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Context in memory is reconstructed based on retrieval questions

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Jeremy Gardette [1,2] & Christine Bastin [1,2]

In context-dependent memory research, focal objects are by default ascribed to item whereas background scenes are considered the context. Questioning this assumption, it was proposed that context is reconstructed rather than encoded: any aspect of an event could become either item or context depending on the question asked. Here we provide evidence supporting this hypothesis across six experiments employing a context reinstatement paradigm. When the memory test focused on background scenes (Experiments 1-2), reinstating the original focal objects increased old responses to targets and lures. This effect remained when background scenes were task-irrelevant and focal objects task-relevant at encoding (Experiment 3). Finally, Experiments 4a-5 showed that, when objects are task-irrelevant at encoding, this effect exists but depends on the size of the objects and scenes on screen. Overall, these results support that context is reconstructed rather than encoded, although the perceptual properties of the stimuli and their relative salience at encoding can limit the effect of context on memory retrieval.

Context plays a pivotal role in episodic memory and is central to modern memory models[1–4]. According to the early encoding specificity principle, any information is encoded in a unique context, and the success of memory retrieval depends on the overlap between encoding and retrieval cues[5]. This principle inspired extensive research on context-dependent memory, which examines memory accuracy for focal items while manipulating the correspondence between encoding and retrieval contexts. Focal objects are typically presented against background scenes that are either repeated or changed during a subsequent recognition memory test probing memory for the focal object, a design known as *context reinstatement*[6,7]. Retrieval is consistently facilitated when encoding and retrieval contexts match, relative to when they differ (for review, see ref. 8).

In context-dependent memory paradigms, the context is typically assigned during the encoding phase, a design feature that rests on the theoretical assumption that item and context are established from the outset of an episode. Challenging this assumption, Easton et al.[9] proposed that context is reconstructed rather than encoded. When encoding an episode, it is unknown which aspects of this episode will be central for future retrieval of the event, and which will be contextual. Therefore, context is not encoded as a separate part of a memory representation alongside the item; rather, context is only defined by the question asked at retrieval. Take the example of having a Guinness one evening during a conference taking place in Kildare, Ireland. If you were asked "When did you last have a Guinness?," the conference and its location would constitute contextual information—features not directly targeted by the question. In contrast, when asked "Where did the last conference you attended take place?," the specific type of beer would, in turn, become contextual information. Thus, any aspect of an event can later become the focus of the memory search, and context is the information defined as incidental by the question asked at retrieval[9].

In the present research, we conducted six pre-registered experiments testing Easton et al.'s account. We used the context reinstatement paradigm designed by Doss et al.[6], in which focal objects are presented against unique scene backgrounds at encoding and retrieval. At recognition, target objects and visually similar lures are presented either on the same background scene as during encoding or on a different one. Participants must distinguish between old and lure focal objects, disregarding the background scene. Reinstating background scenes increases the rate of "old" responses to both target and lure objects[6,10–12]. This paradigm represents an appropriate framework to test Easton et al.'s account, as memory for contextual features is tested indirectly. If context is only reconstructed, features typically considered context can become the focus of the memory test, while those features usually considered items become the context, depending on the instructions of the memory task (hypothesis 1). Thus, focal objects could act as contextual cues if the question at retrieval tested memory for the background scenes instead of the objects (Experiments 1–2). Furthermore, features task-irrelevant at encoding are typically considered contextual at retrieval[11], consistent with the definition of context as unattended information presented alongside attended items[13]. Yet, if any aspect of an event can later become the context, it should not be restricted to the features irrelevant at encoding. Task-relevant and -irrelevant features at encoding could thus become either the item or the

[1]GIGA Research, CRC Human Imaging, University of Liège, Liège, Belgium. [2]Psychology and Cognitive Neuroscience, Department of Psychology, University of Liège, Liège, Belgium. e-mail: j.gardette@uliege.be; Christine.Bastin@uliege.be

