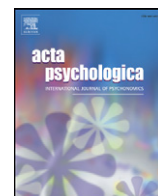




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Photographs cause false memories for the news

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ABSTRACT

What is the effect on memory when seemingly innocuous photos accompany false reports of the news? We asked people to read news headlines of world events, some of which were false. Half the headlines appeared with photographs that were tangentially related to the event; others were presented without photographs. People saw each headline only once, and indicated whether they remembered the event, knew about it, or neither. Photos led people to immediately and confidently remember false news events. Drawing on the Source Monitoring Framework (Johnson, Hashtroudi, & Lindsay, 1993), we suggest that people often relied on familiarity and other heuristic processes when making their judgments and thus experienced effects of the photos as evidence of memory for the headlines.

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1. Introduction

A growing body of research shows that doctored photographs can change memories for events, and other work shows that genuine photographs have a powerful effect on memory in their own right (Brown & Marsh, 2008; Garry & Wade, 2005; Garry, Strange, Bernstein, & Kinzett, 2007; Lindsay, Hagen, Read, Wade, & Garry, 2004; Sacchi, Agnoli, & Loftus, 2007; Strange, Hayne, & Garry, 2008; Strange, Sutherland, & Garry, 2006; Strange, Wade, & Hayne, 2008; Wade, Garry, Lindsay, & Read, 2002). In one study, people heard a description of a fictitious childhood event while looking at their class photo. After a week, they were twice as likely to remember the event than people who only heard the description (Lindsay et al., 2004). In another study, priming people with photographs of various locations often led them, one to three weeks later, to believe they had visited those locations (Brown & Marsh, 2008). Genuine photographs can have remarkable effects on what we remember and believe.

The Source Monitoring Framework (SMF; Johnson, Hashtroudi, & Lindsay, 1993; Lindsay, 2008) provides ways of thinking about these effects. For one thing, when people consider suggestions about a fictitious autobiographical experience, a related photograph can be a source of detailed images. Subsequently, combining these images with products of imagination can create compelling false memories. In other words, photographs can furnish the imagination with content

resembling percepts, thereby fostering false memories (see Lindsay, 2008, for a review). The emphasis here is on the word *subsequently*: in these studies, photographs wield their effects over time. Can genuine photographs cause memory distortions immediately? That is the question we ask here.

According to the SMF, the subjective experience of remembering arises from an (often unconscious) decision process. Mental events with properties characteristic of memories are likely to be attributed to memory, especially if they arise in a context that makes memory a salient source of thoughts and images (Johnson et al., 1993; Lindsay, 2008). In other words, when people try to remember an event, true or false, they use what they know and believe about themselves and the world to run a mental simulation of the event, seeing whether they can conjure up related thoughts and images that add up to a memory. Generally, this strategy works: people are more likely to generate evidence of a prior experience if they really did have it. But false memories arise when mechanisms other than genuine prior experience produce similar (yet false) characteristics. They arise when people run mental simulations of a false event, manufacturing thoughts and images, and mistake them for remembering (see for example, Garry et al., 2007; Lindsay, 2008; Lindsay et al., 2004; Wade et al., 2002).

In the present experiment, we asked people to take a quiz about world events. News headlines appeared briefly on a monitor. The headlines described significant international or national events from the past few years (such as *Bin Laden Offers Truce to Europe, Not US*). On half the trials, the headline appeared with photos. The photos never depicted the event described in the headline; instead, the photo

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was tangential—such as a head shot of Osama Bin Laden. On other trials, no photo accompanied the headline. We asked people to read each headline and then tell us if they remembered the specific instance in which they first learned about that event, merely knew that it happened, or neither. The twist was that two of the headlines in the set were completely false—for example, *Blair Under Fire for Botched Baghdad Rescue Attempt; Won't Step Down*. Half the time these false headlines, too, appeared with a tangential photo (such as Tony Blair at the podium in Parliament).

