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RUNNING HEAD: ANCHORING AND FALSE MEMORIES

Anchoring effects in the development of false childhood memories

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Abstract

When people receive descriptions or doctored photos of events that never happened, they often come to remember those events. But if people receive both a description and a doctored photo, does the order in which they receive the information matter? We asked people to consider a description and a doctored photograph of a childhood hot air balloon ride, and we varied which medium they saw first. People who saw a description first reported more false images and memories than people who saw a photo first, a result that fits with an anchoring account of false childhood memories.

Anchoring effects in the development of false childhood memories

Many self-help books promote techniques for remembering childhood experiences, claiming that recall will help to validate traumatic events. Some books suggest talking to family members to trigger lost memories; other books urge readers to review childhood photos (McKinnon, 2008; Sanderson, 2006; Whitfield, 1995). But repeatedly thinking about false childhood descriptions or reviewing false childhood photos can cause people to remember experiences that never happened (Loftus, 2004; Loftus & Pickrell, 1995; Wade, Garry, Read, & Lindsay, 2002). Together these findings warrant a need to understand the role of different types of information – such as written evidence and photos – in the development of false childhood memories. In this paper we ask what happens to memory when people encounter written and then photographic evidence of a false event – and what happens when the order is reversed?

According to the Source Monitoring Framework (SMF), we create false memories in much the same way that we identify true memories. Remembering is an act of evaluation and classification: first, people evaluate their mental products along various dimensions; second, they classify these products as resulting from genuine experience, or mental activity such as imagination, dreams, or fantasy (Johnson, Hashtroudi, & Lindsay, 1993; Lindsay, 2008). Although people usually classify their mental experiences quickly and without awareness, when the process goes wrong people incorrectly decide that a false autobiographical experience was real.

To study false autobiographical memories, scientists often use a variation of the *memory implantation* technique (Loftus & Pickrell, 1995; Wade et al., 2007). In this technique, people receive evidence – ostensibly provided by a family member – of specific childhood experiences. The twist is that one of the experiences is false. Across 13 studies, 37%¹ of people on average reported images or memories for a range of false events, such as being hospitalized overnight; being attacked by an animal; winning a prize in a contest, and playing a prank on one's teacher (Desjardins & Scoboria, 2007; Hyman, Husband, & Billings, 1995; Ost, Foster, Costall, & Bull, 2005; Porter, Yuille, & Lehman, 1999). This literature shows that people can generate a variety of rich, false autobiographical memories.

In the most common variant of the implantation technique, the evidence for the false event is a written description. More recent research shows that photographic evidence can produce similar effects (see Garry & Gerrie, 2005, for a review). Still other research shows that combining a false description with a genuine photo leads to more false memories than a false description alone (Lindsay, Hagen, Read, Wade, & Garry, 2004). What we do not know is the effect of giving people both written and photographic evidence, but at different times. To address this question, we asked adults to consider a false description and a doctored photograph of a childhood hot air balloon ride, and varied which medium they saw first.

¹ *SD* = 20%; Range: 0% (Pezdek, Finger, & Hodge, 1997), to 81% (Garry & Wade, 2005).

Anchoring

Research on anchoring leads us to expect that people who encounter a description first (hereafter, *Description-first subjects*) should report more false memories than people who encounter a photo first (hereafter, *Photo-first subjects*). When people make decisions based on multiple sources of evidence, the information they acquire early in the process is often more influential than the information they acquire later (Peterson & Ducharme, 1967). For example, Hart's (1995, Experiment 2) mock jurors listened to evidence about a traffic accident. The evidence was presented in various ways, biased in favor of either the defendant's guilt or innocence. Most importantly, jurors exposed to a guilty followed by a not-guilty bias more often produced guilty verdicts than did jurors exposed to a not-guilty followed by a guilty bias. Presumably the early evidence had more weight on jurors' decisions.

