Donald Thomson is a prominent memory researcher from Australia. He has been studying applications of memory research to eyewitness memory and legal proceedings for years. He worked with Endel Tulving for his dissertation at the University of Toronto and then returned to Australia to become a university professor in his homeland. He frequently testifies as an expert witness in many cases that have to do with eyewitness memory.

In 1975, when he was a young researcher, Dr. Thomson appeared on live television, discussing issues of eyewitness memory on a talk show. Also on the talk show was the chief of police of a major city in Australia. Dr. Thomson explained to the television audience how, in some cases, eyewitnesses can be mistaken in their identifications. Shortly after he returned home, police arrived at his door and brought him to the station for questioning. A rape victim had identified him as the culprit. After what must have been a terrifying evening for all involved, Thomson was released. After all, he had a foolproof alibi. At the time of the crime, he had been on live television and could not possibly have committed this terrible act. Subsequent questioning of the victim revealed that she had been watching the program that Dr. Thomson was appearing on just before the crime. Apparently, the woman had confused the face of the rapist with the face she was seeing at the same time or just prior on television—that is, Dr. Thomson. Dr. Thomson was released, but the real criminal was never brought to justice. This woman had been through a horrible ordeal, made worse by the strange memory error that led to the false accusation of an innocent man and may have allowed a guilty one to get away. (For more on this strange misidentification, go to www.sagepub.com/schwartz3e.)

In another case, the U.S. government deported a man named John Demjanjuk to Israel to stand trial for Nazi war crimes. The Israeli government accused Demjanjuk of being “Ivan the Terrible,” a bloodthirsty Nazi executioner during World War II, personally responsible for perhaps hundreds of thousands of murders. Five Holocaust survivors came forward and swore that they remembered Demjanjuk’s face from 40 years earlier and confirmed that he was “Ivan.” Demjanjuk claimed to be innocent, but the Israeli court went with the compelling testimony of the survivors. Demjanjuk was convicted and sentenced to death for genocide and murder. However, shortly before his scheduled execution, the Russian government found documents that proved—without a shadow of doubt—that Demjanjuk was not “Ivan.” The Israeli Supreme Court overturned the verdict and eventually allowed Demjanjuk to return to his home in the United States. How had this happened? Presumably,
the witnesses were claiming in good faith that they recognized the criminal, yet this turned out to be another case of mistaken eyewitness identification (Loftus & Ketcham, 1991). Demjanjuk was subsequently deported to Germany and convicted of other crimes associated with his Nazi past. Though evidence wound up pointing him out as a war criminal, he was not the war criminal he had originally been accused of being.

In both cases, people who had been horribly violated by the worst of criminals came forward to identify their assailants. Despite their fundamental honesty and desire to do right, these witnesses identified the wrong person. How can people form these erroneous memories of what happened? And how do people come to believe that their memories are accurate when they are not? These are two of the topics of this chapter.

In the cases described above, real crimes were committed, and the victims involved remember them. Their problem was that they did not identify the correct person as the criminal. In other cases, entire fictional events are made up and then later remembered as if they were truth. Consider the strange phenomenon involved in the memory of alien induction, studied by Susan Clancy and explored in her 2005 book. Clancy described the memories of abductees, whom she thinks of as normal people who come to believe that their memories of being taken aboard alien spaceships are actually true.

Abductees are people who believe they have been kidnapped by aliens from outer space. Abductees tell similar stories about being removed from their beds in the middle of the night, taken to a spaceship, and then experimented on. The experiments usually involve sexual abuse. Clancy chose to study abductees because she thought that there would be general agreement in the scientific community that their memories are false. And thus, these abductees could be used as a model of false memory in general. Indeed, Clancy (2005) reported that these abductees had similar psychological profiles as normal controls and that they did not have a higher rate of psychiatric illness than did a control population. Yet abductees insisted that their memories were true. Thus, Clancy investigated how these false memories were formed and what allowed otherwise normal people to believe them.

Clancy (2005) inferred that the false memories arise when people with vivid visual imaginations who believe in alien visits experience sleep paralysis. Sleep paralysis occurs when the brain emerges from REM sleep but the body is still paralyzed—this happens in all of us so we do not act out our dreams. During sleep paralysis, the mind is conscious but dream imagery may persist, lending a very real-world sensation to the dreams. This experience can be very distressing for some people. However, either on their own or with the help of therapy, many of the abductees come to believe that these sleep-paralysis dreams were not dreams but reality, and thus they come to really believe that they were abducted by aliens. For Clancy’s research, the abductees constituted a sample of individuals who had come to believe their strong false memories. Indeed, in a battery of tests assessing false memory, Clancy found her abductees were more likely to show memory illusions, some of which will be described shortly. Thus, individual differences in susceptibility to false memories exist, and the abductees fell on the extreme of this scale. (For the transcript of an interview with Dr. Clancy, go to www.sagepub.com/schwartz3e.)

False memories are memories that do not correspond to events as they actually happened. First, to be a false memory, it has to be something that feels like a memory—that is, a person has a recollective experience of an event that took place in the past. Lies
and made-up stories do not count as false memories. Secondly, to be a false memory, the memory must deviate from the event as it actually occurred. Correspondence is an important part of the definition. A true memory is one in which the recollective experience corresponds to an event that actually occurred in the past, whereas a false memory is one in which the recollective experience does not correspond to an actual event.

Historically, the study of false memories has come in two waves. In the 1970s, a memory scientist then at the University of Washington named Elizabeth Loftus introduced a paradigm known as the “misinformation effect” into the memory literature (see Figure 8.1). This effect refers to false memories created by post event misinformation. Participants witness an event and then later receive false information about what occurred during that event. If they later remember the false information, a “misinformation” effect is said to have occurred. Loftus used these data to demonstrate the unreliability of eyewitness memory, and indeed, throughout her career, Loftus has emphasized the role that memory science has played in the field of eyewitness testimony.

In the 1990s, memory scientists turned their attention to another battle being waged in the courtrooms, clinics, and newspapers of the time: the reality of recovered memories of repressed childhood abuse. On one side were people claiming that they had “recovered” memories of abuse after having forgotten for many years. On the other side were people claiming that the recovered memories were false and were a function of leading and misleading therapeutic techniques. Elizabeth Loftus took up the cause of those who thought recovered memories were false memories and was soon developing experimental methodologies to study the issue. This battle raged through much of the 1990s, although a middle ground based on solid science was eventually recognized (Belli, 2012).

The plan for this chapter is first to provide some basic background memory science on the issue of false memory. Then we will look at the issue of how false memories are formed and contrast this with how repressed memories are recovered. We will also outline how false or distorted memory has been examined in the context of legal applications. We will also discuss landmark work on the misinformation effect. Memory researchers have designed protocols that help investigators limit false memories and that promote accurate memory; this “cognitive interview” will also be discussed.