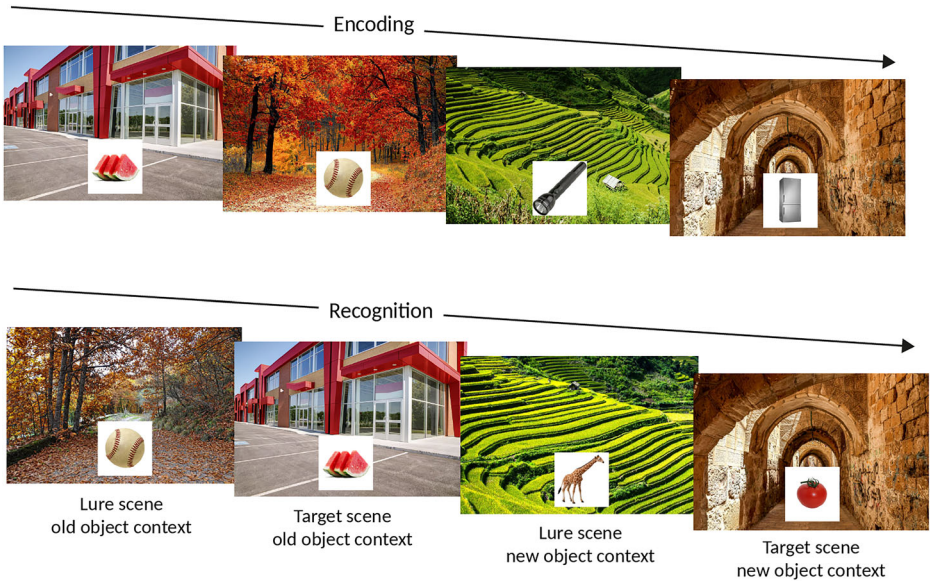


Fig. 1 | Schematic illustration of the experimental material in Experiments 1–4b.

context at retrieval (hypothesis 2). We tested this second hypothesis by examining whether the contextual effect of objects depends on feature relevance at encoding (Experiments 3–5).

Methods

Research transparency statement

Preregistration. The hypotheses, study design, sample size, and analysis plan were preregistered prior to data collection on 25 June 2025 (https://urls.fr/cQSk0h). The six experiments reported here aimed to test the same general hypothesis, and the analysis plan was the same across these experiments. Therefore, we used a single preregistration in which it is mentioned that several variations of the study were planned.

Experiment 1

Participants. A power analysis determined that the effect size $\eta^2_p = 0.31$, estimated from pilot data, required a total sample of $N = 42$ to achieve a statistical power >95% with $\alpha = 0.05$ for a repeated-measures ANOVA. Forty-two young participants (mean age $M = 27.42$, SD = 4.89, 18 females/24 males) were recruited online through Prolific. Screeners were used to ensure that participants met the following inclusion criteria: age between 20 and 35, fluent English, no ongoing mental health issue (including neurodiversity), normal or corrected-to-normal vision, and no more than 300 previous studies completed on Prolific (as suggested by[14]).

Stimuli. We used a set of 88 pairs of scene images and 88 unique scene images from previous studies[11,12]. The similarity of the scene pairs was validated by Szőllősi et al.[12]. In addition, a list of 180 objects from the mnemonic similarity task[15] were used. For each participant, 120 objects were randomly selected for the encoding phase, with each object paired with a randomly selected scene; the remaining 60 objects were used as a *new* context at recognition. For half of the trials, the same scene was presented at encoding and recognition (i.e., targets), whereas for the other half, a visually similar version of the scene was presented at recognition (i.e., lures). For each participant, the 60 scene targets were drawn from the pool of unique scenes, and 60 target/lure scene pairs were drawn from the pool of scene pairs. Within each scene pair, the assignment of one image to the encoding phase and the other to the recognition phase was randomly determined. Half of the scenes were paired with the same object at encoding and recognition (same object context), whereas the other half was paired with a new—never-seen—object (new object context). We decided to compare old and new object context conditions (i.e., context-dependent recognition) rather than old and switched context conditions (i.e., context-dependent discrimination) for two reasons. First, a recent meta-analysis reported that context reinstatement effects are stronger in these conditions compared to when the contexts are recombined between pairs[16]. As our goal was to demonstrate that context is determined at retrieval, we selected the procedure in which any effects of object context reinstatement were most likely to be observed. Second, in follow-up Experiments 3–5, the encoding instructions oriented attention toward either the focal objects only or the background scenes only, which puts less demand on conceptual binding. It was thus unclear whether this encoding procedure would allow for efficient context-dependent discrimination; yet we sought to keep the memory task comparable across experiments. Overall, the recognition memory task included 120 trials divided into 4 conditions: target scene – same object context, Target scene – new object context, Lure scene – same object context, and lure scene – new object context. Scene and object images were 690 × 460 and 160 × 160 pixels, respectively. Focal objects were superimposed at the bottom center of the background scenes (Fig. 1).

