A gist orientation before retrieval impacts the objective content but not the subjective experience of episodic memory

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Abstract

A gist retrieval-orientation decreases one's ability to remember objective details from past experiences. Here, we examined whether a gist retrieval-orientation manipulation can impact both the objective and subjective aspects of remembering. Young participants took part in two cued-recollection tasks in which they studied pictures associated with labels; at retrieval, from the labels, they evaluated the vividness of their memories of the corresponding pictures, and recalled picture details. Before retrieval, participants were submitted either to a gist or a control retrieval-orientation (one per task). Results revealed that the amount of recalled details was lower following the gist condition while vividness ratings did not differ between the two retrieval orientations. Critically, the amount of recalled details predicted the corresponding vividness ratings to a similar extent in the gist and control conditions, thus suggesting that recollected memory traces in the gist condition were still rich enough to be judged as subjectively vivid.

Keywords: episodic memory; vividness; gist; subjective remembering; recall

1. Introduction

The ability to bring back to mind detailed representations of past experiences is a key feature of episodic memory (Tulving, 2002). One way to objectively measure the richness of memory representations is to examine the number of episodic details that people verbally report during a free-recall task (Levine, Svoboda, Hay, Winocur, & Moscovitch, 2002). The amount of produced episodic details is diminished in normal aging (Gaesser, Sacchetti, D, Addis, & Schacter, 2011; Levine et al., 2002; Madore, Gaesser, & Schacter, 2014; Robin & Moscovitch, 2017), which may in part be due to older adults' tendency to focus on the event gist—the general meaning of events rather than their surface form (Brainerd & Reyna, 2002)—when remembering (Flores, Hargis, McGillivray, Friedman, & Castel, 2017; Holland & Rabbitt, 1990). In the present study, we examined whether the induction of a gist retrieval orientation in young adults mimics these age-related differences in episodic memory.

The capacity to remember past events in detail can be experimentally reduced by the use of retrieval-orientation manipulations before the retrieval phase. In a study conducted by Rudoy, Weintraub and Paller (2009), cognitively normal participants were submitted to retrieval-orientation manipulations using picture material before they recalled autobiographical events. In a *detail* condition, participants were asked to describe two pictures in as much detail as possible, and then they recalled an autobiographical memory. During another session aimed at orientating participants toward a gist-based processing (*gist* condition*)*, participants were sequentially presented with pictures and were asked to give a short title to each picture; then, they again retrieved an autobiographical memory. Results revealed that participants recalled fewer episodic details in the autobiographical memory task when it took place after the *gist* than the *detail* retrieval-orientation manipulation (Rudoy et al., 2009). The authors concluded that a gist retrieval-orientation manipulation decreases the ability to remember specific details from past experiences. Recent evidence further suggests that orientation manipulations not only act on memory retrieval mechanisms but can also determine how one processes and encodes incoming experience in episodic memory. Indeed, it has been shown that young participants recalled more details from video clips after a specificity (i.e., a retrieval-orientation that enhances the amount of recalled episodic details) than a gist induction before the encoding phase (Grilli et al., 2019).

Subjective remembering, which can be assessed through self-paced vividness judgements, designates the degree of clarity or intensity of the mental representation that is brought to mind when recollecting a past event (Johnson, Hashtroudi, & Lindsay, 1993; Mitchell & Johnson, 2009). Reinstating mental representations of past events and judging their subjective quality rely on mental imagery processes (Marks, 1973; Pearson, Naselaris, Holmes, & Kosslyn, 2015). Indeed, mental imagery is necessary to generate and maintain depictive representations in mind while remembering (Kosslyn, 1995). It is therefore unsurprising that visual memory and visual imagery share many common cognitive and neural processes (Slotnick, Thompson, & Kosslyn, 2012).

The intensity of the subjective experience of remembering is thought to be based, at least in part, on the objective richness of the corresponding memory representation (Mitchell & Johnson, 2009). More specifically, vividness judgements are deemed to reflect the amount of sensory information available to mind (D'Angiulli et al., 2013). Recently, Folville, D'Argembeau and Bastin (2019) directly examined the extent to which subjective vividness judgements mapped onto objective recall. They conducted a study in which participants encoded pictures of scenes associated with descriptive labels. At retrieval, participants were cued with the labels and were asked to retrieve the associated picture, to judge the subjective vividness of their memory, and to recall as many details of the picture as possible. Results revealed that subjective vividness ratings were predicted by the corresponding amount of recalled details, which provides direct support to the idea that subjective memory experience is closely tied to the objective quantity of retrieved details (Folville et al., 2019).

Although older adults usually recall fewer episodic details than young adults, perhaps because of a gist-orientation processing during memory retrieval, their subjective memory ratings are not, on average, lower than those of young adults (Robin & Moscovitch, 2017; St-Laurent, Abdi, Bondad, & Buchsbaum, 2014). However, the amount of recalled details predicts their vividness ratings to a lesser extent than in young adults, which suggests that they might spontaneously rely on other types of details (perhaps gist information) to calibrate their subjective memory judgments (Folville et al., 2019).