What should be the effect of seeing a photo paired with a true headline? The SMF suggests that people will use the photo to help them generate related thoughts and images. For example, seeing the true headline *Bin Laden Offers Truce to Europe, Not US* along with the photo of bin Laden should help people produce related thoughts (“Yes, he sometimes releases recorded messages”) and related images (such as politicians reacting to the message). Put another way, the photo should act as a kind of cognitive scaffolding, helping people to produce these mental products easily, while generating little detail about cognitive operations—two qualities that are typically associated with fluent processing and genuine experience (Alter & Oppenheimer, 2009; Johnson et al., 1993; Lindsay, 2008).

The SMF predicts the same processes will also occur when people see a photo appear with a false headline. That is, seeing a photo of Tony Blair alongside the false headline *Blair under fire for botched Baghdad rescue attempt; won't step down* should help people to produce related thoughts (“Oh...that's right...some people in the UK were really angry with Tony Blair for participating in the Iraq war”) and to produce familiar images such as Tony Blair with military advisors, hostages, and protestors. In other words—and as with the true photos—photos should provide cognitive scaffolding, helping people generate details about temporal, spatial, and affective qualities, and very little detail about cognitive operations—all qualities associated with fluent processing and memories of genuine experience. These mental products, too, should be attributed to a real memory.

2. Method

2.1. Subjects

A total of 98 Introductory Psychology students at Victoria University of Wellington and the University of Otago, both in New Zealand, completed the experiment.

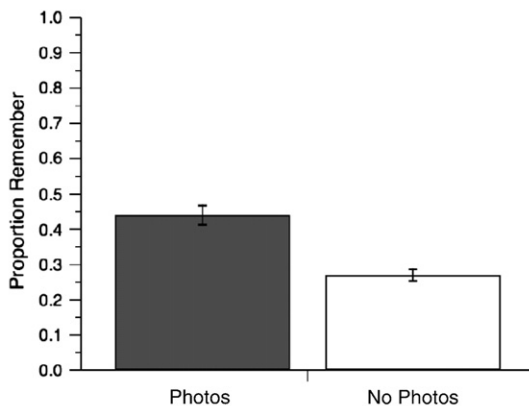


Fig. 1. Proportion of true headlines subjects claimed to remember when the headlines appeared with and without photos. Error bars represent the Standard Error.

2.2. Design

We used a 2 (accuracy) × 2 (photo) design, manipulating the accuracy of the headlines (true or false) and whether the headlines appeared with or without a photo (yes, no) within subjects.

2.3. Procedure

2.3.1. Phase 1

We told subjects that the purpose of the experiment was to determine what types of current events capture people's attention. Then, the experimenter told the subjects:

In a moment you will see a series of news headlines ... some will be accompanied by photographs, some will not. All describe significant national or international news events from the last three years. Your task is to read the headline carefully, to examine any photographs, and then to rate whether or not you *remember* the event described by the headline, *know* it or *neither*.

The experimenter explained that a *remember* rating meant subjects remembered the specific instance in which they heard about, read about, or were told about the event the headline described. A *know* rating meant that, although they did not remember *how* they learned it, they knew that they had learned it. Finally, a *neither* response meant that they neither remembered nor knew that the event had happened. Subjects then were asked to rate their confidence in those decisions from 1 (“not at all confident”) to 5 (“extremely confident”).

Subjects saw 10 critical headlines in this phase, embedded among 30 filler headlines. Eight of the 10 critical headlines were true (“John Paul sainthood process begins”), as were all fillers, and these critical true headlines were randomly selected from the larger set. We selected our true critical and filler headlines from national and international news websites and constrained selection to events that had occurred in the preceding three years; they ranged from 6 to 16 words, and no topic or person appeared more than once. Moreover, they represented a range of stories (hard news, soft news) and differed in their level of familiarity (from obscure international stories to local stories that received exhaustive media coverage). Four of the eight critical true headlines appeared without photographs, and each of the remaining four appeared with two photographs that were tangentially related to—but did not depict—the event described. For example, for some subjects the John Paul headline appeared with a photo of Pope John Paul II praying and an aerial photo of his funeral. Both critical and filler headlines were counterbalanced (as a block) so that they appeared with and without photographs equally often.