**Figure 8.1** Dr. Elizabeth Loftus.
In some situations, what matters is the amount of information a person remembers. In semantic memory, the sheer bulk of memory is often important. How many names for the bones of the body can you remember? How many kings and queens of Great Britain do you know? However, in autobiographical memory, correspondence is more important—that is, the relation between the memory of the event and the actual event. For example, consider that you went on a walk through the park and saw five swans, three ducks, two squirrels, and seven bicycle riders. Later you report that you saw a bunch of birds and some people on bicycles; your memory is accurate (corresponds to the event), even if you do not recall a lot of details. However, if your memory report includes a description of the pigeons, deer, and ATVs that you saw, then you are showing poor correspondence, resulting in false memories. In legal settings, correspondence is paramount, as false memories can lead to wrongful convictions. Of course, the best testimony is both accurate and complete. But completeness only matters if there is a high degree of correspondence between the witness’s testimony and the events that unfolded (Goldsmith & Koriat, 2008; Wixted et al., 2015).

One of the most powerful contributors to poor correspondence is suggestibility. Suggestibility is the tendency to incorporate suggestions or postevent information into one’s memory of an event. All people may wind up with false memories as a function of suggestibility, but some, such as the “alien abductees,” are more suggestible. Thus, understanding suggestibility is an important issue in false memory research (Belli, 2012). However, first, we turn our attention to source monitoring.

### SOURCE MONITORING

A critical feature of retrieval is determining where your memory comes from. How do we know what we are remembering is, in fact, true? Try to remember what you had for breakfast this morning. Are you sure that is what you had for breakfast, or are you remembering what you had for breakfast yesterday? Or are you remembering what you wished you had for breakfast? We have to make decisions about the source and veracity of our memories quickly. Now think about the memory you have of your younger sibling being born. Do you remember this story from your own experience at his or her birth? Or do you know it because you have heard it throughout your life from others? In this case, a source-monitoring decision involves determining whether your memory is of your own experience or is based on stories from your parents.

Attributing a memory to the wrong source can have potentially negative consequences. You may remember that your friend Betty just broke up with her boyfriend. But before you send her flowers, you might consider how you heard of the breakup. If you heard it from an unreliable gossip, you might make certain first by asking Betty herself. If she
confirms it, you get the flowers and take her out for lunch. If you heard it directly from Betty originally, then you will go ahead and order those flowers without calling her about it. Thus, when we retrieve the fact “Betty and her boyfriend broke up,” we automatically make a judgment about the source—reliable or unreliable—and act accordingly. The ability to distinguish between reliable and unreliable sources in memory is called source monitoring.

Failures in source monitoring can lead to false memories. Some researchers have argued that many false memories are the result of failures of source monitoring (Lindner & Henkel, 2015; Meissner, Brigham, & Kelley, 2001). Imagine someone who fails to source monitor effectively and thinks a memory of being a professional basketball player is real and not a function of wishful thinking. By forgetting that the source of this “memory” is a personal fantasy, this person has generated a false memory.

How do we successfully source monitor? The current theory is that source monitoring occurs at the time of retrieval. When a memory is brought to mind, source-monitoring processes unconsciously examine the memory for clues to its origin. Memories with lots of sensory details are usually judged to be real, as are those with strong emotional associations (Johnson, Hashtroudi, & Lindsay, 1993). Note, however, that a strongly imagined and plausible memory (say, shooting the winning basket in a basketball game) may pass this source-monitoring test and be retrieved as a memory of a real event. Reality monitoring (source monitoring between real and imagined sources) has been implicated in false memories concerning both childhood abuse and failures in eyewitness memory.

METHODS OF STUDYING FALSE MEMORY

Deese-Roediger-McDermott Procedure (DRM)

Before you read the rest of this paragraph, test yourself on the demonstration in Figure 8.2. Look at the words you wrote down. You probably remembered most of the words on the list. Now check to see if you wrote down any words that were not on the original list. About 55% of people who recall the words from this list will falsely recall the word sleep. The word sleep is not on the page in your textbook. Thus, if you wrote down sleep on your list, you have made at least one false memory in your life. You may even have felt certain it was on the list. You are not alone; the word’s presence is strongly implied by the associations of the words on the list, and as a consequence, it is likely to be falsely recalled (Arndt, 2012, 2015). Almost every individual will make what is called a critical intrusion if given enough of
these lists—that is, a false memory created by a list in which all of the words are related or associated with the absent but suggested word. Roediger and McDermott (1995) devised a number of lists with a similar theme in mind (based on earlier work by Deese, 1959; hence the Deese-Roediger-McDermott or DRM procedure). (Go to www.sagepub.com/schwartz3e and copy some of the lists—then try this experiment on some of your friends.)

The Deese-Roediger-McDermott (DRM) procedure rapidly induces a false memory (Arndt, 2012, 2015). Many people recall the word sleep, ascribe it to a source, and describe its retrieval as a “recollective experience.” Thus, the DRM procedure provides an excellent experimental window on false memories (Roediger & McDermott, 1995). It is quick and easy to do, reliably produces false memories, involves no misinformation and no questionable ethical procedures, and can lend itself to a great number of experimental manipulations.

There are two standard explanations of the false memories produced via the DRM procedure. One explanation focuses on the nature of the contextual associations. Contextual association’s arise from all of the presented words being linked to or associated with the critical intrusion in some way. In the example, all of the words are related to the critical intrusion, sleep. The context allows for the associations between sleep and all of the presented words to strongly activate the word sleep in the person’s memory. Thus, at the time of recall, the word sleep is highly activated. This activation is then mistakenly confused with episodic memory. Many experiments support this particular point of view (Barnhardt, Choi, Gerkens, & Smith, 2006; Corson, Mahé, Verrier, Columbel, & Jagot, 2011; Huff, Bodner, & Fawcett, 2015; Jou, 2008).

