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## Photos and Memory

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Chapter for Nash & Ost 'False memory' book

We live in a world where we witness news and international events as they happen.

Information is sent and received rapidly, thanks to ever-advancing social networks and fiber-optic communication. But this process of passing information around is wide open to abuse, particularly when information is fabricated or irrelevant, and uncritically passed on. Consider, for example, the photographs that circulated on the internet in October 2012 as Hurricane Sandy swept across New York. Striking images of apocalyptic-looking clouds looming over Manhattan spread around Twitter and Facebook. Photos of a rogue shark swimming through the streets of New Jersey also popped up, but then again, this shark appears every time a major weather event occurs (see: <http://mashable.com/2012/10/29/fake-hurricane-sandy-photos/>). These jaw-dropping images were compelling and dramatic, but the events they depicted were not real. It would be fine, of course, if we could dismiss such captivating, yet fake, images as light entertainment or jokes shared amongst friends. But psychological science suggests we don't. We place faith in photographs to accurately depict real world events. We use images to inform our judgements, to make decisions, and to remind us who we are. And whilst we might carefully choose the friends, experts, and newspaper and media outlets whom we follow, we often pass over photographs uncritically, because photographs are entertaining, or provocative, or they—more dangerously—fit with our world view. As British big-data artist Eric Drass points out: "The legitimacy of information is dependent on the trustworthiness of the source, but often this is unclear, and often overpowered by a compelling image."

Over the last 10-15 years, memory researchers have become increasingly interested in how photos—both doctored and real—affect human memory. Although doctoring images or circulating misleading photos might seem like harmless fun, we know that people often accept photographs as realistic depictions of events. As a result, photos can potentially change our memories of both childhood and recent experiences. They can also influence our decisions, our intentions, our behaviour and even our willingness to confess to something we never did. Photos are powerful because we ascribe them more credibility than they often deserve. They can also make an event feel more familiar than it really is and promote vivid visual imagery, which can

affect a number of common cognitive tasks. Here we describe the growing body of research into photographs and memory, and consider the crucial implications for criminal justice settings.

## **Photographs and childhood memories**

Memory researchers have known for a long time that childhood memories are prone to error. One of the earliest attempts to plant a wholly false childhood memory in adults involved a procedure in which adult subjects were given short narrative descriptions of four childhood events and were asked to remember as much as they could about each experience. The subjects were led to believe that their families had provided the descriptions but, in reality, one event was a fake that the experimenters created. After two visits to the lab in which they worked at remembering the real and false childhood events, 25% of subjects came to believe, wholly or partially, that at the age of 5 or 6, they got lost in a shopping mall and were eventually helped by an elderly lady who reunited them with their parents (Loftus & Pickrell, 1995). This was the first systematic procedure for planting and examining false childhood memories, and the paradigm proved to be popular and robust. To date 16 published studies have used variants of the *familial-informant false-narrative procedure* (Lindsay, Hagen, Read, Wade, & Garry, 2004) to explore the power of suggestive techniques and repeated retrieval.

In the early 2000s, Wade and co-workers adapted the familial-informant false-narrative procedure to determine whether doctored photographs of childhood events, without any accompanying verbal description, might also lead people to develop false childhood memories (Wade, Garry, Read, & Lindsay, 2002). People often rely on photographs of significant, personal experiences to trigger stronger remembering and to remind themselves of who they are, which could make photographs a compelling source of misinformation (for early work into reviewing photos and false recollection see Koutstaal, Schacter, Johnson, Angell, & Gross, 1998; Schacter, Koutstaal, Johnson, Gross, & Angell, 1997). In Wade et al.'s study, over 1-2 weeks, adult subjects worked at remembering events depicted in childhood photographs that their family members provided. The photos depicted moderately significant events, including childhood birthday parties, family holidays and cultural celebrations. One was a fake, and depicted the subject and a relative on a hot air balloon ride—an event that subjects' family members confirmed never happened. To be categorised as having a *clear* false memory, subjects had to report memories of the balloon ride, and provide consistent information beyond that depicted in the photo. For a *partial* false memory, subjects had to consistently elaborate on the false photo (e.g., report feelings, describe who was present etc.) but did not have to indicate memories of taking the

balloon ride per se. By the end of the study period, 20% of subjects remembered the balloon ride clearly and a further 30% remembered it partially: existence proof that doctored photographs—like narratives—could lead people to remember wholly false childhood experiences.