Procedure. Because we aimed to reverse the effect reported in traditional context reinstatement studies (i.e., to make focal objects the context for the background scenes), we adapted the presentation procedure designed by Doss et al.[6]. For each trial, the focal object was displayed alone for 500 ms, then the background scene and object were presented together for 3000 ms, and finally the focal object was displayed alone again for 500 ms (Fig. 2A). The encoding included 120 trials, separated by a fixation cross displayed for 1000 ms. As in the original study, participants were instructed to judge whether each focal object belonged in the background scene by using their keyboard ("y" key for *yes*, "n" key for *no*) while both were displayed. Participants were not warned that a memory test would follow, to ensure incidental encoding. Then, at the end of the encoding phase, they were told that a memory test was about to start, explained why this could not have been disclosed at the beginning of the study, and given the opportunity to revoke their consent.

Before starting the recognition memory test, participants were told that some images would be visually similar to, but different from, images that they had seen during encoding, and were provided with an example of a scene pair. They were asked to indicate whether they had seen each background scene before. They were explicitly instructed that their responses should relate to the background scenes only, not to the objects in the middle. The recognition phase was composed of 120 trials, with a maximum response deadline of 4000 ms, and separated by a 500 ms fixation cross. There were four experimental conditions, each including 30 trials: scene type (target/lure) × object context (same/new).

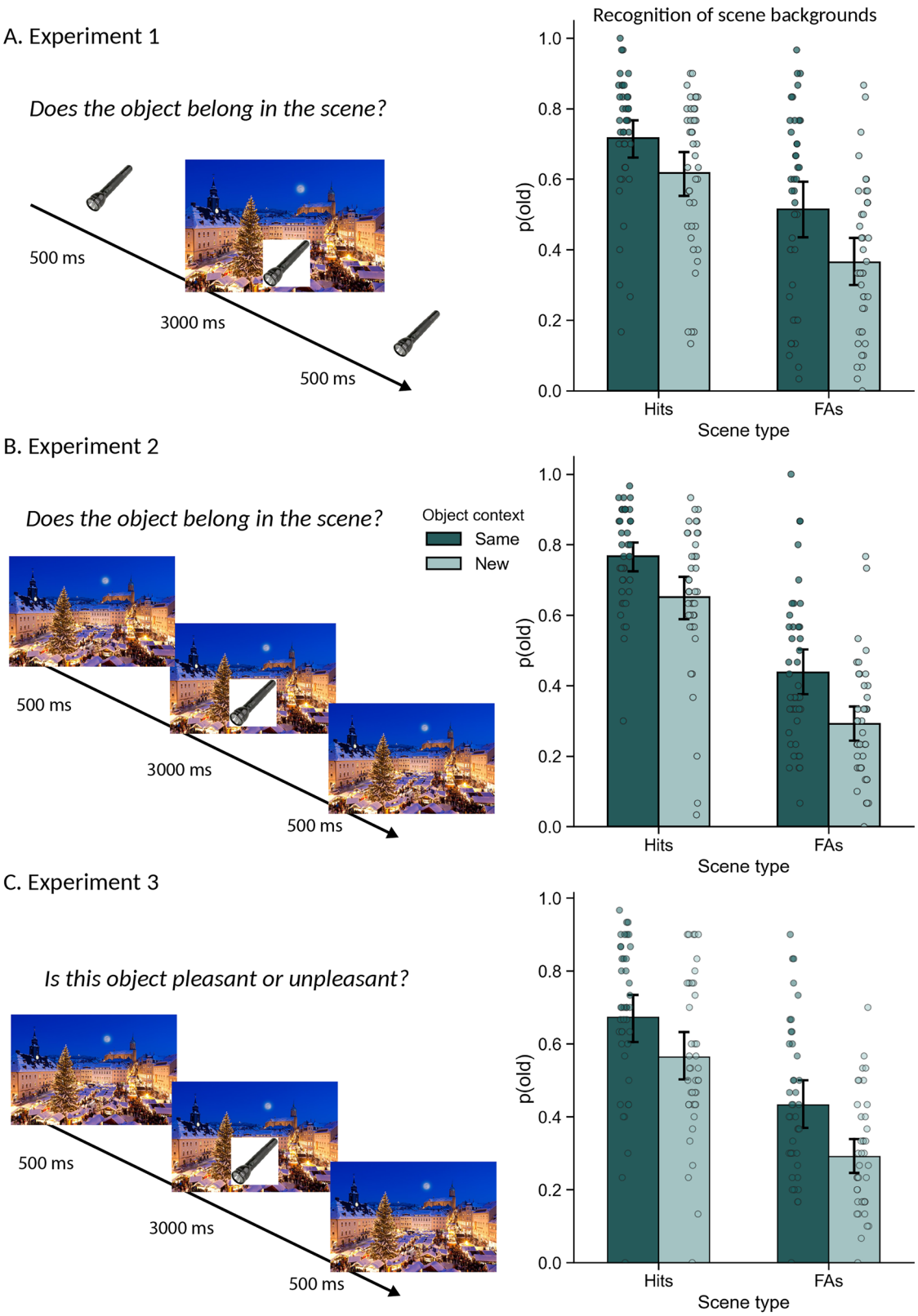


Fig. 2 | Encoding procedures and results of Experiments 1 (N=42 participants), 2 (N=42), and 3 (N=41). Encoding procedures and results of Experiments 1 (**A**, $N = 42$ participants), 2 (**B**, $N = 42$), and 3 (**C**, $N = 41$): proportion of old responses as a function of scene type (hits: target scenes, FAs: false alarms, lure scenes) and object context. Means, 95% confidence intervals, and individual data points.