The current study builds on experimental evidence showing that a gist-based retrieval orientation can reduce the number of reinstated episodic details (Rudoy et al., 2009) and that the amount of retrieved details predicts subjective memory judgements (Folville et al., 2019). More specifically, we assessed whether a gist retrieval-orientation manipulation would reduce not only the number of retrieved episodic details but also the associated subjective experience of remembering in young adults. To examine this question, we conducted an experiment in which a retrieval-orientation manipulation (*gist* or *control*) was performed between the encoding and retrieval of pictures. The cued-recollection task was similar as the one used in our previous study: participants encoded pictures associated with labels and, at retrieval, they were presented with labels alone and were asked to judge the subjective vividness of their memory for the associated picture and to recall as many details of the picture as they could. Each participant was tested in two sessions (one week apart) in which either a gist or control retrieval orientation was included before the retrieval of pictures.

Our first aim was to extend the findings of Rudoy and colleagues (2009) and to examine whether the amount of recalled details would be smaller following the gist than the control retrieval-orientation manipulation. Our second aim was to examine the impact of the gist manipulation on the subjective experience of remembering. Because the amount of recalled episodic details predicts the corresponding vividness ratings, we could hypothesize that vividness ratings would be lower following the gist than the control retrieval orientation. However, a recent experiment suggests that the experimental manipulation of retrieval orientation can have different effects on objective and subjective memory measures. After a control or a specificity induction, young participants mentally created atemporal scenes and then rated the vividness of their mental representations and verbally described the imagined scenarios (Madore, Jing, & Schacter, 2019a). Results revealed that participants produced more detailed mental scenarios after the specificity induction, while their subjective vividness ratings did not differ between the two conditions. Besides, older adults tend to report similar subjective memory ratings as young adults despite impoverished free-recall performance (Robin & Moscovitch, 2017). Thus, it is possible that the subjective vividness of memories would not be impacted by our retrieval-orientation manipulation despite an objective reduction of recalled details. Finally, the last aim of the current study was to investigate whether the amount of retrieved details predicts the corresponding vividness ratings on a trial-by-trial basis, which would replicate the findings of our previous study (Folville et al., 2019), and to examine whether this relationship is similar in the gist and control conditions.

2. Methods

2.1 Participants

Thirty-two young adults (16 men; age range: 18-27, mean=21.03; SD= 2.32) participated in this study. This sample size was determined a priori[1] using G*Power 3 (Faul, Erdfelder, Lang, & Buchner, 2007) to achieve a statistical power of 95% to detect an effect size *d* = .60, with an alpha of .05 (one-tailed)[2]. One participant was not available for the second session and was therefore replaced by another participant. All participants were native French speakers and were recruited in the Liège area in Belgium. None reported past or current psychiatric or neurological disorders. All participants gave written informed consent and the study was approved by the Ethics Committee of the Faculty of Psychology of the University of Liège, Belgium.

2.2 Materials

The stimuli were 60 colored pictures selected from the Nencki Affective Picture System (NAPS) (Marchewka, Żurawski, Jednoróg, & Grabowska, 2014). Selected pictures were neutral (valence ranged from 4.61 to 6.19; *M* = 5.50; *SD*=0.37 and arousal ranged from 3.91 to 6.53; *M* = 4.83; *SD* = 0.53) and depicted natural environments. For the cued-recollection tasks, a descriptive label was assigned to each picture (one to three words). Forty pictures were used for the two cued-recollection tasks (20 each) and the remaining pictures were used for the two retrieval-orientation manipulations (10 each). Note that care was taken to ensure that

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[1] Twelve adults participated in the study of Rudoy et al. (2009) suggesting that the effect size of the retrieval-orientation manipulation (which was not reported) is strong. However, we decided not to conduct our power analysis on these data because participants of Rudoy et al.'s study were older (67 to 78 years) adults while in the current study young adults were tested. Besides, Rudoy et al. studied autobiographical events while we used laboratory discrete stimuli in the present experiment.

[2] Gist-retrieval orientation was hypothesized a priori to have an effect in an expected direction (i.e., lower recall relative to the control manipulation), thus justifying the use of a one-tailed test.

the pictures used for the retrieval orientations were thematically unrelated to the one used in the cued-recollection task so as to avoid interference between the two tasks.

2.3 Procedure

Participants were tested individually during two sessions one week apart. During the first session, participants filled-in a demographic questionnaire and took part to the first cued-recollection task. The task was programmed using E-Prime 2.0 software (Psychology Software Tools, Pittsburgh, PA). The task began with an encoding phase in which participants sequentially viewed twenty pictures associated with their descriptive labels presented during 6 seconds each (see Figure 1). Picture presentation was separated by a fixation-cross for one second. Participants knew that their memory would be subsequently tested.

After encoding, participants counted backward during 2 minutes and then were submitted either to the *gist* or the *control* retrieval-orientation manipulation. In the gist orientation, participants were sequentially presented with ten pictures and they were asked to give a short title (1 to 3 words) to each picture. In the *control* manipulation, participants were presented simultaneously with ten pictures and they were asked to choose two pictures that they were instructed to describe (see Rudoy et al., 2009 for a similar design). No further probe or instruction was given to the participants regarding the description task. This differs from the study of Rudoy et al. (2009) in which participants were asked to describe two pictures in details and in which the experimenter asked for additional information during the task (this may be why the authors referred to this condition as a *detail* retrieval-orientation manipulation).

