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A closer look at children's metacognitive skills: The case of the distinctiveness heuristic



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ABSTRACT

The primary aim of this study was to document the developmental course of distinctiveness effects throughout childhood. Specifically, we examined whether the reduction in false recognition rates that is traditionally observed in children after distinctive encoding could be explained not only by enhanced discrimination between studied and new items but also by the implementation of a conservative response criterion resulting from the use of metacognitive expectations about the quality of memories (i.e., distinctiveness heuristic). Two experiments were conducted in which children in three age groups—4–5, 6–7, and 8–9 years—were asked to study a set of items presented in either pictorial (distinctive) or word (less distinctive) form. In Experiment 1, pictures and words were displayed in two separate lists, a design that is supposed to favor reliance on the distinctiveness heuristic. In Experiment 2, the two types of stimuli were presented within the same list, a design that is supposed to make using the metacognitive heuristic ineffective. Overall, Experiments 1 and 2 provide evidence that children as young as 4 years rely on the distinctiveness heuristic to guide their memory decisions, resulting in a reduction in the false recognition rate when items are presented using a pure-list design (Experiment 1) but not when they are presented using a mixed-list design (Experiment 2). The implications of these findings for our understanding of the development of metacognition and the involvement of metacognitive skills in children's memory performance are discussed.

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Introduction

The finding that distinctively encoded information—operationalized as the processing of differences relative to some context (Howe, 2006)—produces a memory advantage has a long and fruitful history in the domain of memory studies (see Hunt, 2013, for an overview). For instance, much research has shown that distinctive encoding usually improves correct memory and reduces false memory as compared with less distinctive encoding. This pattern has been demonstrated with various sorts of recognition tasks using, for example, picture versus word stimuli (e.g., Gallo, Bell, Beier, & Schacter, 2006; Ghetti, Qin, & Goodman, 2002; Schacter, Israel, & Racine, 1999), reading words aloud versus silently (e.g., Fawcett, Quinlan, & Taylor, 2012; Huff, Bodner, & Fawcett, 2015; Ozubko & MacLeod, 2010), salient versus ordinary items (Strack & Bless, 1994), and bizarre versus common events (e.g., Black et al., 2012).

In general, studies conducted on adults suggest that at least two non-mutually exclusive editing processes—defined as mechanisms people use to avoid false memories (Lampinen & Odegard, 2006)—may account for the superior recognition performance in response to distinctive (e.g., pictures) over nondistinctive (e.g., words) material. First, memory decisions may be more accurate because distinctive encoding strengthens the memory trace, and, thus, produces high-quality memories. As a result, participants may be more likely to reject false information because they are able to recollect information that logically disconfirms the prior presentation of an item (e.g., “I couldn’t have studied *pineapple* because I remember studying *banana*, *raspberry*, and *peach*, and there were only three words per category”). This retrieval process is generally called “recall-to-reject” (Gallo, 2004; Gallo et al., 2006; Lampinen & Odegard, 2006; Rotello, Macmillan, & Van Tassel, 2000).

Second, the memory advantage may result from the implementation of the *distinctiveness heuristic*, a retrieval decision rule based on participants’ metacognitive expectations about the quality of their memories (Dodson & Schacter, 2001; Schacter et al., 1999). According to this account, participants evaluate their memories against a criterion based on how detailed they expect those memories to be. Specifically, people usually expect to be able to recollect more vivid details after distinctive encoding than after less distinctive encoding. When these expectations are not fulfilled, participants tend to conservatively decide that they have never encountered the stimulus before (reasoning that can be formalized as “If I had seen it, I would have remembered it”). Conversely, when participants do not have such metacognitive expectations—for example, after encoding a word—they are inclined to use a more liberal response criterion. Providing evidence for the critical role of expectations in participants’ memory decisions, Dodson and Schacter (2002) showed that the distinctiveness heuristic is used even if none of the items is distinctively encoded as long as participants *believe* that some of the items were encoded in a distinctive manner (see also McDonough & Gallo, 2012). In sum, whereas the recall-to-reject process depends on the objective recollection of specific episodes, the distinctiveness heuristic mainly relies on subjective expectations about the quality of memory traces.

Interestingly, these two memory editing processes have been incorporated into various theoretical models of memory such as fuzzy trace theory, the source-monitoring framework, and signal detection theory. According to fuzzy trace theory, people encode multiple representations of an item in parallel, and these representations vary in terms of their precision. Memory traces that encode an item’s features are called “verbatim traces,” whereas traces that encode general meanings are called “gist traces” (Reyna & Brainerd, 1995). According to this theory, the recall-to-reject strategy would result from the retrieval of verbatim traces. Conversely, the distinctiveness heuristic would depend on awareness of the quality of the traces (Gomes & Brainerd, 2013).

Another theory that distinguishes between the recall-to-reject strategy and the distinctiveness heuristic is the source-monitoring framework (Johnson, Hashtroudi, & Lindsay, 1993). According to this model, people accept a piece of information as having been previously presented only if they can attribute the source of this information to their memory, which is possible because memories for different sources contain characteristically different kinds of information. Within this framework, the recall-to-reject strategy is supposed to influence source monitoring when people correctly attribute episodic details to their respective sources, leading to the rejection of misinformation.

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