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The effects of generation on conceptual implicit memory[☆]

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Abstract

The generation effect has been central to theoretical analyses of implicit memory and has been used as a criterion for classifying implicit tests as conceptual. The present experiments demonstrate that generation does not always enhance conceptual implicit memory. Four experiments examined the effects of generation on conceptual implicit and explicit memory in category-exemplar production and category-cued recall, respectively. Two nonsemantic generation tasks, letter transposition and word-fragment generation, affected recall but not conceptual priming, dissociating performance on the two conceptual tests. A semantic generation task, however, enhanced both recall and priming. Finally, the letter-transposition task enhanced conceptual priming when categorical information was salient at encoding (in study lists blocked by category) but not when categorical information was nonobvious (in randomly ordered study lists). These results help delineate conditions under which generation effects are obtained in conceptual priming and are discussed in terms of the item-specific–relational distinction (Hunt & McDaniel, 1993). © 2002 Elsevier Science (USA). All rights reserved.

Keywords: Implicit and explicit memory; Generation effect; Conceptual priming

The principles that govern implicit and explicit memory appear to differ in a number of ways, as reflected by a variety of population, pharmacological, and functional dissociations (Roediger & McDermott, 1993; Schacter, 1987; Tulving & Craik, 2000). Most important for present purposes are the functional dissociations produced when experimental manipulations exhibit different effects on implicit and explicit memory tests. For

example, the levels-of-processing manipulation produces a marked effect on explicit memory, though it often has no significant effect on implicit tests (Roediger & McDermott, 1993; cf. Brown & Mitchell, 1994). Conversely, manipulations of the similarity of physical (or perceptual) features of the stimuli as presented at the time of study and test affect a number of implicit memory tests but have little or no effect on most explicit tests (see Roediger & McDermott, 1993, for review).

Joining these is the read–generate manipulation, which has attracted considerable interest because this manipulation can produce opposite effects on explicit and implicit memory. This was initially demonstrated by Jacoby (1983), who had

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participants read words out of context (e.g., *xxx-cold*), read words in a meaningful context (e.g., *hot-cold*), or generate words from context (e.g., *hot-????*). Participants' memory for the words was then tested with either an explicit (recognition memory) or an implicit test (perceptual identification). For recognition, the generated words produced the greatest accuracy followed by words read in context and then words read out of context; this is the traditional finding that generated words lead to superior explicit memory (the generation effect; Slamecka & Graf, 1978). On the perceptual-identification task, the opposite results obtained: reading words out of context produced the most priming, followed by reading words in context. The generate condition produced the least priming.

Of the extant theoretical accounts of dissociations of implicit and explicit memory (Toth, 2000; Schacter, Wagner, & Buckner, 2000), perhaps the most successful at accounting for functional dissociations has been the transfer-appropriate-processing (TAP) account (Blaxton, 1989; Roediger, 1990; Roediger & McDermott, 1993), which distinguishes between perceptual and conceptual retrieval tasks. The most widely used implicit memory tests involve the identification or completion of degraded or ambiguous perceptual cues, such as word fragments or stems, briefly presented words, or fragmented pictures. The TAP framework posits that these tests are primarily dependent on perceptual processes during retrieval and as a consequence are sensitive to variation in perceptual processes at encoding but relatively insensitive to variation in conceptual processes. In contrast, most explicit tests (e.g., free and cued recall) and some implicit tests (e.g., category-exemplar production, word association, general knowledge questions) rely on conceptual retrieval processes. Hinging on the conceptual-perceptual distinction, the TAP account has had a good deal of success in accounting for dissociations among memory tests (Roediger & McDermott, 1993).

An important aspect of the TAP framework is a set of criterial variables for operationally defining memory tests as primarily conceptual or perceptual. The central criterion is the read-generate study manipulation (Jacoby, 1983). Under the TAP framework, memory tests which exhibit a generation effect are assumed to reengage primarily conceptual processes, whereas tests exhibiting the reverse generation effect, in which the read condition leads to greater performance, are

assumed to reengage primarily perceptual processes (e.g., Blaxton, 1989; Roediger, 1990; Roediger, Buckner, & McDermott, 1999; Roediger & McDermott, 1993). Other criterial variables are the study-modality manipulation and the levels-of-processing manipulation (e.g., Blaxton, 1989; Java, 1996; Roediger & McDermott, 1993; Roediger, 1990).

The present study examines the effects of generation on conceptual implicit memory. The effects of generation on implicit and explicit tests have been of prime theoretical importance in the implicit memory literature. The finding that the generation manipulation can produce opposite effects on measures of explicit and implicit memory (as in the Jacoby, 1983, example) has traditionally been taken as strong evidence that the dissociated tests measure qualitatively different aspects of memory (e.g., Schacter, 1987). The generation effect was critically important in the development of the TAP account of implicit memory and in the distinction between perceptual and conceptual priming (Blaxton, 1989; Roediger, 1990; Roediger & McDermott, 1993). The effects of generation have likewise been central to other theoretical analyses of implicit memory (e.g., Masson & MacLeod, 1992, 1997; see Roediger & McDermott, 1993 for discussion).

With regard to perceptual priming tests, reading generally produces more priming than generating (see Roediger & McDermott, 1993, for a review), although there are some important exceptions (e.g., Masson & MacLeod, 1992). More important for present purposes are the effects of generation on conceptual implicit memory. Blaxton (1989), using encoding conditions similar to those of Jacoby (1983), found a generation effect in the general knowledge task; generated words produced more conceptual priming than words read in or out of context, a result replicated by (Blaxton (1992) at least with normal control participants; patients with temporal-lobe epilepsy did not produce normal generation effects on this task).

Generation effects have also been observed in the conceptual priming tasks of category-exemplar production, word association, and category accessibility. Srinivas and Roediger (1990) had participants generate the final word of a sentence or read the word in context. They found a robust generation advantage in category-exemplar production. Maki and Knopman (1996) replicated this result with both younger and older adults. In

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