Next, participants received the retrieval task. They were presented with the twenty labels previously seen during the encoding phase and were asked 1) to assess the subjective vividness of their memory for the associated picture, using a Likert scale ranging from 0 (no vivid memory) to 5 (very vivid memory); and 2) to recall as many details of the picture as they could. The instruction for the vividness ratings was: “Assess and rate the vividness of your memory of the picture”. The instruction for the free-recall was: “Recall as many details of the picture as you can”. The recall of each participant was audio-recorded. When participants finished their recall, they pressed on the space bar to move on to the next trial. No time limit was imposed to answer. The order of presentation of the pictures was randomized both at encoding and retrieval.

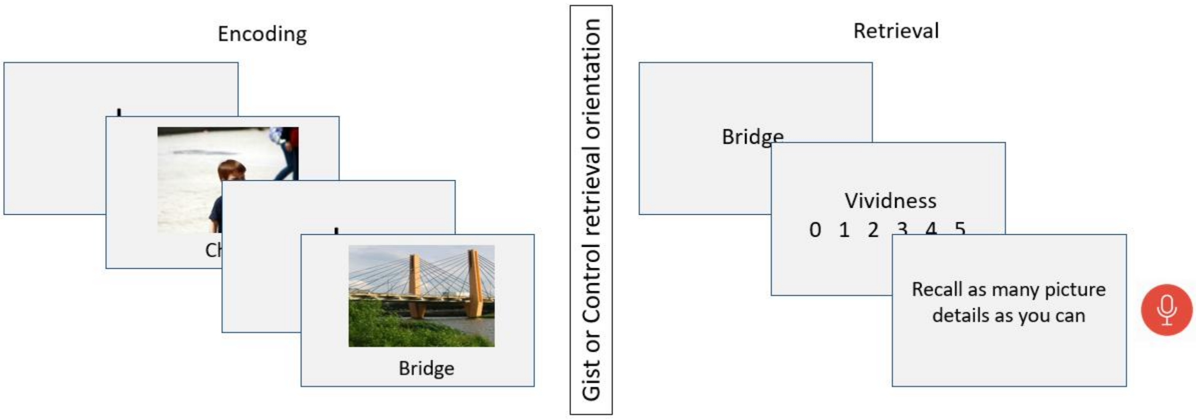

Figure 1. Schematic representation of the cued-recollection task. During encoding, participants viewed pictures associated with descriptive labels for 6 seconds each. After a two-minute delay (backward count), they received the Gist or Control retrieval orientation (order counterbalanced across participants). At retrieval, participants were presented with the labels alone and were asked: 1) to assess the subjective vividness of their memory representation of the picture; 2) to recall as many picture details as possible.

One week after the first session, participants were tested a second time. The cued-recollection task was the same as the first one with the exception that they encoded twenty new pictures with their labels. Between encoding and retrieval, the other retrieval-orientation manipulation (gist or control depending on which was used in the first session) was induced using ten new pictures. The order of the gist and the control condition across the sessions was counterbalanced across participants.

2.4 Narrative scoring

The coding procedure was the same as the one used in our recent study (see Folville et al., 2019, for a detailed description). Briefly, for each participant, the content of the recall protocol for each picture was transcribed. The richness of the recalled content was assessed using a coding procedure that comprised five categories: person (each person or animal mentioned by the participant); object (objects, rooms, natural elements such as trees or hills); perceptual (perceptual information specifying the color, size or texture of a person or an object); spatial (spatial positioning of a person or an object in the picture); and quantity (reporting any amount: 4 chairs, 3 men, and so forth) components. Our five scoring categories were not mutually exclusive: each detail could include components from several categories. For example: the detail "A white car was on the right side" includes an object component (the car), a perceptual component (white color) and a spatial component (right side). Additionally, the coding procedure comprised a semantic detail category that referred to personal or conceptual statements or attribution of what the people depicted on the picture could think, plan to do or have done (e.g., The man was next to the boat propeller, *he probably finished to clean it before the picture was taken*"). The scoring was made by a rater blind to retrieval-orientation conditions (gist or control). A second rater, also blind to retrieval-orientation conditions, scored a randomly selected 20 % of the data. Intraclass Correlation Coefficients

(ICCs) revealed good agreement between the two raters for all component categories (all ICCs > .71).

2.5 Statistical analyses

Because the normality assumption was violated for several component categories, we used robust statistical methods to analyse data (Field & Wilcox, 2017). Robust statistical methods perform well in terms of type I error control and statistical power, even when the normality and homoscedasticity assumptions are violated, and thus they increase the likelihood of discovering genuine differences between groups and associations among variables (Wilcox, 2012). These robust analyses were conducted using the 20% trimmed means (a robust measure of location that ignores the top and bottom 20% of data) and 2000 bootstrap samples (as a way to deal with bias in standard errors by estimating the shape of the sampling distribution by sampling with replacement from the data), as recommended by Field and Wilcox (2017). Effect sizes were estimated using the explanatory measure of effect size ξ; values of 0.10, 0.30, and 0.50 correspond to small, medium, and large effect sizes (Mair & Wilcox, 2019). Reported descriptive statistics refer to the 20% trimmed means and their 95% confidence intervals (CIs) calculated using the percentile bootstrap method with 2000 bootstrap samples (Wilcox, 2012).

