

Diminished episodic memory awareness in older adults: Evidence from feeling-of-knowing and recollection

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Abstract

The ability to reflect on and monitor memory processes is one of the most investigated metamemory functions, and one of the important ways consciousness interacts with memory. The feeling-of-knowing (FOK) is one task used to evaluate individual's capacity to monitor their memory. We examined this reflective function of metacognition in older adults. We explored the contribution of metacognition to episodic memory impairment, in relation to the idea that older adults show a reduction in memory awareness characteristic of episodic memory. A first experiment showed that age affects the accuracy of FOK when predictions are made on an episodic memory task but not on a semantic memory task, suggesting a particular role for episodic memory awareness in metacognitive evaluations. A second experiment showed that the age-difference in episodic FOK accuracy was removed if one took into account subjective reports of memory awareness, or recollection. We argue that the FOK deficit specific to episodic memory is based on a lack of memory awareness manifest as a recollection deficit.

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1. Introduction

Aging leads to a somewhat inevitable deterioration in episodic memory. One prevalent theory is that this memory dysfunction is connected to difficulties with the strategic regulation of memory, or metamemory (e.g. Shimamura, 1994). One such strategic activity is the awareness of memory function, or memory monitoring. The ability to monitor memory performance has considerable importance in everyday life and has been widely investigated previously (Berry, West, & Dennehey, 1989; Dixon & Hertzog, 1988; Perlmutter et al., 1987), especially with reference to age-related changes in episodic memory function (e.g. Connor, Dunlosky, & Hertzog, 1997; Souchay, Isingrini, & Espagnet, 2000). The rationale for such studies of metamemory is that

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episodic memory dysfunction is possibly caused, or at least contributed to, by a deficit in metamemory. A failure to monitor memory would mean that older adults were unable to compensate for their memory difficulties, or find it difficult to allocate cognitive resources efficiently to ensure adequate memory function.

In studies of aging, one of the often overlooked features of episodic memory is recollective experience, the subjective state or memory awareness that separates episodic ‘remembering’ from semantic ‘knowing’ (Tulving, 1985). Comparisons of remembering and knowing, two forms of memory awareness have been studied neuropsychologically as well as experimentally (Tulving, 1985; see Gardiner & Richardson-Klavehn, 2000, for a review) and are proposed to map on to episodic and semantic memory respectively. Recollective experience, or remembering occurs when a rememberer has a sense or feeling of the self in the past (according to Tulving’s (1985) view, ‘autoegetic consciousness’). Images (often visual), feelings, thoughts and verbal statements directly related to the recalled episode also often come to mind during recollective remembering.

A number of different models have been proposed which assume that retrieval in memory can be based on these two distinct forms of memory (see Yonelinas, 2002). (For an account of how these two states could be formed by differences in confidence, and thus rely on a single underlying memory process see Dunn (2004).) In the aging literature, findings from different paradigms provide converging evidence that aging disrupts recollection to a greater extent than familiarity (see, Yonelinas, 2002). For example, estimates from the process-dissociation procedure show that age leads to a decrease in recollection, but does not affect familiarity (Light, Prull, La Voie, & Healy, 2000; Yonelinas, 2002). Recent evidence from signal detection approaches, and in particular, receiver operating characteristic (ROC) curves also confirms that age affects the recollection to a greater extent than familiarity (Healy, Light, & Chung, 2005).

The same pattern of results has been observed using the Remember/Know procedure (e.g. Tulving, 1995) where participants report their subjective experience as either ‘remembering’ or ‘knowing,’ with the finding that older adults report less ‘remembering’ for items that they correctly recognise (e.g. Bastin & Van der Linden, 2003; Clarys, Isingrini, & Gana, 2002; Comblain, D’Argembeau, Van der Linden, & Aldenhoff, 2004; Parkin & Walter, 1992; Perfect & Dasgupta, 1997; Perfect, Williams, & Anderton-Brown, 1995). Our understanding of theory is that one can either be in a conscious state of remembering, or a state of knowing. Thus, our interpretation of this data is that when retrieving items from memory, older adults are less likely to be in the state of remembering. When we argue that memory awareness is diminished in aging, we therefore posit that older adults have fewer instances of recollection. Different types of information support these different remembering and knowing states. For example, ‘remember’ answers are associated with accurate retrieval of contextual information regarding the learning of the items, while this is not the case for knowing judgments (Perfect, Mayes, Downes, & Van Eijk, 1996). Thus, one might argue that older adults with a deficit in episodic memory show two simultaneous or accompanying deficits: a lack of the feeling of remembering, and a lack of contextual information produced at retrieval.

When examining episodic memory deficits in older adults, most studies overlook this central role of subjective experience when defining episodic function, focussing more on the more objective criteria of recently learned (in an earlier experimenter-initiated study phase), versus previously learned (e.g. tests of general knowledge) to differentiate episodic and semantic memory, and measuring memory performance quantitatively, not with subjective reports of the quality of memory. However, when considering metacognition, it is very common to ask participants for reports of subjective experience. Given that episodic memory and metacognition are so often studied in aging, it seems a logical step to examine states of awareness and metacognition in parallel. Thus, in this paper, two experiments examine the relationship between metacognitive monitoring (i.e., the capacity to predict one’s own memory performance) and memory with and without recollective experience. In the first experiment, we compared monitoring in semantic memory (where recollection or ‘remembering’ is not required) and episodic memory (where it is required). In the second experiment, we took a more direct approach, considering metacognitive monitoring and remembering in the same experiment.

The focus of this paper is Feeling-of-Knowing (FOK), in which predictions are made about the likelihood of subsequent recognition of currently non-recalled information (Hart, 1965; Nelson & Narens, 1990). In this procedure, participants are asked to estimate the likelihood that they will recognize a piece of information they have failed to recall earlier, either from long-term knowledge or semantic memory (Hart, 1965; Nelson & Narens, 1990), or from recently learned episodic memory information (Schacter, 1983; Souchay et al.,

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