The remaining two critical headlines were false: [1] “Hussein survives assassination attempt in prison: Bush denies US involvement” and [2] “Blair under fire for botched Baghdad rescue attempt; won't step down.” Data were collected after Hussein's capture but before he was sentenced to death, and before Blair's resignation. In the Photo condition, the false Hussein headline appeared with two photos of the famous toppling of his statue in Baghdad; the false Blair headline appeared with one photo showing Blair looking dejected alongside another photo showing him speaking in Parliament.

We asked subjects to read the headlines. After an alert tone, each headline appeared for 4 s—with or without photographs—on a 30-inch LCD monitor. Then a black screen appeared for 8 s, during which subjects made their ratings with paper and pencil. After all trials had been completed, we thanked subjects for their participation and debriefed them.

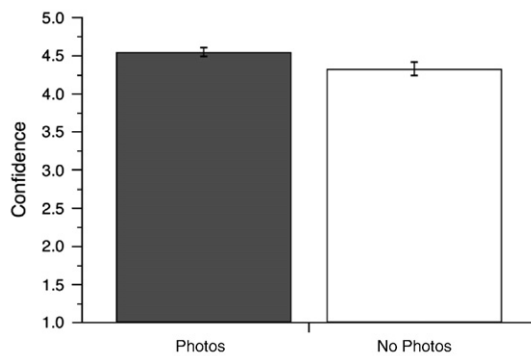


Fig. 2. Confidence (true headlines) when subjects claimed to Remember. Error bars represent the Standard Error.

3. Results and discussion

For both true and false headlines, we asked two questions: first, would photos make people more likely to say they *remembered* world events; and second, would seeing those photos affect people's confidence in their decisions?

3.1. True events

3.1.1. True memories

To examine memories for true events, we calculated the proportion of times each person claimed to remember the specific instance he or she learned about the event described by each of the eight true critical headlines. We classified that proportion according to whether the headlines appeared with photos or without, and display the results in Fig. 1. As Fig. 1 shows, photos mattered: people claimed to remember more true events with photos ($M = .45$, $SD = .26$) than without ($M = .27$, $SD = .23$), $t(97) = 5.49$, $p < .01$, $d = 0.69$. There were no effects on Know ratings, (Photos: $M = .24$, $SD = .21$; No Photos: $M = .27$, $SD = .23$), $t(97) = 1.08$, $p = .28$. Using the independence assumption (IRK familiarity: $F = K/(1-R)$; Jacoby, 1998), we also computed estimates of familiarity for headlines that appeared with or without photos. Familiarity estimates were higher when headlines appeared with photos, (Photos: $M = .42$, $SD = .22$; No Photos: $M = .35$, $SD = .20$), $t(97) = 2.38$, $p = .01$, $d = 0.33$.

3.1.2. Confidence

Fig. 2 shows that people tended to be confident about their remember responses, and more confident when photos accompanied the headlines, $t(52) = 2.16$, $p = .04$, $d = 0.15$.

3.2. False events

3.2.1. False memories

We now turn to our primary research question: Would photos make subjects more likely to claim to remember false world events? To answer that question, we performed the same calculations as for the true events, and display those results in Fig. 3. As Fig. 3 shows, people claimed to remember more false events when headlines appeared with photos than without, $t(96) = 2.89$, $p < .01$, $d = 0.58$ ¹. As was the case with true memories, there were no effects on Know ratings, (Photos: $M = .39$, $SD = .40$; No Photos: $M = .29$, $SD = .35$), $t(96) = 1.28$, $p = .20$. In addition, familiarity estimates were higher when headlines appeared with photos, (Photos: $M = .42$, $SD = .22$; No Photos: $M = .35$, $SD = .20$), $t(91) = 2.25$, $p = .01$, $d = 0.47$.

¹ Note that the small number of false alarms prevents us from using signal detection theory to test for sensitivity and bias in our data.

