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The influence of shifting perspective on episodic and semantic details during autobiographical memory recall

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ABSTRACT

Shifting to a novel visual perspective during retrieval influences autobiographical memories (AM) and can lead to persistent changes in memories. Adopting an observer-like compared to an own eyes perspective reduces episodic information during AM recall, but less is known regarding how viewpoint influences semantic information. In the current study, we investigated how shifting from an own eyes to an observer-like perspective during narrative recall of AMs influences episodic and semantic information. Shifting perspective reduced the number of episodic details associated with emotions and thoughts, and also led to similar reductions in personal semantics. We replicated prior research showing that shifting perspective reduces emotional intensity in subsequent memories, but these subjective changes were not coupled with objective changes in a narrative recall. Our findings suggest that shifting perspective influences the interplay between episodic and semantic information during proximate recall and subjective changes when memories are later recalled.

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Autobiographical memory; visual perspective; narrative recall; episodic memory; semantic memory

Autobiographical memory (AM) integrates episodic (i.e., specific to an event) and semantic (i.e., long-standing knowledge) information, and requires adopting a particular visual perspective during remembering. AMs can be retrieved an own eyes perspective and/or an observer-like perspective, such as when one sees themselves in the memory (Nigro & Neisser, 1983; Rubin & Umanath, 2015), and this viewpoint influences recollective aspects that imbue memories with the subjective sense of reexperience. Specifically, observer-like perspectives are associated with less emotional intensity and vividness (Rice, 2010; Zaman & Russell, 2021), and shifting from an own eyes to an observer-like perspective during retrieval can also produce similar changes that persist when memories are later retrieved from their natural viewpoint (St. Jacques, 2019). Thus, shifting perspective during retrieval can reshape memories, consistent with theories of memory that predict that retrieval can update memories (Lee et al., 2017; Scully et al., 2017) and adaptive reconstructive aspects of memories (Schacter, 2021; Schacter et al., 2011). Prior studies have also shown that adopting an observer-like perspective influences objective content in memories (e.g., Marcotti & St. Jacques, 2018, 2021; McIsaac & Eich, 2002), and can reduce episodic information during AM recall (e.g., Akhtar et al., 2017). However, to our knowledge, no studies have examined how manipulating viewpoint during retrieval contributes to differences in semantic information, nor whether these differences persist in memories over time. In the current study, we examined how shifting from an own eyes to an observer-like perspective during recall influences episodic and semantic information in AMs during proximate recall and whether these changes persist when memories are retrieved two days later.

Few studies have examined how shifting visual perspective affects objective aspects of memories. A small number of studies have examined how viewpoint influences the recall of episodic information in events encoded in the laboratory (Eich et al., 2009; Marcotti & St. Jacques, 2018, 2021; Mcisaac & Eich, 2002; also see Bagri & Jones, 2009). For example, Mcisaac and Eich (2002) asked people to encode lab-based events and then to recall these events while adopting an own eyes or an observer perspective. They found a reduction in emotion and recollection ratings during observer compared to own eyes recall. Supporting these differences in subjective experience, descriptions of memories recalled from an observer's perspective also contained fewer details related to emotions and thoughts experienced during the event, as well as less sensory information when compared to recall from an own eyes perspective. Interestingly, they also found that observer recall included fewer details related to associated ideas not central to the event itself, which included semantic information. Only

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two studies, however, have specifically examined the influence of visual perspective on AM recall. In one study, Irish et al. (2008) found that AMs from childhood that were categorised as observer contained fewer affective and sensory details than AMs from the same time period that were categorised as own eyes, though they contained an equivalent number of details comprising core episodic information about what, where and when. In another study, Akhtar et al. (2017) asked participants to provide a written description for recent and remote AMs and then categorise whether they were naturally recalled from an own eyes or observer perspective. One week later, participants were asked to adopt the opposite perspective while again providing a written narrative. They found that shifting from an own eyes to an observer perspective led to an overall reduction in the number of episodic details, including emotions, thoughts and sensory details, but also core episodic information related to actions and spatiotemporal information. Thus, prior research indicates that observer perspectives are associated with less episodic information, with some studies indicating specific reductions in particular categories such as the number of emotions/thoughts and sensory details.

Much less is known regarding how viewpoint influences semantic information during AM recall. Semantic information is comprised not only of general knowledge about the world (e.g., *Manitoulin Island is the largest freshwater island in the world*) but also personal semantic information concerning self-knowledge and facts about the personal past (e.g., *I like to travel;* Renoult et al., 2012). A number of lines of evidence indicate that viewpoint should influence personal rather than general semantics. Some theories of visual perspective (Libby & Eibach, 2011a; Niese et al., 2021) propose that observer perspectives involve thinking about events in a more abstract way in terms of how they are related to the self-concept and the broader meaning of one's life. Other evidence indicates that observer perspectives might instead reduce personal semantics. For example, the use of a first person's viewpoint in language when describing AM narratives distinguishes personal from general semantics (Renoult et al., 2020), suggesting that personal semantics are linked to an own eyes rather than an observer viewpoint (also see Renoult et al., 2012). Personal semantics frequently involve "experience-near" aspects that include contextual information (e.g., *I like to visit Manitoulin Island every summer* (Grilli & Verfaellie, 2014, 2016)), which are reduced in observer perspectives (e.g., Akhtar et al., 2017; Irish et al., 2008). Supporting this idea, Tulving (1989) in describing amnesic patient K. C. noted that his personal semantics was "knowledge of one's life from the point of view of an observer rather than that of a participant" (pp. 77–78), and recent research has shown that experience-near personal semantics are impaired in amnesic patients due to their compromised episodic memory (Grilli & Verfaellie, 2014, 2016).

In the current study, we investigated how shifting perspective when recalling AM narratives influences episodic and semantic information and whether these potential changes persist during later recall. Participants wrote a narrative description of specific AMs from the last 5 years that were naturally associated with an own eyes perspective, and then either maintained this own eyes perspective or shifted to an observer-like perspective in a separate recall session one week later (see Figure 1). Finally, we tested the impact of shifting perspective by testing the recall of all memories from their natural perspective two days later. We used a standardised autobiographical interview (AI) approach to quantify the amount of episodic and semantic information in AM narratives (Levine et al., 2002) in combination with the New External Taxonomy (NExt) scoring protocol to distinguish personal and general semantics (Strikwerda-Brown et al., 2019; also see Renoult et al., 2020). The AI classifies episodic information internal to the main event described according to a number of categories, including emotion/thoughts and perceptual details. We predicted that shifting from an own eyes to an observer perspective would reduce the number of emotions/thoughts and perceptual details based on prior evidence indicating a specific decrease in these aspects of memory (e.g., Akhtar et al., 2017) and consistent with reductions in subjective ratings of emotional intensity and vividness (St. Jacques, 2019). Additionally, we hypothesised that observer perspectives should also be related to the number of personal semantics during AM recall. We predicted an increase in the number of personal semantic details if observer perspective contributes to a more abstract way of viewing memories in relation to the self (e.g., Libby & Eibach, 2011a), whereas we predicted a decrease in the number of personal semantics if they rely on experience-near and contextual information that is reduced for observer perspectives. Finally, we hypothesised that these changes in narrative content due to shifting perspective would persist on a post-manipulation recall test in which participants retrieved the same memories from their natural perspective.

