



Measuring the speed of the conscious components of recognition memory: Remembering is faster than knowing

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Abstract

Three experiments investigated response times (RTs) for remember and know responses in recognition memory. RTs to remember responses were faster than RTs to know responses, regardless of whether the remember–know decision was preceded by an old/new decision (two-step procedure) or was made without a preceding old/new decision (one-step procedure). The finding of faster RTs for R responses was also found when remember–know decisions were made retrospectively. These findings are inconsistent with dual-process models of recognition memory, which predict that recollection is slower and more effortful than familiarity. Word frequency did not influence RTs, but remember responses were faster for words than for nonwords. We argue that the difference in RTs to remember and know responses reflects the time taken to make old/new decisions on the basis of the type of information activated at test.

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1. Introduction

According to dual-process models of recognition memory, previously studied items can be identified as old either because they are consciously recollected or because they evoke a feeling of

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familiarity (e.g., Atkinson & Juola, 1974; Jacoby, 1991; Jacoby & Dallas, 1981; Mandler, 1980, 1988; Yonelinas & Jacoby, 1996). This distinction is supported by findings from studies showing that recollection and familiarity can be dissociated experimentally. For example, recollection is more sensitive than familiarity to levels-of-processing manipulations (e.g., Gardiner, 1988; Khoe, Kroll, Yonelinas, Dobbins, & Knight, 2000; Mulligan & Hirshman, 1995) and divided attention (e.g., Gardiner & Parkin, 1990; Jacoby & Kelley, 1992; Jacoby, Woloshyn, & Kelley, 1989), while familiarity is more sensitive than recollection to modality changes between study and test (e.g., Gregg & Gardiner, 1994; Toth, 1996). There is also evidence that recollection and familiarity are supported by different brain regions. For example, findings from several studies indicate that recollection is dependent on the hippocampus while familiarity is dependent on the surrounding medial temporal lobe regions (e.g., Aggleton & Brown, 1999; Tulving & Markowitsch, 1998; Yonelinas, Kroll, Dobbins, Lazzara, & Knight, 1998). Recollection and familiarity can thus be dissociated both behaviorally and in terms of their underlying neural substrates (see Yonelinas, 2002, for a review).

The view that recognition memory involves two processes has also been investigated using the *remember-know* procedure (Gardiner, 1988; Tulving, 1985). This procedure capitalizes on the fact that recollection and familiarity can be distinguished on the basis of subjective experience. In *remember-know* studies, participants are instructed to categorize each positive recognition decision as either a *remember* (R) response if they can consciously recollect the item's study presentation, or a *know* (K) response if they recognize the item on the basis of familiarity but cannot consciously recollect its study presentation. The distinction between remembering and knowing was originally used to describe the states of awareness that characterize retrieval from episodic and semantic memory respectively (Tulving, 1985). However, subsequent findings have often been interpreted within a dual-process framework (e.g., Dewhurst & Anderson, 1999; Dewhurst & Hitch, 1999; Jacoby, Yonelinas, & Jennings, 1997; Rajaram, 1993, 1996; Yonelinas, 2002).

Although the distinction between remembering and knowing is consistent with the view that recognition memory involves two separate processes, some studies that have used the *remember-know* procedure have produced findings that are inconsistent with the predictions of dual-process models. For example, dual-process models attribute the word frequency effect (WFE) in recognition memory (better recognition of low-frequency than high-frequency words) to a greater enhancement of familiarity for the low-frequency words following their study presentation (e.g., Jacoby & Dallas, 1981; Mandler, 1980). However, Gardiner and Java (1990) found a WFE in R rather than K responses, suggesting that word frequency influences recollection rather than familiarity (see Dewhurst, Hitch, & Barry, 1998, for similar findings). This is consistent with the view that the WFE reflects the greater distinctiveness of low-frequency words (Glanzer & Adams, 1990; Rajaram, 1996; Reder et al., 2000).

The aim of the present study was to investigate a further discrepancy between dual-process models and *remember-know* studies concerning the relative speed of the recollection and familiarity processes. According to dual-process models, familiarity is a rapid and automatic process that places relatively low demands on cognitive resources, whereas recollection is a slower and more effortful process that places greater demands on cognitive resources (e.g., Atkinson & Juola, 1974; Jacoby, 1991; Mandler, 1980, 1988; Yonelinas & Jacoby, 1994, 1996). This view is supported by the findings of Hintzman and Caulton (1997) that under speeded test conditions participants can make old/new decisions more rapidly than they can make judgements that require recollection

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