Subjects in the hot air balloon study, and in follow-up experiments, typically developed false memories slowly over the duration of the study (Garry & Wade, 2005; Wade, Garry, Nash, & Harper, 2010). The subjects who ultimately reported illusory memories often began by offering visual snippets of the balloon event and then embellished these details over the study period until their reports became coherent, detailed and clear. A clause-analysis of subjects' memory reports revealed an interesting fact: the information depicted in the fake photographs played a small role in determining the content of subjects' illusory memory reports. Fewer than 30% of the clauses in subjects' false memory reports were made up of information that subjects could have reasonably gleaned from the doctored photograph. Indeed, the vast majority of subjects' memory reports were made up of details they must have incorporated from other cognitive processes—presumably imagination and relevant, real memories.

In later research, Garry and Wade (2005) pitted verbal descriptions of a childhood balloon ride against doctored photos of the same event to determine which medium—images or descriptions—would foster more false memories. Counter-intuitively, the descriptions proved to be more powerful. Of the subjects who reviewed the hot air balloon description, 82% were categorised as reporting images or full blown memories of the balloon ride, compared to 50% in the photo condition. One possible explanation for this pattern of results is that words afford people more freedom to imagine the suggested experience (e.g., the shape, size and colour of the balloon) and to construct a memory that contains idiosyncratic and familiar information. We know from the source monitoring and perceptual fluency literatures that easily imagined events are more likely to be mistaken for genuine memories (Johnson, Hashtroudi, & Lindsay, 1993; Lindsay, 2008; Newman, this volume; Whittlesea, 1993, 2011). Consistent with this account, Hessen-Kayfitz and Scoboria (2012) showed that imbuing doctored photos with additional, unfamiliar details, lowers the rate of false recall. Their subjects were less likely to report false childhood memories of a hot air balloon ride when they viewed doctored balloon images that contained an unfamiliar lighthouse digitally inserted into the background (see Figure 1). Thus doctored photos may be powerful, but research suggests they are no more so than descriptions of suggested events.

Figure 1 of Hessen-Kayfitz and Scoboria's (2012) doctored photos

One question that frequently arises in the false memory domain is whether subjects are genuinely developing false memories or simply uncovering true memories. This is an important point because the “lost in the mall” or even the “hot air balloon” suggestion could conceivably be leading people to recall genuine events rather than to report false memories. This question has led researchers to examine false memories for implausible and even impossible events to determine whether suggestive manipulations really are creating false memories. In a clever series of experiments, Braun, Ellis, and Loftus (2002) used doctored images of company advertisements to induce impossible memories. Subjects evaluated advertisements for a Disney resort. Half viewed a generic ad that did not mention any cartoon characters, and half viewed a fake ad for Disney that featured Bugs Bunny—a Warner Bros character. After a delay, subjects were asked about any childhood trips they took to Disney, and viewing the fake ad led 16% of subjects to falsely claim that they had personally met Bugs at Disney. Follow-up experiments by Grinley (2002) showed that multiple exposures to the fake ad boosted the likelihood of false memories (25% of subjects in one study, 36% in another).

Children can develop wildly implausible false memories too with the aid of doctored photos. In one study, 6- and 10-year-olds were given doctored photographs of themselves, aged 2. One doctored photograph depicted them taking a hot air balloon ride, the other depicted them having tea with Prince Charles (Strange, Sutherland, & Garry, 2006). The royal tea scenario, is of course, highly implausible, if only for the fact that the royal family live in England and the subjects were all New Zealanders. Yet, after reviewing the fake photos, the children were just as likely to have developed a memory for having tea with the Prince as they were to develop a memory for the hot air balloon ride. For example, one child remembered the following details about the fictitious balloon experience:

This . . . is . . . this is me, Michael and Granddad and um we went in a balloon, in Christchurch somewhere. And it was a sixplay [display] of balloons. And we had to pay like \$5 or something for the ride. And we went in there for like half an hour or something and we went over Christchurch. And . . . yeah. And we were down there for, on holiday ... And after ... I had done this I went and saw my Dad in the dairy [convenience store] and he gave, and my grandma gave me free lollies [candy] and all that. (Strange et al., 2006, p.944).