3. Results

Participants were able to recognize previously encoded labels in both conditions, with comparable hit rates (i.e., trials for which the participant remembered at least one detail of the corresponding picture) between the gist (trimmed mean = 91 %, 95% CI (85.50, 94.75)) and control (trimmed mean = 92.25 %, 95% CI (88.25, 95.00)) retrieval orientations, M_{diff} = 0.41, 95% CI [-7.56, 5.06], $Y_t(19) = 3.95$, $p = .68$, $\xi = 0.08$.

3.1 Effect of retrieval-orientation manipulation on episodic recall

Our first aim was to examine the effect of the retrieval orientations on the amount of recalled components. To examine this question, we computed the average number of components that was recalled for each category and for each participant in both retrieval-orientation conditions. Note that only hit trials were included in this analysis.

We conducted a 2 retrieval-orientation (gist vs. control) x 5 component categories (person vs. object vs. perceptive vs. spatial vs. quantity) robust within-subjects ANOVA. This ANOVA yielded a main effect of retrieval-orientation, F_t= 18.88, $p < .001$, suggesting that participants recalled more components after the control than the gist retrieval-orientation manipulations. There was also a main effect of component category, F_t= 442.60, $p < .001$, as well as a significant interaction between the retrieval orientation and component category, F_t= 6.53, $p < .001$. Follow-up comparisons using robust paired t-tests revealed that participants recalled a smaller number of object, M_{diff} = 0.337, 95% CI [0.17, 0.50], $Y_t(19)$ = 4.33, $p < .001$, $\xi = 0.51$ and perceptual components, M_{diff} = 0.237, 95% CI [0.10, 0.37], $Y_t(19)$ = 3.69, $p = .002$, $\xi = 0.39$, after the gist than the control orientation, while there was no difference between the retrieval orientations in the number of recalled components for the person, M_{diff} = 0.003, 95% CI [-0.04, 0.05], $Y_t(19)$ = 0.17, $p = .86$, $\xi = 0.03$, spatial, M_{diff} = 0.05, 95% CI [-0.09, 0.19], $Y_t(19)$ = 0.77, $p = .45$, $\xi = 0.10$, and quantity, M_{diff} = 0.004, 95% CI [-0.04, 0.05], $Y_t(19)$ = 0.17, $p = .86$, $\xi = 0.03$, categories (see Figure 2A).