Why are our judgments biased toward information we encounter first? One explanation is that early information anchors and shapes the way we gather and interpret subsequent information. Indeed, people typically make an initial judgment based on the first piece of evidence they receive, then update that judgment by considering the implications of each new piece of information (Carlson & Russo, 2001). Because source monitoring is a judgment process, we might expect to find anchoring effects in the development of false memories: the first piece of evidence people receive should influence their source monitoring more than the second piece of evidence. If so, then research suggests that when the first piece of evidence is

a written description, people should be especially prone to developing false memories.

Garry and Wade (2005) found that people who read a description of a false childhood balloon ride were more likely to cultivate false images and memories, and to speculate about the false event, than were people who saw a doctored photograph. Descriptions, Garry and Wade hypothesized, better support activities known to produce false memories: they give “free rein” to the imagination, and allow more speculation, and infusion of personal knowledge into people’s images and memories (Lyle & Johnson, 2006; Sharman & Scoboria, 2009). Taken together then, research on anchoring effects and on false autobiographical memories suggests that Description-first people would report more false images and memories than Photo-first people.

Consistency

Other research suggests that the consistency of details across the pieces of evidence is paramount, and leads us to predict the opposite pattern of results. Consistency is the extent to which separate pieces of evidence fit together. For instance, when pairs of adults described a long-ago shared experience and then evaluated the accuracy of each other’s memory, they used the consistencies (or inconsistencies) between their own and their partner’s statements to justify their accuracy judgments (Ross, Buehler, & Karr, 1998).

If people rely on consistency to distinguish between real and false memories, then encountering a description of the balloon ride first should

give their imagination free rein, allowing them to imagine fellow balloon riders, balloon styles, and so on. But later, when they encounter the photo of the balloon ride, at least some of the details they have imagined should clash with details in the photo. “That’s odd,” they might think, “the balloon I remember was a different shape from what’s in the photo.” These inconsistencies should prompt people to evaluate their mental imagery more rigorously – and when they do, they may realize that they do not recall what happened before the balloon ride, or how odd it is that the event was never the stuff of “family stories.” Ultimately they may reject the false event because their memory of the balloon ride does not meet the criteria for a genuine memory. But this process should occur only for Description-first people, not Photo-first people.

In short, theoretical reasoning about anchoring and consistency leads to different predictions about how the order in which people see written and photographic evidence of a false event might influence memories for it. We examined this issue in the following experiment.

Method

Subjects

Fifty-three confederate students from Victoria University of Wellington (New Zealand) and Warwick University (United Kingdom) each recruited a family member subject aged 18-30 whom they were confident had not

experienced the false event.² Confederates and subjects each received a \$25 voucher (NZ) or £15 cash (UK).

Design

We used a two-group between-subjects design, with order (Description-first, Photo-first) as the factor, and we randomly allocated subjects to either the Description-first condition ($N = 27$, 59% female, $M = 21.2$ years, $SD = 3.6$) or Photo-first condition ($N = 26$, 62% female, $M = 21.7$ years, $SD = 3.2$). A similar proportion of New Zealand and British subjects were in each condition.

Materials and Procedure

For each subject, we created two booklets following the format in Figure 1; one contained four photos of childhood events, and the other contained four descriptions of the same childhood events. Events 1, 2 and 4 were real; Event 3 was always the false event, a hot air balloon ride (Strange, Hayne, & Garry, 2007; Wade et al., 2002). We verified with family members that the ride (which would have required parental consent) never happened.

² We obtained similar patterns of results among our New Zealand and British samples.



Figure 1. Sample of a photograph booklet (upper row) and description booklet (lower row).

Photo booklets

Confederates provided photographs of moderately significant events (school functions, family trips, celebrations) showing their family member (the subject) between age 4-8. We asked confederates to select a range of experiences, avoiding often-repeated events. We digitized the photos, cropped them to 15 x 10 cm, and printed them in grayscale at 300dpi. We used Adobe Photoshop® to produce the doctored image of the subject taking a balloon ride with at least one family member; Figure 2 shows an example.



