Cue familiarity and 'don't know' responding in episodic memory tasks

Maciej Hanczakowski [a,*], Tomasz Pasek [b], Katarzyna Zawadzka [c], Giuliana Mazzoni [d]

[a] School of Psychology, Cardiff University, UK
[b] Institute of Psychology, Jagiellonian University, Poland
[c] Psychology, University of Southampton, UK
[d] Department of Psychology, University of Hull, UK

ABSTRACT

Metacognitive monitoring and control are two interdependent mechanisms by which people regulate encoding and retrieval processes in memory. While much is known about monitoring, and how the results of monitoring processes affect control at encoding, much less evidence is available for the monitoring–control relationship with respect to the regulation of retrieval. The present study provides information on this point by assessing whether a factor that is known to affect metacognitive monitoring at retrieval, i.e. cue familiarity, affects also metacognitive control at retrieval (i.e. the decision to volunteer or withhold a response in a memory task). In seven experiments cue familiarity was manipulated by having participants make a pleasantness judgment beforehand for half of the critical cues. Results showed that cue familiarity affected not only metacognitive judgments of feeling-of-knowing and retrospective confidence, but also the rate of 'don't know' responses in different recognition tasks. These results demonstrate that a factor known to affect metacognitive monitoring determines also the decision to volunteer or withhold a response (metacognitive control), which in turn shapes participants' performance in a memory task.

© 2013 Elsevier Inc. All rights reserved.

Introduction

Research in metamemory investigates how people regulate the processes by which information is acquired, retrieved from memory and output in a memory report. This research is based on a conceptual framework proposed by Nelson and Narens (1990), according to which people monitor their own cognitive processes and use the products of monitoring to modify these processes, thus exerting control over their memory performance. Due to this dual monitoring–control perspective on metamemory, research in this area follows two paths. One path is to examine monitoring processes by collecting people's subjective appraisals of a certain memory process. Several of such judgments have been thoroughly investigated with judgments-of-learning (JOLs), feeling-of-knowing judgments (FOK judgments) and confidence judgments (CJs) being the most common ones. The second path of metamemory research is to focus on control processes. The question asked within this line of research is whether the products of monitoring (as assessed by the aforementioned subjective judgments) are related to people's decisions which determine memory performance. The examples of such decisions include the choice to continue or terminate a study episode (e.g., Koriat, Ma'ayan, & Nussinson, 2006), the choice to restudy information (e.g., Metcalfe & Finn, 2008) or the choice to volunteer or withhold retrieved information (e.g., Koriat & Goldsmith, 1994, 1996). A crucial assumption of all metamemory research, which speaks to the importance of metamemory for our understanding

* Corresponding author. Address: School of Psychology, Cardiff University, 64 Park Place, Cardiff CF10 3AT, UK.
  E-mail address: HanczakowskiM@cardiff.ac.uk (M. Hanczakowski).

of memory, is that changes in monitoring affect control which determines memory performance.

That metacognitive monitoring and control processes are closely linked is clear from a vast set of studies investigating the process of acquiring information. Research conducted within the metamemory framework and concerned with the regulation of encoding operations demonstrate how manipulations that affect participants' appraisal of the encoding process, as reflected in JOLs, also influence their decisions of how to study, and ultimately lead to changes in the effectiveness of study, as reflected in memory performance (see Finn, 2008; Metcalfe & Finn, 2008; Rhodes & Castel, 2009, for examples). However, evidence for the monitoring–control relationship is less abundant with respect to the regulation of retrieval. Although two of the most commonly examined metacognitive judgments, FOK judgments and CJs, are thought to reflect subjective appraisals of a retrieval process, the question of whether changes in these judgments are related to changes in regulation of memory retrieval remains, in our view, understudied.