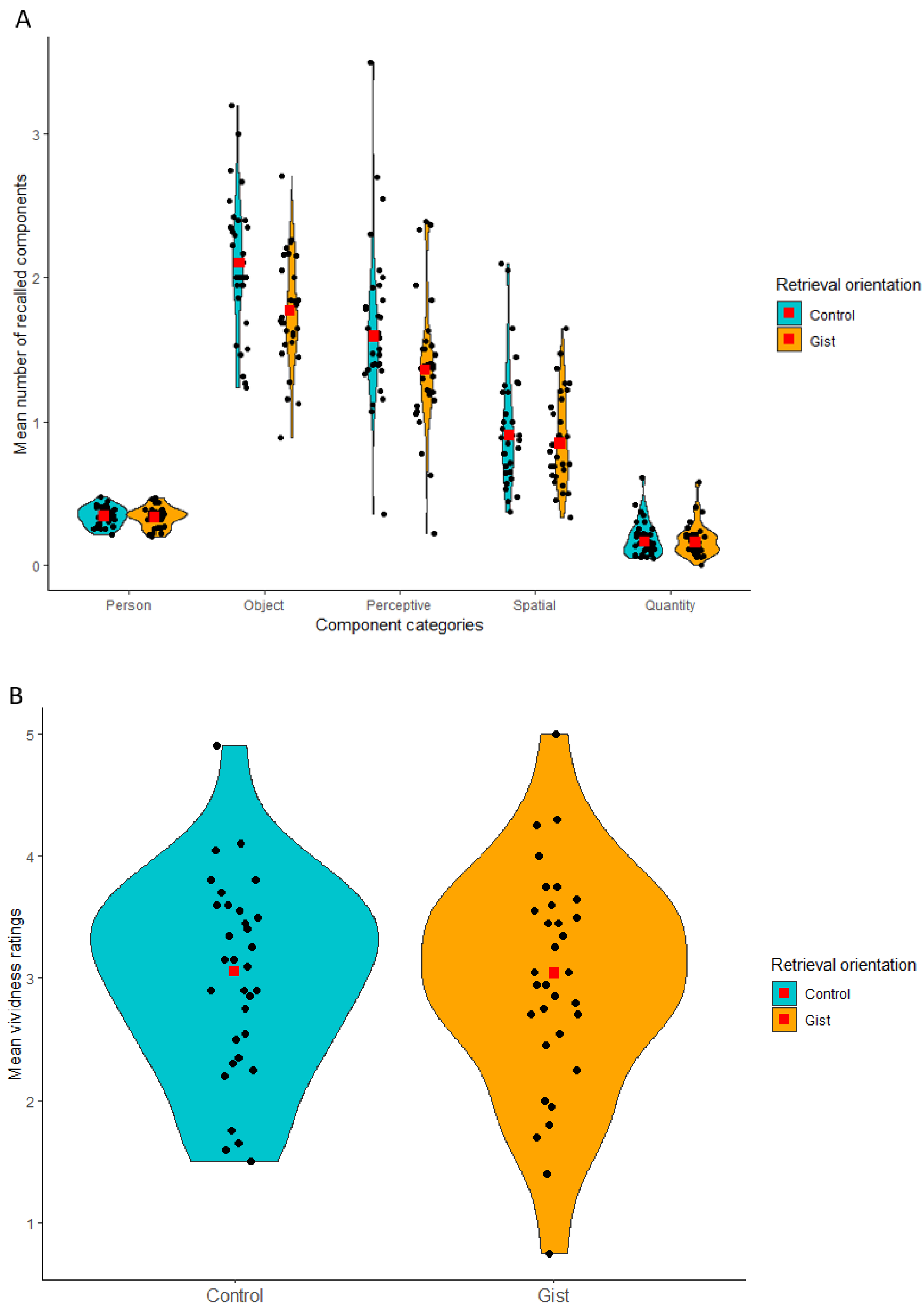

Figure 2. A. Violin plot of the number of recalled components in the different component categories (people vs. object vs. perceptual vs. spatial vs. quantity) in the gist and control retrieval-orientation manipulations. B. Violin plot of the mean vividness ratings in the cued-

recollection task after the gist and the control retrieval-orientation manipulations. Red rectangles represent the 20% trimmed means.

To ensure that the lower amount of perceptual components reported by the participants after the gist orientation could not be explained by the lower amount of objects recalled (a perceptual detail always referred to a person or an object), we divided the rate of perceptual components by the number of people and objects recalled. Results revealed that the difference between the gist and the control orientations in the number of recalled perceptual components was no longer significant, M_{diff} = 0.03, 95% CI [-0.03, 0.09], Y_t (19) = 0.97, *p* = .34, ξ = 0.11.

The analysis comparing the rates of semantic details in the gist (trimmed mean = 0.096, 95% CI (0.056, 0.147)) and in the control (trimmed mean = 0.098, 95% CI (0.065, 0.137)) retrieval orientations revealed no significant difference between the two manipulations, M_{diff} = 0.003, 95% CI [-0.05, 0.05], Y_t (19) = 0.13, *p* = .89, ξ = 0.02, suggesting that the number of non-episodic details reported by the participants was not impacted by the retrieval-orientation induced before retrieval.

3.2 Effect of retrieval-orientation manipulation on subjective vividness

We examined whether vividness ratings varied within subjects to a similar extent in the gist and control retrieval-orientation manipulations. We computed the standard deviation of the vividness judgements within each subject and submitted these values to a robust t test. Results revealed that vividness ratings varied within subject to a similar extent in the gist and control retrieval-orientation manipulations, M_{diff} = 0.08, 95% CI [-0.26, 0.11], Y_t (19) = 0.88, *p* = .39, ξ = 0.13.

Next, we examined the impact of the retrieval-orientation manipulation on the subjective experience of remembering and investigated whether subjective memory experience is predicted by the amount of recall components on a trial-by-trial basis. We also investigated whether the relationship between the amount of recalled components and subjective vividness was similar after the gist and control orientations.

We conducted a robust mixed-effects analysis using the robustlmm package (Koller, 2016) implemented in the R software (R Core Team, 2017). Trials of the cued recollection task were modelled as level 1 units and participants as level 2 units. The dependent variable was vividness ratings. The total number of components recalled (i.e., the sum of persons, objects, spatial, perceptual and quantity) was added as first-level predictor, retrieval orientation as second-level predictor, and the Number of components x retrieval orientation cross-level interaction was also added to investigate potential differences between the gist and control orientations in the relationship between vividness and the number of components produced in free recall. Subjects and items were modelled as crossed random effects. More specifically, the model included random intercepts for both subject and item, and by-subject random slopes (Baayen, Davidson, Bates, 2008).

This mixed-effects analysis revealed that the number of recalled components was a significant predictor of vividness, $\beta = 0.309$, SE = 0.032, $t = 9.71$, $p < .001$, showing that trials that received higher vividness ratings were characterized by more recalled components. Neither retrieval orientation, $\beta = 0.093$, SE = 0.114, $t = 0.78$ (see Figure 2B for the trimmed-means of vividness rates), nor the Number of components x retrieval orientation cross-level interaction, $\beta = 0.007$, SE = 0.023, $t = 0.32$, were significant predictor of vividness ratings (see Figure S1 in the Supplementary Material for a representation of the relationship between the amount of retrieved components and vividness ratings in the gist and control retrieval-orientation manipulations for each of the 32 participants). These results suggest that rates of vividness did not differ significantly between the gist and control orientations and that the amount of recall components predicted the corresponding subjective vividness judgements to a similar extent in the gist and in the control retrieval-orientation conditions.