Figure 2. Process of doctoring a photo. Original photo provided by family confederate (left) and doctored photo (right).

Description booklets

For each real photo, confederates described the event, year it happened, subject's age, and people involved. For the false photo, we personalized a generic 45-word description, based on details in the photo, and used in earlier research: "When you were around [6-8] years old, you and your [dad/mum/sister] went up in a hot air balloon. You didn't go far off the ground because the ropes anchoring the balloon were still attached" (Garry & Wade, 2005, p.360).

Interviews

We used Wade et al.'s (2002) procedure, interviewing people individually, three times over 1 week. All interviews were recorded.

Interview 1. We told subjects that the study was investigating how people reminisce about childhood events. We gave subjects Booklet 1, the format of which depended on their order condition, asked them to report everything they could recall about each event in turn, and reassured them that people often find it difficult to remember long-ago events. When subjects had trouble recalling an event, we used guided imagery to encourage them to reinstate the physical and mental context of the event. Specifically, we asked them to concentrate on the description or photo for 1 minute, and to visualize the location, what they might have seen, and how they might have felt (Wade et al., 2002). We did not introduce any additional false information during this process. When subjects could recall no more, we moved on to the next event.

We asked subjects not to discuss childhood events with family members or to review other childhood photos until the study was over. They took a copy of their event booklet home to think about the events daily.

Interview 2. The second interview occurred 3-4 days later, depending on subjects' availability. As they returned Booklet 1, we told subjects "sometimes thinking about childhood events in different ways can make a difference," and gave them Booklet 2 in the different evidence format. We then asked them to look at each event in their second booklet and to report any additional details they could recall, rather than repeating details from Interview 1. For the false event and any true event that subjects struggled to recall, we repeated the guided imagery instructions from Interview 1. Finally, we reminded subjects not to discuss childhood events with family members

or to review other photos. They took a copy of Booklet 2 home so that they could think about the events daily.

Interview 3. The final interview took place one week after Interview 1 and followed that same procedure except that subjects did not engage in guided imagery, and they reported everything they could remember without a booklet in front of them. Before debriefing, we asked subjects how often they had thought about the events during the study and whether they had discussed the events with others.

Results & Discussion

Most subjects indicated surprise that one of the photos was a fake: "Really?" "That's awesome!" Moreover, two trained judges³ independently reviewed transcripts of subjects' event reports to answer the question "To what extent does the subject believe they took a childhood balloon ride?" (1 = strong disbelief; 5 = strong belief). Judges concurred on 72% ($\kappa = .80$) of categorizations and classified disputed cases into the more conservative category. In total, 83% of subjects were judged to have a moderate or strong belief (4 or 5 on the scale). Together these findings suggest that subjects were unaware of the true nature of the study and that our data are not the result of their trying to please the experimenter.

Reports of the false event

³ Judges could not be blind to the order manipulation because subjects often referred to the format of the false evidence. However, all of our independent judges were first year psychology majors in the first month of Introductory Psychology. They were naive to our hypotheses and unfamiliar with the false memory literature.

We now turn to our primary research question: Did the order in which subjects viewed the description and photo influence false recall? To answer this question, two new independent judges used Lindsay et al.'s (2004) criteria to determine who reported *memories*, *images (but no memories)*, and *no images or memories* of the false event at Interview 1 and Interview 3 (judges did not score transcripts from Interview 2 because subjects were not asked to provide extensive memory reports in that session). Subjects were classified as having a memory if they reported remembering the balloon ride, using terms such as "I remember...", and reported details beyond those in the description or in the photograph. Subjects were classified as having images if they reported seeing mental images of the balloon, the people involved, or where it happened, but did not use terms that suggested they were remembering the balloon ride. Judges concurred on 94% ($\kappa = .90$) of categorizations at Interview 1 and 83% ($\kappa = .77$) at Interview 3; we classified disputed cases into the more conservative category.