When the list is relatively small (e.g., nurse, sick, lawyer, medicine), the critical intrusion (doctor) is less likely to be recalled than if the list is relatively long (e.g., nurse, sick, lawyer, medicine, health, hospital, dentist, physician, ill, patient, office, stethoscope, surgeon, clinic, cure; Roediger, Watson, McDermott, & Gallo, 2001). Longer lists result in a greater likelihood of remembering the critical intrusion as a word on the list. This is likely because the greater number of associations is more likely to strongly activate the absent but associated word. Huff et al. (2015) showed that when people engage in distinctive processing on each item rather than contextual processing to relate the items, the number of critical intrusions is reduced, though not eliminated. Often, when learning lists for free recall, participants will try to make a story linking the items—this increases contextual processing. Focusing on what makes an item unique captures the idea of distinctiveness processing. Huff et al.’s results mean that when people focus more on what makes each item in a list unique rather than how they can relate the items, false memories decrease. These data are consistent with the contextual association view, because not attending to context decreases the likelihood of a false memory.
An alternate explanation of false memories in the DRM procedure focuses on the idea that memory representation is not exact. This has been labelled fuzzy-trace theory (Brainerd, Wright, Reyna, & Mojardin, 2001; Bland, Howe, & Knott, in press; Marche & Brainerd, 2012). I prefer the term gist of the list, as what is encoded refers to the primary meaning of the list rather than its individual examples. In this view, when items are encoded, they are not encoded literally but rather in terms of their meaning, a reasonable hypothesis given what we know about long-term memory. Thus, when a person encodes words such as physician, dentist, and surgeon, these words may be transformed into the word doctor at encoding, as the correct meaning is extracted rather than the literal words. This theory explains why participants are good at recognizing the actual words that were on the list, as they are consistent with the gist of the fuzzy trace. However, when participants are asked to recall items, the critical intrusion is likely to be recalled, as it is the word most strongly encoded by the meaning or gist of the list (Marche & Brainerd, 2012). To test this view, Lampinen et al. (2006) asked both children and adults to study DRM lists that were either mixed together, so that it was more difficult to detect the gist of mixed-up lists, or listed one after the other, such that it was much easier to detect the gist of each list. After all items had been presented, the participants were asked to free recall the lists. Lampinen et al. found that there were more critical intrusions—for both children and adults—when the lists were presented one after the other, allowing the gist to be extracted more easily. When it was harder to detect the gist, critical intrusions went down, consistent with fuzzy-trace theory.

The DRM is a good experimental paradigm for looking at false memories induced by associative structures. However, there is some concern as to whether it serves as a model for real-world false memories. The issue of ecological validity has been raised. Many think that a large gap exists between false memories for words and the kinds of false memories that disrupt people’s lives. Although individuals clearly have different propensities to

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**Figure 8.2** Read the following words aloud at a rate of one word every three seconds. After you have read all the words, close your book, take out a piece of paper, and write down as many of these words as you can.

<table>
<thead>
<tr>
<th>Bed</th>
<th>Dream</th>
<th>Slumber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drowsy</td>
<td>Awake</td>
<td>Snore</td>
</tr>
<tr>
<td>Rest</td>
<td>Tired</td>
<td>Wake</td>
</tr>
<tr>
<td>Yawn</td>
<td>Doze</td>
<td>Snooze</td>
</tr>
<tr>
<td>Peace</td>
<td>Nap</td>
<td>Blanket</td>
</tr>
</tbody>
</table>
produce critical intrusions, it is unclear how DRM predicts false memories in real-world situations (Watson, Bunting, Poole, & Conway, 2005). However, some research shows some interesting patterns that are predictive of real-world phenomena. Leding (2011) showed that people who have a greater “need for cognition”—that is, value the time they spend on cognitive tasks—show more false memories in the DRM than those with a lesser “need for cognition.” Baugerud et al. (2016) compared maltreated children and non-maltreated children concerning the likelihood of generating critical intrusions in the DRM procedure. Maltreated children showed a higher rate of critical intrusions for lists that had emotional content that those that were neutral, suggesting that maltreated children may be more prone to memory illusions. In another study, Wilson et al. (2015) found that meditation actually increased false memory rates in the DRM, suggesting a note of caution for meditating before testifying in court. In short, much of the recent focus on the DRM has been on showing on how it is applicable to everyday situations.

Visual False Memory Procedure

The visual false memory procedure is closely related to the DRM procedure. In this procedure, people are presented with a series of closely related pictures, such as pictures of fruit or pictures of people engaged in sports. Later, participants will examine a series of pictures, some of which are new, some of which are new but related to earlier pictures, and some of which are old pictures. Participants must decide if the picture was seen earlier. False memory can be measured when participants endorse new pictures, and the analog to critical intrusions is when they recognize related but new pictures as being old (Olszewska et al., 2015). The visual false memory procedure creates bigger false memory effects than does the DRM (Hege & Dodson, 2004). Moradi et al. (2015) looked at visual false memories in combat veterans who had post-traumatic stress disorder and those that did not. The post-traumatic stress disorder veterans were more susceptible to critical intrusions than the un-traumatized veterans, suggesting that exposure to trauma may increase the likelihood that people develop false memories.

False Memory Induction Procedure

Elizabeth Loftus and her colleagues invented another way of examining false memories in experimental participants. In this technique, Loftus was able to better model the kinds of false memories that are of concern outside the laboratory. This method is called the false memory induction procedure (Loftus, Coan, & Pickrell, 1996). In this method, false memories of events are induced in participants. Of course, for ethical reasons, abuse memories are avoided, but Loftus and her team have been able to show that ordinary college students will generate false
memories of episodic events when put in this procedure. (For an article on this topic by Elizabeth Loftus, go to www.sagepub.com/schwartz3e.)

Before discussion of the false memory induction procedure, we need to look briefly at the controversy over recovery of repressed memories. There are some psychologists who argue that all recovered repressed memories are necessarily false, and there are some psychologists who accept the veracity of all recovered memories. Here we will try to present the best scientific evidence on this issue. However, the debate is not between cognitive psychology and evidence-based clinical psychology. Rather, the debate arises from different views of memory between cognitive psychology and schools of psychotherapy still largely grounded in Freudian theory, which has never had much scientific support within clinical psychology. Cognitive-based memory researchers argue that many of these recovered memories may, in fact, be false memories brought about by the processes described in this chapter. Freudian psychotherapy argues that these recovered repressed memories are almost always true. In order to address this issue, a reasonable model of repressed memories must be presented. The false-memory induction procedure attempts to provide a model for how psychotherapy can actually produce false memories.

Loftus and Davis (2006) described several controversial psychotherapy techniques that some therapists have used to promote the recovery of repressed memories of childhood abuse, usually sexual abuse. The recovery of repressed memories is the retrieval of previously forgotten events. Loftus and Davis contended that many of these techniques are also powerful at inducing false memories. These techniques include hypnosis, guided imagery (that is, imagining oneself in an abuse situation to see if it is real), writing in journals, and more strange activities such as “trance writing.” Laboratory studies show that each of these techniques can lead to false memories. Hypnosis, for example, leads to a strong increase in the number of reported false memories with a small, if any, increase in the number of reported true memories. With respect to “guided imagery,” some therapists believe that it will help clients remember abusive events from their childhood. However, empirical research also links it with false memories. Thus, Loftus and Davis argued that rather than help clients confront what is really causing them psychological distress—the reason they seek psychotherapy in the first place—these techniques simply install false memories in them. Thus, for Loftus and Davis, these techniques are a double-edged sword. They induce false memories, which may have negative repercussions in a person’s life, and they distract attention from the root causes of the person’s problems (see Lynn et al., 2015).