Participants answered using their keyboard ("o" for *old background*, "n" for *new background*).

Analyses. As pre-registered, we analyzed the proportion of old responses to background scenes as a function of scene type and object context. We opted for this approach, rather than analyzing hits and false alarms separately, because we did not expect the effect of object context to differ between scene targets and lures[11,12]. We therefore conducted a repeated-measures ANOVA on the proportion of old responses with both

scene type (target/lure) and object context (same/new) as within-subject factors. We assessed normality by visual inspection of residuals and the Shapiro–Wilk test. Assumptions were met for the analyses of experiments 3, 4a, and 4b. When one of the assumptions was not met, we used a linear mixed-effects model using with the lme4 package in R[17], including subjects as a random effect, and standardized parameters were obtained using the effectsize package[18].

Experiment 2

Experiment 1 showed that focal objects can serve as contextual cues during background scene recognition. In this first experiment, we reversed the encoding procedure used by Doss et al.[6] such that the focal object appeared alone before and after the background scene and focal object were presented together. Experiment 2 aimed (1) to replicate Experiment 1 and (2) to test whether its results depend on the encoding procedure. We therefore adopted the original encoding procedure while employing the background scene memory test as in Experiment 1.

Participants. Forty-two participants who did not take part in the other experiments were recruited online in Prolific (mean age $M = 26.16$, SD = 4.61, 27 females/15 males). This sample size was determined based on the same power analysis as in Experiment 1. The same screeners as in Experiment 1 were used.

Stimuli, procedure, and analyses. The stimuli and randomization procedure were the same as in Experiment 1. During the encoding phase, the background scene was first displayed alone for 500 ms, then the background scene and focal object appeared together for 3000 ms, and finally the background scene was displayed alone again for 500 ms (Fig. 2B). The rest of the procedures and the instructions were identical to those of Experiment 1.

Experiment 3

Experiments 1 and 2 showed that context reinstatement of the focal object influences recognition memory decisions for background scenes (hypothesis 1). Experiments 3–5 tested hypothesis 2: task-relevant and task-irrelevant features at encoding can become either the focus of retrieval or the context, depending on the memory task instructions. In Experiment 3, background scenes were task-irrelevant at encoding and the focus of retrieval, whereas focal objects were task-relevant at encoding and task-irrelevant at test.

Participants. As in Experiments 1 and 2, 42 new participants were recruited. One participant failed to complete the full study, resulting in a final sample of $N = 41$ (mean age $M = 26.65$, SD = 4.00, 27 females/15 males). We note that the estimated statistical power with $N = 41$ was >97% based on the effect size found in the first two experiments. The recruitment procedure and screeners were identical to those of Experiments 1 and 2.

Stimuli, procedure, and analyses. The stimuli and randomization procedure were identical to those of Experiments 1 and 2. Like in Experiment 2, in the encoding phase, the background scene was first displayed alone for 500 ms, then the background scene and focal object appeared together for 3000 ms, and finally the background scene was displayed alone again for 500 ms (Fig. 2C). To make background scenes task irrelevant, participants were asked to judge the focal objects as pleasant or unpleasant, using their keyboard ("f" for *pleasant*, "k" for *unpleasant*). They were explicitly told that their responses should "relate to the objects in the middle, not the backgrounds." The rest of the procedures and the instructions were identical to those of Experiments 1 and 2.

Experiment 4a

Experiment 3 showed that features relevant or irrelevant at encoding are not constrained to the role of item or context at retrieval. Experiment 4a tested whether task-irrelevant objects at encoding could influence subsequent recognition memory decisions for background scenes.

Participants. As in Experiment 3, 42 participants who did not take part in the other experiments were recruited, and one participant was excluded because they failed to complete the full experiment, resulting in $N = 41$ (mean age $M = 27.12$, SD = 4.67, 22 females/19 males). The recruitment procedure and screeners were identical to those of Experiments 1–3.

