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Is the Public Understanding of Memory Prone to Widespread 'Myths'?

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Abstract

It is frequently asserted that the understanding of memory among the general public and among legal and psychological professionals is deficient, the most prominent examples being that many people appear to liken memory to a video camera, overestimate the association between accuracy and confidence, and believe in repression. The existing evidence is limited to single questionnaire items, however, and to date there has been little investigation of context effects or of the public's underlying assumptions about memory. In the first study we found that people endorse the video camera metaphor as well as several other prominent memory metaphors, but that they were more likely to agree that memory is *not* like a video camera when the assumptions were made explicit and alternative responses were provided. In the second study we replicated this finding and found a context effect whereby alternatives reduced endorsement of the video camera metaphor. For the first time we identified frequent reports of naturally-occurring imagery involving moving scenes, and showed that drawing attention to imagery increased agreement with the video camera metaphor. In a third study we found that non-psychologists' beliefs about accuracy-confidence, while reflecting considerable uncertainty, were more consistent with the current evidence than those of psychologists, and that they tended to use the term 'repression' in a way consistent with scientific evidence. Overall, lay views of memory were considerably more nuanced and in line with research than has been suggested, contradicting claims of widespread memory "myths".

Key Words: Memory Assumption Imagery Confidence Repression

The issue of how well non-experts understand the nature of memory is of central importance in the debate over whether there is a need for special education of legal and clinical professionals, as well as for expert testimony on memory in courts of law (Houston, Hope, Memon, & Read, 2013). Probably the most prominent example given by psychologists of lay misunderstanding is the claim that non-experts endorse the idea that memory is a like a video camera, faithfully recording the details of everything a person sees (Berkowitz & Frenda, 2018; Clifasefi, Garry, & Loftus, 2007; Lacy & Stark, 2013; Lynn, Evans, Laurence, & Lilienfeld, 2015; Patihis, Ho, Tingen, Lilienfeld, & Loftus, 2014). This view of memory as like a video camera has been described as "typical" (Lacy & Stark, 2013) and "pervasive" (Clifasefi et al., 2007), as well as being among the "50 great myths of popular psychology" (Lilienfeld, Lynn, Ruscio, & Beyerstein, 2010). In the current study we examine responses to the video camera question and to two others, concerning repression and the relation between confidence and accuracy, that are frequently held to exemplify deficiencies in non-expert knowledge. All were originally measured with single items, despite the methodological concerns attached to this approach. We compare responses to the original questions with responses to alternative versions designed to resolve ambiguity and test underlying assumptions, assess alternative explanations of previous findings, and investigate whether deficiencies in non-expert knowledge are still apparent.

Study One

In one sample of over a thousand jurors, 46% selected "true" rather than "false" in response to the statement "The act of remembering a traumatic event is like a video recording in that one can recall details as if they had been imprinted or burned into one's brain" (Schmechel, O'Toole, Easterly, & Loftus, 2006). The most commonly cited findings, relevant not just to

traumatic memory but to memory in general, were based on a nationally representative U.S. telephone survey (Simons & Chabris, 2011). Out of 1500 respondents, 24% “strongly agreed” and 39% “mostly agreed” with the statement “Human memory works like a video camera, accurately recording the events we see and hear so that we can review and inspect them later”. In contrast, all memory experts disagreed with the statement. A subsequent study replicated the survey using Mechanical Turk survey methods (Simons & Chabris, 2012), and the authors weighted both sets of responses to U.S. 2010 Census data. Using these adjustments they calculated that the proportions agreeing with the survey statement were 52.7% for the telephone survey and 46.9% for the Mechanical Turk survey.

There are reasons to be cautious in taking these results at face value. For example, the statement used by Simons and Chabris (2011) is “double-barreled”, containing two separate ideas: That events are recorded accurately, and that they can later be reviewed and inspected. Standard texts on survey methodology note that double-barreled questions are associated with an increased risk of misleading responses because respondents may agree with one element but not with another (Sudman & Bradburn, 1982). With the video camera statement respondents might agree that events could be inspected later but not that they are recorded accurately. The statement also asks respondents to think metaphorically. Metaphors involve correspondences from different domains (e.g., “the mind is a computer”) rather than literal comparison statements (e.g., “a mallet is like a hammer”) and do not therefore imply any exact mapping of features or properties (Bowdle & Gentner, 2005). Previous research suggests that respondents may simultaneously hold alternative metaphorical beliefs about memory, for example spatial metaphors (Roediger, 1980), that might have different implications.

These issues exemplify a common concern in the design of survey items, namely that they can often be understood differently according to the context (Belli, Conrad, & Wright, 2007; Galesic & Tourangeau, 2007; Sudman & Bradburn, 1982). With the video camera statement there are at least two missing aspects of context. The first is the opportunity to agree with a contrast item that suggests memory is *not* like a video camera. There is a large literature indicating that whether items are worded positively or negatively has a significant influence on survey responses (Chessa & Holleman, 2007; Kamoen, Holleman, Mak, Sanders, & van den Bergh, 2011). Moreover, the original question wording might lead some respondents to conclude, relying on normal conversational inference, that the video camera metaphor must be relevant to human memory (Grice, 1975): They might correctly assume that the questions had been written by experts but incorrectly assume that such experts would not ask them to answer deceptive questions. The second missing aspect involves explicit consideration of the assumptions thought to be involved, for example that thinking memory is like a video camera implies that it faithfully records the details of everything a person sees.

Despite the recognition that autobiographical recall typically has a strong visual element (Fletcher et al., 1995; Tulving, 1983), researchers have not considered whether answers to the video camera statement might be influenced by people's experience of their own memory. The possibility that people have memories in the form of scenes successively unfolding, as though on a videotape, does not appear inconsistent with prominent approaches to understanding episodic recall such as the notion of "mental time travel" (Suddendorf & Corballis, 1997; Tulving, 1985) or the idea that it involves the reactivation of brain regions that were active during encoding (Danker & Anderson, 2010; Squire & Wixted, 2011).

It is really only in the area of trauma that researchers have documented people's descriptions of their memory for an overwhelming event as frequently resembling a videotape that replays the same content repeatedly (Ehlers & Steil, 1995). Yet it is widely accepted that normal imagery frequently contains dynamic information containing objects or people in motion (Jeannerod & Decety, 1995; Paivio & Clark, 1991). The existence of dynamic imagery suggests that memory for everyday events might also sometimes be experienced as a sequence of scenes unfolding, as if on a videotape, and this could provide an alternative explanation for why people endorse the video camera statement.