The false memory induction procedure is modeled on these psychotherapy techniques, except that the goal is not to provide insight and relief to people suffering from psychological distress. Rather, the goal is to determine whether these techniques induce false memories in healthy normal adults.

In the false memory induction procedure, experimenters ask participants about particular events from their childhood that, in fact, never happened. Researchers tell participants
that they have spoken to a parent or an older sibling and received information about the childhood event, and that they want to see how much the individual can remember about the event. In fact, the experimenters do contact a family member but just to confirm that a similar event did not happen to the participant. Participants might be asked about the time, as a young child, they spilled punch on the bride's wedding dress at a family wedding. They might be asked about the time they took a ride in a hot air balloon while on vacation. They might be asked about the time that they got lost at the mall. They might be asked about the time a school nurse took a skin sample. Because the events never took place, almost all participants initially deny remembering the event. However, in the false memory induction procedure, the experimenters will repeatedly and leadingly question the participants about such memories. In some cases, people do start to remember details of events that never took place.

For example, Loftus and Pickrell (1995) recruited 24 parents who tried to convince their children that they had been lost in the mall as a child when, in fact, they had not. Participants were repeatedly questioned about this event as if it had taken place and were also asked to imagine themselves back in the mall. Although most of the participants never generated false memories of being lost in the mall, 25% did. Six of the 24 participants "remembered" partial or complete details of the never-experienced event. Hyman, Husband, and Billings (1995) found a similar percentage of people generated false memories in a similar paradigm.

Repeated questioning combined with the authority of a close family member leads some participants to create false memories. The rate of false memory induction is relatively low. At best, it reaches rates of about 50% for memories that are ordinary and not traumatic (i.e., taking a ride in a hot air balloon). For some items, it remains at 0% (being treated with an enema at the doctor's office; see Pezdek, Finger, & Hodge, 1997). In most cases, it takes the form of accepting the wisdom of the parent or sibling—that is, the belief that the event must be true if Mom says it is true, without any recollective experience. However, in some cases, the participants wind up not just believing that the event occurred but elaborating on the event, providing details that were not presented to them by the researchers. In these cases, the participant truly has an autobiographical episodic memory that just happens to not correspond to a real event. Hyman and Pentland (1996) found that 25% of participants wound up elaborating on and describing new details concerning events that never happened.

We can conclude from the above data that human memory is susceptible to false memory. Not all the time, not for all events, and perhaps not even for everybody, but by and large, false memories can and do occur. A question remains: Can false memories of truly traumatic memories occur? Is it possible to induce these false memories in unsuspecting participants?

All memory researchers have considered it unethical to attempt to falsely induce memories of childhood abuse, but some memory researchers have pushed the limits of ethically acceptable false memory induction to demonstrate the power of false memory induction. For example, Heaps and Nash (2001) induced false memories of childhood near-drowning events. Porter, Yuille, and Lehman (1999) induced false memories of vicious animal attacks in childhood. In both cases, false memories were produced at rates similar to those of other studies with less traumatic memories. Shaw and Porter (2015) used repeated
suggestive questioning and guided imagery in order to examine if they could induce memories of having committed a crime. After three sessions of intense questioning, they found that the majority of participants produced false memories of having committed crimes, such as theft or assault. This particular study has applications to harsh interrogation techniques, which have often been blamed for false confessions. In fact, Kaplan et al. (2016) argue that highly emotional conditions, such as those involved in being asked about a crime one committed, lead to higher false memory rates than less emotional situations. I will hasten to add that in these studies, participants went through rigorous debriefing sessions. However, even after being told that the memories were induced, many participants continue to maintain vivid memories that they know are false (Clark, Nash, Fincham, & Mazzoni, 2012). So it is likely that these kinds of false memories demonstrate that at least some recovered memories of traumatic events are really just false memories.

The false memory induction procedure has also led to some other interesting findings. In particular, the induction of false memories can lead to changes in patterns of food preferences. Bernstein and Loftus (2009) described experiments in which participants were induced to have false memories of getting sick from eating particular foods, such as egg salad. Later, participants expressed an aversion to egg salad that they had not had before. In contrast, Laney, Morris, Bernstein, Wakefield, and Loftus (2008) induced false memories of food preferences. They induced participants to remember how much they enjoyed eating asparagus as children. Later, these participants demonstrated increased desire and liking of asparagus. These researchers suggested that inducing false memories may be a way of getting people to eat a healthier diet.

**Imagination Inflation**

Imagine that, when you were a six-year-old child, your parents took you on a trip in a hot air balloon while on vacation. It was a warm and sunny day in Napa Valley, California. You were a little bit scared, but once you were aloft, the flight was kind of boring. You could not see out over the basket, and when you tried, your father pulled you back, fearing you would fall out. So you just counted the number of people in the balloon who were wearing “Crocs” (a kind of sandal popular in the early 2000s). Afterward, you told your parents the hot air balloon ride was boring, and they scolded you, explaining they had spent a lot of money so that you could have that experience. You decided it was better not to talk about the balloon ride after that because all you could remember of it anyway was being pulled away from the side and the blue Crocs the tall, weird-looking man with the mustache was wearing (see Figure 8.3).

Sound plausible? I am not saying this really happened to you, just that you should imagine it. Try to imagine it vividly—try to see the excitement of the morning; the giant, colorful balloon; the disappointment at not being able to see anything; and the image of the blue sandals. Amazingly, research shows that imagining a scenario such as this increases the likelihood that you will later falsely remember an event of that type.

In **imagination inflation**, researchers induce false memories by simply having the participant imagine an event.
imagine the event. False memories can be induced without any deception on the part of the researcher. The researcher simply asks the participant to imagine an event, such as taking a hot air balloon ride. The simple act of imagining it influences the rate at which those participants later report whether they have ever experienced that event (Bays, Zabrucky, & Foley, 2015; Leding, 2012).

Mazzoni and Memon (2003) asked people to rate the likelihood that each of several events had happened to them. Some of the events were plausible, such as finding money in the back of a taxicab or having a tooth removed by a dentist, and others were impossible, such as having a skin sample taken by a school nurse (something not done in Great Britain, where the experiment took place). Participants were asked the likelihood that each of these events had taken place before they were six years old. One week later, the participants returned and imagined the plausible event or the impossible event. As a control, they read a brief description of the other event. For the memory test, participants returned a week after that. Here, they were asked to judge whether various events had happened to them, including both the plausible and impossible event. Participants’ recall was rated on a scale that ranged from “no memory of the event” to “vivid memory of the event with details.”