It is important to note that photographs do not have a particular power to make children believe in impossible events. Other studies have shown that suggestive descriptions of plausible

event (almost choking on a candy) and implausible events (being abducted by a UFO) are equally likely to give rise to rich false memories in children (Otgaar, Candel, Merckelbach, & Wade, 2008).

Although doctored photos have become a useful tool for examining the mechanisms underlying false memory reports, on a more practical level, we know that people are unlikely to encounter doctored photos of themselves doing things they have never done in their day-to-day lives. This line of thinking led Lindsay et al. (2004) to wonder about the influence of *real* photographs on false memory creation. Using a variant of the familial-informant false-narrative procedure, Lindsay and colleagues attempted to plant a false memory of putting Slime—the bright green gooey toy—in a teacher’s desk in Grade 1 or 2 (age 5 or 6). Subjects were led to believe that the prank was committed with a classmate, and that the teacher was unhappy and made the subject and their accomplice sit facing a wall, legs and arms crossed, for 30 minutes. The procedure, once again, proved extremely powerful with 23% of subjects stating that they remembered this event. But more importantly, this false memory rate almost tripled, to 65%, when subjects used their school class photo from grade 1 or 2 as an aide-mémoire. Several processes could account for why the class photo, which didn’t depict the suggested Slime incident, worked so well. As Lindsay et al. argued, the photo may have boosted the credibility of the suggestion, enabled subjects to speculate about the event, or provided a visual springboard for imagination.

### **Photographs and recent memories**

In familial-informant false-narrative (or photo) studies, subjects are asked to recall a suggested event that ostensibly happened during childhood, which may involve thinking back to 10, 20, or even 30 years ago. Of course, childhood memories are typically faded, sketchy, and difficult to recollect, so it is easy to see why people are prone to accepting suggestions and, with a little repeated imagination and social demand, reporting wholly false memories of distant events. Indeed, people are more prone to misremembering an event that ostensibly occurred at age 2 than at age 10 (Strange, Wade, & Hayne, 2008). So there are good reasons to believe that altering someone’s memory for a recent event—something that occurred within the last few hours or last few days—would be much more challenging. Or would it?

Sacchi, Agnoli, and Loftus (2007) explored the influence of doctored photos on memory for significant, recent public events. The researchers digitally doctored two photographs, one of a relatively old event: the 1989 Tiananmen Square protest in Beijing, and one that occurred only a

year before the study was conducted: the 2003 Iraq war protest in Rome. For the Beijing event, an original photograph depicting a student standing in front of military tanks was doctored to include crowds of people standing on the side-lines. For the Rome event, aggressive-looking demonstrators and police officers wearing riot gear were digitally added to the original image of the peaceful demonstration march. Subjects viewed a photo of the Beijing event and a photo of the Rome event, each one either in its original or doctored format. In a recognition memory test, subjects who viewed the doctored Beijing image estimated that more people were involved in the protest than those who viewed the original photograph. Similarly, subjects who viewed the doctored Rome image were more likely to state that the protest involved physical confrontation, damage to property, and significant injuries. The doctored-photo subjects were also 7 times more likely to state that people were killed during the demonstration. Directly instructing subjects to disregard the photographs didn't change these results, which illustrates the power of doctored photos to influence memory of even relatively recent events.

One limitation of the Saachi et al. (2007) study is that subjects may not have been familiar with the Tiananmen Square or Iraq war protests. Indeed, 35% of Saachi et al.'s younger sample and 5% of their older sample, reported being 'completely unfamiliar' with the Beijing event. Rather than reporting their memories of these events, some subjects may have simply guessed or fabricated their answers. Other research has avoided this problem by examining the persuasive effects of photographs when they are presented alongside a to-be-remembered event, and the results are strikingly similar. Garry, Strange, Bernstein, and Kinzett (2007) asked subjects to proofread a set of news articles, and to indicate where an accompanying photograph should be placed. The critical article described a tropical hurricane that had destroyed properties when it hit a coastal town in Mexico. Some subjects received a photograph depicting the aftermath of the hurricane and some received a photograph of the town before the hurricane had hit. Later on, subjects were given a surprise recognition test to determine whether their memories of the article had been influenced by the content of the photograph. About a third of subjects who viewed the 'aftermath' photograph claimed to remember that the hurricane had caused death and serious injuries. Only 9% of those who had seen the 'before' photograph claimed to have read statements about death in the original article. Garry et al. concluded that spending two minutes with a photograph depicting property damage was enough to facilitate speculation or mental images about the outcomes of a hurricane. These speculations or images were subsequently incorporated into memory, and subjects came to believe that they had read, rather than imagined, some serious personal injuries.