In the first study we assessed whether the video camera analogy was endorsed more strongly than a number of alternative memory metaphors. We also compared responses to the original statement used by Simons and Chabris (2011) with responses to two similarly constructed statements that offered participants the opportunity to agree that memory was partially like a video camera or not like a video camera. These were designed to make explicit some of the assumptions thought to be implied by the original statement. We further tested the effects of context by asking respondents to respond to the original statement a second time having considered these two related questions.

Method

Participants. Of the 198 participants who responded to the survey, all were currently enrolled at university. Nineteen participants were enrolled on psychology degrees and a further seven did not report their degree course. All these were excluded in order to minimize the possible effects of prior teaching on memory. In the final sample of 172, there were 62 men and 108 women (2 chose not to supply a gender). Their mean age was 21.81 years (*SD* 4.23).

Participants came from a total of 27 different countries, those best represented being the U.K. (*n* = 55, 32%), China (*n* = 40, 23%), and the U.S.A. (*n* = 14, 8%). The sample size provided power close to 1.0 to detect a difference between individual questionnaire items corresponding to a 2-tailed medium effect size (*d* = 0.5).

Materials and procedure. An online questionnaire was programmed on Qualtrics (Qualtrics, Provo, UT). The first part of the survey was derived from previous literature on common memory metaphors (Koriat & Goldsmith, 1996; Randall, 2007; Roediger, 1980) with some changes and additions and included 22 items. Participants were asked how much they would agree that memory was like the items listed and responded on a 7-point Likert scale, where 1 = "Strongly Disagree", and 7 = "Strongly Agree". Sample items included "*A storehouse", "A video camera",* and *"A diary entry"* (see Table 1).

Seven items measuring personal beliefs about memory, three from a public neuroscience literacy survey (Herculano-Houzel, 2002) and four from a survey of adult Norwegians (Magnussen et al., 2006), were then administered, followed by five items on knowledge of memory from taken from Simons and Chabris (2011). One of the knowledge items was the original statement about memory being like a video camera, administered using the original scale (1 = strongly disagree, 2 = mostly disagree, 3 = mostly agree, 4 = strongly agree, 5 = don't know). Of these 12 items, results from the video camera question only were analysed. The other 11 items reported in Supplementary Table 1 were not analysed as there was no relevant manipulation of wording or context.

Respondents finished by answering three versions of the video camera statement. The first two versions were alternative statements that simultaneously manipulated the wording of the statement (using more tentative and negative versions) and made the assumptions inferred by

previous researchers more explicit. These statements were “Human memory works partly like a video camera, accurately recording some of the events we see and hear so that we can review a simplified version later” and “Human memory is not like a video camera because we cannot play back events exactly as they happened”. These were followed by a second presentation of the original video camera statement. Participants were asked to read through all three versions prior to rating them all on the same scale as before.

Participants were approached individually using an identical script and invited to take part, those who agreed being sent a link by email to the online survey. After providing consent, the survey materials described above were presented. Following this demographic information was collected, and participants were debriefed. No payment was offered. Ethical approval was provided according to the UCL Department of Psychology procedures.

Results and Discussion

The five most strongly endorsed metaphors (see Table 1) were that memory is like a diary entry, a video camera, a library, rooms in a house, and a storehouse. There were no significant differences between endorsement of the video camera metaphor and any of these other four metaphors, largest $t(170) = 1.55$, $p = .122$ (2-tailed). Seventeen of the 22 metaphors were endorsed with an average above the scale midpoint of 4, indicating general agreement rather than disagreement.

The distribution of responses to all statements involving memory being like a video camera is shown in Table 2. Overall agreement with the original statement when it was first presented was 32.6%. Agreement with the alternative stating why memory was partly like a

video camera was 50.0% and with the alternative stating why memory was not like a video camera was 70.9%. When retested, agreement with the original statement was 38.9%.

Differences between responses when the participants were explicitly instructed to compare the three statements were carried out using a repeated-measures ANOVA, ignoring 'Don't know' responses. There was a significant effect of statement, $F(2, 300) = 23.19$, $p < .001$, $\eta p^2 = .134$. Follow-up t-tests indicated that Alternative 2, specifying why memory was not like a video camera, was endorsed to a significantly greater extent than Alternative 1, $t(159) = 4.34$, p

Table 1

Participants' Endorsement (Mean, SD) of Memory Metaphors

A diary entry	5.31	1.20
A video camera	5.12	1.64
A library	5.06	1.62
Rooms in a house	4.89	1.47
A storehouse	4.88	1.38
Computer storage	4.75	1.57
A painting	4.74	1.51
A collage	4.70	1.42
A made-up story	4.67	1.66
A perfume	4.58	1.78
An artist's impression	4.55	1.81
A jigsaw puzzle	4.55	1.46
Melodies on a piano	4.50	1.66
A filing cabinet	4.31	1.32
A muscle	4.29	1.75
Lock and key	4.11	1.58
A subway map	3.99	1.59
A conveyor belt	3.63	1.39
An aviary	3.16	1.12
A compost heap	3.16	1.46
A bottle	2.63	1.38

Table 2

Frequency of Responses to Memory Statements

Statement	Strongly Disagree	Mostly Disagree	Mostly agree	Strongly agree	Don't Know
Original item [a]	55 (32.0%)	52 (30.2%)	45 (26.2%)	11 (6.4%)	9 (5.2%)
Alternative 1 [b]	24 (14.0%)	53 (30.8%)	70 (40.7%)	16 (9.3%)	9 (5.2%)
Alternative 2 [c]	10 (5.8%)	37 (21.5%)	77 (44.8%)	44 (25.6%)	4 (2.3%)
Original item repeated	46 (26.7%)	50 (29.1%)	53 (30.8%)	14 (8.1%)	9 (5.2%)

Note. [a] Human memory works like a video camera, accurately recording the events we see and hear so that we can review and inspect them later; [b] Human memory works partly like a video camera, accurately recording some of the events we see and hear so that we can review a simplified version later; [c] Human memory is not like a video camera because we cannot play back events exactly as they happened.

< .001, which in turn was endorsed to a greater extent than the original statement, $t(153) = 3.32$, $p < .001$.

Adding gender as an additional factor in the ANOVA did not produce any evidence of an interaction with the significant main effect, $F(2, 294) = 1.38$, $p = .253$, $\eta_p^2 = .009$. Neither did country of origin (UK vs. others) interact with the significant main effect, $F(2, 298) = 0.27$, $p = .734$, $\eta_p^2 = .002$. A comparison of responses to the original statement at the two times it was answered indicated that it was endorsed slightly more often on the second occasion, $t(154) = 2.064$, $p = .041$ (2-tailed).