Methods

Participants

There were 40 participants (25 females) between the ages of 19–34 years old ($M = 23.33$, $SD = 3.17$). The sample size is larger than previous studies investigating the influence of visual perspective on narrative recall of AMs (Akhtar et al., 2017, $n = 33$; Irish et al., 2008, $n = 30$) and on par with prior research showing the effects of visual perspective on the characteristics of AM (e.g., St. Jacques et al., 2017). All participants were native English speakers, reported they were not currently on any medication that would affect their cognitive function and had not been previously diagnosed with any mood or cognitive disorders. Participants were recruited from the Harvard study pool and community

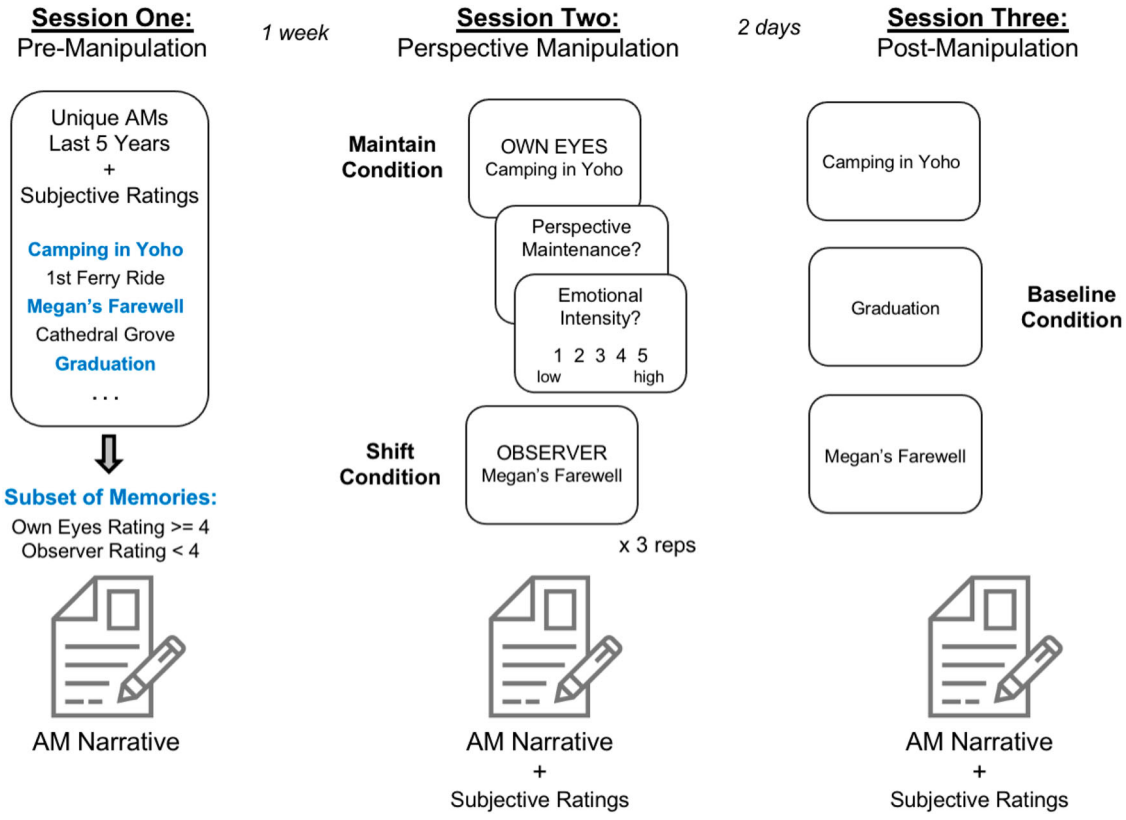

Figure 1. Study design. The study took place across three separate study sessions. In Session 1, participants generated specific autobiographical memories from the last five years and provided subjective ratings. We selected a subset of memories naturally associated with an own eyes perspective based on the ratings, and participants wrote a narrative for these events. In Session 2, we manipulated the perspective participants adopted during retrieval. Participants either maintained (own eyes) or shifted (observer) their perspective across several retrieval trials, with the final retrieval including a narrative description. In Session 3, we then examined the impact of the perspective manipulation on memory recall without instructions to adopt a particular perspective.

and provided written informed consent for a protocol approved by the Harvard Institutional Review Board.

Procedure

Session 1: pre-manipulation

The aim of Session 1 was to provide a pre-test measure of the subjective characteristics and narrative content of AMs as they were naturally retrieved prior to our perspective manipulation. Participants were first asked to generate 60 specific AMs, which occurred at a particular time and place, from the last 5 years and provide a unique title and date. They also provided subjective ratings on 7-point Likert-type scales for reliving (from 1 = *not at all* to 7 = *as clearly as if happening now*), emotional intensity (from 1 = *none* to 7 = *high*), valance (from 1 = *not at all* to 7 = *completely*), own eyes and observer perspective (from 1 = *not at all* to 7 = *completely*), rehearsal (from 1 = *not at all* to 7 = *more than any other memory*) and belief (from 1 = *100% imaginary* to 7 = *100% real).* We controlled for the initial perspective of memories by selecting a subset of nine events that were spontaneously associated with a strong own eyes perspective, as indicated by higher own eyes ratings (≥5) coupled with lower observer ratings (<4).[1] These own eyes memories were used in all further procedures.

Next, participants were asked to write a narrative for the subset of own eyes memories. They were shown the event title they had provided and instructed to describe the event in as much detail as possible and to write down all the details that come to mind even if they seemed trivial. Event titles were presented in a random order. Participants were also asked to generate another set of unique AMs that occurred in the last 5 years, and to provide a brief title, location, person and object for each memory. These were collected to be used in a separate study examining future simulation and will not be discussed here.

Session 2: perspective manipulation

Session 2 occurred one week later. The aim of Session 2 was to manipulate the visual perspective participants adopted during AM retrieval in order to examine its impact on subjective ratings and narrative content. We refer to these findings as the *proximate effects* of shifting perspective on AM retrieval. Participants were asked to retrieve the subset of the own eyes memories identified in Session 1 while adopting an own eyes or observer perspective, thus either maintaining (Maintain Condition, three memories) or shifting (Shift Condition, three memories) their visual perspective. We first included multiple

covert retrieval repetitions to strengthen the manipulation (e.g., St. Jacques et al., 2017). On each trial, participants were presented with the event title and had 7.5 s to remember the event from the indicated perspective. Then they had 2.5 s to rate how well they maintained the given perspective from 1 *(low)* to 5 (*high)*, and the emotional intensity they felt from 1 (*low*) to 5 (*high*). Each memory was repeated three times from the indicated perspective and trials were presented in a random order such that no two memories were repeated consecutively.

