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The effect of distinctive visual information on false recognition

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Abstract

Using the false memory paradigm (Deese, 1959), recently revived by Roediger and McDermott (1995), we examined the effect on true and false recognition of presenting study items in unusual looking fonts. In one condition, each font was associated with a single study item. In a second condition, each font was presented 12 times per study list, randomly distributed across several themes. In a third condition, each font was presented 12 times in the study list, and was associated with a particular study theme. False recognition levels were lowest when there was a unique association between each font and a single study item, whereas false recognition levels were highest when all items from a theme were presented in the same font. Further, the effects of font condition on false recognition of lures maintained when font condition was manipulated within participants and lists. These results, taken together, are inconsistent with theories proposing that false recognition reduction is the product of global shifts in response strategies across conditions (e.g., Schacter, Israel, & Racine, 1999). However, perspectives highlighting the effects of memory based processes on true and false recognition provide an adequate account.

Keywords: False memory; Recognition; Perceptual attributes of memory; Distinctiveness hypothesis

False memory has received a tremendous amount of attention in the past several years, both in popular circles as well as in the memory community. Within the memory community, the focus on false memory in list learning paradigms can be traced to a study by Roediger and McDermott (1995). Roediger and McDermott, reviving a paradigm originated by Deese (1959), presented participants with lists of study items that were all related to a single, unpresented item (referred to as the *lure item*). On a later free recall test, a memory task in which participants do not often intrude unstudied items, participants produced the lure item with approximately the same probability as study items presented in the middle serial positions of the study list (Roediger & McDermott, 1995). Further, participants were given a recognition memory test and asked to provide remember-know responses when an item was judged old. Results of the recognition memory test produced two notable findings. First, the false alarm rate of the lure items was approximately equivalent to the hit rate for studied items. Second, participants often assigned a *remember* response to lure items, indicating that they consciously recollected the presentation of the lure items on the study list, when, in fact, such items were never presented at study. These results have been subsequently replicated and extended by numerous researchers (e.g., Payne, Elie, Blackwell, & Neuschatz, 1996). The fact that participants falsely recognize and recall unstudied items with such a high probability, coupled with the fact that participants claim conscious recollection of a lure item's presentation,

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suggests that false recognition[1] is caused by fundamental memory processes. Thus, understanding the nature of false recognition may provide critical insights into the processes of memory.

Concurrently, theorists have become increasingly interested in the role that recognition memory decision processes play in the production of true and false recognition (Hirshman, 1995; Hirshman & Arndt, 1997; Miller & Wolford, 1999; Roediger & McDermott, 1999; Wickens & Hirshman, 2000; Wixted & Stretch, 2000). In general, decision based approaches to false recognition (e.g., Dodson & Schacter, 2001, 2002; Hirshman, 1995; Miller & Wolford, 1999; Schacter et al., 1999) claim that there are elements of memory representations that cause participants to change the basis by which they evaluate whether a test item should be considered studied. For example, increasing the precision with which study items are encoded may lead to an increase in the amount of information participants require to be retrieved from memory before endorsing a test item as old (Hirshman, 1995).

The hypothesis that false recognition differences are caused by decision processes is often contrasted with the hypothesis that differences in false recognition are due to memory based processes independent of decision processes, such as encoding or representational factors (Arndt & Hirshman, 1998; Hirshman & Arndt, 1997; Roediger & McDermott, 1999; Wickens & Hirshman, 2000; Wixted & Stretch, 2000). Memory based approaches to false recognition (e.g., Wickens & Hirshman, 2000; Wixted & Stretch, 2000) claim that the properties of the memory representations on which false recognition is based are the causal element producing changes in false recognition across experimental conditions. For example, increasing the precision with which a study item is encoded may decrease the match between an unstudied test item and items encoded in memory, thereby reducing the evidence that the test item was studied (Shiffrin & Steyvers, 1997).

A recent theoretical instantiation of how decision processes may reduce false recognition in the paradigm of Deese (1959) and Roediger and McDermott (1995) was proposed by Schacter et al. (1999) (see also Dodson & Schacter, 2001, 2002). Schacter et al. proposed that when participants are provided with salient visual information at study, they will come to expect that they should be able to retrieve detailed visual information at test. Such a retrieval strategy will cause participants to search more rigorously at test for encoded visual information, a notion Schacter et al. referred to as a *distinctiveness heuristic*. When participants are unable to retrieve visual information, they will tend to reject the test item, producing a reduction in false recognition because unstudied items are less likely to have visual information associated with the representations supporting their recognition. Further, Schacter et al. (1999) proposed that a distinctiveness heuristic operated on a global basis, such that all test items were subjected to analysis for associated visual information in memory, and not just items for which salient visual information was re-presented at test.

Consistent with the operation of a distinctiveness heuristic, Israel and Schacter (1997) and Schacter et al. (1999) observed a reduction in false alarms when participants were shown pictures of study items (in addition to words) at encoding relative to participants that were only provided with words at study. Further, this reduction in false alarms occurred regardless of whether both pictures and words or only words were presented at test, suggesting that a general shift in decision strategy occurred as a result of the *study* of pictorial information. Schacter et al. (1999) further tested the distinctiveness heuristic hypothesis by varying encoding condition within participants and study lists. The distinctiveness heuristic hypothesis predicts that when encoding condition (picture + word vs. word) is manipulated within participants and study lists, similar levels of false recognition should occur across encoding conditions. The reason for this is simple: if a difference in decision strategy is the solitary reason that differences in false recognition are observed in an experiment, there should not be differences in the memory based factors that contribute to false recognition across conditions. Thus, if encoding condition is manipulated within participants and lists, and participants do not change their decision strategy across item types within a test list (see Stretch & Wixted, 1998 for evidence that participants maintain a single decision strategy within a test list), then the differences in false recognition reduction observed due to encoding condition should no longer be observed. Thus, by manipulating encoding condition within study lists, any amount of false recognition reduction resulting from a decision strategy shift would be equated across encoding conditions, and different levels of false recognition could only result from the properties of the memory representations on which false recognition is based. Consistent with the proposition that a distinctiveness heuristic was driving the reduction in false recognition, the manipulation of encoding condition within participants and study lists eliminated differential suppression of false recognition across word and pictorial encoding (Schacter et al., 1999; see Dodson & Schacter, 2001 for similar results with saying vs. hearing words at study).

The ubiquity of the distinctiveness heuristic as a mechanism of false recognition reduction is less clear.

[1] While the term false recognition technically applies to the erroneous recognition of *any* new test item, we are primarily concerned with the false recognition of unstudied items that are semantically related to a number of study items. Thus, we use this term to refer to this restricted case of false recognition phenomena.