Our findings confirm that the video camera metaphor of memory is often endorsed by non-psychologists, and co-exists simultaneously with a number of other metaphors that have previously been noted, for example the idea of memory as a diary entry or a library. The assumptions thought to underlie these other metaphors have not yet been examined to see if they are consistent or inconsistent with the assumptions thought to underlie the video camera metaphor. The main question raised by previous research, however, is what can be deduced about people's beliefs concerning memory from their endorsement of the video camera metaphor, as exemplified in the statement used by Simons and Chabris (2011). Given the chance to choose between statements, respondents clearly preferred alternatives that recognized memory is selective, rejecting the video camera analogy significantly more often than endorsing it when it was explicitly linked to the assumption that events could be played back exactly as they happened. Over 70% of participants agreed with an item proposing that memory was *not* like a video camera. This finding contradicts interpretations that have previously been made concerning responses to the video camera statement, but supports research on the importance of question wording (Kamoen et al., 2011).

Interestingly, participants' agreement with the original statement did not lessen as a result of considering other options, and actually increased slightly. The most plausible explanation for this increase is that it occurred as a result of being asked to consider other memory items in the course of the survey. The increase does, however, suggest that the absence of a more detailed explanatory context was not responsible for the way the statement was endorsed in previous studies and that participants' understanding of the statement remained relatively stable. Instead, the data would seem to suggest that endorsement did not imply the assumptions that have been inferred by some psychologists. Additional questions revealed a more nuanced understanding of memory that is more in line with scientific findings than has previously been suggested.

The current study was limited in its use of young adult respondents educated to university level. Although there is little evidence that the responses of students not studying psychology and those of older adults differ in any meaningful way (Desmarais & Read, 2011; Kassin, Tubb, Hosch, & Memon, 2001), it is important to ensure our results are not due to sampling considerations. Endorsement of the video camera statement at 38.9% was also somewhat lower than the 46.9% reported in Simons and Chabris' (2012) survey. This may reflect the fact that participants considered a variety of memory metaphors during an earlier part of our study; presenting the video camera statement first would rule out the possible influence of order effects. Another explanation is that there are changing views about memory in the general population. Finally, despite our findings it is quite possible that some individuals do hold the belief that memory reproduces experiences exactly as they happened. Determining whether this is true requires a more detailed probing of respondents' assumptions.

Study Two

This study had two main aims. The first was to assess whether participants reported the subjective experience of a memory in which a series of scenes unfolded, as if in a video sequence, and whether either their subjective experience, or drawing their attention to it, was related to their endorsement of the video camera metaphor. The second was to address the misconceptions that, according to Simons and Chabris (2011), are entailed by agreeing with the video camera metaphor.

The first misconception (which we term *completeness*) is that "the idea… implies a level of completeness and accessibility of our representations that is inconsistent with known limits on visual perception and attention". The second misconception (which we term *passivity*) is that "video recording implies a passive process in which the visual world is imprinted into memory… [but] decades of research have documented the influences of stored information on encoding". The third misconception (which we term *immutability*) is that "the idea that memory retrieval is akin to rewinding and replaying a tape contradicts the well-established idea that memory retrieval is a constructive process influenced by knowledge, beliefs, expectations and schemas" (all quotations from Simons & Chabris, 2011, p. 5). In addition we identified two related beliefs: that memory is in general highly accurate (which we term *accuracy*), and that individual memories are stored permanently in some form (which we term *permanence*). In this study participants responded to statements reflecting each of these beliefs, worded both positively and negatively.

This study therefore attempted to replicate and extend the work of Simons and Chabris (2012) using a similar sample of U.S. citizens obtained through Amazon Mechanical Turk

(MTurk). The first two predictions concerned subjective experience: We predicted that a substantial proportion of participants would describe having certain memories that unfolded in a sequence of scenes and that having their attention drawn in advance to their subjective experience would increase levels of agreement with the Simons and Chabris (2011) statement. The third prediction was that endorsing the video camera statement would be positively correlated with items reflecting the three misconceptions identified by Simons and Chabris (2011). Finally, repeating the procedure used in Study One, we predicted that respondents would endorse the alternative statements that memory was not, or only partially, like a video camera more strongly than the original statement used by Simons and Chabris (2011).

Method

Participants. We posted a task on MTurk titled "Beliefs about Human Memories" which was described as follows: "You will be asked demographic questions. You will also be asked the extent to which you agree or disagree with a series of statements about human memory. We expect it to take no longer than 5 minutes to complete." $0.25 was paid for completion. Participants were required to reside in the United States and have an MTurk task approval rate of more than 90%. Two participants were rejected for having a non-unique IP address and seven for making invariant responses. As shown in Supplementary Table 2, the demographic characteristics of the final sample of 200 were similar to the MTurk sample collected by Simons and Chabris (2012).

Measures. Demographic data were collected using the same response format as Simons and Chabris (2012).

***Subjective experience items*.** Participants were asked "In which of the following ways do you experience memories of important events in your life?" Four distinct types of experience were measured on a 4-point scale (Never, Sometimes, Usually, Always): "As a single image"; "As a series of separate images"; "As a connected series of scenes like a videotape"; and "Without any accompanying images". Only if participants selected *Sometimes, Usually,* or *Always* for the item "As a connected series of scenes like a videotape", was the fifth experience item presented. This item requested participants to provide an "an example of the kind of event you remember this way" via an open-end text box.

***Video camera statement and alternative statements*.** The items and response options were identical to Study One: "Human memory works like a video camera, accurately recording the events we see and hear so that we can review and inspect them later"; "Human memory works partly like a video camera, accurately recording some of the events we see and hear so that we can review a simplified version later" and "Human memory is not like a video camera because we cannot play back events exactly as they happened".

***Misconception/belief statements*.** All statements were measured with the 5-point agreement scale used by Simons & Chabris (2011, 2012) that included a Don't Know option (scale point 5). Ten statements measured the *completeness*, *passivity*, *immutability*, *accuracy*, and *permanence* beliefs, with one statement consistent and one inconsistent with the belief. For example, *accuracy* beliefs were measured with the items "Human memory is generally highly accurate" and "Some of our memories turn out to be quite mistaken". The consistent *immutability* statement and inconsistent *permanent* statement were taken from Patihis and colleagues (2014). All statements are shown in Table 4.