After repeated covert retrieval, we then asked participations to write a narrative description of the same AMs from the perspective indicated. Participants were once again presented with their brief title, but now they were asked to write a narrative description of the memory in as much detail as possible and to write down all the details that come to mind even if they seemed trivial as they recalled from the indicated perspective. They were also asked to provide subjective ratings on how well they maintained the perspective, how similar the perspective was to the one they had covertly took earlier, and how emotionally intense the memory was; all were on 7-point scales from 1 *(not at all maintained)* to 7 *(strongly maintained),* 1 *(not at all)* to 7 *(completely)* and 1 *(none)* to 7 *(high),* respectively. Event titles during the written portion were presented in a random order.

Session 3: post-Manipulation

Session three took place two days later. The aim of Session 3 was to examine the impact of the perspective manipulation on subsequent retrieval of AMs from their spontaneous perspective. We refer to the results from this Session as the *post-manipulation effects* of shifting perspective on AM retrieval. Participants were presented with the title of their memory and asked to recall from their natural perspective (i.e., no instructions regarding perspective were provided) by writing a narrative description in as much detail as possible. This included memories from the Maintain and Shifted Conditions, as well as three memories that had not been retrieved in Session 2, thus controlling for potential differences in memories due to time alone (Baseline Condition). Event titles were presented in a randomised order. After each narrative description, participants were asked to complete the same subjective ratings as Session 1, excluding the rehearsal scale.

Participants were also asked to retrieve plausible future events based on the recombination paradigm task (Addis et al., 2009), as well as to fill out additional questionnaires about mental health and visual imagery. However, these data are not presented as they are not the main focus of the current study.

Narrative coding

We used a standardised scoring procedure that quantifies the narrative content of AMs based on the Autobiographical Interview (AI; Levine et al., 2002). Briefly, the first step involves identifying the main event of the narrative description (i.e., specific episode that occurs at a specific place and time). The narrative is then segmented into separate details. Details were categorised into either internal or external details. Internal details were those that contributed to the main event including event, place, time, emotion/thought and perceptual. Time and place details were combined into a single spatiotemporal category. We coded the additional external details based on the NExt scoring protocol (Strikwerda-Brown et al., 2019; also see Renoult et al., 2020). This taxonomy has four categories for external details: specific events, extended episodes, personal semantics and general semantics. A specific event detail reflects information that is spatiotemporally constrained but is beyond the boundaries of the main event. Extended episodes reflect events that take longer than 24 hours or are repeated in time (i.e., what usually occurs during a particular holiday). Personal semantics are details about the self that are no longer linked to a specific episode (e.g., *I like basketball*) and include facts about other people that are framed in a way that connects it to oneself (e.g., *My uncle is shy)*. Based on Renoult et al. (2020) we combined extended episodes with personal semantics to make a composite personal semantics detail category. General semantics reflect general knowledge that people of a specific context or culture will know and also includes facts about other people that are not framed in a way that is relevant to oneself. Events that were not part of the main event and the participant did not directly experience were also considered general semantic details. Finally, we also scored external details associated with repetition and other details based on the AI, which were combined here given their rarity. We used a semi-automated coding procedure (Wardell, Esposito, et al., 2021). Scoring involved using Microsoft Office 365 Word 2019 to create keyboard shortcuts for each of the AI internal details and the NExt external details, and a python script was used to count the total number of details within each subcategory for each memory in each participant.

Scorers (C.I.K. and A.S.L.R.), were initially trained on the AI using a subset of narratives. Both scorers were blind to the sessions, conditions and study predictions. A drift check was performed during coding to ensure that both scorers were maintaining the proper coding protocol. The check revealed lower than desirable reliability for spatiotemporal details, which we resolved through discussion and recoding of these details. Our final reliability analysis was calculated using a two-way mixed intraclass correlation coefficient analysis and we found Cronbach's alpha scores > 0.88, which indicates that there was excellent reliability among the coders.

Data analysis

We used Jamovi (version 1.6.23.0) to run all statistical tests. For all narrative details reported, square root transformations were performed to address issues of normality in

Table 1. Subjective ratings for Session 2.

	Maintain	Shifted
Perspective maintenance		
Repetition 1	3.96 (0.82)	3.30 (0.67)
Repetition 2	4.00 (0.74)	3.38 (0.82)
Repetition 3	3.98 (0.76)	3.42 (0.83)
Emotional intensity		
Repetition 1	3.73 (0.82)	3.32 (0.87)
Repetition 2	3.73 (0.72)	3.29 (0.92)
Repetition 3	3.56 (0.89)	3.21 (0.91)

Note: Mean (SD).

the data. After transformations, we identified potential outliers based on the interquartile range (IQR) method, with extreme values indicated by 1.5*IQR below the first quartile or 1.5*IQR above the third quartile. Outliers were detected in some of the conditions and sessions, but inspection of the data indicated that these reflected natural variation in narrative details and/or subjective ratings. We conducted the analyses both with and without the inclusion of outliers and found that the main findings did not change. Thus, here we report the analyses including these extreme values. Unless indicated, we conducted a 3 (Condition: Maintain, Shift, Baseline) × Session (Session: One, Two, Three) repeated measures ANOVA with Condition and Session as within-subject factors. We used Bonferroni's correction to control for multiple comparisons in follow-up analyses as reflected by p_{adj} values. Summarised data are available at DOI: 10.17632/cvz9xdtwd2.3.

Results

Shifting perspective on subjective ratings: proximate effects

We first examined how shifting perspective influenced subjective ratings during covert retrieval during Session 2 by conducting a 2 (Condition: Maintain, Shift) × 3 (Repetition: 1, 2, 3) repeated measures ANOVA separately on emotional intensity and perspective maintenance ratings (for means and SD see Table 1). For emotional intensity, we found a main effect of Repetition, $F(2, 76) = 4.18$, $p = .019$, $\eta_p^2 = 0.10$. Post-hoc analyses indicated that there was a significant decrease in emotional intensity from the first to the third repetition, $p_{adj} = 0.047$. There was also a main effect of Condition, $F(1, 38) = 7.57$, $p = .009$, $\eta_p^2 = 0.17$, reflecting lower emotional intensity ratings in the shifted ($M = 3.27$, $SD = 0.90$) than maintain ($M = 3.67$, $SD = 0.81$) condition.[2] For perspective maintenance, we also found a main effect of Condition, $F(1, 38) = 18.98$, $p < .001$, $\eta_p^2 = 0.33$, indicating lower ratings in the shifted ($M = 3.37$, $SD = 0.77$) than maintain ($M = 3.98$, $SD = 0.77$) condition. There were no other main effects or interactions. Thus, replicating our previous study (St. Jacques et al., 2017), we found that shifting perspective led to proximate changes in emotional intensity across retrieval repetitions. During narrative recall participants continued to report similar reductions in perspective maintenance, $t(39) = 5.62$, $p < .001$, $d = 0.89$ [0.52, 1.25], in the shifted ($M = 4.60$, $SD = 1.14$) versus maintain condition ($M = 5.90$, $SD = 1.04$). There was also a significant reduction in perspective similarity ratings in the shifted ($M = 4.52$, $SD = 1.21$) than maintain condition ($M = 5.55$, $SD = 1.17$), $t(39) = 5.58$, $p < .001$, $d = 0.88$ [0.51, 1.24], suggesting that perspective was more variable across retrieval repetitions when adopting an observer than an own eyes perspective.