Stimuli, procedure, and analyses. The stimuli and randomization procedure were identical to Experiments 1 to 3. As in Experiment 1, in the encoding phase, the object was first displayed alone for 500 ms, then the background scene and object appeared together for 3000 ms, and finally the object was displayed alone again for 500 ms (Fig. 3A). To make objects task-irrelevant, participants were instructed to rate the pleasantness of the background scenes. Because most scene images were expected to be perceived as pleasant, pleasantness was rated on a four-point scale (from 0 – "very unpleasant" to 3 – "very pleasant") to provide more response variability and keep the task engaging. Participants were explicitly told that their responses should "relate to the background, not the objects in the middle." The rest of the procedures and the instructions were identical to those of Experiments 1–3.

Experiment 4b

Experiment 4a failed to replicate the object context reinstatement effects found in Experiments 1–3. Given that background scenes were task-relevant at encoding and the focus of the recognition memory task, these results may reflect an *outshining* effect[8]: increased reliance on available memory cues that reduces the effect of context. In Experiment 4b, we shortened the encoding time of background scenes and changed the instruction for a shallower encoding. If strong memory for background scenes masked context effects of the object in Experiment 4a, the reduction of memory performance should allow the context reinstatement to manifest itself.

Participants. Forty-two new participants were recruited (mean age $M = 29.42$, SD = 3.64, 27 females/15 males). The recruitment procedure and screeners were identical to those of Experiments 1–4a.

Stimuli, procedure, and analyses. The stimuli and randomization procedure were identical to Experiments 1–4a. In the encoding phase, the object was first displayed alone for 1400 ms, then the background scene and object appeared together for 1200 ms, and finally the object was displayed alone again for 1400 ms (Fig. 3B). Participants were instructed to categorize each background scene as either indoor or outdoor using their keyboard ("f": indoor, "k": outdoor). They were explicitly told that their responses should "relate to the background, not the objects in the middle". The rest of the procedures and the instructions were identical to those of Experiments 1–4a.

Experiment 5

The results of Experiment 4a are unlikely to be explained by an outshining effect, since weakening background scene memory did not restore the object context effect. An alternative explanation is the degree of visual overlap: because scene images contain more visual information than images of individual objects, the perceptual overlap between the visual input at encoding and retrieval is stronger when background scenes are manipulated as the context compared to when focal objects are manipulated. Therefore, context reinstatement of the background scene influences focal object recognition even when background scenes are task-irrelevant at encoding, but it is not the case when focal objects are the context. If this assumption holds, manipulating the size of objects and scenes on screen so that focal scenes are presented against background objects should reveal the context effect of background objects even though they are task-irrelevant at encoding. Experiment 5 tested this hypothesis.

Participants. Forty-two participants who did not take part to the other experiments were recruited (mean age $M = 26.42$, SD = 4.50, 20 females/22 males). The recruitment procedure and screeners were identical to those of Experiments 1–4.

Stimuli, procedure, and analyses. The stimuli and randomization procedure were identical to Experiments 1–4. Unlike the other experiments, scenes were 196×130.6 pixels and were superimposed at the bottom center of 480×480 pixels objects, both at encoding and