Procedure. Participants accepting the task on MTurk were redirected to Qualtrics, where further information was provided and participants gave informed consent. All first provided demographic data. Participants were then randomized to receive either (a) the subjective experience items, followed by the original video camera statement, followed by the misconception statements; or (b) the original video camera statement, followed by the misconception statements, followed by the subjective experience items. Forty-nine percent of the sample saw the subjective experience items first. The order of the misconception statements was randomized for each participant. Finally, participants in both groups were presented with the two alternative versions of the video camera statement after which the original video camera statement was presented for a second time. Participants were asked to read through all three versions prior to rating them on the same scale as before. Therefore, as in Study One, participants endorsed the original video camera statement twice, once at an earlier point in the questionnaire prior to being exposed to the alternative versions and once at the end of the questionnaire after seeing the alternative versions. Ethical approval was provided according to the UCL Department of Psychology procedures.

Results and Discussion

Memory like a video camera. Overall, 56% of participants endorsed (i.e., answered "Agree" or "Strongly Agree" to) the original video camera statement earlier in the questionnaire prior to having considered the alternative versions; a rate comparable to Simons & Chabris (2011: 63%, 2012: 47%). The 'don't know' response was 2%. A simultaneous logistic regression was conducted to determine whether gender, age, income, education, and number of psychology classes taken predicted endorsement. To facilitate comparison with Simons and Chabris (2011, 2012), we only included respondents who answered the statement before the items about

subjective experience. The only variable to predict endorsement was number of psychology classes taken (*OR* = 0.58, 95% *CI* 0.34 – 0.94, *p* = .033), those with more classes being less likely to endorse it.

Respondents who answered the subjective experience items before the initial video camera statement endorsed the statement more strongly (endorsement rate 70.2%, *M* = 2.94, *SD* = 0.86) than those who answered them afterwards (endorsement rate 45.1%, *M* = 2.39, *SD* = 0.87; *t*(194) = 4.39, *p* < .001).

Endorsement of the original video camera statement fell from 56% earlier in the questionnaire, prior to having seen the alternative versions, to 31.9% at the end of the experiment, after having seen the alternative versions. A paired t-test indicated that the mean level of endorsement at the earlier point (*M* = 2.65, *SD* = 0.91) was significantly greater than at the end (*M* = 2.15, *SD* = 0.71), *t*(188) = 7.62, *p* < .001.

Subjective experience. Table 3 reports the frequencies with which the sample described experiencing important events as single images, as a series of separate images, as a connected series of scenes like a videotape, and without any accompanying images. Only 2.5% of the sample reported never having accompanying imagery. As is apparent, certain important events were commonly experienced as a connected series of scenes like a videotape, with 88.5% saying this happened at least some of the time. Examples participants provided of memories they experienced in this way included everyday events such as “Being at the beach, watching my son sitting in the surf” and “I remember conversations with other people that way, like sitting around at work and talking to other teachers”, as well as more significant events such as “The day my son celebrated his first birthday” and “My father’s death”.

Table 3

Experiences of Imagery Accompanying Important Events

Experience important events as:	Never	Sometimes	Usually	Always
Single images	28 (14.0%)	125 (62.5%)	40 (20.0%)	7 (3.5%)
A series of separate images	13 (6.5%)	114 (57.0%)	61 (30.5%)	12 (6.0%)
Connected images like a videotape	23 (12.5%)	81 (40.5%)	82 (41.0%)	14 (7.0%)
Without imagery	88 (44.0%)	87 (43.5%)	20 (10.0%)	5 (2.5%)

A**lternatives to the video camera statement.** Overall 67.2% of the sample endorsed the statement about memory being partly like a video camera and 57.4% the statement about it not being like a video camera. Repeated measures one-way ANOVA was used to compare the mean level of endorsement between the video camera statement (at the end of the questionnaire) and the two alternative statements (i.e., "not like a video camera" and "partly like a video camera"). There was a significant difference between the mean levels of endorsement, $F(2, 364) = 36.39$, $p < .001$, $\eta p^2 = .167$. Follow-up t-tests revealed that endorsement was greater for both the "not like a video camera" ($M = 2.78$, $SD = 0.85$) and "partly like a video camera" ($M = 2.84$, $SD = 0.76$) statements than the original video camera statement ($M = 2.15$, $SD = 0.71$; smallest $t(187) = 6.42$, $p < .001$). No difference was found between the mean endorsement of "not like a video camera" and "partly like a video camera" statements ($t < 1$).

Misconceptions and beliefs. Endorsement of the misconceptions suggested by Simons & Chabris (2011) and the two other beliefs about memory are displayed in Table 4. 'Don't know'

responses ranged from 2% to 12% and are not included in the analyses. Over 85% of the sample agreed that the completeness of memories is affected by attentional factors, that personal beliefs and biases play a role in what is seen, and that some memories turn out to be quite mistaken. Statements that rejected the misconceptions had greater rates of endorsement than those accepting them: *completeness*, $t(188) = 13.52$, $p < .001$; *passivity*, $t(185) = 11.61$, $p < .001$; *immutability*, $t(182) = 4.38$, $p < .001$. Respondents were also more likely to agree with the statement about memories being often mistaken rather than with the statement about them being highly accurate, $t(188) = 13.52$, $p < .001$. They were more likely to agree that memories could completely decay rather than being permanent, $t(165) = 3.07$, $p = .002$, although this difference was smaller and half of respondents endorsed both the consistent and inconsistent statement as true (50.30%).

Chi-square tests with continuity correction were employed to investigate agreement with these beliefs and endorsement of the video camera statement. The predictions are summarized in Table 4. The analyses indicated that four of the statements relating to the three misconceptions identified by Simons and Chabris were significantly associated with endorsement of the statement in the predicted direction (smallest $\chi^2(1) = 12.00$, $p = .001$). The two completeness and passivity statements with extremely high endorsement rates had insufficient variance to demonstrate significant associations (largest $\chi^2(1) = 0.95$, $p = .331$). Endorsement of the video camera statement was also related to the two accuracy beliefs in the predicted direction (smallest $\chi^2(1) = 13.13$, $p < .001$). However, endorsement of the statement was related to greater agreement with the idea that memories decay ($\chi^2(1) = 23.09$, $p < .001$) and less agreement with the idea that memories are permanent ($\chi^2(1) = 9.25$, $p = .002$).

Initial endorsement of the video camera statement (56% agreement) was similar to that reported by Simons and Chabris (2011, 2012). The fact that agreement was higher than in our Study One may be related to the different sample, or to the procedure whereby respondents in Study One first answered questions about a variety of memory metaphors and were exposed to other statements about memory. For example, reminding subjects, “We sometimes remember incorrectly” or suggesting the possibility that “Once you have experienced an event and formed a memory of it, that memory does not change” could have influenced initial video camera statement endorsement rates. Further studies manipulating the order of memory metaphors and memory statements relative to the video camera statement would help to distinguish between these possibilities.