Our main research question was whether the proximate changes due to shifting perspective reflected significant changes in memories across the sessions. We examined this question by conducting a 2 (Condition: Maintain, Shift) × 2 (Session: One, Two) repeated measures ANOVA on emotional intensity ratings.[3] We found significant main effects of both Condition, $F(1, 39) = 8.25$, $p = .007$, $\eta_p^2 = 0.17$ and Session, $F(1, 39) = 19.74$, $p < .001$, $\eta_p^2 = 0.34$, which were qualified by a significant Condition × Session interaction, $F(1, 39) = 14.98$, $p < .001$, $\eta_p^2 = 0.28$ (see Figure 2A). Simple main effect analyses indicated that

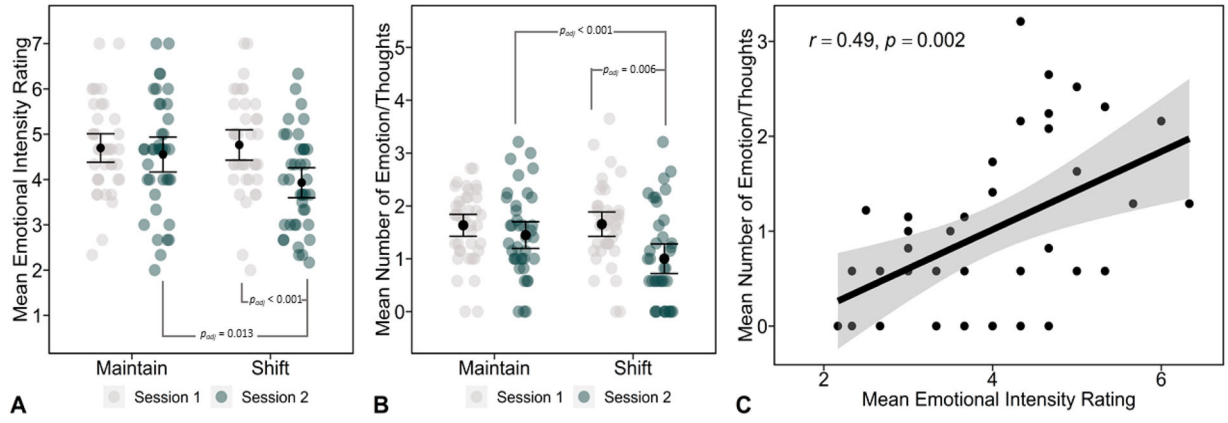

Figure 2. Effect of shifting perspective on emotional intensity and emotion/thought details. There was a significant reduction in emotional intensity ratings (A) and emotion/thought details (B) from Session 1 to Session 2 when shifting from an own eyes to an observer perspective during AM recall. (C) There was also a significant positive correlation between emotional intensity ratings and emotion/thought details when shifting perspective during Session 2. Coloured circles reflect the mean for each participant, black circles represent the mean within each condition and error bars reflect the 95% CI. Narrative data reflects square root transformed values.

Table 2. AI details for each session.

	Maintain			Shift			Baseline	
	Session 1	Session 2	Session 3	Session 1	Session 2	Session 3	Session 1	Session 3
Internal								
Event	4.31 (1.35)	4.26 (1.38)	4.35 (1.24)	4.33 (1.63)	4.17 (1.35)	4.41 (1.37)	4.32 (1.21)	4.22 (1.32)
Perceptual	1.70 (0.84)	1.74 (1.15)	1.83 (1.04)	1.66 (0.98)	2.09 (1.20)	1.94 (1.40)	1.68 (0.99)	1.71 (0.96)
Emotion/thought	1.63 (0.67)	1.45 (0.80)	1.46 (0.75)	1.66 (0.75)	1.00 (0.89)	1.49 (0.66)	1.64 (0.74)	1.48 (0.71)
Time/place	1.29 (0.47)	1.27 (0.58)	1.43 (0.49)	1.30 (0.51)	1.34 (0.46)	1.38 (0.49)	1.23 (0.52)	1.35 (0.53)
External								
External event	0.42 (0.60)	0.41 (0.52)	0.51 (0.56)	0.29 (0.67)	0.26 (0.53)	0.30 (0.57)	0.37 (0.63)	0.35 (0.52)
Personal semantic	1.35 (0.78)	1.22 (0.86)	1.35 (0.69)	1.39 (0.84)	0.82 (0.82)	1.22 (0.75)	1.40 (0.81)	1.34 (0.79)
General semantic	0.73 (0.55)	0.56 (0.48)	0.69 (0.49)	0.72 (0.51)	0.59 (0.53)	0.75 (0.53)	0.72 (0.54)	0.69 (0.45)
Repetition/other	0.76 (0.50)	0.69 (0.57)	0.64 (0.63)	0.64 (0.56)	0.52 (0.51)	0.60 (0.58)	0.71 (0.62)	0.69 (0.59)

Note: Mean (SD). Values reflect square root transformed data.

there was a significant reduction in emotional intensity ratings from Session 1 to Session 2 in the shifted condition, $p_{adj} < 0.001$, but not in the maintain condition. There was also a significant reduction in emotional intensity ratings in the shifted ($M = 3.93$, $SD = 1.07$) versus maintain condition ($M = 4.55$, $SD = 1.25$) in Session 2, $p_{adj} = 0.013$.

Shifting perspective on narrative details: proximate effects

Internal details

To examine the influence of shifting perspective on internal details in AM narratives, we conducted separate 2 (Condition: Maintain, Shift) × 2 (Session: One, Two) repeated measures ANOVAs on the number of details in the event, spatiotemporal, emotional/thought and perceptual categories (for means and SD see Table 2). There were no significant differences in the number of event, F's = 0.11–0.56, p's = .46–.74, or spatiotemporal details, F's = 0.22–0.74, p's = .40–.76.

For emotion/thought details, we found a significant main effect of Condition, $F(1, 38) = 15.10$, $p < .001$, $\eta_p^2 = 0.28$, and Session, $F(1, 38) = 5.45$, $p = .025$, $\eta_p^2 = 0.13$, which was qualified by a significant Condition × Session interaction, $F(1, 38) = 8.65$, $p = .006$, $\eta_p^2 = 0.19$ (see Figure 2B). Simple main effect analyses indicated that there was a significant reduction in emotion/thought details from Session 1 to Session 2 in the shifted condition, $p_{adj} = 0.006$, but not in the maintain condition. Additionally, emotion/thought details ratings were also significantly lower in Session 2 in the shifted than maintain condition, $p_{adj} < 0.001$. Thus, as predicted, shifting perspective reduced the number of emotion/thought details reported in AM narratives. We also found that the number of emotion/thought details and emotional intensity were positively correlated in the shifted condition, $r = .49$ [0.21, 0.70], $N = 39$, $p = .002$. Thus, individuals who recalled fewer emotion/thought details in AM narratives when adopting an observer perspective during Session 2 also reported less emotional intensity reported during remembering (see Figure 2C).