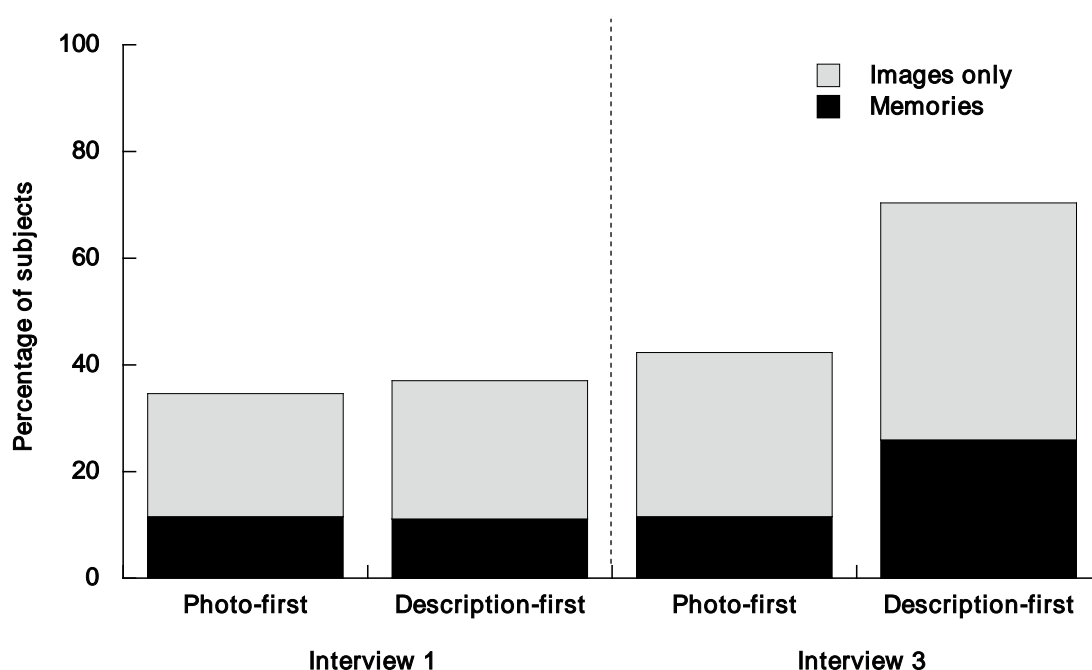


Figure 3. Percentage of subjects classified as having false images or memories as a function of condition and

As Figure 3 shows, by the end of the experiment Description-first subjects were more likely to report false images or memories than Photo-first subjects, a pattern that fits with the anchoring mechanism, $\chi^2(1, N = 53) = 4.31, p = .04, \eta^2 = .59$. Table 1 shows sample false reports. Note that no subject reported false information at Interview 1 prior to guided imagery.

Interestingly, the left panel in Figure 3 shows that the pattern of false reports at Interview 1 does not replicate the pattern Garry and Wade (2005) found at Interview 1 where descriptions elicited more false details than photos did. There are two methodological changes that could account for the difference in findings. First, Garry and Wade's false descriptions contained more self-relevant detail: the name of the subject's hometown. Because self-relevant details can encourage false memories, Garry and Wade's false descriptions might have enhanced processing fluency more than our descriptions. An enhancement in fluency might account for the difference in patterns (Hyman, Husband, & Billings, 1995; Desjardins & Scoboria, 2007). Second, Garry and Wade's event booklets contained a mixture of descriptions and photos, whereas our booklets contained all photos (Photo-first subjects) or all descriptions (Description-first subjects). Perhaps the subjective fluency

of the false event is influenced by the subjective fluency of other, recently considered, events. Garry and Wade proposed that descriptions enhance processing fluency more than do photos. If so, descriptions might be perceived as more fluent when presented alongside photos (as in Garry & Wade) than when presented alongside descriptions (as in this study). Such a mechanism would also account for the difference in patterns.