For the first time, however, we were able to show a role for subjective experiences of imagery. Consistent with the evidence that people are able to create dynamic imagery (Jeannerod & Decety, 1995; Paivio & Clark, 1991), a high percentage of people reported experiencing some

Table 4

Endorsement of Beliefs About Memory

	Predicted association with video camera statement	Agreement (%)
Completeness		
The completeness of our memories can be affected by what we were attending to at the time of the event	Negative	93.50
Our memory of an event provides us with a complete picture of what we saw happening	Positive	35.50
Passivity		
When we witness an event, what we see can be shaped by our personal beliefs or biases	Negative	93.00
Memory passively records exactly what we see in front of our eyes	Positive	53.00
Immutability		
Memory is constantly being reconstructed and changed every time we remember something	Negative	73.00
Recalling a memory is like replaying the same tape and having the same experience over again	Positive	56.00
Accuracy		
Some of our memories turn out to be quite mistaken	Negative	85.50
Human memory is generally highly accurate	Positive	37.50
Permanence		
A memory can decay over time until that memory no longer exists	Negative	76.50
Memory of everything experienced is stored permanently in the brain, even if we can’t access all of it	Positive	62.50

of their memories as like a videotape, and drawing their attention to their subjective experience of imagery before the video camera question was associated with increased agreement rates. These observations support the idea that there are multiple reasons why someone may endorse the video camera question.

Other clear evidence of context effects emerged from comparing responses to the alternative video camera statements. As in Study One, agreement was significantly higher with contrasting propositions that memory was not, or was only partly, like a video camera. These findings affirm the importance that has been ascribed to framing items using both positive and negative language (Kamoen et al., 2011; Sudman & Bradburn, 1982). Unlike in Study One, however, we found that endorsement of the video camera statement was significantly lower at the end of the questionnaire. This difference could be due to the inclusion of additional items assessing beliefs and misconceptions about memory that were not present in Study One, and that prompted further thought about the accuracy of the video camera statement.

Assessment of memory beliefs supported Simons and Chabris' (2011) assertions that endorsing the video camera statement is related to misconceptions that memory provides a complete picture of what is seen, that it passively records what is in front of us, and that recalling a memory is akin to replaying a tape. In addition it was related to believing memory is accurate. Contrary to prediction, however, endorsement of the video camera statement was related to viewing memory as less permanent and more subject to decay, a set of beliefs that evoked much less clear-cut and more inconsistent responses compared to beliefs about accuracy, completeness, passivity, and immutability.

It is of interest that psychologists have also disagreed about the permanence of memories. Although some regard this idea as a misconception and cite evidence for the decay

of memories (Lynn et al., 2015; Patihis et al., 2014), others have argued that once memories are consolidated their accessibility can change over time, with apparently forgotten memories often being retrievable with the right cues (Hodges, Berry, & Wood, 2011; Tulving & Madigan, 1970; Tulving & Pearlstone, 1966). This emphasis on longer-term retrievability is a feature of the 'new theory of disuse' (Bjork & Bjork, 1992), which distinguishes the storage and retrieval strength of a memory. In this theory memories can be high in storage strength (i.e., well learned and long-lasting) while simultaneously being low in retrieval strength (i.e., extremely unlikely to come to mind in the absence of specific retrieval cues).

Finally, for each misconception, endorsement of statements that were consistent with scientific consensus was greater than endorsement of statements that were inconsistent. In this case, we found participants understand the misconceptions about *complete*, *passive*, and *immutable* memory better than purported by Simons & Chabris (2011, 2012). In particular, statements consistent with scientific consensus that memory is neither *complete* (94%) nor *passive* (93%) were endorsed with very little disagreement. Therefore, as Simons & Chabris (2011, 2012) only used statements that were inconsistent with scientific consensus, it is likely their results overstate the extent to which people endorse misconceptions (such as the video camera statement).

Study Three

A widely-used set of questions were originally devised to assess the degree of consensus among experts, with a view to determining the confidence with which various empirical findings about eyewitness testimony and memory could be presented in court (Kassin, Ellsworth, & Smith, 1989). Kassin et al. (1989) devised 21 statements of the form "Very high levels of stress impair the accuracy of eyewitness testimony" and the experts rated the degree of empirical support for a number of statements as well as whether the

finding was reliable enough to be presented in court. A subsequent study (Kassin & Barndollar, 1992) presented these statements to a group of potential jurors, simply asking them to judge whether statements were “generally true”, “generally false” or “I don’t know”. This was followed by a further survey of the experts containing 17 of the original statements along with 13 new statements (Kassin et al., 2001).

One statement in the Kassin et al. (1989) survey, which was strongly endorsed by experts but more weakly by the general public, was a statement about memory confidence: “An eyewitness's confidence is not a good predictor of his or her identification accuracy”. Similar discrepancies on this statement between expert and non-expert opinion have since been found in numerous surveys, and it is commonly argued to exemplify the deficiencies in jurors’ and legal professionals’ knowledge (Benton, Ross, Bradshaw, Thomas, & Bradshaw, 2006; Lacy & Stark, 2013; Magnussen & Melinder, 2012; Melinder & Magnussen, 2015; Read & Desmarais, 2009; Wise & Safer, 2004). However, although expert opinion supported this statement at the time, recent evidence has clarified that under certain circumstances confidence is highly reliable and predictive of accuracy (Wixted, Mickes, Dunn, Clark, & Wells, 2016; Wixted, Mickes, & Fisher, 2018). Alternative phrasings of this question may therefore lead to a better indication of the match between lay samples and the results of memory research: Statements could ask whether confidence is never a good predictor of accuracy (now known to be false) or is sometimes a good predictor of accuracy (now known to be true).

Another statement in the Kassin et al. (2001) survey was “Traumatic experiences can be repressed for many years and then recovered”. A number of subsequent surveys have obtained strikingly high rates of endorsement by non-expert samples (Read & Desmarais, 2009), and practitioner clinical psychologists similarly tend to endorse the idea of repression to a much greater extent than experimental psychologists or research clinical psychologists

(Patihis et al., 2014). Given that there is little scientific evidence for unconscious repression, it has been repeatedly argued that lay groups, including legal and mental health professionals, must therefore be ill-informed about memory (Benton et al., 2006; Lynn et al., 2015; Melinder & Magnussen, 2015; Patihis et al., 2014). However, repression is an ambiguous term, Freud himself sometimes using it to refer to an unconscious process (Bowers & Farvolden, 1996; Erdelyi, 2006), and at other times to the deliberate suppression of unwanted memories, a process which has strong empirical support (Anderson & Hanslmayr, 2014). On this basis it has been suggested that the apparent endorsement of repression in surveys may reflect a belief in deliberate suppression (Brewin & Andrews, 2014).