Another compelling example of people developing false memories based on inferences they have drawn from photographs comes from work conducted by Linda Henkel (2012). Subjects read short stories that induced them to infer certain scenarios. “Sabrina dropped the delicate vase”, for example, induces the inference that the vase broke. Each story was accompanied by a photograph depicting the likely inference (e.g., a broken vase), a photograph depicting a different aspect of the story (e.g., a vase before it was dropped), or no photograph at all. As expected, subjects were more likely to claim that they had read the inference—that the vase was broken—in the story when the story was accompanied by a broken-glass photograph, compared to when it was accompanied by a vase photograph, or no photograph. In fact, subjects falsely recognised inferences almost 75% of the time after seeing inference-consistent photographs (Experiment 1). These false inferences, induced by the presence of a photograph, were made with high confidence and were enduring. The errors occurred even when memory was strong (i.e. when subjects were tested after 5 minutes), and when memory was not prompted (i.e. when subjects were tested using free-recall). When recounting memories of recent events, we seem to find it difficult to determine which information we have gleaned from photographs, and which information we have read about or experienced.

Further research has shown that photographs don't have to infer a particular outcome to create havoc in memory. Even seemingly innocuous photographs set alongside news headlines can have a marked impact. Strange, Garry, Bernstein, and Lindsay's (2011) subjects were presented with genuine headlines from recent significant international events, along with a number of headlines that were created by the researchers. Some headlines were accompanied by a photograph that was loosely related to the event. The headline “Bin Laden Offers Truce to Europe, Not US”, for example, was accompanied by a headshot photo of Osama Bin Laden. The remaining headlines were presented without photographs. The mere presence of a tangentially-related photo encouraged people to confidently and immediately state that they remembered both the true and the fictitious events. Critically, 38% of the false events with photographs were “remembered”, whereas only 16% of the false events without photographs were “remembered”.

Similar results were reported by Newman, Garry, Bernstein, Kanter, and Lindsay (2012) who presented familiar and unfamiliar celebrity names with either a photograph of that person, or no photograph. Subjects had to quickly respond either “true” or “false” to the claims “This famous person is alive” or “This famous person is dead”. For unfamiliar celebrities, the presence of the photograph increased the likelihood that subjects would report the statement was true. In a second experiment, general knowledge claims (e.g. “Macadamia nuts are in the same evolutionary family as peaches”) that were accompanied by a nonprobative photograph (e.g. macadamia nuts),

were also judged as more likely to be true, than similar claims without photos. The photo-induced *truth bias* is robust and persistent. When subjects were invited back to the lab 48 hours after making ‘true’ or ‘false’ judgements about general knowledge claims, the statements that had previously been presented with photos were *still* more likely to be deemed true (Fenn, Newman, Pezdek, & Garry, 2013). Thus, even nonprobative photographs can have enduring and misleading effects on people’s judgements.

Newman and co-workers have investigated the mechanisms underlying the photo-induced truth bias (Newman et al., 2012). One possibility is that photos increase ‘*truthiness*’—the subjective and intuitive feeling that something is true—because they provide a semantically rich context which facilitates the generation of related thoughts and images. These thoughts and images are then misconstrued as evidence to suggest that something is true. Another possibility is that the photos themselves drive the effect, because they are deemed to be inherently credible. As photos are interpreted as evidence of reality (Kelly & Nace, 1994; Wright, 2013), they may have simply given the statements an aura of plausibility. To test these competing accounts, Newman and colleagues used a variant of the celebrity names study described above, to compare the effect of presenting celebrity names with either non-probative photos or verbal descriptions of those photos. Subjects tended to respond “true”, regardless of whether the celebrity name was accompanied by a photo or a verbal description of the photo. Therefore, the truth bias effect is not restricted to photographs, *per se*, but rather any technique that facilitates elaboration by generating related ideas and images, can lead people to conclude that claims are true. As the authors report, photos (and words) inflate ‘*truthiness*’ (Fenn et al., 2013; Newman et al.).