Mazzoni and Memon (2003) did not attempt to convince the person that the event had actually occurred. The researchers only asked for the participant to imagine an event. Nonetheless, this procedure can and does induce false memories. More participants believed that they had a skin sample taken from them as children than if they had not imagined the event. Furthermore, more participants now reported new details of their
memory of the event, convinced that it was real, than if they had not imagined the event. Thus, simply imagining an event can increase the likelihood that we have a false memory for that event.

Bays et al. (2015) used a similar procedure to the Mazzoni and Memon (2003) procedure, but Bays et al. also varied the kind of imagery that participants used during the imagination procedure. In one condition, participants were prompted to imagine events that may or may not have occurred, but in a second condition, the experimenters used guided imagery, in which they led participants through the imagery procedure. Bays et al. found this guided imagery procedure led to the belief that more of the events had actually happened to participants than the prompted imagery, especially for negative events.

One of the questionable psychotherapeutic techniques criticized by Loftus and her colleagues is guided imagery. In guided imagery, a therapist who suspects a client might have been abused as a child may ask the client to imagine such an event and see if it “feels real.” This is what is happening in the imagination inflation paradigm, except that the experimenter does not give implicit suggestions that the memory is real. This research suggests that therapists must be careful about what they suggest that their clients imagine because their more suggestible clients might develop false memories. Furthermore, these false memories might have devastating consequences for the client and his or her relationship to other people. Consider the following study. Scoboria, Mazzoni, and Jarry (2008) suggested to participants that they had gotten sick eating peach yogurt as a child. One week later, the participants returned for what they thought was a different experiment on food preferences. Compared to control participants, those who thought that they had gotten sick on spoiled yogurt rated their preferences for yogurt lower and were less likely to choose yogurt than crackers when offered food. Thus, a false memory of a food reaction can create an aversion to that food. (To find out more about imagination inflation, go to www.sagepub.com/schwartz3e.)

**Fabricated or Altered Evidence**

Consider looking at a photograph of yourself in a hot air balloon. There you are, six years old, smiling from above the railing of the balloon. There’s the proof—you may not remember it now—but you definitely were in the balloon. Recent studies have used programs like Photoshop to alter photographs to provide false evidence that events took place. The question is whether these doctored photographs and videos can induce false memories in the people who view them. The answer is a resounding yes. Doctored photos and videos are very strong inducers of false memories (Nash, Wade, & Lindsay, 2009).

Nash et al. (2009) asked participants to engage in simple acts, such as rolling dice and browsing through books. The participants were filmed while they were doing these acts. In a second session, participants were simply asked to imagine doing similar actions. Two weeks later, the participants returned for the test phase. In the meantime, Nash et al. had altered some of the videos to create videos of the people doing actions that they had only imagined during the second session. At the time of test, Nash et al. showed the altered videotapes to participants. Compared to participants who had not seen altered videotapes, those who had seen the altered videotapes had far more false memories. The effect of
doctored videos was increased when those participants were also asked to imagine the false events as well. Moreover, Wade, Green, and Nash (2010) showed that after having viewed fabricated videotapes, participants were more likely to sign documents claiming they had witnessed a behavior (cheating) that they actually did not see. Thus, fabricated visual evidence can also induce false memories and potentially lead to inaccurate testimony.

In an interesting variant on this theme, Patihis and Loftus (2016) found that people could have false memories of video presentations when none actually exists. Patihis used both a computer survey and an in-person interview to ask whether participants could remember the video coverage of the plane that crashed in Pennsylvania on 9/11, which occurred when most of the participants were young children. In fact, there never was any video of that plane, though there was of the other planes that were brought down by terrorists that day. In both the computer survey format and the in-person interview, some participants reported false memories of seeing the video and generated details about that memory. As in other studies, not all participants generated false memories, with 33% of individuals in the computer survey generating false memories and only 13% of people in the in-person interview generating false memories. Nonetheless, these are false memories that occur even in the absence of presented altered imagery.

SECTION SUMMARY AND QUIZ

False memory refers to the observation that people do misremember events. The cognitive study of false memory attempts to determine the how and the why of false memory. Psychologists who study false memory are interested in the correspondence between the actual event and the person’s memory of it. One mechanism that produces false memory is the failure to source monitor. If you remember something but attribute it to the wrong source, it may wind up as a false memory. False memories have been investigated with a number of techniques, including the Deese-Roediger-McDermott (DRM) procedure, visual false memory procedure, the false memory induction procedure, imagination inflation, and fabricated or altered evidence.

Section Quiz

1. Clancy (2005) studied memory processes in people who believed that they were abducted by space aliens:
   a. Because all scientists would agree that memories of being abducted by space aliens were false, this would provide a good model of false memory
   b. Because people who believe that they have been abducted by space aliens represent a population vastly different from normal individuals
   c. Because people who believe they have been abducted by space aliens are less prone to false memories in the DRM procedure
   d. Because she was interested in the characteristics of space aliens
2. In the context of research on human memory and false memory, correspondence means
   a. The amount of information a person can recall about an event
   b. The match between a person’s memory and the event as it actually happened in the past
   c. The dialogue between memory researchers and their experimental participants
   d. All of the above

3. In the DRM procedure, false memories are thought to occur because
   a. The experimenters introduce implicit false information
   b. Most participants are highly suggestible
   c. The participants extract the gist or meaning from a list, which is associated with a non-presented but related item
   d. Demand characteristics of the study create the expectation that people should misremember

4. In studies using altered video of earlier events, the researchers find that
   a. Doctored photos and videos are very strong inducers of false memories
   b. Not all people, but some, will be induced to have false memories
   c. Participants were more likely to sign documents claiming they had witnessed a behavior (cheating) that they actually did not see
   d. All of the above

HYPNOSIS AND MEMORY

Research suggests that hypnosis does not increase the number of true memories produced. Indeed, to the contrary, it increases the possibility of succumbing to false memories. More information is retrieved during hypnosis than when the witness is in his or her normal state, but most of the additional information is false. In some instances, a new and true memory can be produced by hypnosis. However, the increase in memories produced by hypnosis is dominated by false memories (Kirsch, Mazzoni, & Montgomery, 2007; Lynn, Laurence, & Kirsch, 2015).