For perceptual details we found a significant main effect of Condition, $F(1, 38) = 5.26$, $p = .027$, $\eta_p^2 = 0.12$, which was qualified by a significant Condition × Session interaction, $F(1, 38) = 9.67$, $p = .004$, $\eta_p^2 = 0.20$. Simple main effect analyses indicated that there was a significant increase in perceptual details from Session 1 to Session 2 in the shifted condition, $p_{adj} = 0.043$, but not in the maintain condition (see Figure 3). Additionally, perceptual details were also significantly higher in Session 2 in the shifted than maintain condition, $p_{adj} < 0.001$. Thus, in contrast with our prediction, shifting to an observer perspective led to a significant increase in the number of perceptual details reported in AM narratives. While coding the narratives we noted that some of the perceptual details related to visual perspective (e.g., *I see myself*, *I see through my own eyes, from the viewpoint of*) or the image of the self from this perspective (e.g., *I watch myself*, *I change expressions, I see myself hurt)*, and that these were primarily used in narratives during Session 2. To examine whether the inclusion of these details was driving the significant Condition × Session interaction, we conducted an additional analysis that excluded perspective related information from the

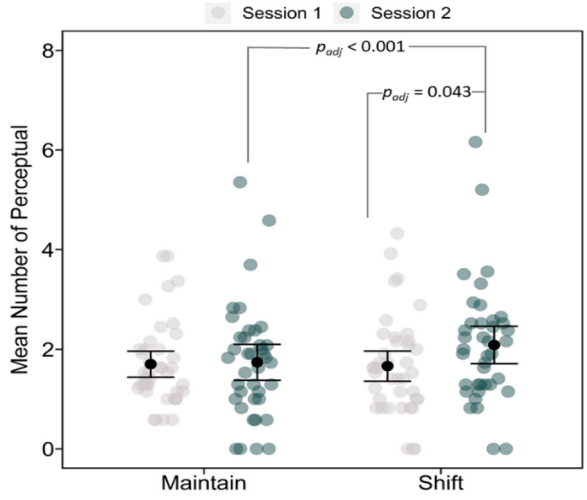

Figure 3. Effect of shifting perspective on perceptual details. There was no difference between Session 1 and Session 2 perceptual details in the maintain condition, but a significant increase in perceptual details in the shift condition. Coloured circles reflect the mean for each participant, black circles represent the mean within each condition and error bars reflect the 95% CI. The adjusted p-value is shown. Narrative data reflects square root transformed values.

perceptual category and found that the Condition × Session interaction no longer reached significance, $F(1, 38) = 3.66$, $p = .063$, $\eta_p^2 = 0.09$. Thus, the increase in the number of perceptual details in the shifted condition primarily reflects information related to viewpoint.

External details

To examine the influence of shifting perspective on external details in AM narratives, we conducted separate 2 (Condition: Maintain, Shift) × 2 (Session: One, Two) repeated measures ANOVAs on the number of details in the external specific events, personal semantics, general semantics and repetition/other categories (for means and SD see Table 2). There were no significant differences in the number of external specific events, general semantics, or repetition/other categories, F's = 0.07–56, p's = .47–.93. For personal semantics we found significant main effects of Condition, $F(1, 38) = 4.65$, $p = .038$, $\eta_p^2 = 0.11$, and Session, $F(1, 38) = 12.62$, $p = .001$, $\eta_p^2 = 0.25$, which were qualified by a significant Condition × Session interaction, $F(1, 38) = 11.22$, $p = .002$, $\eta_p^2 = 0.23$. Simple main effect analyses indicated that there was a significant decrease in personal semantics from Session 1 to Session 2 in the shifted condition, $p_{adj} < 0.001$, but not in the maintain condition (see Figure 4). Additionally, there was a significant decrease in the number of personal semantics in Session 2 in the shifted condition compared to the maintain condition, $p_{adj} = 0.003$.

Relationship between internal and external details

To better understand the relationship between the changes in internal and external details when shifting perspective across Sessions 1 and 2, we conducted a mixed-effects model (estimated using REML) to account for the clustering of memories within each participant. As a first step, we calculated the difference in detail across sessions by subtracting Session 1 from Session 2 scores for personal semantics, emotion/thoughts and perceptual details. Thus, positive values here reflect an increase in the number of details from Session 1 to Session 2, whereas negative values reflect a decrease. We included the difference in personal semantics as the outcome variable, and difference in emotion/thought details, difference in perceptual details, and Condition (dummy coded) as the predictor variables. Given that the relationship between episodic and semantic details might vary with the age of the memory (e.g., Piolino et al., 2002), we also included memory age in days as a predictor in the model. Centred clusterwise scaling was used to isolate the within-subject effects of emotion/thought details, perceptual details and memory age in years.

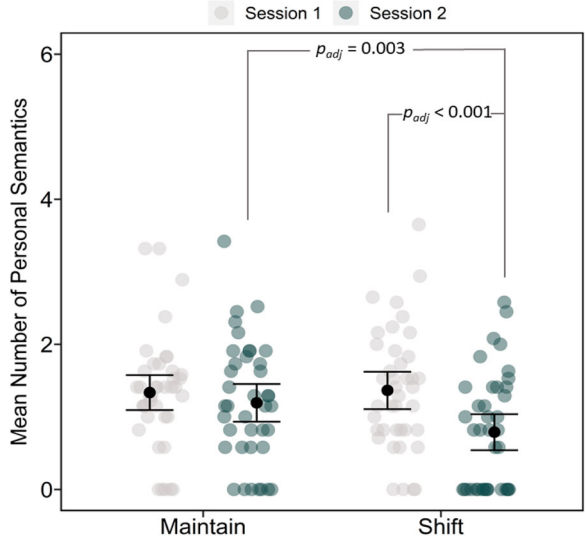

Figure 4. Effect of shifting perspective on personal semantics. There was a significant reduction in the number of personal semantics from Session 1 to Session 2 when shifting from an own eyes to an observer perspective during AM recall. Coloured circles reflect the mean for each participant, black circles represent the mean within each condition and error bars reflect the 95% CI. Narrative data reflects square root transformed values.

We first examined an intercept-only model (or empty model without predictors), including participant as a random intercept in the model. This empty model revealed a significant effect of the intercept, $\beta = -0.79$, $t(38.94) = -2.68$, $p = .011$, indicating that the difference in personal semantics across sessions varied across participants. The intraclass correlation coefficient showed that 18% of the variance in the difference in personal semantics was between participants, with the remaining variance reflecting variability of memories within participants. Moreover, a likelihood ratio test indicated that the model fit including participant as a random effect was significantly better than a model without this random effect, $\chi^2(1) = 12.97$, $p < .001$, thus validating the mixed model approach used here.

