allowing us to test again whether ultimate source memory details affected initial search time. However, this experiment also allows us to determine whether cue versus target information affects memorial search times in the absence of correct cued-recall performance.

- Pre-strengthening of cues versus targets in separate conditions
  - Cues experienced two times each for 2 s randomly
  - Targets experienced two times each for 2 s randomly
- 40 words pairs presented at 5 s each
  - Half in a male voice
  - Half in a female voice
- Cued recall with reaction time measured from the first keypress
  - Enter key to targets not recalled
- Source-monitoring test with intact pairs

EXPERIMENT 2



EXPERIMENT 2: RESULTS

The results can be seen in the figure with the strengthening the cue being presented in the left-hand bars and the strengthening of the target being presented in the right-hand bars. Obviously, cued-recall search time was vastly increased when the target was strengthened as compared with pre-strengthening the cue. Thus, this main effect would argue strongly for the notion that partial information in memory about a to-be-retrieved memory influences the degree to which a memorial search is engaged. This result is consistent with an accessibility account of metamemory and search (Koriat, 1993). However, there is a significant statistical interaction. When the cue was strengthened, source memory being correct increased the initial search time as compared with when ultimate source details were not accurately available. This condition fully replicates Experiment 1. The partial information being retrieved, as evidenced by the ultimate source test, clearly caused people to search memory longer even in the absence of correct cued recall. In summary, this experiment (along with Experiment 1) shows evidence that later access to correct information with better cues will influence the degree or time that people search memory for desired information.

CONCLUSIONS

The primary purpose of this study was to determine whether searching memory was influenced by additional memorial details that may or may not be diagnostic to a current decision. We chose to first conduct a cued recall test, and then, we tested people on their memory for the gender of the speaker. When cued recall failed, we found that people searched their memory longer when they ultimately were able to retrieve partial information about the memory trace that they were seeking. Together, these results suggest that a metacognitive strategy to search memory is strongly influenced by the cue, but may be more influenced by the partial information that is accessed at the time of a retrieval attempt. These experiments are an initial attempt to understand the dynamics of how partial information (defined here as source information) affect metacognitive decisions. Our current work examines how characteristics of the cue (e.g., high versus low word frequency) might affect search decision times. In summary, access to partial information, or just additional context information, can affect the degree to which we search for item information.