Hypnosis itself is a real phenomenon. In hypnosis, an individual is placed in an altered state of consciousness in which he or she is more likely to incorporate suggestions into his or her behaviors, beliefs, and memories (Hunter & Eimer, 2012). People tend to vary in the extent to which they can be hypnotized. Some people are highly suggestible and easily hypnotized. Others are highly resistant and are practically impossible to hypnotize. Suggestibility is another method whereby people can incorporate false information into autobiographical memory. Thus, hypnosis is not a good option when trying to elicit more information from a confused witness.
This is not to say suggestibility is always a bad thing. In some circumstances, being suggestible has its advantages, and hypnosis does have practical value (see Hunter & Eimer, 2012). Suggestions can be made to people under hypnosis to help them overcome medical conditions, especially with respect to pain tolerance (e.g., Otani, 1992). A highly suggestible person can be hypnotized and made to feel less pain, while the less suggestible person has to bear the more intense pain. But for memory, the contention here is simply that hypnosis is another means of suggestibility and thus increases the possibility that false memories will be created (Mazzoni & Lynn, 2007; Mazzoni, Laurence, & Heap, 2014).

**RECOVERED MEMORIES: THE REALITY OF REPRESSION**

False memories are a real phenomenon. They are relatively straightforward to demonstrate in the lab, and we have evidence that they exist in the real world. It is almost certain that some recovered memories of childhood abuse are the result of false memories induced by shaky therapeutic procedures. This has led some to conclude that all recovered memories of repressed events are essentially false memories (Loftus & Ketcham, 1994). Is it possible to show that forgotten memories of childhood trauma can later be retrieved? Nowadays, the consensus is that there is evidence that some childhood trauma is forgotten, only to be remembered much later. This implies that not all recovered memories are therapy-induced false memories. First, the data that suggest that repression and recovery are possible will be discussed. Second, two explanations for this phenomenon will be offered, and experiments that support these explanations will be discussed.

In a landmark study, Williams (1995) tracked down 129 women who had been abused as children and as children, sent to the hospital for treatment. Thus, these were cases in which the abuse was documented shortly after it occurred. Williams used this sample to satisfy potential critics who might question whether abuse had occurred: It would be hard to argue that recovered memories of abuse in this sample were completely false, given that the women had, as children, been admitted to a hospital for treatment for abuse. The age at the time of the abuse ranged from less than one year to 12 years old. Williams contacted the participants after they had reached adulthood.

Williams (1995) found that 12% of the women did not remember the abuse. Some of these women were younger than age five at the time of abuse, and for those, the forgetting may have been normal childhood amnesia. But for the women who were older at the time of the abuse, the explanation for forgetting cannot be attributed to childhood amnesia. Thus, strange as it may seem, it is possible to forget being the victim of awful crimes that required hospitalization. Possible reasons for forgetting such traumatic events will be discussed shortly. Furthermore, 16% of women reported that there was a time when they had forgotten about the abuse even though they remembered it at the time of the interview. Indeed, they reported that an external cue triggered their memory of the abuse. Other studies have also shown that some well-documented abuse victims lost their memory of the event and later recovered it (Shobe & Schooler, 2001).

Critics have argued that the Williams (1995) data are open to alternate explanations because of flaws in the study’s methodology and data analysis. Yes, these women have a documented history of abuse, but that does not preclude the possibility that the memory
of that abuse is false—that is, not a true episodic memory, but a secondary memory based on learning of the events later. Indeed, the memory may have been a function of reconstructive processes and stories that the woman heard rather than a true episodic memory. Thus, some memory theorists, like Loftus and Davis (2006), remain skeptical of Williams’s study.

Can we do better? Can we distinguish between a recovered memory that is a real episodic memory and a recovered episodic memory that is false (even if it captures a historically true event)? The key here is in looking at features that typically appear in false memories and in true memories. For example, research suggests that memories that are gradually recovered during suggestive therapy share many properties with false memories. They tend to be vague, have more to do with thought processes, are less emotional, and have fewer sensory details. Memories that arise during therapy and have these characteristics may, in fact, be false memories. On the other hand, some recovered memories of childhood abuse are spontaneous and happen all at once. These spontaneous, sudden memories are more likely to be correlated with documented histories of abuse (Geraerts, Raymaekers, & Merckelbach, 2008). These spontaneous, sudden memories are also more likely to be highly charged emotionally and have more sensory detail. Thus, it appears that the hallmark of the true recovered memory is its spontaneous nature, usually brought on by a seemingly random retrieval cue. Memories recovered by the leading nature of a therapist’s inquiry are more likely to be false.

In Freudian psychology, it is important for the patient to become aware of the childhood trauma that is now causing psychological distress in adulthood. For this reason, many psychotherapists probe for hidden memories of abuse. However, some research in modern clinical psychology tells us that preventing traumatic memory from entering our conscious awareness can have positive benefits (Philippot, Baeyens, Douilliez, & Francart, 2004), directly contradicting the Freudian view. So for some clinical psychologists, recovering repressed memories may not be a desirable outcome for their clients. But whichever clinical school one adheres to, it is relevant to find out the mechanism whereby repression and recovery take place.

For cognitive psychologists, emotional memories are generally thought to be better remembered than less emotional memories, under normal circumstances (Reisberg & Heuer, 2004). Thus, situations that produce repressed but recoverable memories may result from complex processes operating on those memories. From the point of view of memory science, the questions of why some memories are repressed and why some are later recovered are equally important. Lately, some intriguing experimental paradigms have been developed to explore this issue.

**Mechanisms of Repression and Recovery**

What does it mean to repress an event? Repression is usually thought of as the blocking out of traumatic memories of childhood trauma, particularly trauma associated with sexual abuse. This view of repression dates back to the work of Freud. Repression is defined here as forgetting highly emotional memories, usually from childhood. But what cognitive mechanisms can account for repression? For memory scientists, it is necessary to examine
these mechanisms, especially given that in most circumstances, highly distinctive and emotional events tend to be well remembered and not forgotten.

Recent theory has focused on two potential mechanisms. The first is the failure-to-rehearse explanation. Because memories of childhood trauma are highly negative, often private, and potentially embarrassing, they are not likely to be rehearsed often. We often reflect on positive events, but for some negative events, we may not do so. Then if we do not rehearse the event, the normal processes of updating and elaboration will not be invoked, leading to a poor and less accessible memory trace. So simply failing to rehearse a memory can have a passive effect that leads to that memory becoming inaccessible. Second, active suppression may account for repression. Active suppression here means that people may deliberately force themselves not to remember the item. Every time the memory is activated, people will distract themselves or force themselves to think about something else. Although this sounds paradoxical at first, research suggests that people can inhibit particular memories from growing stronger. We will consider the data for both of these ideas.