Although photographs can influence what we remember, research suggests that we aren’t all equally prone to the same memory distortions. Recent research by Frenda, Knowles, Saletan, and Loftus (2013), for instance, shows how our political beliefs can influence the likelihood of false memories for different political scenarios. In an online study incorporating over 5000 individuals, Frenda et al. presented subjects with descriptions of three true, and one (out of a possible five) fabricated political events. An authentic photo accompanied each of the true events, and images were doctored to accompany the fabricated events (see Figure 2). Nearly all of the subjects (98%) stated that they remembered at least two of the true events occurring, and half of the subjects reported that they remembered the false event, with 27% of these people even stating that they had seen it happen on the news. Interestingly, Frenda et al. showed how subjects’ political orientation influenced which suggestion they fell prey to. Liberals, for instance, were more likely than Conservatives to falsely remember that George W. Bush holidayed with a baseball celebrity during the Hurricane Katrina catastrophe. Similarly, Conservatives were more likely than Liberals

to falsely remember that Barack Obama shook hands with the president of Iran. Frenda and colleagues concluded that false events are more easily implanted in memory when they are congruent with one's pre-existing attitudes. Of course, it could have been political ideology, or other factors that are confounded with political ideology, that led to these differences. However, the study used a large, general population sample, and the findings converge with those from smaller-scale, college sample studies (e.g. Garry et al., 2007; Sacchi et al., 2007). All these studies suggest that photographs don't only transform our memories, but also our judgements of recent experiences.

**Figure 2 of Frenda, Knowles, Saletan, and Loftus's (2013) doctored photos**

### **Implications for criminal justice**

It should be clear by now that photographs—both real and doctored—can affect what we recall about events across the lifespan and, in some cases, lead people to develop elaborate false memories. This raises important questions about whether photographs might also have consequences for how we behave, and if so, what the implications are for legal settings. For example, could photographs encourage people to testify about, or confess to, things that never happened?

Henkel (2011) explored whether photos can make people falsely claim that they have performed an action. Subjects performed and imagined performing various actions (e.g. breaking a pencil). One week later, they viewed photographs depicting some of these (performed or imagined) actions in their completed state (e.g., a broken pencil), and some photos depicting the completed state of 'new' actions that were neither performed or imagined. In a final session, another week later, subjects were given a surprise memory test in which they had to determine which actions they had originally performed and which they had imagined. When subjects had viewed a photo of the completed action they were more likely to falsely claim that they had performed, rather than merely imagined, that action. Moreover, viewing photos of a new action in session 2 induced some subjects to report performing or imagining those actions in session 1. Of course, it's possible that increased familiarity with the actions, through repeated exposure to them, caused the effect. However, using a similar procedure, Henkel found that viewing a photograph of an action once had approximately the same effect on memory errors as reading a textual description of the action four times. Thus, it appears that the photographs are the driving

force of the errors and that photographs can cause people to state with high confidence that they remember doing things they did not actually do.

The fact that photographs can elicit false memories of mundane actions does not speak closely to situations in which people might testify about events that never occurred. There are no ramifications for misremembering a broken pencil. However, law enforcement officers sometimes use photographs when interviewing suspects in criminal investigations (Inbau, Reid, Buckley, & Jayne, 2005; Kassin et al., 2007). Concerns about these techniques led Nash and colleagues to develop an experimental procedure for exposing mock-witnesses to doctored evidence and then attempting to obtain false testimony.

In Nash and co-workers' false-video procedure, subjects are filmed while completing a computerized gambling task in which they take fake money from a 'bank' when they answer questions correctly, and return fake money to the bank when they answer questions incorrectly. Later, subjects are told that the person sitting next to them during the gambling task (a research confederate) had cheated and took money from the bank when they should have returned it. In reality, the confederate didn't cheat, but subjects are told that the 'other participant' was clearly trying to earn more money in order to win a cash prize. Subjects are then randomly assigned to one of the experimental conditions. In Wade, Green, and Nash (2010), some subjects watched a digitally manipulated video of the confederate cheating. Some were told that incriminating video evidence existed. The remaining subjects were told nothing about video evidence. Finally, subjects were asked if they could corroborate the (false) accusation that the other subject cheated by signing a statement confirming that they had actually witnessed the other subject cheating. Overall, 20% of subjects signed the witness statement, knowing that their corroboration would result in disciplinary action against the accused student. Most importantly though, subjects who saw the false video evidence were more likely to sign the statement than those who were told the video existed, and significantly more likely to sign the statement than those who were told nothing about the video evidence. A third of the subjects who signed the witness statement (from the see-video and told-video conditions) also provided additional incriminating details, such as: "I saw the 'X' sign crossed out on her screen and she reached out for a note from the bank".