Table 1. *Sample false images and memories.*

Condition	Memories	Images
Description- first	<p>Okay. Um, in this I remember um looking up and seeing the flame; a big flame went up into the balloon. That was pretty cool at the time. And the heat, I remember feeling the heat as well, of the flame. And looking up and seeing the dude um with the, pulling the thing that made the flame go up. And um, he was wearing gloves too. And yeah. Um, my sister was there and my mum was there, were there.</p>	<p>I can remember what it felt like to be up there. But before I was thinking about that I was thinking of um, it was like seeing grass blowing in the wind beneath you as you were up high, and then seeing sea out to the side. So it's like it's a cliff-face sort of thing. A view of that, rather than in a city in the middle of looking up like that. And really high. Just being above, hovering above somewhere and just seeing grass and *** like that.</p>
Photo- first	<p>I think we'd gone to: we were having like a family day or something, some kind of family outing. It wasn't like we were just driving along in the car and we just saw a hot air balloon. I think we planned it. We sort of used to plan to have these family days. Um, I think we had a picnic as well. And then we went on the hot air balloon. We went on the hot air balloon at the end of the picnic. We had the picnic in a park or something ... I remember being really scared of the balloon guy, the actual driver. He was just a scary guy. I don't know, I can't remember any reason why I was scared but um, he just scared me. I think he was a pretty hard, hardened looking dude. He was a friendly, smiley type you know ... Just looking at his clothing just reminded me I was really scared of that guy for some reason. I don't know why. But you know. Just thought he was really scary.</p>	<p>I kind of remember um we were in a hurry to get there. I don't know whether I said that before. Like, I feel like we were in a hurry or we were going after something so we almost didn't get there or something. I remember maybe being in the car on the way there, like, like that's just a vague remembrance so it's not like um, very vivid. But um, don't, on the actual balloon, hm. Pretty vague. I do kind of feel like it happened kind of more now because I can kind of imagine it more. But I don't imagine a particular; I can't, yeah, no I can't remember the conversations from it, on the balloon or anything, when we were up there. I just kind of have more the feelings of what was the surrounds and stuff.</p>

We did find differences between Description-first and Photo-first people's memory reports that fit with Garry and Wade's conclusion that descriptions give people carte blanche to imagine. Specifically, our two judges found a tendency at Interview 1 for Description-first subjects to speculate more often (e.g., where the event occurred, who was involved, how they were feeling) than Photo-first subjects, $M_{\text{Description-first}} = 4.0$ details ($SD = 3.6$) vs. $M_{\text{Photo-first}} = 2.5$ ($SD = 2.4$), $t(51) = 1.80$, $p = .08$.

At Interview 3, our two judges rated the extent to which subjects believed the false event really happened (1 = strong disbelief; 5 = strong belief). Overall, Description-first subjects had stronger beliefs about the balloon ride than did Photo-first subjects, $M_{\text{Description-first}} = 4.1$ ($SD = 1.0$) vs. $M_{\text{Photo-first}} = 3.4$ ($SD = 1.3$), $t(52) = 42.44$, $p = .02$; perhaps unsurprising given that Description-first subjects described more images and memories than did Photo-first subjects. However, even when we examined only those subjects judged to have no images or memories, we found stronger beliefs among Description-first subjects than among Photo-first subjects, $M_{\text{Description-first}} = 3.4$ ($SD = 0.9$); $M_{\text{Photo-first}} = 2.5$ ($SD = 1.1$), $t(19) = 2.17$, $p = .04$. If descriptions give subjects more freedom to speculate and infuse personal knowledge, greater processing fluency might lead to stronger beliefs and more source monitoring errors (Garry & Wade, 2005; Lindsay, 2008).