3 Discussion

The current study aimed to examine the effect of a gist-based retrieval orientation on the amount of retrieved episodic details and the subjective experience of remembering. In two separate sessions, young participants studied pictures associated with verbal labels. During each session, a retrieval orientation manipulation (gist or control) was induced between encoding and retrieval. At retrieval, participants rated the vividness of their memories for the pictures and recalled as many pictures' details as they could. Results revealed that the gist orientation decreased the objective number of details reported by the participants while it did not impact their subjective experience of remembering. Besides, the amount of recollected details predicted the corresponding subjective vividness judgements to a similar extent in the gist and control conditions.

The reduced recall of episodic details after the gist relative to the control retrieval orientation replicates previous findings (Rudoy et al., 2009) and suggests that gist retrieval-orientation manipulations decrease the objective amount of episodic details that is retrieved during a free-recall task. Our findings also echoes the recent study of Sheldon and Ruel (2018) in which participants were asked to mentally navigate routes and to verbalize the content of their mental navigation after receiving either a gist or a detail retrieval orientation, which revealed that participants produced fewer details after the gist than the detail condition.

Besides affecting memory for detail, the gist-retrieval manipulation may also impact memory for the gist of the stimuli (Brainerd & Reyna, 2002). In other words, it could be that participants remembered more of the general form and meaning of the scenes following the gist-retrieval orientation. The current study does not allow us to evaluate this possibility because memory for the gist of stimuli was not assessed. This possibility could also apply to previous studies on the topic, which only assessed the effect of the retrieval-orientation manipulations on the amount of retrieved episodic details (Grilli et al., 2019; Rudoy et al., 2009). In a recent study, Flores and colleagues asked young and older participants to memorize pairs of daily life objects (Flores et al., 2017). At test, participants were asked to determine which of the two items was the cheapest (i.e., gist information) or to recall the exact price (i.e., verbatim/detailed information). It was found that older adults, who presumably relied more on the gist of the stimuli, had comparable performance as young adults when choosing the cheapest item while their memory performance for the exact price was lower (Flores et al., 2017; see also Gallo, Hargis, & Castel, 2019 for comparable results). Future studies could combine a gist-retrieval orientation manipulation with such measure of memory for gist information, so that it could be examined whether a gist orientation induced before retrieval not only reduces memory for specific episodic details but also favours the recall of gist information.

Another challenge is to provide evidence that a gist memory-retrieval orientation reduces the amount of retrieved details by specifically impacting episodic memory mechanisms rather than just diminishing the talkativeness of the participants (which would also result in a reduced free-recall rate) (Madore et al., 2014). A first way to show that the effect of the retrieval-orientation manipulation is episodic-specific is to include a task that does not rely on episodic memory mechanisms. For instance, some studies using specificity inductions also included a description task in their design (Madore et al., 2014; Madore, Jing, & Schacter, 2019b; Madore & Schacter, 2016). They found an increase in the number of reported episodic details when remembering the past or imagining the future after the specificity induction while the induction did not impact the number of reported details in the description task. Such pattern of result supports the assumption that the retrieval-orientation manipulation specifically targeted episodic memory mechanisms (Madore et al., 2014). In the current study, we did not include any non-episodic memory task (e.g., a description task) that would allow us to ensure that the observed effects rely on episodic memory mechanisms. However, the finding that our manipulation impacted the recall of episodic details while not influencing the report of semantic or conceptual details (i.e., there was no difference in the number of reported semantic details between the gist and the control retrieval orientations) provides an alternative way to confirm that our manipulation specifically affected episodic memory mechanisms (Grilli et al., 2019; Madore & Schacter, 2016; Rudoy et al., 2009). . Therefore, our data suggests that the gist manipulation specifically influenced episodic memory mechanisms and did not decrease the amount of reported episodic details just by reducing general narrative processes.

The second important finding of our study is the lack of significant effect of retrieval orientation on vividness ratings. This suggests that retrieval-orientation manipulations can impact the objective amount of retrieved episodic details without affecting the associated subjective experience of remembering. These results corroborate the recent study of Sheldon and Ruel (2018) mentioned above, in which the subjective vividness of mental navigation did not vary according to the memory orientation (gist or detail). Similar results were also observed in an experiment in which young participants produced more detailed mental scenarios after a specificity than a control induction, while the subjective vividness of their mental representations did not differ between the two conditions (Madore et al., 2019a).