The idea that repression is a myth is often bracketed with the claim that traumatic events can never be forgotten (McNally, 2005; Shobe & Kihlstrom, 1997). However, it is now clear that traumatic events are not immune to forgetting (Brewin, 2012; Gleaves, Smith, Butler, & Spiegel, 2004; Means & Loftus, 1991; Raphael, Cloitre, & Dohrenwend, 1991; Schraedley, Turner, & Gotlib, 2002). The existence of these disparate strands in the literature suggest that understanding and evaluation of lay beliefs in this area would be improved, both by modifying the original repression statement to ask about deliberate forgetting, and by asking if traumatic events can be forgotten.

The aim of this study was to test whether alternative wordings of these two questions would provide a different perspective on non-expert knowledge. We sampled younger and older groups of non-experts and compared their responses with psychology students to estimate the effect of exposure to teaching on memory research.

Method

Participants. Of the 160 participants, 80 were psychology students (6 men, 74 women, mean age 18.76 years), 40 were students from other disciplines (18 men, 22 women,

mean age 20.47 years), and 40 were older adults (26 men, 14 women, mean age 43.25 years). The gender distribution differed significantly, $\chi^2(2) = 45.73$, $p < .001$. A 1-way ANOVA followed by post-hoc tests indicated that the older adults were significantly older than both the student groups ($p < .001$), who did not differ from each other ($p = .220$).

Materials and procedure. An online questionnaire was programmed on Qualtrics (Qualtrics, Provo, UT). Eight statements from the original Kassin et al. (2001) questionnaire were followed by two further blocks of eight statements in a within-subjects design. Each of these blocks consisted of the same set of original statements in the same fixed presentation order but alternatively worded. We report here data on the two statements specifically concerned with beliefs about repression and accuracy-confidence that are the focus of Study Three. These, together with their alternative wordings, are shown in Table 5 and the unanalyzed statements are given in Supplementary Table 3. In order to control for order effects half of the participants were randomly allocated to receive the block of Alternative 1 statements before the block of Alternative 2 statements, while this was reversed for the other half. Following Kassin and Barndollar (1992), the response scale consisted of the following options: “generally true”, “generally false”, and “I do not know”.

Participants were invited to take part in a study for which they would be required to read statements regarding eyewitness memory and indicate whether they were generally true or false. Those who agreed were sent a link by email to an online survey. After providing consent, a series of statements appeared on the screen one at a time. Following this participants completed the Juror Bias Scale (Kassin & Wrightsman, 1983), which is not reported here, demographic information was collected, and participants were debriefed. Psychology students received course credit for their participation but otherwise no payment was offered. Ethical approval was provided according to the UCL Department of Psychology procedures.

Table 5
Survey Statements Presented

	Original wording from Kassin et al. (2001)	Alternative wording 1	Alternative wording 2
Accuracy-confidence	An eyewitness's confidence is not a good predictor of his or her identification accuracy	An eyewitness's confidence is never a good predictor of his or her identification accuracy	An eyewitness's confidence is sometimes a good predictor of his or her identification accuracy
Repression	Traumatic experiences can be repressed for many years and then recovered	Traumatic experiences can never be forgotten	Traumatic experiences can be deliberately blocked out for many years and then recovered

Data analysis. Statements were first checked for any difference due to participant gender, using the combined non-psychology student and older adult groups in which both men and women were well represented. Alternative statements were also checked for presentation order effects. The main analysis of interest was how the distribution of true, false, and don't know responses differed between the original and each of the two alternative statements. For each original statement two McNemar tests compared the change in the proportion of true versus false/don't know responses and the change in the proportion of false versus true/don't know responses. Correlations between the original and alternative statement employed phi coefficients. This was repeated with each of the alternative statements. Differences in the distribution of responses on each statement by the three samples were investigated with chi-squared tests.

Results and discussion

Accuracy-confidence. There were no significant gender differences on responses to any statement, largest $\chi^2(1) = 2.04$, $p = .360$, and the order in which the two alternative statements were presented did not lead to them being endorsed differently, largest $\chi^2(1) = 4.82$, $p = .090$. McNemar tests indicated no significant differences between the proportion of

responses for the original and alternative 1, largest $\chi^2(1) = 0.73$, $p = .391$, but the original and alternative 2 differed on both the true/don't know versus false comparison, $\chi^2(1) = 21.83$, $p < .001$, and true versus false/don't know comparison, $\chi^2(1) = 18.08$, $p < .001$. As Table 6 shows, the most common change was from "Generally true" to "Generally false" for alternative 2. On the true versus false/don't know comparison, responses to the original statement were positively correlated with alternative 1, $\varphi = .62$, $p < .001$, but negatively correlated with alternative 2, $\varphi = -.43$, $p < .001$. Psychology students were significantly more likely to agree with the original statement than other students, $\chi^2(2) = 18.08$, $p < .001$, or older adults, $\chi^2(2) = 25.47$, $p < .001$. They were also significantly more likely to agree with alternative 1 than other students, $\chi^2(2) = 13.76$, $p < .001$, or older adults, $\chi^2(2) = 28.44$, $p < .001$. Psychology students were significantly more likely to disagree with alternative 2 than other students, $\chi^2(2) = 7.07$, $p = .029$, or older adults, $\chi^2(2) = 8.45$, $p = .014$ (see Supplementary Table 4).

Table 6

Frequency of Responses to Accuracy-Confidence Statements

Statement	Generally true	Generally false	I do not know
Original accuracy-confidence [a]	103 (64.4%)	41 (25.6%)	16 (10%)
Alternative 1 [b]	103 (64.4%)	47 (29.4%)	10 (6.3%)
Alternative 2 [c]	57 (35.6%)	91 (56.9%)	12 (7.5%)

Note. [a] An eyewitness's confidence is not a good predictor of his or her identification accuracy; [b] An eyewitness's confidence is never a good predictor of his or her identification accuracy; [c] An eyewitness's confidence is sometimes a good predictor of his or her identification accuracy.