Next, we included our level-one predictors in the model. We first examined whether random slopes were warranted for the predictors by using a likelihood ratio test to compare models in which a random slope was included or not for each individual predictor. We found that allowing the slope for perceptual details to vary led to a significantly better model fit than without this random term, $\chi^2(2) = 8.65$, $p = .013$. However, random slopes for the remaining predictors did not improve the overall model fit. Thus, our final model included a random slope for perceptual details, but not the other predictors. The conditional R^2 indicated that the final model explained 31% of the variance for the difference in personal semantics from Session 1 to Session 2 when including both fixed and random effects. As expected, Condition was a significant predictor, $\beta = -1.06$, $t(181.84) = -2.75$, $p = .007$, reflecting a greater decrease in personal semantics in the shifted compared to the maintain condition.[4] Emotion/thought detail was also a significant predictor, $\beta = -0.29$, $t(198.24) = -3.02$, $p = .003$, but this effect was qualified by a significant interaction with Condition, $\beta = 0.30$, $t(209.61) = 2.10$, $p = .037$. Simple effects analyses showed that emotion/thought was a significant predictor in the maintain condition, $\beta = -0.29$, $t(197.45) = -2.96$, $p = .003$, but not in the shifted condition, $\beta = -0.01$,

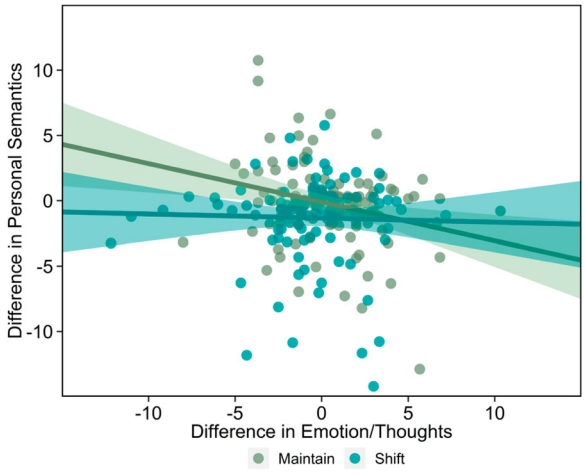

Figure 5. Relationship between emotion/thoughts and personal semantics. Visual perspective moderated the relationship between differences in emotion/thoughts and personal semantics from Session 1 to Session 2. The difference in emotion/thoughts was a significant negative predictor of the difference in personal semantics in the Maintain condition, but not the Shift condition. Difference = Session 2 – Session 1. Emotion/thoughts are centred within a cluster to isolate within-subjects effects.

$t(201.02) = .11$, $p = .913$ (see Figure 5). There was no significant effect of perceptual detail, $\beta = -0.04$, $t(76.74) = -0.61$, $p = .545$. In sum, for memories in which an own eyes perspective was maintained across Session 1 and Session 2 there was a negative relationship between differences in emotion/thoughts and personal semantics. However, the relationship between episodic and semantic details was altered when shifting to an observer perspective, such that the changes in personal semantics and emotion/thoughts within AMs were independent.

Shifting perspective on su bjective ratings: post-manipulation effects

To examine post-manipulation effects of shifting perspective on subjective ratings we conducted separate 3 (Condition: Maintain, Shift, Baseline) × 2 (Session: One, Three) repeated measures ANOVAs on emotional intensity, positive valence, negative valence, reliving and belief (for means and SD see Table 3). There were no significant differences in reliving, F's = 0.36–2.53, p's = .09–.64. For positive valence, the effect of Session did not meet our threshold for significance, $F(1, 39) = 4.02$, $p = .052$, $\eta_p^2 = 0.09$, and there no other effects, F's = 1.33–1.42, p's = .25. to 0.27. For emotional intensity we found a significant main effect of Session, $F(1, 39) = 5.20$, $p = .028$, $\eta_p^2 = 0.12$, which was qualified by a significant Condition × Session interaction, $F(2, 78) = 5.25$, $p = .007$, $\eta_p^2 = 0.12$. Simple main effect analyses indicated that there was a significant decrease in emotional intensity ratings from Session 1 to Session 3 in the shifted condition, $p_{adj} = 0.006$, but not in the maintain or baseline conditions. Next turning to negative valence, there was a significant Condition × Session interaction, $F(2, 78) = 5.84$, $p = .004$, $\eta_p^2 = 0.13$, but none of the simple main effect analyses were significant after correction for multiple comparisons. Finally, for belief in the accuracy of memory there was a significant main effect of Session, $F(1, 39) = 7.11$, $p = .011$, $\eta_p^2 = 0.15$, reflecting a reduction in belief from Session 1 ($M = 6.21$, $SD = 0.80$) to Session 3 ($M = 6.00$, $SD = 0.75$).

To examine how shifting perspective influenced subjective ratings of visual perspective we conducted a 3 (Condition: Maintain, Shift, Baseline) × 2 (Session: One, Three) × 2 (Perspective: Own Eyes, Observer) repeated measures ANOVA. There was a significant main effect of Perspective, $F(1, 39) = 263.86$, $p < .001$, $\eta_p^2 = 0.87$, which was qualified by a Session × Perspective interaction, $F(1, 39) = 49.37$, $p < .001$, $\eta_p^2 = 0.56$. Simple main effect analyses indicated that there was a reduction in own eyes ratings, $p_{adj} < 0.001$, but an increase in observer ratings from Session 1 to Session 3, $p_{adj} < 0.001$. However, own eyes ratings were higher than observer ratings in both Sessions, $p_{adj} < 0.001$.

In sum, shifting perspective led to post-manipulation reductions in emotional intensity ratings when remembering from the participant's natural perspective, but there were no other changes in subjective ratings. To better understand whether the reduction in emotional intensity ratings were related to proximate changes in autobiographical narratives when shifting perspective in Session 2, we conducted further correlation analyses between emotional intensity ratings in Session 3 and emotion/thought, perceptual and personal semantic details in Session 2 in the shifted condition. However, there were no significant correlations, r's = –.03–.26, p's = .10–0.85, suggesting that proximate changes in the quantity of

Table 3. Memory characteristics for Session 1 and Session 3.

