Independent recollection/familiarity ratings can dissociate:

Evidence from the effects of test context on recognition of event details

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Abstract

Bodner and Richardson-Champion (2007) found a dissociative effect of test context on binary remember/know judgments about a critical set of details from a film sequence. Details of medium difficulty were more likely to be judged "recollected" when preceded by a set of difficult details than a set of easy details, but were similarly likely to be judged "familiar". Using the same paradigm, we replicated this dissociation when participants independently rated recollection and familiarity. Our finding represents the first evidence that independent recollection/familiarity ratings can be dissociated. In contrast, previous studies using independent ratings have yielded parallel effects of variables that produce dissociative effects with binary judgments. Our discussion considers potential causes of this dissociation, whether test context influenced discrimination or response bias, and implications for interpreting subjective recognition experiences. Demonstrations that test context can affect recollection reports also have implications for designing and conducting eyewitness interviews.

Keywords: recognition memory; remember/know judgments; recollection/familiarity ratings; test context effects; dissociations

Public Significance Statement

We investigated how recognition memory for a set of details from a witnessed event was affected by whether an earlier block of details was relatively harder or easier to recognize. We found that this manipulation of the test context influenced recollection ratings but not familiarity ratings. Our results have implications for measuring memory and for interviewing eyewitnesses.

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Studies using the *remember/know* procedure indicate that people can discriminate their reporting of two qualitatively distinct types of recognition experience: feelings of recollection (indicated by *remember* responses) and feelings of familiarity (indicated by *know* responses). Many functional dissociations between these two recognition states have been reported, in which manipulations affect reports of one state but not the other (Gardiner, Ramponi, & Richardson-Klavehn, 2002). These dissociations could indicate that separate memory processes give rise to each state. For example, by a dual-process account (e.g., Yonelinas, 2002), remembering reflects a successful recollection process, whereas knowing occurs when the recollection process fails but a familiarity process surpasses a threshold (cf. Donaldson, 1996; Dunn, 2008; Rotello, Macmillan, & Reeder, 2004).

Alternatively, dissociations between recollection and familiarity might simply be artefacts of the binary nature of remember/know judgments (Higham & Vokey, 2004). In the standard remember/know task, participants cannot report both recollection and familiarity for a given item (cf. Tousignant, Bodner, & Arnold, 2015). Thus, when a manipulation increases reports of one state, the potential rate of reporting the other state is constrained, resulting in a dissociation. Using mutually exclusive judgments to estimate recollection/familiarity processes is inappropriate if those processes are functionally independent. To address this issue, Higham and Vokey (2004) developed an *independent ratings method* in which participants rate the extent to which they experience *each* state for *each* item. This method has the advantage of allowing participants to make independent assessments of the two states without requiring the researcher to assume that the two states are independent at a process level.

The independent-ratings method has been used to revisit remember/know dissociations that arise from manipulations such as levels-of-processing at study (LOP; see Yonelinas, 2002), processing fluency at test (e.g., Rajaram & Geraci, 2000; Willems & Van der Linden, 2006), and the memorability of items forming the test context (e.g., Bodner & Lindsay, 2003). In each case, rather than replicating these dissociations, parallel effects have been found (Brown & Bodner, 2011; Higham & Vokey, 2004; Kurilla & Westerman, 2008; Tousignant & Bodner, 2012). This pattern invites the worry that parallel effects may be artefacts of the independent ratings task. Perhaps participants are unable to independently evaluate and rate recollection and familiarity, and thus this method may inevitably yield parallel effects (cf. Brown & Bodner, 2011).

To investigate these possibilities further, we narrowed our attention to the effects of test context on recognition experiences. With judgments, test context consistently has been found to influence recollection rather than familiarity (Bodner & Lindsay, 2003; Bodner & Richardson-Champion, 2007; McCabe & Balota, 2007; Tousignant, Bodner, & Arnold, 2015). With ratings, on the other hand, Tousignant and Bodner (2012) reported a parallel effect. Thus, the only evidence to date that test context influences familiarity comes from a task that, to date, has only generated parallel effects. The goal of our study was therefore to examine whether test context selectively influences recollection ratings, or influences both recollection and familiarity ratings. To find out, we repeated Bodner and Richardson-Champion's (2007, Experiment 2) study of test context, but replaced binary judgments with independent ratings.