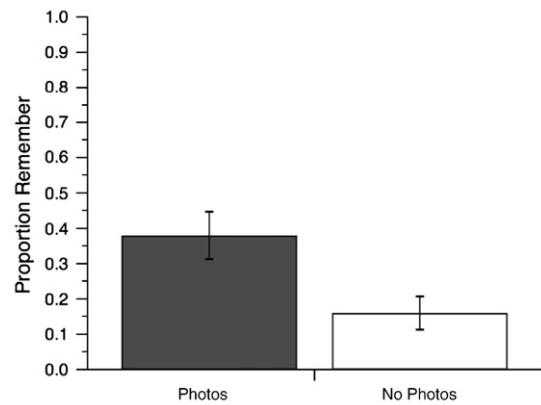


Fig. 3. Proportion of false headlines subjects claimed to remember when the headlines appeared with and without photos. Error bars represent the Standard Error.

3.2.2. Confidence

Fig. 4 shows that there was a non-significant tendency for confidence to be higher in the no-photo compared to photo condition when people claimed to Remember, $t(24) = 1.87$, $p = .07$, $d = 0.87$. We speculated that this counterintuitive tendency is merely a fluke (note that there were only 5 subjects in the no-photo/remember cell).

3.3. False memories of true events

Consider how people might come to say they remember the true events. On the one hand, the photo might help people generate thoughts and images that they really did experience. On the other hand, the photo might help them manufacture thoughts and images that they never did experience (or a mix of the two). In this sense, we could say that just because people come to remember true events does not mean they have a genuine memory for those events.

To determine whether our photo effect would generalize across event type², two independent raters classified the 8 true events as either highly memorable or less memorable—based on their own memory of the event—yielding 4 events of each type (2 with a photo; 2 without). We found that when true headlines appeared with photos, subjects were more likely to say they remembered those events ($M = .45$, $SD = .37$) compared to when the headlines appeared alone ($M = .30$, $SD = .33$), $F(1, 97) = 30.62$, $p < .01$, $d = 0.43$. Not surprisingly, people were more likely to say they remembered a highly memorable headline than a less memorable one (Highly Memorable: $M = .47$, $SD = .39$; Less Memorable: $M = .27$, $SD = .32$), $F(1, 97) = 30.62$, $p < .01$, $d = 0.56$. There was no interaction, $F < 1$. These findings provide tentative evidence that photographs might also lead people to “falsely” remember genuine world events³.

Our results fit with the idea that photographs provided “cognitive scaffolding” leading to the fluent processing we associate—accurately or inaccurately—with genuine experience (Alter & Oppenheimer, 2009; Johnson et al., 1993; Lindsay, 2008). Rubin’s “basic systems” approach to memory (see Rubín, 2006, for a review) also helps us understand the effects of photos on remembering. Rubín described memory as a byproduct of the operation of multiple separate systems and subsystems (e.g., a visual system composed of subsystems for what and where, an auditory system, a language system, etc.) and notes that many memory judgments involve coordination and interactions across multiple systems. In particular, he emphasizes

² We thank an anonymous reviewer for suggesting this analysis.

³ Performance on the true filler items was similar to that of the Critical True headlines. On average people said remember to 35% of the filler headlines that appeared with Photos and 30% of those that appeared without photos, which is a significant difference, $t(98) = 2.92$, $p < .01$.

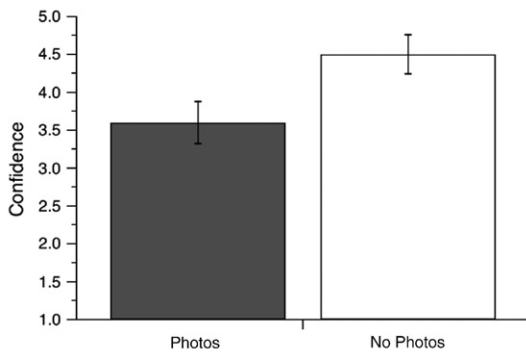


Fig. 4. Confidence (false headlines) when subjects claimed to Remember. Error bars represent the Standard Error.

