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Context reinstatement in recognition: Memory and beyond

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ABSTRACT

Context effects in recognition tests are twofold. First, presenting familiar contexts at a test leads to an attribution of context familiarity to a recognition probe, which has been dubbed 'context-dependent recognition'. Second, reinstating the exact study context for a particular target in a recognition test cues recollection of an item-context association, resulting in 'context-dependent discrimination'. Here we investigated how these two context effects are expressed in metacognitive monitoring (confidence judgments) and metacognitive control ('don't know' responding) of retrieval. We used faces as studied items, landscape photographs as study and test contexts and both free- and forced-report 2AFC recognition tests. In terms of context-dependent recognition, the results document that presenting familiar contexts at test leads to higher confidence and lower rates of 'don't know' responses compared to novel contexts, while having no effect on forced-report recognition accuracy. In terms of context-dependent discrimination, the results show that reinstated contexts further boost confidence and reduce 'don't know' responding compared to familiar contexts, while affecting forced-report recognition accuracy only when contribution of recollection to recognition performance is high. Together, our results demonstrate that metacognitive measures are sensitive to context effects, sometimes even more so than recognition measures.

Introduction

Both encoding information in memory and its later retrieval occur in context. Context can be understood as any type of information that accompanies encoding and retrieval but is not itself a target of either encoding or retrieval. In experimental studies on memory, a variety of conditions have been treated as context, ranging from mood (e.g., Eich, 1985; Eich & Metcalfe, 1989) to position of a word on a computer screen (e.g., Macken, 2002; Murnane & Phelps, 1993). Context has been investigated mostly to determine whether reinstating study context at the moment of testing facilitates memory retrieval. A substantial number of studies document such beneficial effects of context reinstatement in recall (e.g., Godden & Baddeley, 1975; Smith, Glenberg, & Bjork, 1978), but a somewhat more complex picture emerges in recognition, with some studies showing benefits of reinstating context for recognition performance (e.g., Geiselman & Bjork, 1980; Smith, 1985) and some showing no benefits (Hockley, 2008; see also Smith & Vela, 2001, for a review). In the present study we take a novel but complementary approach to investigating context effects in memory, as we focus on how a context present at retrieval affects metacognitive processes.

The metacognitive approach to memory stresses that the process of remembering does not end when retrieval of information from memory is completed. When asked a memory question, people need not only gather information from memory. They also need to assess the quality of the products of memory retrieval and to decide whether this quality is sufficient to warrant reporting of the retrieved memory. According to the framework developed by Koriat and Goldsmith (1996), the processes of responding to a memory question start with generating a

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candidate answer based on information stored in memory. After the memory retrieval process is complete, the metacognitive monitoring process takes over and a person assesses his/her confidence that the product of memory retrieval (the candidate response) is correct. Finally, after assigning confidence to the candidate response, in the process of exerting metacognitive control, a decision is taken whether assigned confidence is high enough to volunteer the candidate response, or, alternatively, whether a 'don't know' (DK) response to the memory question should be given. Critically, according to the Koriat and Goldsmith framework, the metacognitive processes are mixed with memory retrieval to shape memory performance in free-report tests (i.e., in tests allowing response withholding). This is because in such tests omissions may reflect either failures to access appropriate memory information, or the state in which required information is accessible but confidence assigned to this information is too low to warrant its disclosure.

Despite years of research on how retrieval context affects memory processes, the issue of whether metacognitive processes of monitoring and control are affected by changes in study-test contexts has not been systematically investigated. It is an important gap in our knowledge, since, as discussed above, metacognitive processes shape the contents of a memory report. If context present at retrieval were to affect how confident people are about the products of their memory processes, then, according to the Koriat and Goldsmith (1996) framework, it would also determine the probability of volunteering retrieved information in free-report memory tests, affecting the number of correct and incorrect details reported. Thus, for example, context reinstatement may benefit memory retrieval and at the same time make people more confident that the products of retrieval are correct, increasing the chances that retrieved details are disclosed. But it is also possible that context would affect metacognitive processes even when it has no effect on memory. As described in the next section, research on context effects in recognition identified conditions under which context present at study and later provided at test failed to affect recognition accuracy in forced-report tests. However, if context were to affect metacognitive processes under such circumstances, then it could lead to changes in free-report recognition output, demonstrating how context may exert influence upon memory performance via metacognitive, not memory processes. Such a demonstration was the main motivation behind conducting the present study.

In the present study we aim to investigate how changes in study-test contexts affect metacognitive processes. To this aim, we borrow the paradigm previously used to examine the effects of context reinstatement on recognition performance and we use this paradigm to investigate how study-test contexts determine confidence (metacognitive monitoring) and decisions whether to volunteer responses to a memory question or to respond DK (metacognitive control). In what follows, we first present an overview of the literature on context reinstatement in recognition and then we outline our predictions of how context may affect metacognitive processes.

Context effects in recognition

The most comprehensive work on context effects in recognition was conducted by Murnane and Phelps (1993, 1994, 1995) within the theoretical framework of the ICE (Item, Context, and Ensemble information) theory (cf. Murnane, Phelps, & Malmberg, 1999). According to this theory, when items are presented with context at study, three types of information can be encoded: (a) item information, (b) context information, and (c) information specific to an ensemble created by an item and its context, to which we will refer here as an item-context association.[1] When, in a subsequent old/new recognition test, a studied context is re-presented together with a novel or old probe, it matches the stored context information, resulting in a feeling of familiarity. Familiarity of the context is attributed to the test probe, increasing the probability of an 'old' response. Importantly, this occurs whenever studied context is used in a test, independently of whether the probe it accompanies corresponds to an item studied in this particular context. The same effect on 'old' responses occurs both for targets studied in different contexts and for foils which were not studied at all. In consequence, studied contexts presented at test increase both hits to studied items, whether they were paired with this particular context or not, and false alarms to foils. This type of effect Murnane et al. dubbed *context-dependent recognition*.

A different effect may sometimes occur when at test context is re-presented with the same particular item with which it was paired at study. In such a case, inclusion of both the item and its originally paired context in a compound cue may result in recollection of the item-context association. Recollection of this association also induces more 'old' responses. However, such a recollection necessarily occurs only for studied items and thus recollection of item-context associations specifically increases hits to old items but not false alarms to foils. This type of effect Murnane et al. (1999) dubbed *context-dependent discrimination*, as a specific increase in hits for targets means that participants are better at discriminating between targets and foils.

The empirical studies on context effects largely followed the directions outlined within the ICE theory. Hockley, Bancroft, and Bryant (2012) reviewed the results of a number of conditions employed in various studies on context effects in recognition and found that false alarm rates to foils tested in studied contexts are invariably larger than false alarm rates to foils tested in novel contexts, which supports the idea of context-dependent recognition (see also Dodson & Shimamura, 2000; Hockley, 2008). However, the issue of context-dependent discrimination

[1] In the present work we do not differentiate between a global-matching approach to recognition memory, as advocated by Murnane et al. (1999), and a dual-process approach promoted by other researchers (e.g., Macken, 2002), as we believe that these two are quite similar in their descriptions of the context effects. In other words, from the perspective of our study, we do not see much difference between the concept of matching ensemble information to contents of a memory store and recollection of item-context associations. For convenience, we use the term of recollection of item-context associations in the present paper, rather than the global matching terminology of ICE.