Characteristics of the false reports

Thus far, our data fit with an anchoring account of false memories. If this account were correct, we might also expect that by the end of the study,

Description-first subjects should report more false details traceable to the description than to the photo, whereas Photo-first subjects should do the opposite. That is what we found. Two new judges parsed subjects' false event reports into clauses (excluding irrelevant clauses and repetitions) and classified those clauses according to whether information could be traced back to the first medium, the second medium, both media, or neither. The judges concurred on 99% of categorizations. In line with an anchoring account, there was a tendency for subjects in both conditions to report more details that were consistent with the first medium than the second medium, $M_{\text{first}} = 0.35$ ($SD = 0.90$), $M_{\text{second}} = 0.11$ ($SD = 0.38$), $F(1, 102) = 3.32$, $p = .07$, $\eta^2 = .03$.

With so much support for an anchoring account, should we conclude that consistency played no role in people's false memories? The answer depends on whether subjects actually encountered inconsistencies between their internally-generated details of the balloon event and the details depicted in the photo. To address this issue, we asked two new independent judges to determine how many subjects described at least one discrepancy between their own images or memories of the false event and the doctored photo. Judges concurred on 94% ($\kappa = .85$) of categorizations and they classified the disputed cases via discussion. Table 2 illustrates some of the subjects' comments.

Table 2. *Samples of Description-first subjects' comments about discrepancies.*

Comments
My mum was scared of those kinds of things too, so if she could do it, then I'm sure I'd be ok. I probably felt safe her being there.
I remember that [the flame] being like real close or something... but then, on the other hand, it doesn't look like there's much fire there now so I might be imagining it.
I imagined the basket being a bit more, um, not quite so long.
When I remembered back to the event I thought the ropes came off the bottom.
When I imagined it, it was different to what it actually is [in the photo].
In my memory I thought the basket was a lot smaller and a lot shadier and more closed.
It looks like we were actually quite high up!
There are heaps of people in there! I don't remember that.

Judges determined that 48% of Description-first subjects reported an inconsistency about the balloon ride – yet none of the Photo-first subjects did so, $\chi^2(1, N = 53) = 16.6, p < .01, \phi = .56$. Thus, as the consistency account predicts, Description-first but not Photo-first subjects experienced inconsistencies between their own mental products and the details in the doctored photo. Yet, Description-first people developed more false images

and memories than did Photo-first people. Of the Description-first subjects who reported inconsistencies, 23% reported false images, and 46% reported false memories.

These results cause us to wonder why, even in the face of inconsistencies they noticed, so many Description-first subjects reported something about the false event. We suspected a confirmatory bias: once subjects believed the ride really happened, they were more likely to search for – or generate – information consistent with that belief than information inconsistent with it (Nickerson, 1998). This finding might explain why some people develop and retain erroneous memories in the face of conflicting evidence (the case of Ronald Cotton is an excellent example, see www.pickingcottonbook.com).

Our results fit with an anchoring account, but an additional test of our conclusion would be to use a 2 x 2 between-subjects design, manipulating the false medium viewed first (photo or description) and the false medium viewed second (photo or description). Such a design would clarify whether the second medium contributes to false memory development at all.

One counterexplanation for our results is that Description-first people were more motivated to work at remembering the false event than Photo-first people. However, both groups reported thinking about the false event a similar number of times, $M_{\text{Description-first}} = 6.6$ times ($SD = 3.8$) vs. $M_{\text{Photo-first}} = 6.3$ ($SD = 4.0$), $F < 1$. Thus, the idea that Description-first subjects worked harder at remembering cannot adequately explain our findings.

Our findings help to refine Mazzoni and Kirsch's (2002) metacognitive

model of false memory construction. Their model posits that in the absence of a clear memory, we might use external evidence – such as information gleaned from family members or personal photos (see also Wade & Garry, 2005) – to determine whether an event really occurred. This process of evaluating information from various sources, may, according to our results, involve more than simply summing up the available evidence. Situational factors, such as the order in which the evidence is considered, could play a significant part.

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