In a modified version of the false-video procedure, Nash and Wade (2009) illustrated how doctored video footage could induce people to falsely confess to cheating on the task. When accused of cheating, all of the subjects complied and signed a confession form stating that they had cheated. Yet those who viewed a doctored video of themselves apparently cheating were more likely to confess on the first request and were more likely to confabulate details than those

who were just told that incriminating video evidence existed. Perhaps most importantly, those who viewed the doctored video were more likely to internalise (come to believe) that they had actually cheated. Given that the same pattern of results emerged when subjects were accused of cheating on three separate occasions, it is unlikely that they simply signed the confession because they thought it was plausible they had unknowingly cheated.

In another study designed with criminal justice applications in mind, Wright, Wade, and Watson (2013) showed that timing and repetition both serve to increase the power of false video evidence. Subjects who were shown false video evidence of themselves cheating on a computerised driving test after a brief 9 minute delay, were more likely to believe that they had cheated than those who were shown false video evidence immediately after they had been told that they had been caught. Presenting the false evidence more than once also resulted in subjects being more likely to believe that they had cheated. Repetition over time was particularly persuasive: when the false evidence was repeated with a delay, subjects were 20% more likely to confabulate details about how they cheated than when evidence was repeated without a delay. Again, these findings raise concerns about police techniques such as presenting suspects with false evidence, persistent questioning and repeatedly stating that the suspect is guilty (Inbau et al., 2005; National Policing Improvement Agency, 2009). In sum, these studies suggest that doctored image evidence, particularly when presented repeatedly over a delay, might affect the reliability of people's memory reports in forensic settings.

### **Images are powerful**

What is it about images that can make us misremember significant, personal experiences? Why do images lead us to think, for example, that fictitious statements are true? How can images lead us to confess to a misdemeanour we never committed? Scientists are starting to understand the complex social and cognitive mechanisms underlying the creation of false memories, and the growing body of research on photos and memories is highlighting the role that images play.

The prevalent theoretical approach to understanding false memories is the source monitoring framework (SMF; Johnson, Hashtroudi, & Lindsay, 1993). Given that memories are not stored with a label to help us later identify their source, we must determine the source of our mental experiences in some other way. The SMF proposes that we make such sources judgements using various cues—qualitative characteristics—within our memories, such as perceptual detail (e.g. sound) and contextual detail (e.g. time), to differentiate between memories of events we perceive and events we internally generate (i.e., imagine or think about). Usually we judge the source of

our memories automatically and effortlessly based on these qualitative cues because memories of real events are, on average, richer in the qualitative characteristics than memories of internally generated events. Based on this framework, the chances of making a source misattribution increase when internally generated events take on more of the qualitative characteristics typically associated with actual memories. When this happens, confusion about the correct source of the mental experience can lead to false memories. As we know from research already discussed in this chapter, images are extremely powerful in making people more prone to source monitoring errors, but why?

Based on the SMF, Nash, Wade, and Brewer (2009) advanced three possible cognitive mechanisms that might account for the role images play in memory distortions: *familiarity*, *imagery* and *credibility*. First, we know that memories of perceived (real) events usually come to mind fluently and quickly, which results in a feeling of *familiarity*. If imagined or suggested events come to mind with such fluency, they can also feel familiar and are prone to being misattributed to memory rather than to their actual source (Jacoby, Kelley, & Dywan, 1989; Newman, this volume). When thinking about this in the context of photographs, it might be that the visual depiction of an event causes images to come to mind fluently, generating feelings similar to those experienced when remembering a real event. This can create an illusion of familiarity, and result in a source misattribution. Second, images may make it easier for people to imagine the suggested event because they act as a scaffold for other related *imagery* from real memories. The imagery generated from the photograph and the imagery of real memories become intertwined, embellishing the former with qualitative characteristics that are typically only associated with memories of real events (Johnson et al., 1988). In short, false memories occur when the distinction between imagery generated from the photograph and imagery from real memories become blurred. Finally, images are often perceived to be evidence of reality (Kelly & Nace, 1994; Wright, 2013), and therefore may provide a *credible* indication that the suggested event has occurred. This can result in people lowering their criteria for accepting an imagined event as a real memory (Mazzoni & Kirsch, 2002). As a consequence, the lowered criteria can explain why even an imagined event low in perceptual and contextual detail might be incorrectly accepted as a real memory.