Repression. There were no significant gender differences on responses to the original statement or either of the alternatives, largest $\chi^2(2) = 3.02$, $p = .221$ ("generally false" and "I don't know" responses were combined for the original statement due to small expected frequencies in the cells). The order in which the two alternative statements were presented did not lead to them being endorsed differently, largest $\chi^2(2) = 2.64$, $p = .268$. McNemar tests comparing the original and alternative 1 indicated that both the proportion of true versus false/don't know responses and the proportion of false versus true/don't know responses showed a highly significant difference, smallest $\chi^2(1) = 20.01$, $p < .001$. Table 7 shows that the endorsement of the original statement is higher than that of alternative 1. In contrast, endorsement of the original and alternative 2 did not differ, largest $\chi^2(1) = 3.70$, $p = .054$. On the true versus false/don't know comparison, responses to the original statement were independent of alternative 1, $\varphi = .04$, $p = .584$, but positively correlated with alternative 2, $\varphi = .38$, $p < .001$. Psychology students did not differ significantly from other students or older adults in their responses to any of the statements, largest $\chi^2(2) = 4.43$, $p = .109$ (see Supplementary Table 5).

Table 7

Frequency of Responses to Repression Statements

Statement	Generally true	Generally false	I do not know
Original repression [a]	122 (76.3%)	16 (10.0%)	22 (13.8%)
Alternative 1 [b]	82 (51.3%)	51 (31.9%)	27 (16.9%)
Alternative 2 [c]	119 (74.4%)	27 (16.9%)	14 (8.8%)

Note. [a] Traumatic experiences can be repressed for many years and then recovered; [b] Traumatic experiences can never be forgotten; [c] Traumatic experiences can be deliberately blocked out for many years and then recovered.

Consistent with previous research (Desmarais & Read, 2011; Kassin et al., 2001), there was little evidence that the responses of students not studying psychology and those of older adults differed in any meaningful way, although there was some indication that psychology students were impacted by the content of their courses. The overall agreement with the original accuracy-confidence statement used by Kassin et al. (2001) was higher than those reported by Kassin and Barndollar (1992) or Desmarais and Reed (2011), but this was due to the high levels of endorsement by psychology students. The data also make clear that this statement was taken to be synonymous with the claim that accuracy is never a reliable predictor of identification accuracy. Psychology students were more likely to accept the original statement and alternative 1 but rejected alternative 2 which proposed that confidence is sometimes a reliable predictor of identification accuracy. Recent research (Wixted et al., 2016; Wixted et al., 2018) indicates that alternative 2 should now be accepted as most consistent with the evidence. Both samples of non-psychologists were equally likely to say that all these statements were generally true or generally false, indicating considerable uncertainty. This uncertainty meant that by default their views were actually more consistent with the new evidence than were the more definite views of the original experts and of contemporary psychology students.

Endorsement of the original repression statement was very common in our sample, and accords with high rates of endorsement of repression found for legal professionals (Benton et al., 2006) and for samples of undergraduates, mental health professionals, and the general public (Patihis et al., 2014). The discrepancy with the traditional view of memory experts has been argued to demonstrate widespread faulty beliefs about memory, suggesting a need for education of clinicians and law enforcement officers (Lynn et al., 2015; Patihis et al., 2014). However, the comparable rates of endorsement for, and correlation with, our alternative 2 indicate that this response could be based on a belief in motivated forgetting, a

relatively non-controversial process. As we have previously suggested (Brewin & Andrews, 2014), agreement in surveys with the idea of "repression" does not, in the absence of an explanation of this term, imply that people think repression is unconscious. In contrast, the frequent rejection of the original repression statement by experimental psychologists (Patihis et al., 2014) suggests they have interpreted it more narrowly to mean unconscious repression.

Consistent to some degree with their responses to the original repression statement, our sample was more likely to disagree with alternative 1, which stated that traumatic events can never be forgotten. Nevertheless, a majority still believed this was "generally true", in line with a number of claims made by psychologists (McNally, 2005; Otgaar & Howe, 2014; Shobe & Kihlstrom, 1997). Given the evidence that traumatic events can in fact sometimes be forgotten (Gleaves et al., 2004; Means & Loftus, 1991; Raphael et al., 1991; Schraedley et al., 2002), it is worth looking for possible ambiguity in the question wording.

In this regard it may be helpful to recall the distinction between two independent properties of a memory, its 'storage strength', that is how well learned it is, and its 'retrieval strength', that is how accessible (or retrievable) it is (Bjork & Bjork, 1992). Some traumatic events may occur during a discrete period of a person's life, perhaps during a particular developmental period, with the result that despite the memories remaining high in storage strength changes in family accommodation or structure may result in effective retrieval cues being rarely encountered. This analysis implies that believing traumatic events can never be forgotten is implicitly based on a consideration of storage strength rather than retrieval strength, a hypothesis that could be explored in future studies.

An inherent limitation of our within-subjects design is the unknown effect of presenting participants with successive, similarly-worded statements. Although there was little evidence for order effects among the two alternatives, we cannot assess the effects of

first presenting the original Kassin et al. statements. Although instructions advised participants to respond to each statement independently, and made them aware that although some statements might seem similar they were in fact different, some confusion may have occurred upon viewing a statement they thought they had already seen. If participants perceived the statements as similar they might have been drawn to respond in a similar manner, which might have minimized the effect of the wording changes. Replication using a between-subjects design would therefore be desirable.

General Discussion

Data from all three experiments reported here are consistent with a wealth of research confirming that the way in which questions are posed can make a major difference to the responses that are received (Belli et al., 2007; Kamoen et al., 2011; Sudman & Bradburn, 1982). Although the studies were limited to three statements about memory, these are the most frequently cited evidence for non-expert misconceptions. Clearly, the results should not be taken to suggest that misunderstandings about memory are uncommon. Nevertheless, the findings suggest that non-expert opinions about memory may be more closely aligned with the evidence than has hitherto been appreciated, and that more systematic examination of different question wordings may lead to a more accurate characterization of expert and non-expert opinion alike.

The results emphasize that in designing items that tap lay beliefs about memory particular care may be necessary not to inadvertently incorporate assumptions or distinctions that have specific meanings for psychologists. For example, the video camera statement uses the word “accuracy” (as in the phrase “accurately recording the events we see and hear”), which can be conceptualized in different ways (Koriat & Goldsmith, 1996). As these authors note, accuracy can be conceptualized in terms of the amount that is recalled as a proportion of

the total amount of information that was presented (the “storehouse” metaphor). Many traditional experimental studies, in which there is control over exactly what is presented to participants, adopt this approach. Accuracy can also be conceptualized in terms of the amount that is recalled which is consistent with what was originally presented (no matter how small or great a proportion this is of the original input). Koriat and Goldsmith (1996) refer to this as the “correspondence” metaphor. The correspondence metaphor is more characteristic of studies assessing everyday autobiographical memory, where there is typically little or no control over what the individual has had the opportunity to perceive.