After watching a feature film sequence, Bodner and Richardson-Champion's (2007, Experiment 2) participants first made remember/know judgments about details from the film that were either easy or hard to recognize (based on pilot work). After this test context manipulation, participants made judgments for a set of film details of medium difficulty. A dissociation was

found such that medium details were more likely to be judged remembered after the hard context than the easy context, whereas the effect on know judgments was not significant. This dissociation replicated in a mixed block design. In line with a functional account of recognition judgments (Gruppuso, Lindsay, and Kelley, 1997), Bodner and Richardson-Champion argued that memory experiences for medium details were more likely to meet a definition of "remembering" established by a hard context relative to that established by an easy context.

Bodner and Richardson-Champion's (2007) study is unique in using a film sequence rather than word lists as the study materials. We reasoned that a film sequence may provide a wider range of "recollective fodder" than a word list, but it might not provide a wider range of "familiarity fodder". By the functional account of recognition, the two test contexts might enable participants to construct different definitions of "recollection" but might not enable them to construct different definitions of "familiarity". If so, then recollection ratings might be influenced by context while familiarity ratings might be unaffected. In contrast, if participants cannot separate their evaluations of the two experiences in the ratings paradigm (i.e., if the independent ratings method is problematic), or if test context genuinely influences both experiences (contrary to the typical dissociative test context effect found with binary judgments), then a parallel effect should occur.

Method

Participants

The study was approved by the University of Liège Ethics Review Board. The participants were 88 undergraduates from University of Liège (mean age = 23; 43 women), randomly assigned to either the easy or hard test context group (44 per group). This sample size gave us a predicted power of .80 for detecting an interaction between test context and rating,

assuming a small effect size (f = .15).

Materials

The study event was a French-dubbed version of the 6-minute DVD chapter "Dirty Cop" from the film *Water's Edge* (directed by Khan, 2004, Ch.5). The clip depicted a tense and violent series of events including a crime so that our findings might have relevance for eyewitness memory. The test details largely concerned visual details or dialogue, and were French translations of the 45 true (15 easy, 15 medium, 15 difficult) and 10 false details from Bodner and Richardson-Champion (2007; see Supplemental Materials).

Procedure

The study phase followed Bodner and Richardson-Champion (2007). Participants were tested individually. After watching the film sequence, they completed a recognition test. The test instructions explained that a series of details would be presented, some from the film (*true details*) and others not (*false details*). Participants then read definitions of recollection and familiarity, accompanied by examples of all four possible combinations of recollection and familiarity (Higham & Vokey, 2004) (see Supplemental Materials). After the experimenter clarified any questions, participants explained the recollection/familiarity distinction until the experimenter was satisfied. Participants then responded in turn to 30 details. The initial context block included either 10 easy or hard true details plus 5 false details. The following critical block contained 10 medium true details plus 5 false details (see also Weinstein & Roediger, 2010, 2012). The block structure was not apparent to participants. False details were randomly assigned to block, and the details within each block were randomly ordered for each participant. Participants first verbally indicated whether a detail was true or false. For details deemed true, they then verbally rated their recollection and familiarity for it on separate 4-point scales (1 =

definitely no, 2 = probably no [plutôt non], 3 = probably yes, 4 = definitely yes; Higham & Vokey, 2004; see Supplemental Materials). The experimenter recorded their responses.