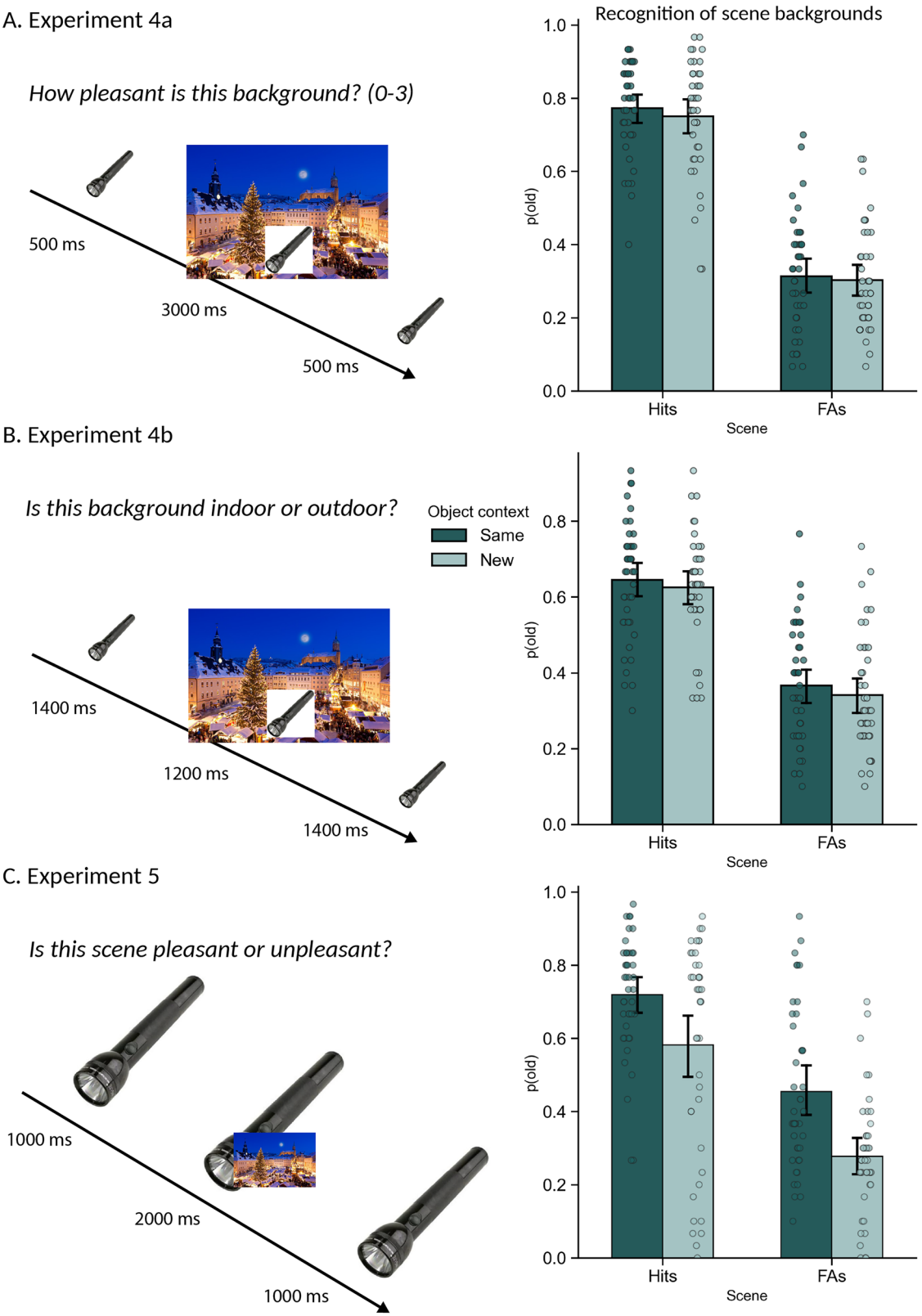


Fig. 3 | Encoding procedure and results of Experiments 4a (N=41 participants), 4b (N=42), and 5 (N=42). Encoding procedure and results of Experiments 4a (**A**, $N = 41$ participants), 4b (**B**, $N = 42$), and 5 (**C**, $N = 42$): proportion of old responses as a function of scene type (hits: target scenes, FAs: false alarms, lure scenes) and object context. Mean, 95% confidence intervals, and individual data points.

recognition. In the encoding phase, the object was first displayed alone for 1000 ms, then the scene and object appeared together for 2000 ms, and finally the object was displayed alone again for 1000 ms. Participants were instructed to decide whether they felt each focal scene was pleasant or unpleasant using their keyboard ("f": pleasant, "k": unpleasant). They were explicitly told that their responses should "relate to the scenes, not the objects behind." The rest of the procedures and the instructions were identical to those of Experiments 1–4. We conducted a repeated-

measures ANOVA on the proportions of old responses, with scene type (old/new) and object context (same/new) as factors.

Ethics

This research was approved by the Ethics Committee of the Faculty of Psychology at the University of Liège (approval #2324-090). In all experiments, participants gave their informed consent before taking part and received compensation according to the standard rate in Prolific (i.e., £9/hour).

Results

Experiment 1

We found a main effect of scene type such that the proportions of old responses were greater for target than for lure scenes, standardized $\beta = 0.99$, 95% CI [0.72, 1.26], $p < 0.001$. The main effect of object context was also significant, with higher proportions of old responses to scenes associated with the same object context at encoding and recognition than to those associated with a new object context, $\beta = 0.58$, 95% CI [0.32, 0.85], $p < 0.001$. The scene type × object context interaction effect was not statistically significant, $\beta = -0.20$, 95% CI [−0.58, 0.18], $p = 0.306$. The results are illustrated in Fig. 2A.

Experiment 2

The main effect of scene type was significant, with higher rates of old responses for target than for lure scenes, $\beta = 0.1.39$, 95% CI [1.10, 1.67], $p < 0.001$. The main effect of object context was also replicated, $\beta = 0.56$, 95% CI [0.28, 0.85], $p < 0.001$. The scene type × object context interaction was not statistically significant, $\beta = -0.12$, 95% CI [−0.52, 0.29], $p = 0.571$. The results are illustrated in Fig. 2B.