that visual and spatial systems often play particularly important roles in contributing to memories (p. 294):

Remembering sensory details makes people likely to judge that they performed an action rather than just thought about it, though the spatial imagery may be more important than the visual image itself (Johnson & Raye, 1981; Johnson et al., 1993). Thus, forming visual images of events that never occurred may be important in the creation of false memories (Garry, Manning, Loftus, & Sherman, 1996; Hyman & Pentland, 1996)

In Rubin's terms, we might think of the photo as providing a second route by which people can create mental products they later mistake for reality. In this sense, Rubin's approach is like the SMF. Although they differ in some significant ways, they share the central premises that (a) memories are byproducts of the various processing systems that underlie and give rise to ongoing experience, and (b) during remembering products of multiple systems and subsystems are combined. Thus Rubin's basic systems approach is also consonant with our findings.

A critic might argue that by surrounding two false events with a large number of true events, we created demand characteristics that may have led subjects to claim to remember events that they did not really remember⁴. But it is clear that subjects were comfortable reporting that they did not remember events, because they often reported that they neither remembered nor knew a true event (e.g., an average of about 45% of the time for true headlines in the no-photo condition). Moreover, even if subjects did experience a demand to claim to remember events, that would not explain why photos increased such reports.

Our study represents an important departure from the typical autobiographical memory "implantation" research (see Strange, Clifasefi, & Garry, 2007). Although we adopted some aspects of that paradigm—such as leading people to believe that all the events were real—we exerted little in the way of social pressure. People always had the option to say they neither remembered nor knew about the event—an option they chose 51% of the time (43% for true events). Even so, we produced false memories for significant world events after only 4–12 s. Given how labor-intensive implantation research can be, at least for autobiographical events, our procedure is a significant innovation (see Brown & Marsh, 2008; Roediger & McDermott, 1995; see also Bernstein, Whittlesea, & Loftus, 2002, although note that they only measured changes in confidence that an event had occurred).

The SMF suggests that photos should influence a range of phenomenological reports besides claims of remembering—they might help people manufacture thoughts and images about other claims such as belief or feelings of truth. Just like the photo of Tony

Blair, a photo paired with a scientific misconception, product claim, or myth should help people "see" related images, create them more easily, and misattribute them to a feeling of truth (see also, Begg, Anas, & Farinacci, 1992; Bernstein, 2005; Schwartz, 1982; Schwarz, Sanna, Skurnik, & Yoon, 2007). If so, then when people see a photograph of a dinosaur alongside the false statement "Humans and dinosaurs coexisted on Earth 6000 years ago," they should be more likely to say the statement is true. Such an effect would be of concern to science educators, and be a significant twist on the educational psychology literature showing that pictures can help establish context and meaning, and prompt remembering of related ideas (e.g., Bransford & Johnson, 1972; Harp & Mayer, 1997; Mayer & Gallini, 1990; Tindall-Ford, Chandler, & Sweller, 1997; Waddill & McDaniel, 1992).

We would expect similar effects if photos appeared alongside myths in a "myths and facts" public information campaign (*Myth: Swine flu means it is unsafe to eat pork* alongside a photo of a pig), a magazine advertisement (*Yo-good yogurt has more fruit than any other brand!* alongside a photo of a strawberry), or a political message (see also, Arkes, Hackett, & Boehm, 1989). Indeed, on July 8, 2009, the *Washington Times* reported that then US Supreme Court nominee Sonia Sotomayor gave three speeches claiming "inherent physiological differences between the races." The claim is completely false, but on the basis of it the paper's editors likened Judge Sotomayor to 1960s southern bigots and said she should not come "within a country mile" of an appointment to the Supreme Court. Given Justice Sotomayor's difficult confirmation process, one might speculate about the impact of the editorial, which was accompanied by a file photo "head shot" of Judge Sotomayor.

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⁴ We thank Roddy Roediger for pointing out this possibility.

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