Which mechanism, *familiarity*, *imagery* or *credibility*, best accounts for the power of photographs to influence memory? Nash, Wade, and Brewer (2009) tested these three mechanisms directly using a simple procedure. Subjects were videoed as they observed and copied a Research Assistant (RA) performing various actions such as clapping his hands or performing a salute. Subjects were then shown video-clips of the actions, and video-clips of two ‘new’ critical actions.

In the video, subjects either saw the RA performing the actions with the subject ostensibly in the room (Self+RA), the RA performing the actions without the subject in the room (RA-Only), or a stranger performing the actions in an unfamiliar room (Stranger-Only). In all three conditions subjects gave higher memory ratings to the critical actions than the control actions (that the subject neither observed nor performed). This suggests that simply seeing the critical actions being performed in the video clip increases their familiarity and results in false memories of performing these actions. Further, the Self+RA condition was most powerful in creating memories of performing the critical actions. With the subject ostensibly in the room, this condition provides the most persuasive false evidence and thereby gives some weight to the credibility mechanism.

Frenda et al.'s (2013) research, described earlier, on the power of doctored photos to distort people's memories for political events, also supports a credibility account. When subjects viewed doctored images of events that had not actually happened, their personal attitudes affected how credible they felt the suggested event was. If the event depicted in the image was congruent with their political beliefs, subjects perceived the event to be more believable and presumably lowered their threshold for accepting any internally generated 'memory' of the event as real. If the event depicted in the image was incongruent with their political beliefs, subjects perceived the event to be less believable and raised their threshold for accepting any internally generated 'memory' of the event as real.

Curiously, the perception that images are credible sources of information is a paradox given that images are (and always have been) manipulated. There are two main reasons we should worry about this pervading misconception. First, as we alluded to at the start of this chapter, image-editing technology and image-sharing facilities are developing at a phenomenal pace. As a result, we are increasingly exposed to sophisticated doctored images. Second, research using computer-generated images demonstrates just how remarkably poor people are at detecting digital manipulations (Farid, 2009; Farid & Bravo, 2010). Ongoing work in our own lab, using real-life images, reveals a bias in people towards accepting images as authentic when they are not. We find that when people are unsure about the authenticity of an image they have a tendency to assume the image is real (Nightingale, Wade, & Watson, 2015). What-is-more, we know that even warnings and previous experience of personally altering photographs don't appear to protect people from being fooled (Kelly & Nace, 1994). We might assume the misplaced credibility attributed to photos is set to persist, thus future research should further examine this process and its contribution to belief, memory and judgment distortion.

However, we know that the credibility mechanism cannot explain the effect of photos in every situation. Recall that Newman and colleagues (2012) presented famous names with a photo of the famous person or a text description of the person, and subjects were equally likely to respond “true” to the statement “This famous person is alive” regardless of the format of the additional information. Therefore, in this instance, photos didn’t afford any more credibility in the information than did text. In fact, these findings fit with an imagery mechanism—both photos and text descriptions might facilitate people’s ability to bring to mind related images and ideas leading to an inflated feeling of ‘truthiness’. Thus, it isn’t necessarily the case that one single mechanism—*familiarity, imagery or credibility*—prevails. In fact, some empirical evidence suggests a combination of processes could be at play (Nash, Wade, & Lindsay, 2009).

## Conclusion

It is clear that photographs can readily distort our memories for both distant and recent experiences. Photos can also influence our decisions, our judgements and even our behaviour. On a theoretical level, we still have a lot to learn about how and why photos can affect our memories so much. Although photos carry with them an unwarranted degree of credibility and authenticity, there are clearly other cognitive processes at play that make them persuasive. On a more practical level, we know that taking, sharing, and altering photographs is only becoming easier, more affordable and more popular amongst people all over the world. And while the effects of photos on memory, cognition and behaviour are often minor, in certain circumstances, for example, in criminal justice settings, we believe these effects could have major ramifications. Of course, your own chances of experiencing such severe negative consequences are fairly slim, but the next time you see a news article or posting on a social network site that is accompanied by a photograph, we invite you to remember the shark swimming through New York and to view that photo with a critical eye.

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