	Maintain		Shift		Baseline	
	Session 1	Session 3	Session 1	Session 3	Session 1	Session 3
Reliving	4.79 (1.21)	4.73 (1.10)	4.90 (1.04)	4.74 (0.99)	4.62 (1.11)	4.61 (1.06)
Emotion	4.70 (1.01)	4.67 (1.16)	4.76 (1.08)	4.28 (1.15)	4.72 (0.99)	4.52 (1.18)
Positive valance	4.55 (1.33)	4.42 (1.31)	4.86 (1.18)	4.65 (1.42)	4.68 (1.23)	4.25 (1.11)
Negative valance	2.83 (1.48)	2.66 (1.25)	2.58 (1.25)	2.57 (1.25)	2.53 (1.19)	2.98 (1.25)
own eyes	6.21 (0.76)	5.47 (1.36)	6.20 (0.70)	5.13 (1.32)	6.19 (0.69)	5.38 (1.47)
Observer	1.54 (0.58)	2.63 (1.45)	1.62 (0.62)	2.58 (1.06)	1.60 (0.59)	2.57 (1.25)
Rehearsal	3.75 (1.24)	N/A	3.30 (1.11)	N/A	3.33 (1.14)	N/A
Belief	6.29 (0.86)	5.97 (0.84)	6.10 (0.86)	5.92 (0.80)	6.24 (0.86)	5.92 (0.81)
Memory age (days)	770 (616)	N/A	764 (585)	N/A	803 (602)	N/A

Note: Mean (SD).

episodic and semantic details in autobiographical memories when shifting perspective were not contributing to post-manipulation changes in emotional intensity.

Shifting perspective on narrative details: post-manipulation effects

Internal details

To examine post-manipulation effects on how shifting perspective influenced internal details we conducted separate 3 (Condition: Maintain, Shift, Baseline) × 2 (Session: One, Three) repeated measures ANOVAs on an event, emotion/thought, spatiotemporal and perceptual details (for means and SD see Table 2). There were no significant differences in an event or perceptual details, F's = 0.02–2.38, p's = .10–0.88. For spatiotemporal details there was a significant main effect of Session, $F(1, 38) = 4.61$, $p = .038$, $\eta_p^2 = 0.11$, reflecting an increase in detail from Session 1 ($M = 1.27$ [1.14, 1.41], $SD = 0.42$) to Session 3 ($M = 1.39$ [1.25, 1.53], $SD = 0.43$). For emotion/thought details, there was also a significant main effect of Session, $F(1, 38) = 5.93$, $p = .020$, $\eta_p^2 = 0.13$, reflecting a decrease in detail from Session 1 ($M = 1.64$ [1.44, 1.85], $SD = 0.62$) to Session 3 ($M = 1.47$ [1.29, 1.66], $SD = 0.57$). Thus, there were changes in internal details within AMs over time, but not due the perspective manipulation.

External details

To examine post-manipulation effects of shifting perspective on external details we conducted separate 3 (Condition: Maintain, Shift, Baseline) × 2 (Session: One, Three) repeated measures ANOVAs on external specific events, personal semantics, general semantics and repetition/other categories. There were no significant differences, F's = 0.07–0.75, p's = .47–.93.

Discussion

The current study examined the influence of shifting visual perspective on episodic and semantic details in AM narratives. Our findings demonstrate for the first time that shifting from an own eyes to an observer-like perspective influences both episodic and semantic details in autobiographical narratives. Specifically, shifting perspective reduced episodic details associated with emotion and thoughts, increased perceptual details and reduced personal semantic details. Moreover, visual perspective also altered the compensatory relationship between episodic and semantic details (Devitt et al., 2017), as reflected by the negative relationship between emotion/thoughts and personal semantics when maintaining compared to shifting perspective. Replicating prior research (St. Jacques, 2019), we also found reductions in emotional intensity due to shifting perspective that persisted in memories two days following the perspective manipulation. Despite these changes in the subjective experience, however, there were no post-manipulation differences in episodic or semantic content.

AM involves an interplay between episodic and semantic memory that is evident during narrative recall such that memories are described using a combination of information that varies in spatiotemporal specificity. Prior research has shown that the degree of episodic and semantic information depends upon the emotional valence of memories (St. Jacques & Levine, 2007; Wardell, Madan, et al., 2021), age of memories (e.g., Piolino et al., 2002) and can also be shaped by episodic specificity training (Madore & Schacter, 2014). Here, using standardised methods for assessing AM (Levine et al., 2002; Renoult et al., 2020; Strikwerda-Brown et al., 2019), we found that adopting an observer-like perspective influenced both episodic and semantic details – significantly extending prior research that focused solely on episodic information (Akhtar et al., 2017; Irish et al., 2008). Semantic information is typically included in events to compensate for a lack of episodic information (Devitt et al., 2017), consistent with theory suggesting that episodic and semantic information interact (e.g., Irish & Piguet, 2013; Jordão & St. Jacques, 2021). Here we found a negative relationship between emotion/thoughts and personal semantic details when participants maintained an own eyes perspective, but not when they shifted to an observer perspective. Thus, visual perspective moderated the relationship between differences in episodic and semantic details across sessions within the same AM. Given that emotion/thoughts and personal semantics are typically anticorrelated, shifting to an observer-like perspective might selectively reduce one or the other type of detail when it is present in the memory. Interestingly, differences in perceptual details were not associated differences in personal semantics, suggesting that the interaction between episodic and semantic information may not hold for all subcategories. The relationship between emotion/thoughts and personal semantics remained when controlling for the age of the memory and emotional valence. However, the memories elicited here were also relatively recent ones (i.e., from the last 5 years) and did not specifically target negative and positive events. It would be of interest for future studies to examine how the characteristics of individual memories impact how shifting perspective influences remembering. Our findings warrant a broader consideration of role of viewpoint in understanding the interaction between episodic and semantic memory, as well as the interaction between different subcategories of details.

Shifting to an observer-like perspective reduced emotion/thought details and emotional intensity, consistent with prior research (Akhtar et al., 2017; Berntsen & Rubin, 2006). Replicating Sekiguchi and Nonaka (2014), we found that reductions in emotional intensity due to shifting to an observer perspective also persisted in subsequent memories. However, we did not find changes in emotion/thought details during subsequent recall. The decoupling of subjective and objective aspects of

emotion in subsequent recall might reflect the different mechanisms by which viewpoint can impact memories. Robinson and Swanson (1993) suggested that "changing point of view might alter either the event features that are available to awareness or the manner in which they are re-experienced" (p. 176; see also, Schacter, 1996, p. 22). Actively shifting perspective has proximate effects on the quantity of emotion/thought details that might be later reflected by qualitative changes in the recall, which are not captured by quantitative coding. This interpretation dovetails with the suggestion that adopting an observer-like perspective involves an objective retrieval orientation that lacks affective feeling (Nigro & Neisser, 1983) leading to a dispassionate observer view in which the salience of emotional information is dampened (Sutin & Robins, 2008). Thus, although AMs contained the same number of emotion/thoughts following the perspective manipulation, these details might be re-experienced with less feeling due to shifting perspective during retrieval. An important direction for future research will be to examine whether shifting perspective contributes to qualitative differences in the nature of details recalled, such as the consistency of information over time.