**Failure to Rehearse**

Smith and Moynan (2008) conducted a study that examined the failure-to-rehearse hypothesis. They wanted to demonstrate that rehearsal failure could account for some initial forgetting and then later recovery of memory. They did the experiment in a lab setting with the goal of demonstrating powerful forgetting and equally strong recovery with simple word stimuli. Using this methodology, they planned to develop an experimental analog to the kinds of memories that people may repress outside of the lab. The experiment served as a basis for speculating about the nature of repression and recovery.

First, participants viewed a long series of categorized lists. For each list, the participants saw the category label (e.g., “fish”) and many exemplars (e.g., salmon, halibut, trout, snapper). Participants wrote down each word and made a judgment as to the fit of each word to the category. Thus, trout would be a good fit to the category of “fish,” but perhaps seahorse might be less so. Three of these lists were called critical lists, in which forgetting was to be induced, whereas the rest were filler lists. The three critical lists were composed of two word lists designed to elicit emotional responses (e.g., “curse words,” “deadly diseases”) and one neutral list (e.g., “tools”). The fillers were all neutral categories (e.g., “fish”). Participants were not told about any future memory tests, thus

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**Repression:** The active forgetting of highly emotional memories, usually from childhood.

**Failure to rehearse:** A theory that explains repression. Because memories of childhood trauma are highly negative, often private, and potentially embarrassing, they are not likely to be rehearsed often.

**Active suppression:** A theory that explains repression. People may deliberately force themselves not to remember the event.
mirroring the incidental learning that would initially occur in any real-world event that induced repression (see Figure 8.4).

Following the category judgments, participants were given one of two intervening tasks. In one intervening task, the control group was given nonverbal problems to solve, such as math problems. In the other filler task, the “forget” group was given semantic tasks with the filler categories. They were asked to make judgments of the pleasantness of the items on the list, the size of the items on the list, or the number of syllables in each word on the list. What is important here is that these additional tasks were done with the filler categories—that is, not the critical lists. The idea was that retrieval practice with the filler categories would make the critical categories less accessible later. Important to note here is that in the “forget” group, the task involved making judgments about items within the categories, which would promote thinking about these categories and prevent rehearsing items in the critical categories. This was important later, as the memory tests would include both recall of the categories and recall of items within a category.

This procedure induced retrieval bias. Retrieval bias occurs when a procedure is employed that makes some information easier to recall than other information. Retrieval bias can be induced by requiring a participant to retrieve certain information, such as examples of “fish,” a filler category. This makes the fish information easier to retrieve, while making it more difficult to retrieve other categories that were not rehearsed, such as “diseases.” Put another way, the filler categories are rendered more accessible and thus are more likely to be retrieved; the critical lists are not rehearsed, become less accessible, and therefore, are less likely to be retrieved.

Retrieval bias is relevant to the situation of repressing memories of childhood abuse. These memories are painful, confusing, and embarrassing both to a child and to an adult. It is likely that some people will spend much more time thinking of other things and as little time as possible focusing on the memory of the abuse. Eventually, as the events that are rehearsed continue to grow in accessibility, the memory of the abuse, through lack of retrieval, is rendered inaccessible and hence repressed. Smith and Moynan (2008) described a situation in which a long continuous event or set of events occurred (i.e., summer camp), filled mostly with positive recurring events (soccer, campfires), which are described and retold many times (that is, rehearsed), and a single isolated negative event (the abuse), which occurred once and then was never spoken about (i.e., failure to rehearse).

Think of the experimental conditions in Smith and Moynan’s (2008) experiment. First, we have the critical, emotion-inducing lists and non-emotional control lists. Second, we have a variable in which one group does a nonverbal distractor task and a second group does a verbal task with the filler lists, designed to induce retrieval bias. To mirror the repression situation, Smith and Moynan followed these experimental variables with two memory tests. In the first test, participants were asked to free-recall the names of the categories presented during the initial phase. The experimenter asked the person to recall as many categories as possible without providing any clues, cues, or hints. In
this test, the participants were expected to recall the category names, not the exemplars within a category. Second, following the free recall of categories, the category names were given as cues to remember the exemplars from each list. In the category-cued list, participants were expected to recall the exemplars from each category, including the critical lists (see Figure 8.4).

The results reveal some interesting features about the critical lists. First, consider the recall of category names. In the “forget” condition (verbal filler task), participants were less likely to recall the category names of the critical emotional items than they were in the control condition (that is, the nonverbal task; see Figure 8.5). Indeed, for the category “diseases,” the level of category recall fell from over 20% in the control condition to just about 2% in the “forget” condition. Only 2% of participants recalled the category name “disease” when they had engaged in semantic practice with items from the filler lists.

However, in the category-cued retrieval of list exemplars, there was no difference in recall between the control and “forget” conditions in the number of exemplars recalled from the critical categories (“disease,” “curse words,” “tools”). Thus, once the category had been activated, then it was possible to retrieve the words that had been presented in that
category. Smith and Moynan (2008) pointed out that the participants were not generating words that fit the category. Participants rarely included intrusions—that is, words from the same category that were not on the list (only about 1% did so). To restate the experiment’s results: The forget condition led to decreased free recall of critical category names, but it did not lead to any changes in the cued recall of category exemplars.

Let’s see how closely these results fit the pattern of repression and recovery of abuse. First, amid a large number of neutral categories, two categories were emotional and negative in nature (“diseases,” “curse words”). This is like a normal childhood (neutral categories, such as campfires and soccer games) shattered occasionally by an abusive event (the negative emotional categories, such as the abuse). Then, in the “forget” condition, the neutral categories are rehearsed (as we tell stories of the positive events of childhood), but the emotional critical categories are not rehearsed (as some individuals and families may steadfastly refuse to discuss the abuse and its consequences). When people are asked to recall the categories (or remember the important events of their lives), they are good at remembering the practiced categories but often fail to remember the critical categories (i.e., the abuse). However, when given the appropriate retrieval cue (in this case, the category name, such as “curse words”), the participants have no difficulty retrieving the items from that list (just as, once the right cue is given, abuse victims spontaneously recall the abuse).
potentially explains why repressed memories may be recovered in therapy, as therapy may provide just the right retrieval cues. The Smith and Moynan (2008) experiment, with its complexity, may serve as a good model of the significance of rehearsal or lack of it in repressing and then recovering memories.

**Retrieval Suppression**

Another mechanism whereby repression might occur is active suppression of the retrieval of unwanted memories. People may actively work to push an unpleasant memory out of consciousness, eventually leading to the event being completely forgotten, at least until the appropriate retrieval cue is given (Anderson & Huddleston, 2012). Think about something really terrible—the horrors of the Holocaust, the images of the Twin Towers collapsing, or perhaps even the fact that you, like all people, will eventually die. Most people prefer not to think about these events and quickly focus their attention and working memory elsewhere. Thus, even non-abused people often attempt to suppress unpleasant thoughts or memories. In the case of 9/11, the public images and discussions in schools, news programs, and other venues will always remind you that this event did take place. But a personal tragedy may not receive the same public attention. Thus, actively working to avoid remembering a personal tragedy might just succeed.