These findings can be interpreted in relation to the criteria that people set to provide vividness ratings. When introspectively judging the subjective quality of a memory, one may rely on one's metacognitive knowledge and use a self-defined threshold or criterion to determine the extent to which the memory is vivid (St-laurent, Abdi, Burianova, & Grady, 2011). For instance, one may decide that remembering from 2 to 4 details or from 6 to 8 episodic details about a picture corresponds to "slightly vivid" or "very vivid" memory representations, respectively (note that such judgments are probably not conscious and systematic, but may instead result from heuristics). In the current study and in the experiment of Madore et al., (2019a), the difference in the amount of reported components between the gist (or specificity) and control conditions, although statistically significant, was not large[3]. It is therefore possible that the richness of retrieved memory representations was not sufficiently lowered by the gist manipulation for the memory trace to be judged as less vivid based on the criterion underlying the subjective memory scale (e.g., trials in which 8 or 7 details are reinstated may be both judged as "very vivid"). It should also be noted that in the current study and in the experiments of Sheldon and Ruel (2018) and Madore and colleagues (2019a), vividness judgements were made on a Likert scale ranging from 0/1 to 5, so it could be that the scale is not sensitive enough to detect subtle differences in subjective memory

[3] In the current study we observed a difference of 12% in the recall of components between the gist and the control orientations, a proportion that is very similar to the one observed in the study of Madore et al. (2019a): 14% of change in the number of summed details between the specificity and the control conditions.

intensity between the two retrieval-orientation manipulations. For example, remembering 8 or 7 details could receive the same rating of 5 on a 5-point Likert scale, but could be associated with slightly different vividness values if they were judged using a Visual Analog Scale ranging from 0 to 100 (Bartoshuk et al., 2002). Besides, although it is accepted that individuals rely on their metacognitive knowledge to anchor a judgement on a Likert scale, how they determine that a given rating (e.g., 5) represents what they have in mind remains largely unknown (Hofer & Sinatra, 2010). Thus, future studies should examine whether the use of other subjective memory scales (e.g., VAS) results in more subtle differences in the rates of vividness between retrieval-orientation manipulations.

Interestingly, when examining the trial-by-trial relationship between vividness and the amount of retrieved details in the gist and control conditions, we found that the number of recalled components predicted the corresponding vividness ratings and that the magnitude of this relationship was similar between the two conditions. In other words, subjective vividness judgements varied from one trial to another according to the quantity of retrieved details to a similar extent in both conditions. It is likely that the number of recalled details varied from one trial to another as a function of pictures' level of visual richness in the two retrieval-orientation manipulation conditions, even if the average number of remembered details was lower in the gist condition. In other words, when they were in a gist mode that oriented them toward the processing of the global frame of their memories, participants probably still used retrieved memory details to judge the subjective quality of their memories from one trial to another. Retrieval-orientation manipulations thus seem to influence objective memory retrieval while not impacting vividness ratings, nor affecting how retrieved details are used or weighted to calibrate such subjective judgements.

From a broader perspective, there is a long-standing debate as to whether phenomenal consciousness (subjective experience) and access consciousness (what is reportable and usable for decision making) arise from the same trace or stem from distinct traces that can be dissociated (Overgaard, 2018). One view is that phenomenal consciousness overflows (i.e., has a greater capacity than) the content that can be accessed (Block, 2007). For instance, when participants are briefly presented with arrows of letters, they think that they can still see all the letters of the lines after they disappeared (phenomenal consciousness), while they can only verbally report (access consciousness) 3 or 4 letters (Sperling, 1960; see Block, 2011 for a review). This suggests that one can have a conscious phenomenology of a trace without being able to consciously access all the content of it (Block, 2011). One way to interpret our finding would be that the retrieval-orientation manipulation impacted the amount of details that could be accessed without affecting phenomenal consciousness (i.e., the subjective experience of vividness). In other words, participants may have the same phenomenological experience of the remembered pictures in the gist and control conditions while having access to different amount of content details (i.e., subjective vividness may overflow the picture content that can be accessed and verbally reported).

Concerning the cognitive aging literature, it has been suggested that even when older individuals retrieve less detailed memory representations, their subjective memory judgements are still high so that subjective memory judgements do not mirror the actual level of richness of the corresponding memory representations (McDonough, Cervantes, Gray, & Gallo, 2014; Robin & Moscovitch, 2017; St-Laurent et al., 2014). Therefore, one may argue that our results (i.e., lower episodic recall but similar vividness ratings after the gist retrieval-orientation manipulation) mimic the pattern of results often described in the aging literature. However, in the current study, we found that the number of recalled components predicted the corresponding vividness ratings and that the magnitude of this relationship did not differ between the two conditions, whereas in our previous study (Folville et al., 2019) we found that older adults' vividness judgements were predicted by the amount of retrieved details to a lesser extent than in young adults. This suggests that the retrieval-orientation manipulation used in the current study did not exactly reproduce the pattern of performance often observed in the elderly, with older adults using retrieved details differently relative to their younger counterparts to judge the subjective quality of their memories (Folville et al., 2019). Older adults' tendency to rely less on specific visual details than young adults to judge the subjective vividness of their memories may result from a change in a cognitive process that the current gist orientation did not target and that future studies should try to identify and examine.

As already noted, one limitation of the current study is the absence of non-episodic memory task that would take place after the orientation manipulation and that would allow us to examine whether the effect of the gist manipulation was specific to episodic memory tasks. Another limitation is that we did not include a baseline measure (i.e., a measure of participants' recall ability without any retrieval-orientation manipulation occurring before), so we cannot ensure that our gist manipulation indeed decreased the amount of retrieved details; another possibility would be that the difference observed between the two conditions was actually driven by an increase in the number of recalled details in the control condition.