In contrast with our prediction, we found that shifting to an observer perspective increased rather than decreased the number of perceptual details in AM narratives. The AI perceptual detail category includes visual and other sensory information as well as spatial information related to egocentric location in space (Levine et al., 2002). Inspection of the perceptual detail category revealed that the increase in the observer condition was due to information about viewpoint and the rememberer's location in space rather than visual information per se. Similarly, other research has also shown that adopting an observer perspective during retrieval can increase details associated with taking this perspective (e.g., one's personal appearance, use of third-person referents; Mcisaac & Eich, 2002). These findings suggest that changes in the characteristics of AMs when shifting to an observer-like perspective are not simply due to a dual-task decrement, but instead reflect qualitatively changes in remembering that can lead to both decreases and increases in how these memories are described. In contrast with the current findings, Akhtar et al. (2017) found a decrease in sensory-perspective details in observer perspectives during AM recall using a different coding system. While it is unclear whether the sensory-perspective category used by Akhtar et al. (2017) is equivalent to the types of perceptual information captured by the AI and whether this explains the differences in the findings, both studies highlight that visual perspective not only influences the types of information recalled but itself can act as a specific type of episodic detail. In fact, some of the earliest evidence for visual perspective comes from descriptions of viewpoint included in autobiographical narratives (for review see Nicolas et al., 2013). Understanding how perspective is described (McDermott et al., 2016) could also inform how viewing the self when adopting an observer-like perspective (Kinley et al., 2021) contributes to changes in memory.

Adopting an observer-like perspective reduced personal semantics linked to experience-near aspects and was associated with greater descriptions of this external viewpoint, consistent with current conceptualizations that link personal semantics to a first-person viewpoint (Renoult et al., 2020). Grilli and Verfaelle (2014, 2016) emphasised that episodic details reflecting spatiotemporal context contribute to the "experience near" aspect of personal semantics. However, personal semantics can also be emotion laden as they include preferences (e.g., "I love jazz") and typical emotional reactions (e.g., "I always feel nervous before conference talks"; Renoult et al., 2012, 2020), which might also be attenuated when adopting an observer-like perspectives. The emotional nature of personal semantics provides additional insight regarding the lack of a significant relationship in differences in emotion/thoughts across Sessions 1 and 2 and changes personal semantics when shifting perspective. Adopting an observer-like viewpoint seems to reduce both of these experiential and conceptual aspects of emotion, but normally there is an opposing relationship between these types of details at the level of an individual memory. We focused on how visual perspective influences semantic information within a particular AM. However, specific AMs are organised within a larger framework that includes abstract knowledge about one's life such as particular life periods (Conway & Pleydell-Pearce, 2000), shared cultural norms regarding life scripts (Berntsen & Rubin, 2004) and event-component networks built up through the repetition of highly familiar experiences (Brown, 2016). Moreover, semantic memory can shape how specific AMs are accessed and reconstructed (Cabeza & St Jacques, 2007). Libby and Eibach (2011a) proposed that observer-like imagery involves an abstract way of thinking that enables people to place memories within the broader meaning with respect to their autobiography. Adopting an observer-like perspective for more remote or self-relevant memories, which are better embedded within this life story, might lead to a greater focus on how these events are related to conceptual knowledge about the self (e.g., Libby & Eibach, 2011b) and potentially an increase in personal semantics. Investigating how adopting an observer-like perspective influences the role of semantic information during memory reconstruction (e.g., Iriye & St. Jacques, 2020) and how particular episodes are understood within these overarching knowledge systems based on their remoteness and self-relevance would be of great interest for future studies.

Understanding how shifting perspective influences the subjective and objective content of AMs has important clinical implications. Prior research has shown that shifting to an observer perspective is one of the most effective emotional regulation strategies (Webb et al., 2012). The current results support this research by demonstrating that shifting perspective also reduces experiential and conceptual aspects of affective and self-related information in

AMs. However, adopting an observer perspective might not support emotional regulation in all contexts (Powers & LaBar, 2019). Greater reliance on observer perspectives is thought to contribute to the maintenance of emotional disorders (Holmes & Mathews, 2010). The lack of access to emotional aspects of memory when adopting an observer perspective prevents the ability to process emotionally charged memories in the long-term, which can delay recovery in post-traumatic stress disorder (PTSD; McIsaac & Eich, 2004) and contribute to negative self-evaluation and avoidance in depression (Kuyken & Moulds, 2009). Some models of visual perspective suggest that observer perspectives can also amplify emotions (Libby & Eibach, 2011a; Sutin & Robins, 2008). Capturing both episodic and semantic aspects of AM that are influenced by visual perspective during remembering, could provide a broader understanding of the benefits and costs of adopting an observer perspective on emotional experience.

Limitations

Although the current study contributes novel findings regarding how shifting from an own eyes to an observer-like perspective affects episodic and semantic details in AM narrative recall, one limitation was that we were not able to examine shifting from an observer-like to an own eyes perspective. The approach we took here was to try to elicit recent memories that were naturally associated with an own eyes and observer-like perspectives in order to control for initial differences in visual perspective. However, only about half of the participants reported such events. Some studies have shown equivalent effects on memory irrespective of the direction of the shift (St. Jacques et al., 2018), whereas others found less impact on emotional and visual information when shifting in this direction (Berntsen & Rubin, 2006; Butler et al., 2016). Future research might address this by examining how shifting back to an own eyes perspective, following a shift to an observer-like perspective, influences narrative recall (e.g., Butler et al., 2016). Additionally, although the sample size used here was larger than most previous studies investigating the role of visual perspective on narrative recall (i.e., Akhtar et al., 2017; Irish et al., 2008) it was lower than would be ideal (Brysbaert, 2019). Manual coding of autobiographical narratives using the AI is time intensive and it is not often practical to test large samples using this technique (van Genugten & Schacter, 2022; Wardell, Esposito, et al., 2021). The development of automated methods for scoring AI details (e.g., van Genugten & Schacter, 2022) is an important direction for increasing the sample size of future narrative coding studies.

Conclusion

Our findings revealed that shifting to a novel observer perspective has proximate effects on both episodic and semantic content during narrative recall of AMs, consistent with the active role of retrieval in reshaping memories. Understanding how perspective shifts lead to other quantitative and qualitative changes in memories that persist over time has important implications not only for theory (St. Jacques, 2019; Sutin & Robins, 2008), but also in a clinical application where shifts in perspective are used to modify aspects of memory such as the degree of emotion experienced (Powers & LaBar, 2019; Wallace-Hadrill & Kamboj, 2016).

Notes

1. We aimed to elicit a larger number of events to include strong observer perspectives, but only 22 out of 40 participants had a sufficient number of these memories. Thus, here we focus on strong own eyes memories only.
2. Narrative data and subjective ratings from Session 2 and 3 were missing for one participant due to a technical issue.
3. In Session 2, based on the final emotional intensity ratings during narrative recall.
4. We also conducted separate mixed effects models for the difference in personal semantics, emotion/thoughts, and perceptual details, in which we controlled for the emotional valence of memories (positive valence – negative valence) based on subjective ratings provided in Session One. Controlling for the initial emotional valence of the memories did not affect the results of the mixed effects model.

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Disclosure statement

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