



Remembering and Knowing: Using another's subjective report to make inferences about memory strength and subjective experience

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ABSTRACT

The Remember–Know paradigm is commonly used to examine experiential states during recognition. In this paradigm, whether a Know response is defined as a high-confidence state of certainty or a low-confidence state based on familiarity varies across researchers, and differences in definitions and instructions have been shown to influence participants' responding. Using a novel approach, in three internet-based questionnaires participants were placed in the role of 'memory expert' and classified others' justifications of recognition decisions. Results demonstrated that participants reliably differentiated between others' memory experiences – both in terms of confidence and other inherent differences in the justifications. Furthermore, under certain conditions, manipulations of confidence were found to shift how items were assigned to subjective experience categories (Remember, Know, Familiar, and Guess). Findings are discussed in relation to the relationship between subjective experience and confidence, and the separation of Know and Familiar response categories within the Remember–Know paradigm.

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1. Introduction

When the Remember–Know (RK) paradigm was first introduced by [Tulving \(1985\)](#), Remember and Know responses were posited as reflecting auto-noetic and noetic consciousness based on retrieval from episodic and semantic memory respectively. In recognition memory tests, old items were categorised as Remembered when the participant retrieved from memory something they had thought or experienced at the time of encoding and categorised as Known when the participant was aware that the item had been on the study list but could not recall anything experienced for the item at that time ([Gardiner & Richardson-Klavehn, 2000](#); [Tulving, 1985](#)). Since Tulving's first examination of Remember and Know subjective experiences two main issues have dominated the RK literature: The relationship between subjective experience and confidence, and the relationship between the subjective states of Remembering and Knowing and the underlying processes of recollection and familiarity. The experiments presented here examined both these issues using a novel methodology.

1.1. Subjective experience and confidence

The relationship between subjective experience and confidence has been acknowledged from the conception of the RK paradigm when [Tulving \(1985\)](#) demonstrated that Remembered items were given higher confidence ratings than were

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Known items. This has been replicated in numerous experiments (e.g., Brewer & Sampaio, 2006; Gardiner & Java, 1990; Rajaram, 1993; Rajaram, Hamilton, & Bolton, 2002; Rotello & Zeng, 2008; Tulving, 1985; and Yonelinas, 2001) with the suggestion that information from subjective awareness is used to judge how confident one is (Gardiner, 2001). The relationship between subjective experience and confidence has also been the subject of debate between advocates of dual-process and single-process models of recognition. Dual-process models (e.g., Mandler, 1980; Tulving, 1985; Yonelinas, 1994, 2002) assume that two distinct processes underlie recognition and that successful recognition is determined by contributions from both processes. Conversely, single-process accounts propose that recognition relies on only one continuous dimension of familiarity, confidence, or memory strength, and successful recognition is determined by the strength of this single dimension (e.g., Donaldson, 1996; Dunn, 2004). For comprehensive reviews of the literature that summarise the opposing viewpoints see Yonelinas (2002), Diana, Reder, Arndt, and Park (2006), Dunn (2004, 2008), Parks and Yonelinas (2007), and Wixted and Stretch (2004). However, despite continued theoretical debate, how the layperson understands, conceptualises, and acts upon subjective experiences of memory and confidence in memory are still not well understood.

Experiments that have compared RK and confidence judgments have shown different patterns of responding elicited by these two judgment types. Early studies operationalised confidence as a two-category scale of Sure–Unsure and compared proportion of items assigned against proportion assigned to Remember and Know. Using this comparison, these two judgment types were shown to not elicit the same patterns of responses using word/non-word (Gardiner & Java, 1990; Rajaram et al., 2002) or masked priming manipulations (Rajaram, 1993; and with the addition of a Guess category Tunney & Fernie, 2007). More recently, differences between RK and confidence judgments have been demonstrated by comparison of verbal reports at recognition to ‘think-aloud’ verbalisations made during study (McCabe, Geraci, Boman, Sensenig, & Rhodes, 2011). Here justifications for Remembered items were more likely to contain recollection of details verbalised during encoding than were justifications for high-confidence items. Taken together, these findings demonstrate that while judgments of confidence and subjective experience may be interrelated, RK judgments are not made solely on the basis of confidence and the two are not “experimentally interchangeable” (Rajaram et al., 2002, p. 234).

RK and confidence judgments have also been compared using a larger scale to measure confidence and analysis has focused on the resulting receiver-operating-characteristic (ROC) curves. Using this methodology, higher confidence has been consistently found to be associated with Remember responses compared to Know responses (Rotello, Macmillan, & Reeder, 2004; Rotello, Macmillan, Reeder, & Wong, 2005; Slotnick, 2010; Wixted & Stretch, 2004; Yonelinas, 2001; Yonelinas, Dobbins, Szymanski, Dhaliwal, & King, 1996). Different modelling approaches have aimed to determine whether the data are better explained by single- or dual-process models (e.g., Donaldson, 1996; Dunn, 2004, 2008; Gardiner, Ramponi, & Richardson-Klavehn, 2002; Macmillan, Rotello, & Verde, 2005; Wixted & Mickes, 2010). In a review, Gardiner (2008) concluded that most of these available models provide a reasonably good fit to the data but that as the technical complexity of the models has increased it has become more and more difficult to see how to discriminate between them empirically (see also O’Connor, Guhl, Cox, & Dobbins, 2011). Rather than attempting to provide evidence supporting one or other of the models, the experiments presented here examine how people make and understand judgments of subjective experience and confidence. In particular, we were interested in whether the content and nature of people’s subjective reports was enough to ‘recover’ information about confidence and experiential state from those who actually performed the memory test. Our goal was to examine how people interpret evidence from experiential reports in terms of both confidence and categories of subjective experience.

1.2. Knowing and familiarity

A second issue of debate within the RK paradigm is the relationship between the states of Remembering and Knowing and the processes of recollection and familiarity. In their review, Gardiner and Richardson-Klavehn (2000) identified interpretation of Know responses as “the most vexatious problem in the remember/know paradigm” (p. 238). The root of this problem lies in, firstly, whether Know responses are defined to participants in terms of familiarity or certainty; and secondly, whether Know responses are interpreted as reflecting an underlying process of familiarity or a state of knowing. For example, some researchers choose to ask participants to make Remember–Familiar judgments instead of Remember–Know. Donaldson, MacKenzie, and Underhill (1996) assert “. . . *familiar* rather than *know* was used to indicate nonrecollection, because the word *know* carries a connotation of certainty that is inconsistent with a confidence rating that indicates lack of certainty. Participants find it hard to say that they are unsure that an item was there but that they know it was” (p. 487, italics in original). Other researchers choose to encompass both familiarity and knowing within one response category, for example, Kelley and Jacoby (1998) define Knowing as “. . . the inability to recollect any details of the study presentation in combination with a *feeling of familiarity or certainty* that the word was studied” (p. 134, italics added). The issue of how Know responses are interpreted in terms of a familiarity process or a subjective state of knowing is not helped by many research reports not including the exact wording used to define response categories to participants.

Some researchers have separated Know and Familiar as response options. In their study of student learning, Conway, Gardiner, Perfect, Anderson, and Cohen (1997) found that participants could differentiate K and F responses; a K response indicating that they ‘just knew’ the answer. Students took multiple-choice question exams following four psychology lecture courses and students assigned answers to one of four categories: Remember (R), Know (K), Familiar (F), or Guess (G). At initial testing, higher performing students designated more answers as Remember than did poorer performing students; however, at re-test, these students assigned more answers to Know than to Remember. Conway et al. discuss this ‘R-to-K shift’ as

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