Results

Table 1 provides the mean proportions of details judged true. Table 2 provides the mean recollection and familiarity ratings for details judged true. In the context block, easy true details were far more likely to be judged true than hard true details (.79 vs. .31), $F(1, 86) = 278.70$, $MSE = 0.02$, $p < .001$, $\eta^2_p = 0.77$. A 2 (context: easy vs. hard) × 2 (rating: recollection vs. familiarity) mixed-factor ANOVA revealed main effects of rating (familiarity ratings > recollection ratings), $F(1, 86) = 15.71$, $MSE = 0.16$, $p < .001$, $\eta^2_p = .15$, and condition (easy details > hard details), $F(1, 86) = 126.68$, $MSE = 0.16$, $p < .001$, $\eta_p^2 = .60$. The interaction effect was not significant, $F(1, 86) = 2.48$, $MSE = 0.16$, $p = .12$, $\eta_p^2 = .02$. Thus, recognition and ratings differed for true details across the two context blocks. False details in the context block were judged true similarly often after the hard versus easy context (.30 vs. .32), $F < 1$. Familiarity ratings were higher than recollection ratings $F(1, 86) = 12.19$, $MSE = 0.30$, $p < .001$, $\eta_p^2 = .12$, but context had no effect, and did not interact with ratings, Fs < 1.

In the critical block, medium true details were more likely to be judged true after the hard vs. easy context (.64 vs. .52), $F(1, 86) = 24.16$, $MSE = 0.01$, $p < .001$, $\eta^2_p = 0.22$. Familiarity ratings were higher than recollection ratings, $F(1, 86) = 13.74$, $MSE = 2.42$, $p < .001$, $\eta^2_p = .14$, and ratings were higher after the hard vs. easy context, $F(1, 86) = 8.35$, $MSE = 0.32$, $p = .005$, $\eta_p^2 = .09$, but these results were qualified by a significant interaction, $F(1, 86) = 5.07$, $MSE = 0.17$, $p < .05$, $\eta_p^2 = .06$. Critically, follow-up tests showed that medium details received significantly higher recollection ratings after the hard (vs. easy) context (3.02 vs. 2.63), $F(1, 86) = 13.26$, $MSE = 0.25$, $\eta_p^2 = 0.13$, $p < .001$, whereas their familiarity ratings were not significantly higher (3.11

vs. 3.01), $F < 1$. Thus, test context had a dissociative effect on independent recollection/familiarity ratings.

False details in the critical block were judged true similarly often after the hard versus easy context (.21 vs. .19), $F < 1$. Familiarity and recollection ratings for false details were similar, $F(1, 86) = 1.45$, $MSE = 0.37$, $\eta_p^2 = 0.02$, $p = .23$, and test context did not influence overall ratings, or interact with rating types, Fs < 1.

Because we could not counterbalance the assignment of film details to true vs. false status, conducting signal-detection analyses to examine whether test context influenced discrimination or response bias might be subject to distortions. However, our findings that test context did not affect either the rate of "true" claims or recollection ratings for false details in the critical block, unlike for medium details, leaves open the possibility that test context improved discrimination rather than leading to a more liberal response bias (cf. McCabe & Balota, 2007).

Discussion

Our study is the first to show a dissociative effect of a variable across independent recollection/familiarity ratings. Test context affected ratings of recollection, but not of familiarity—replicating the pattern obtained in the same paradigm with binary remember/know judgments (Bodner & Richardson-Champion, 2007). By either method, claims of recollection for medium details increase when the context consists of harder relative to easier details. Our finding that test context affects reports of recollection should be borne in mind when interviewing eyewitnesses about their memory for event details (see also Weinstein & Roediger, 2010; 2012).

The dissociative pattern we obtained is noteworthy for several reasons. First, it establishes that participants can, at least to some extent, independently rate their experiences of recollection and familiarity. That independent ratings have previously yielded parallel effects is

not an inevitability that evinces a flaw in this method (see also Brown & Bodner, 2011). Second, it establishes that under some circumstances binary judgments and independent ratings generate the same pattern supporting the same conclusion (e.g., that test context modulates recollection). Third, it establishes the importance of conducting further research toward understanding the factors that determine when the two methods will converge versus diverge. And fourth, in turn, that research will enhance our understanding of the links between subjective experience and underlying recognition memory processes.