4 Conclusions

The current study shows that retrieval-orientation manipulations can significantly impact the amount of episodic details that are retrieved without influencing the associated subjective memory experience. Our gist-retrieval orientation decreased the amount of retrieved episodic details but participants probably recollected memory traces that were still sufficiently rich to be judged as subjectively vivid, which may explain why rates of vividness did not differ between the two conditions. Besides, the amount of retrieved details predicted the corresponding vividness judgements to a similar extent in the gist and control conditions, thus suggesting that the retrieval-orientation manipulation lowered the amount of retrieved episodic details but did not impact the use of these details to judge the subjective vividness of memories. More investigation is needed to understand under which conditions and the reasons why retrieval-orientation manipulations differentially impact the objective content and the subjective experience of episodic memory. Interpreting the results of such investigation in light of the cognitive aging literature may be of particular interest, since the subjective experience of remembering of older individuals seems to become somewhat disconnected from the objective content of their memories.

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A gist orientation before retrieval impacts the objective content but not the subjective experience of episodic memory

Supplementary material

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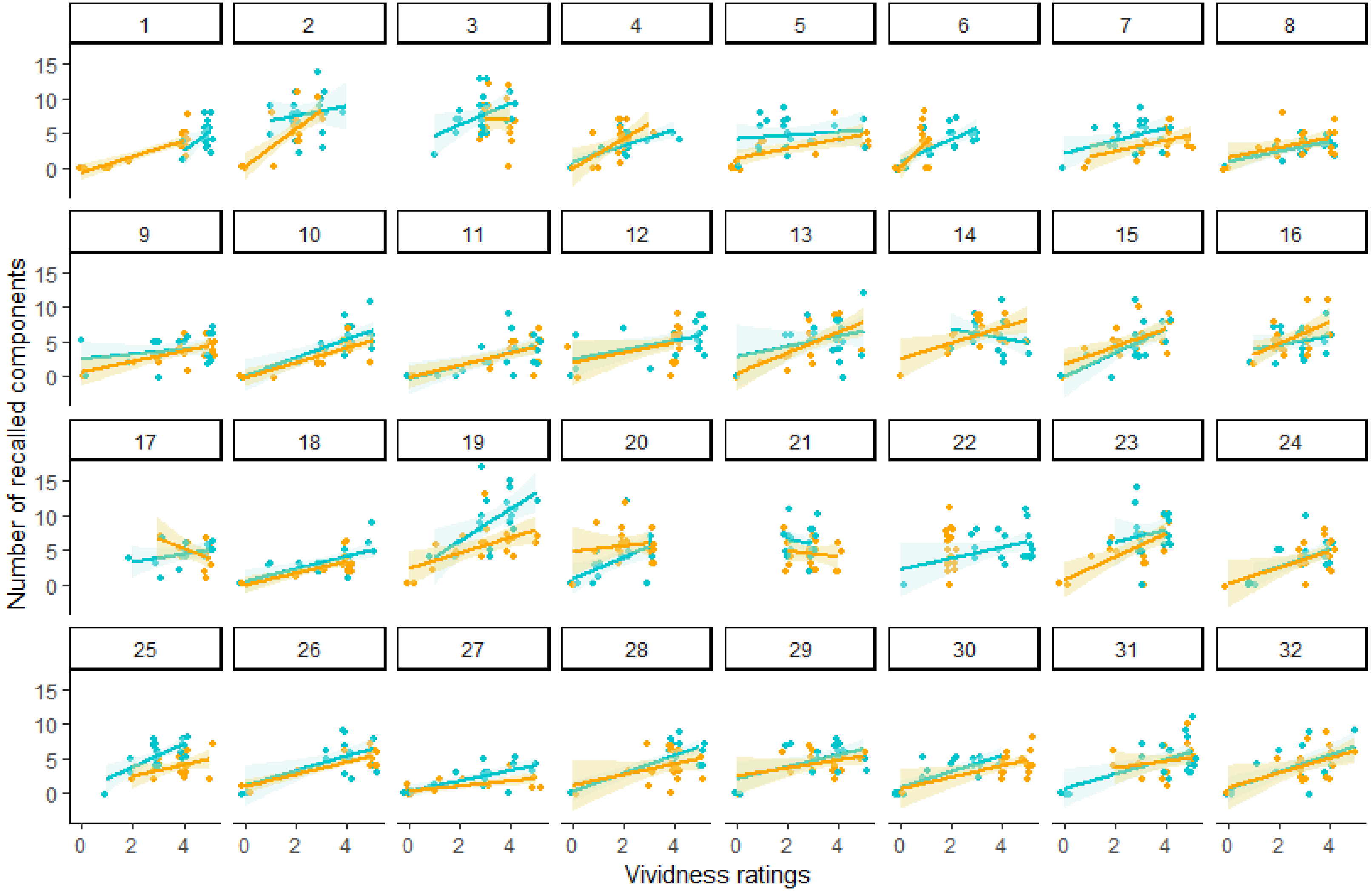
Figure S1. Relationship between the amount of retrieved components (Y axis) and vividness ratings (X axis) in the gist and control retrieval-orientation manipulations for each participant. Turquoise blue and orange refer to the control and the gist conditions, respectively. The number in the box at the top of each graph corresponds to participant's number.

Figure S1.



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