A case of FOK judgments may serve as an example. FOK judgments are judgments of future recognition provided after a retrieval attempt (Hart, 1965). Despite vast knowledge of the factors that determine the magnitude and accuracy of FOK judgments (see Koriat, 2007, for a review), the evidence for their relation to any control elements of memory retrieval remains scarce. There are several studies that indicate how factors that affect FOK judgments determine whether retrieval would be initiated (e.g., Reder, 1987; Reder & Ritter, 1992) and for how long it would proceed (Barnes, Nelson, Dunlosky, Mazzoni, & Narens, 1999; Singer & Tiede, 2008). However, it remains unclear whether changes in such control decisions translate into changes in memory performance, a vital question for the importance of studies in metamemory. For example, in the case of the length of a memory search, which is the most commonly investigated control aspect of retrieval, the consequences of changes in retrieval latencies remain elusive, with studies showing that longer search associated with higher FOK judgments is largely ineffective (Malmberg, 2008). Moreover, it is also worth noting that FOK judgments are commonly provided after a retrieval attempt is finished, while the control decisions described here take place before or during retrieval. To our knowledge there is no clear evidence linking FOK judgments to any control operations that would be implemented after a retrieval attempt and that would affect memory performance. The aim of the present study is to make a step towards bridging this gap between research on post-retrieval metacognitive monitoring and post-retrieval control.

The relative scarcity of research on control of retrieval processes may be related to a widely held assumption that retrieval processes are largely automatic (e.g., Craik, Govoni, Naveh-Benjamin, & Anderson, 1996; Moscovitch, 1992) and hence cannot be easily modified by metacognitive control processes. However, the metacognitive perspective on memory provides a clear example of a control process that has straightforward consequences for memory performance and which is implemented in the retrieval stage of a memory process. This control process is a

decision whether certain information should be volunteered or whether a 'don't know' (DK) response should be given instead. Even if the retrieval process itself is automatic and thus not easily malleable by metacognitive control, the process of building a memory report from the products of retrieval is a clear example of metacognitive processes at play. Furthermore, decisions to volunteer a response or to answer DK reflect control processes that have clear implications for the final memory performance. More DK responses translate into less information provided in a memory report, quite commonly decreasing the overall volume of correct information volunteered but at the same time increasing the overall accuracy of volunteered information (Koriat & Goldsmith, 1994, 1996; Koriat, Goldsmith, & Pansky, 2000). The question that we investigate in the present study is thus whether factors that affect post-retrieval monitoring affect also metacognitive control of retrieval in the form of decisions on whether to provide the answer to a memory question or to respond DK. We also assessed whether any such control changes affect various measures of memory performance besides the rate of DK responding.

The particular factor that is examined in the present study is cue familiarity. Abundant evidence exists that cue familiarity affects metacognitive monitoring at retrieval (e.g., Liu, Su, Xu, & Chan, 2007; Metcalfe, Schwartz, & Joaquim, 1993; Schwartz & Metcalfe, 1992; Vernon & Usher, 2003). When participants study cue–target pairs of unrelated words, increasing familiarity of the cues affects metacognitive judgments made at retrieval. Studies have linked cue familiarity to both the magnitude of FOK judgments, that is judgments elicited by the cue alone and concerning the recognizability of the targets (Schwartz & Metcalfe, 1992), and, more recently, to the magnitude of CJs, that is judgments concerning the correctness of the targets endorsed in a recognition test (Chua, Hannula, & Ranganath, 2012). In the present study we investigate whether cue familiarity determines whether retrieved information would be volunteered or whether it would be withheld and a DK response should be emitted instead.

We focus on cue familiarity for one important reason. Changes in the rate of DK responses, the main variable of interest in the present study, may result from changes to either memory or metamemory processes. If the manipulation of a certain factor led to retrieval of more correct answers to memory questions, this could be revealed by a drop in DK responses. However, in this case such a drop would simply reflect increased effectiveness of basic memory processes, and not a change in metacognitive processes. In the present study we are interested in post-retrieval metamemory processes rather than the effectiveness of retrieval. To clearly establish that a factor that determines metacognitive monitoring also affects metacognitive control independently of basic memory processes, we thus focus on a factor that is known to affect metacognitive monitoring without changing the effectiveness of retrieval. Cue familiarity is just such factor.

Changes in cue familiarity have clear effects on metacognitive monitoring, as reflected in higher FOK judgments and CJs for familiar cues, but previous studies indicate that cue familiarity does not affect the effectiveness of basic