Previous interpretations of the video camera statement by psychologists may have been based on the “storehouse” metaphor, taking “accuracy” to mean that everything that was originally recorded was correctly recalled. Non-psychologists, in contrast, following the “correspondence” metaphor, may have taken “accuracy” to mean that any items of information that were recalled were consistent with what was originally recorded. Answers to the other questions additionally clarified that such items of information were in fact not necessarily assumed by respondents to represent events exactly as they happened. Future studies could usefully consider whether ‘accuracy’ may be treated by non-psychologists as a functional concept that is considered more in terms of practical utility, contrasting with the quantitative approach that is more typical of research.

Similarly, when the accuracy-confidence statement was first written it is likely to have been interpreted by memory experts as referring to a generally accepted body of research that indicated low agreement between the two. It has always been recognized that questions may need updating in light of increments in knowledge (Brown, 1984; Simons & Chabris, 2011). In this case subsequent research has highlighted that conclusions about the relation between accuracy and confidence were largely based on studies using the point-biserial correlation and that other statistical approaches, such as calibration analysis, yielded

very different answers (Wixted et al., 2016; Wixted et al., 2018). The issue with the repression statement is somewhat different from the other two, in that it involves a technical term which may or may not be understood by lay respondents in the same way as by psychologists.

One consideration in assessing knowledge of human faculties such as memory is that all respondents are 'expert' in the sense that they have a very large number of relevant observations at their disposal. If expert and lay views diverge, therefore, it may be prudent to look first for explanations to the way these views have been measured and in the nature of the respective lay and expert knowledge base. The relevance of such factors was illustrated concretely in Study Two by the effect of drawing respondents' attention to their own experience of imagery prior to rather than after answering the questions. In this case there was a knowledge base in respondents' own experience that had no immediate counterpart in the psychological literature. The role played by subjective experience is often overlooked, not just in attitude and belief surveys, but in experimental studies. There is growing evidence, for example, that spontaneous visual imagery commonly accompanies many unrelated tasks (Brewin & Soni, 2011; Schlagman & Kvavilashvili, 2008) and is an unacknowledged influence on visual memory task performance (Brewin & Langley, 2018).

More generally, it has been noted that there are few if any 'laws' of memory, with performance varying considerably according to the situations, people, and materials involved (Roediger, 2008). Determining lay beliefs about memory may therefore benefit from distinguishing between generally applicable statements and statements that apply in some circumstances (even if not in others). For example, it is evident that many personal memories are accompanied by imagery, but the presence and nature of the imagery may vary considerably. Respondents who interpret the video camera question as referring to what memory *can* be like in some circumstances are likely to answer differently than those who

interpret it to mean what memory is *always* like, and this distinction will not be captured by a single agree-disagree scale. From this perspective the practice of amalgamating "agree" and "strongly agree" responses may also obscure respondents' attempts to indicate caveats or limiting circumstances that are relevant to understanding their conception of memory.

Our results also have implications for the legal system and expert witnesses operating within it. The idea of memory not being like a video recorder has been taken up and appears in publications and judgements in some jurisdictions. For example, in July 2012 New Jersey developed new guidelines for jurors, instructing them "Research has shown that human memory is not at all like a video recording that a witness need only replay to remember what happened. Human memory is far more complex" (Anonymous, 2012). Similar comments were made by Mr. Justice Leggatt in a well-known civil case in the U.K. (Gestmin v. Credit Suisse, 2013: EWHC 3560 (Comm); Case No. 2011 Folio 1267). Our data caution lawyers and experts alike not to make premature assumptions about what jurors believe and to take into consideration the various ways in which memory can be subjectively experienced. It would be potentially damaging if testimony was discounted purely on the basis that the witness described their memory as "like a video recording".

Our data also indicate that the common lay practices of likening memory to a videorecorder or asserting that traumatic memories can be repressed should not be presented by experts as evidence that jurors have mistaken ideas about memory, or that expert testimony on memory is essential. Such an argument neglects both the existence of multiple memory metaphors and the indications that beliefs about memory are often more nuanced than first appears, as well as the ambiguities in presenting lay samples with technical terms like "repression". At the same time our data clearly indicate that there are high levels of uncertainty in all samples about the relation between confidence and accuracy. In Gestmin v. Credit Suisse Mr Justice Leggatt described as a "common error" the belief that "the more

confident another person is in their recollection, the more likely their recollection is to be accurate". This statement misrepresents the research findings, which indicate that although confidence is no guarantee of accuracy, equally there are circumstances when confidence and accuracy are highly related. Failing to understand and explain this may have serious consequences for the justice system (Wixted et al., 2018).

We have previously identified a need for experts to be more explicit about procedures and assumptions underlying research findings, for example when presenting material concerning false memory to the courts (Brewin & Andrews, 2017). Many of the same issues are relevant here. Providing courts solely with the expert's conclusions will not help to educate lawyers and judges about the methods and reasoning that have resulted in those conclusions. Rather, it is necessary to explain what materials were used, how terms were defined to participants, and what was the nature of the experimental or study context. If these explanations are lacking there is a real danger that experimental findings will be misunderstood and overgeneralized.

In closing, we would like to reiterate that we are not trying to argue that lay beliefs about memory are invariably, or even often, sound. This has not been established. They do, however, appear to be nuanced and in some cases more consistent with psychological science than they have been given credit for. Where uncertainty prevails, as in the relation between confidence and accuracy, there is often a corresponding disagreement among experts. At present, therefore, general statements asserting the prevalence of memory 'myths' or that lay opinions are frequently in error (Berkowitz & Frenda, 2018; Clifasefi et al., 2007; Lacy & Stark, 2013; Lynn et al., 2015; Patihis et al., 2014) appear to be premature, and attempts to educate clinicians or legal professionals about apparent deficits in their knowledge about memory should proceed with caution until a better understanding of their beliefs has been established.

Context

This series of studies arose from our interest in people's subjective experience of memory, for example the involuntary memories and images that are a prominent part of psychopathology. We were intrigued that although PTSD patients sometimes describe their involuntary trauma memories as "like a videotape" this subjective phenomenon did not appear to have been investigated in healthy samples. Our suspicion was that beliefs about memory might be a function of such personal experiences of imagery. Another concern was that investigation of lay beliefs might assume a knowledge base (for example, about the relation of accuracy and confidence, or about the definition of repression) that was specific to a body of psychological research rather than drawing more widely on everyday experiences. All these factors, we suspected, might shape questionnaire items, disadvantage non-expert samples, and make their understanding of memory appear deficient when this was not in fact the case. Encountering these claims within legal reports further strengthened our wish to better test their empirical basis.

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