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How distinctive processing enhances hits and reduces false alarms

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ABSTRACT

Distinctive processing is a concept designed to account for precision in memory, both correct responses and avoidance of errors. The principal question addressed in two experiments is how distinctive processing of studied material reduces false alarms to familiar distractors. Jacoby, Kelley, and McElree (1999) has used the metaphors early selection and late correction to describe two different types of control processes. Early selection refers to limitations on access whereas late correction describes controlled monitoring of accessed information. The two types of processes are not mutually exclusive, and previous research has provided evidence for the operation of both. The data reported here extend previous work to a criterial recollection paradigm and to a recognition memory test. The results of both experiments show that variables that reduce false memory for highly familiar distracters continue to exert their effect under conditions of minimal post-access monitoring. Level of monitoring was reduced in the first experiment through test instructions and in the second experiment through speeded test responding. The results were consistent with the conclusion that both early selection and late correction operate to control accuracy in memory.

Introduction

The ability to discriminate between correct and incorrect responses in memory is a difficult challenge when the incorrect response is plausible and familiar in the context of the cue. Such situations are common in day-to-day memory. Examples include: In which of those three journals did I encounter that paper?; Which type of mustard was I to buy?; Was Pat at last week's meeting or the one the week before or both?. In this paper, we report experiments based on a laboratory model of these examples. The experiments were designed to investigate the roles of target encoding and test strategy on memory accuracy. The research was premised on a particular view of distinctive processing developed to account for precision in memory both in terms of correct memory for target items and correct rejection of incorrect items.

Distinctive processing

Distinctive processing is defined here as the processing of difference in the context of similarity (Gentner & Markman, 1994; Hunt, 2006). Similarity refers the spatio-temporal, semantic context of the items comprising an event (Klein, Shiffrin, & Criss, 2007). Difference refers to attributes of an item not shared by other items in the event. A common laboratory implementation of this definition requires the subject to perform an item-specific processing task, e.g. pleasantness rating, on a categorized list. The pleasantness rating task encourages processing of item-specific meaning in the context of the spatio-temporal

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and categorical similarity among the items. The combination of item-specific meaning encouraged by the processing task and relational categorical meaning shared by the items is highly diagnostic of a particular item and theoretically is the basis for precise memory. In this laboratory model, each word is a theoretical item and each list is a theoretical event. Prior studies have shown much better memory for target items processed distinctively in accord with this definition than for items processed only for similarity (see Hunt, 2012; Hunt & McDaniel, 1993 for reviews).

As described here, distinctive processing is initiated at study, which begs the question of how distinctive processing could directly affect performance on incorrect items that are not part of the study event. Hunt (2003) proposed that distinctive processing occurs at various grain sizes of memory. Memory for items within an event benefit from processing the differences among the items in the context of their similarity, termed item-based distinctive processing. Likewise, differences in the processing of lists that are similar on one or more dimensions also is distinctive processing, which in the context of proper cues at test will reduce confusion between the events. Building on the work of Dobbins, Kroll, Yonelinas, and Liu (1998) and Gruppuso, Lindsay, and Kelley (1997), Hunt had participants study two categorized lists, each containing instances from the same categories. Either a category judgment or a pleasantness rating task was performed on the lists. Some participants performed the same task on both lists while others performed different tasks on each list. The test required participants to recognize items from List 2 in the presence of List 1 distracters. False alarms to first list items were reduced by performing different orienting tasks on the two lists (see also Dobbins et al. and Gruppuso et al. for this finding using unrelated word lists). Hit rates for second list items were higher following pleasantness rating than following category judgment on the second list items. Thus item-based distinctive processing of the second list items facilitated hit rates while event-based distinctive processing of the separate lists reduced false alarms to familiar items. The purpose of the research presented here is to investigate how event-based distinctive processing enhances regulatory control over memory errors as well as to replicate the effects of item-based distinctive processing on hit rates. Three candidate explanations for the effect of event-based distinctive processing are considered.

Post-access monitoring

Accuracy can be controlled by monitoring retrieved memories for evidence of an item's presence in the target list. The monitoring hypothesis originates with Johnson's seminal work on memory for the source of items (e.g., Johnson, Hastroudi, & Lindsay, 1993). Monitoring can take the form of general source monitoring as in the activation-monitoring theory of false memory (Roediger, Watson, McDermott, & Gallo, 2001) or more specific monitoring as in the distinctiveness heuristic (Schacter, Israel, & Racine, 1999).The distinctiveness heuristic describes the case in which some aspect of the original experience is judged to be highly memorable (distinctive), and a strategy is adopted at test to examine each accessed item for the presence of that distinctive information. Absence of the distinctive property is evidence that the item is incorrect. For example, Schacter and his colleagues have shown repeatedly that false memories are less likely when the material is presented as pictures versus words and have argued that pictures yield more distinctive recollection than words (see Schacter & Wiseman, 2006, for a review). Gallo (2010, 2013) developed a more general version of the same monitoring principle, which stipulates that retrieval expectations, regardless of memorability, influence monitoring accuracy. Applied to event-based distinctive processing, the idea is that subjects expect more accurate discrimination between two similar lists if the lists were processed differently than if the same process were applied to both lists. For example, if the topic of conversation between you and me on two different occasions is the same, identifying a particular element of the conversation with one of the conversations will be more difficult than if the two conversations were about two different topics. As applied to Hunt (2003), monitoring accuracy of items from the second list was better when the orienting tasks differed for the two lists because recollection of performing the List 2 task was highly diagnostic of target items.

Retrieval constraint

Retrieval accuracy also can be enhanced by constraining access to the target items. This restraint can be imposed in two different ways. The first is by reducing processing at study that would encourage potential false responses at test. As applied to false memory in the DRM paradigm, the argument is that any variable that focuses processing on item-specific information at study also limits relational processing among the studied items. Because the critical item is related to the studied items, the reduction in relational processing limits access to the critical item at study and hence the probability of it later being falsely remembered (Arndt & Reder, 2003; Hege & Dodson, 2004; Huff & Bodner, 2013). Although this version of the constraint hypothesis provides a plausible explanation of the effect of certain variables on false memory in the DRM paradigm, it is less applicable to the data from Hunt (2003) on event-based distinctive processing. The manipulation that reduced false alarms in the Hunt study, which was the orienting task on the second study list, cannot cause a reduction in the activation of the incorrect items at study because those items were presented prior to the critical manipulation.

More relevant is a different version of the constraint hypothesis. Rather than assume that some aspect of processing is deficient, the argument is that precise processing of targets at study can be reinstated at retrieval to the exclusion of incorrect items. Jacoby's research on memory for foils introduced this idea (Halamish, Goldsmith, & Jacoby, 2012; Jacoby, Shimizu, Daniels, & Rhodes, 2005; Jacoby & Shimizu, 2005), which subsequently has been supported by additional research (Alban & Kelley, 2012; Danckert, Macleod, & Fernandes, 2011; Marsh et al., 2009). In essence, the combined effect of precise encoding with appropriate cuing restricts access to the targeted information. Item-based distinctive processing provides the precision of target encoding that could serve this purpose.