Experiment 3

As in Experiments 1 and 2, the main effect of scene type was significant, with higher rates of old responses for target than for lure scenes, $F(1, 40) = 71.91$, $p < 0.001$, $\eta^2_G = 0.30$, 95% CI [0.12, 1.00]. We also found a significant main effect of object context, with more old responses for old object context than new object context, $F(1, 40) = 29.50$, $p < 0.001$, $\eta^2_G = 0.09$, 95% CI [0.00, 1.00]. The scene type × object context interaction was not statistically significant, $F(1, 40) = 1.70$, $p = 0.199$, $\eta^2_G < 0.01$, 95% CI [0.00, 1.00]. The results are illustrated in Fig. 2C.

Experiment 4a

As in the previous experiments, we found a significant main effect of scene type, $F(1, 40) = 208.87$, $p < 0.001$, $\eta^2_G = 0.71$, 95% CI [0.58, 1.00]. In contrast, the main effect of object context was not statistically significant, $F(1, 40) = 0.95$, $p = 0.336$, $\eta^2_G < 0.01$, 95% CI [0.00, 1.00]. The scene type × object context interaction was not statistically significant, $F(1, 40) = 0.24$, $p = 0.629$, $\eta^2_G < 0.01$, 95% CI [0.00, 1.00]. The results are illustrated in Fig. 3A.

Experiment 4b

As in the previous experiments, we found a significant main effect of scene type, $F(1, 41) = 107.83$, $p < 0.001$, $\eta^2_G = 0.47$, 95% CI [0.28, 1.00]. The main effect of object context was not statistically significant, $F(1, 41) = 2.43$, $p = 0.127$, $\eta^2_G < 0.01$, 95% CI [0.00, 1.00]. The scene type × object context interaction was not significant, $F(1, 41) = 0.04$, $p = 0.84$, $\eta^2_G < 0.01$, 95% CI [0.00, 1.00]. The results are illustrated in Fig. 3B.

Experiment 5

As in Experiments 1–4, the main effect of scene type was significant, with higher rates of old responses for target than for lure scenes, $\beta = 1.13$, 95% CI [0.80, 1.47], $p < 0.001$. We also found a significant main effect of object context, with more old responses for old object context than new object context, $\beta = 0.66$, 95% CI [0.32, 1.00], $p < 0.001$. The scene type × object context interaction was not statistically significant, $\beta = -0.15$, 95% CI [−0.62, 0.32], $p = 0.533$. The results are illustrated in Fig. 3C.

Discussion

We tested the theoretical claim of Easton et al.[9] that context is reconstructed rather than encoded. This account holds that any feature of an encoded event can become either the item or the context, depending on the focus of memory retrieval. To test this hypothesis, we took advantage of the context reinstatement paradigm, in which unique background scenes are classically associated with focal objects at encoding and subsequently reinstated or switched during a recognition memory task[6].

In context reinstatement studies, focal objects and background scenes are by default ascribed to item and context, respectively. Based on the assumption that context is defined by retrieval questions, we predicted that focal objects could act as contextual cues if the recognition memory test pertained to the background scenes. Experiments 1 and 2 aimed to test this prediction by shifting the focus of the recognition memory task to the background scenes instead of the focal objects (hypothesis 1). The target and lure background scenes paired with the same focal object at encoding and test were more often judged as old than those presented with a different object, indicating that focal objects served as contextual cues. This effect was observed irrespective of encoding procedure, as reversing the order of focal object and background scene presentation (between Experiments 1 and 2) did not alter the results. The results reported here closely mirror those of previous studies that used focal objects as items and backgrounds as context[6,19]. Because we used the same encoding task as previous studies, the retrieval question alone defined focal objects as contextual and background scenes as the items. Experiments 1 and 2 provide the first evidence that focal objects can become the context when memory for background scenes is tested, which supports the assumption that it is the focus of retrieval that defines the item and the context in memory[9].

In Experiments 1 and 2, participants judged whether each focal object belonged in the background scene during encoding, fostering object-scene associations. Recent studies reported context reinstatement effects when only focal objects must be processed at encoding[11,12], suggesting that contextual features are implicitly integrated into memory representations. In these studies, focal objects are task-relevant, and background scenes are task-irrelevant, both at encoding and retrieval. We hypothesized that features irrelevant at encoding could become the focus of retrieval, and task-relevant features become contextual, depending on the question of the memory task. In Experiment 3, encoding focused on the focal objects only, but the recognition memory task targeted the background scenes. Replicating Experiments 1 and 2, focal objects acted as contextual cues for scene recognition. Task-irrelevant background scenes and task-relevant focal objects have thus become the focus of retrieval and the context, respectively. These results show that contextual features at retrieval need not be task-irrelevant at encoding, as assumed by some previous accounts (e.g., ref. 13); rather, any feature of an event can become contextual at retrieval.