Importantly, test context has now been found to influence recollection of both film details and studied lists of words, and that influence occurs whether binary judgments or independent ratings are collected. Of these four combinations, an influence of test context on familiarity has been found only when word lists are studied and independent ratings are collected (Tousignant & Bodner, 2012). Our results rule out the possibility that this parallel effect is an automatic outcome of using ratings, but two other possibilities must await further research. One is that the "odd effect out" might not replicate. But, the more interesting possibility is that participants might only be able to separate their evaluations and ratings of recollection and familiarity enough to show a dissociation when the paradigm yields a wide range and variety of recollective experiences. When this is not the case, participants' evaluation of recollection may drive their evaluation of familiarity. Given that visual stimuli have been found to enhance distinctiveness relative to word stimuli (e.g., Gallo, Bell, Beier, & Schacter, 2006), future research should compare the effects of test context on ratings in situations where the distinctiveness of the materials is manipulated (e.g., by comparing images vs. words).

A limitation of our paradigm is that a film event does not lend itself to counterbalancing the assignment of true vs. false details. As a result, we could not apply signal-detection measures

to determine whether test context influences sensitivity or response bias. Although we did not find evidence that test context influenced recognition of false details, other test context studies have found evidence that test context influences response bias (Bodner & Richardson-Champion, 2007, Experiment 3; Bodner et al., 2015, Experiment 3; McCabe & Balota, 2007, Experiment 3; Tousignant & Bodner, 2012; cf. Bodner & Lindsay, 2003, Experiment 4). For example, Bodner and Richardson-Champion (2007, Experiment 3) found that informing participants of the difficulty of each test block eliminated the test context effect—presumably by homogenizing the two groups' functional definitions or expectations of recollection for the critical block.

The effect of test context on recollection ratings is compatible with the functional account of recognition (Gruppuso et al., 1997), according to which the variety of recollections experienced during a recognition task shape how participants define their response options. It is also compatible with the expectancy-heuristic account (McCabe & Balota, 2007), by which participants given a hard context may also set lower expectations about the distinctiveness of their recognition experiences, leading them to adopt a more liberal response criterion (see Pansky & Goldsmith, 2014). Consistent with these accounts, test context can also increase confidence judgments (Arnold & Prike, 2015), further suggesting that memory states are inferential, rather than rigid phenomenological categories. At present, there is a considerable overlap between the functional and expectancy heuristic accounts, thus it may be fruitful to combine them toward explaining the range of influences of variables on subjective recognition experiences.

Finally, our findings encourage revisiting other dissociations observed using binary remember/know judgments. For example, Alzheimer's disease has been linked to a blunting of the subjective experience of remembering but not of familiarity (Genon et al., 2014; Rauchs, Piolino, Mezenge, et al., 2007; Rauchs, Piolino, Mézenge, et al., 2007). Whether such

dissociations replicate with independent ratings, using both word list and film event paradigms, is worthy of investigation.

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Table 1

Mean (SD) Proportion of Event Details Judged True, by Block/Context

Block and Detail Type	Easy Context	Hard Context
Context Block		
Easy or Hard Details	.79 (0.13)	.31 (0.14)
False details	.30 (0.23)	.32 (0.27)
Critical Block		
Medium Details	.52 (0.11)	.64 (0.18)
False Details	.19 (0.18)	.21 (0.22)

Table 2

Mean (SD) Recollection and Familiarity Ratings for Event Details Judged True, by Block/Context

	Recollection Rating		Familiarity Rating	
Block and Detail Type	Easy Context	Hard Context	Easy Context	Hard Context
Context Block				
Easy or Hard Details	3.27 (0.37)	1.98 (0.78)	3.41(0.35)	2.32 (0.66)
False Details	1.88 (1.17)	2.16 (1.24)	2.22 (1.30)	2.39 (1.22)
Critical Block				
Medium Details	2.63 (0.50)	3.02 (0.51)	3.01 (0.44)	3.11 (0.54)
False Details	1.75 (1.54)	1.56 (1.50)	1.81 (1.54)	1.71 (1.59)