Experiments 4a and 4b did not reproduce the effect of object context when the background scenes were both task-relevant at encoding and the focus of the memory task. One explanation for the results of Experiment 4a was an *outshining* effect—increased reliance on available memory cues that diminishes context effects[8]. In Experiment 4b, we shortened the encoding duration of background scenes and used a shallower encoding instruction[20]. This manipulation effectively decreased memory discrimination (Fig. 3A, B), but this was again not associated with an effect of object context. Although we cannot rigorously rule out the hypothesis of an outshining effect, the difficulty of the memory discrimination task in Experiment 4b was comparable to that of Experiments 1–3, making it unlikely that the lack of an effect of object context in this experiment was due to task difficulty. Alternatively, we investigated whether results from Experiments 4a and 4b were explained by the similarity principle, according to which the perceptual overlap between a probe and a memory trace determines the likelihood of retrieving this trace[5]. Because scene images contain substantially more visual information than images of individual objects, reinstatement of background scenes produces a greater perceptual overlap between encoding and retrieval inputs than object reinstatement. We tested this hypothesis in Experiment 5

by reversing the relative sizes of objects and scenes (Fig. 3C) while using the instructions of Experiment 4a. Experiment 5 replicated the object context reinstatement effect. Experiments 4–5 extend the findings of Experiments 1–3 by showing that although any feature of an event can become either the item or the context at retrieval, the impact of context on memory depends on the perceptual properties and relative salience of those features. According to the DRYAD model[21,22], younger and older adults' ability to retrieve information from memory depends on representational density, which is determined by attention at encoding. In this view, the distinction between item and context is artificial, and the sparser encoding of contextual than of item information is explained by the greater allocation of attention to the latter during encoding. In their framework, Easton et al.[9] expected attentional focus at encoding to have no effect on the nature of context at retrieval, but to modulate the salience of elements in the environment. These two accounts together explain the results of Experiments 4a, 4b: the weaker encoding of objects is due to both their perceptual salience being lower than that of scenes and attention at encoding being directed away from them. Overall, the results of Experiments 3–5 support that although attentional focus at encoding does not constrain the nature of context at retrieval, it impacts the salience of the different elements in the environment, which in turn modulates the potential contextual effect of these elements on memory.

Limitations

Although the present study provides the first behavioral evidence that context is reconstructed depending on retrieval questions, several limitations should be acknowledged. First, we decided to examine context-dependent recognition because object context effects were most likely to be observed in these conditions. Consequently, further research is needed to determine whether object context reinstatement will also allow for context-dependent discrimination, that is, discrimination between same and switched contexts[6] or between same and lure contexts[12]. Second, although we used photographs of complex real-world stimuli, pictures of focal objects and background scenes presented on a computer screen are not comparable to processing objects versus spatial environments in the real world. Future studies should extend the present work to more ecological settings, such as virtual reality (e.g., ref. 23).

Conclusion

The present study provides converging evidence that item and context are shaped by retrieval questions rather than encoded[9], challenging traditional assumptions about context in memory and open new avenues for future research. Some memory models propose that item and context are processed in distinct brain regions, respectively, the perirhinal and parahippocampal cortices (e.g., ref.[2]). Easton et al. hypothesized that when probing memory for the same event in different ways, the dedicated brain regions should respond to stimulus type rather than to its role as item or context. The parahippocampal cortex was associated with the reinstatement of background scenes serving as context for focal object recognition[24]. Applying our paradigm in an fMRI study would enable the comparison of brain activations underlying focal object and background scene recognition across two conditions: when objects act as context for scene memory and vice versa. We predict that the perirhinal and parahippocampal cortices will respond preferentially to the processing of objects and scenes, respectively[25–27], regardless of their roles as item or context. Beyond visual representations of objects and scenes, episodic memories include emotional, social, narrative, temporal, or conceptual information. Future research should determine whether these different types of features can likewise serve as items or contexts depending on the retrieval question.

Data availability

The behavioral data supporting the findings of this study are available at https://urls.fr/E_RRfa.

Code availability

The analysis code, material, and experiment code used in this study are available at https://urls.fr/E_RRfa.

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Author contributions

J.G.: conceptualization, investigation, software, formal analysis, visualization, writing-original draft. C.B.: conceptualization, funding acquisition, resources, supervision, writing-review and editing.

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Competing interests

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Correspondence and requests for materials should be addressed to Jeremy Gardette or Christine Bastin.

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