A landmark study on this topic was conducted by Anderson and Green (2001). They were specifically interested in whether repression could be simulated in the laboratory and modeled on active suppression. First, they trained participants on simple word pairs (they used the example of *ordeal–roach*). When the participants had mastered a list of 40 word pairs (i.e., improved to the point where they could recall all the target words when given the cue word), Anderson and Green moved on to the next phase of the experiment.

Anderson and Green (2001) employed what they called a “think/no think” procedure (see Figure 8.6). On some trials, participants were given “think” instructions. When the cue word (*ordeal*) was presented, participants were supposed to recall the target word that went with it and say it aloud. On other trials, they received “no think” instructions, which meant they were meant to actively avoid thinking about the target word. Saying it aloud, as in the think condition, led to a loud buzzing sound. In some cases, items in the no-think condition occurred as many as 16 times—that is, people were asked to suppress the target on 16 different occasions. Note that, unlike in the Smith and Moynan (2008) study, participants were actively suppressing the retrieval of these items instead of simply not having opportunities to rehearse.

The retrieval suppression worked! When Anderson and Green (2001) gave a final recall test after all of the suppression and practice trials were over, they found that the suppressed items were recalled much worse than control items that were neither practiced nor suppressed, and recall of suppressed items was also worse than that for the practiced items. Moreover, the more suppression per item (16 times vs. fewer), the worse recall was. Anderson and Green were afraid that expectations might inhibit some people from reporting recall for some of the suppressed items, so they paid participants 25 cents for each item recalled. Nonetheless, that incentive failed to increase the number of recalled targets in the suppressed conditions.
Benoit, Hulbert, et al. (2015) employed the same basic procedure while participants were being monitored by fMRI (also see Anderson et al., 2004). Benoit et al. asked participants to either suppress or rehearse more real-world stimuli, such as pictures of faces and physical locations. Moreover, after engaging in suppression or rehearsal, they indicated their success at doing just that. Benoit et al. found that the dorsolateral region of the prefrontal cortex was a key region in suppression and this region became most active when the act of suppressing the memory proved difficult. Suppression was associated with a decrease in activity in the hippocampus, a key memory-encoding region of the brain. The dorsolateral regions prefrontal cortex was apparently driving the conscious suppression of the no-think item and working to inhibit the hippocampus from making memory connections. Moreover, people whose problem is recalling too much rather than too little—that is, those with post-traumatic stress disorder, show a decided deficit in the think/no-think procedure (Catarino et al., 2015). Thus, the neuroscience and clinical science also supports their view—people are actively attending to the action, and the action is inhibiting memory.

What does this mean? Well, at least in a laboratory simulation, people can actively suppress retrieval items, and this active suppression later makes those items more difficult to recall (Anderson & Huddleston, 2012). Is this similar to what happens in repression of traumatic events? It is not clear. The material used in this experiment is a far cry from memories of traumatic events in childhood. Nonetheless, people who have suffered from a traumatic event may actively work to not retrieve that event. This experiment shows that such active suppression can work.

**Figure 8.6** Experimental paradigm from Anderson and Green (2001).
FALSE MEMORIES AND LEGAL PSYCHOLOGY

Psychology is contributing to many aspects of how we view the law and our legal system. Think about how many aspects of the legal system reflect important psychological processes. Witnesses to crimes must rely on memory to help police with their investigations. Police detectives themselves must engage in any number of problem-solving skills to solve crimes and catch suspected criminals. How we interrogate criminal suspects also depends heavily on psychological research. In the courtroom, attorneys must influence jury decision-making, and judges must decide what juries should or should not know about the case. During deliberation, jury members must convince each other of the logic and correctness of their views on a particular trial. All of these aspects of legal behavior are now under investigation by one team of psychological researchers or another.

Psychologists are studying the cognitive and social processes involved in these activities and offering their expertise to propose ways in which the system can be improved. Scholars are studying how juries make decisions, how jurors interpret evidence that they are told to discard, how juries and judges interpret scientific evidence, how police can maximize the evidence they can obtain from an honest witness, how police can detect dishonest testimony, how police conduct lineups, how children differ from adults when giving testimony, and of course, the unreliability of eyewitness memory. In this chapter, we will consider eyewitness memory and what processes can lead eyewitnesses to incorrectly remember aspects of a crime.

EYEWITNESS TESTIMONY

Many years ago, on a cold winter New Hampshire day, a friend offered to drive me home. It was freezing and snowing, and my boots were already soaked through, so I was not looking forward to my usually relaxing mile walk home. We pulled out of my friend's parking spot and were just about to make a right turn, when, out of nowhere, a large truck with a snowplow smashed into my friend's car. Surprisingly, neither my friend nor I was hurt, and there was little damage to either the car or the truck. The snowplow driver, a large man, stepped out of his truck, checked his truck for damage (there was none), and started belligerently swearing at my friend and me. He then got back into his truck and drove off without exchanging insurance information or waiting for the police. I quickly wrote down his license plate number. My friend and I then drove to the police station to report the incident. After my friend described what happened, a police officer pulled me aside and politely asked me to describe the snowplow driver. “He was tall, almost your height,” I responded. But then I was silent. I couldn’t describe one more thing about him. The best the police officer could put down on his report was “a tall white man between the ages of 30 and 50,” which probably fit the description of every snowplow driver in the state of New Hampshire at the time. I could not recall one detail about his face. Did he have a big nose? Was his hair light or dark? I could not even recall if he had facial hair. Now this was a minor accident, and my friend had insurance, so a massive manhunt was not ordered for this crime. But what if it had been? Was I worthless as a witness? Would I have been able to pick
him out of a lineup? I seriously doubted it. I was a graduate student studying memory and well versed in the literature on eyewitness memory. But it did me no good. I failed as a witness.

I started off this chapter with two cases in which eyewitnesses identified a person as a criminal and later evidence exonerated that person. Here is another. In 1985, Kirk Bloodsworth was convicted and sentenced to death for the brutal rape and murder of a young child. Much of the evidence of his guilt was testimony from an eyewitness who claimed she saw him with the girl just before the crime. Almost immediately, his lawyers started working on the testimony of the witness, which changed considerably from her first encounter with police investigators to the time she testified in court. But her firm assertion that she saw Bloodsworth with the girl convinced the jury. Eight years later, Bloodsworth was pardoned and released after DNA evidence demonstrated he could not possibly have been the killer. An honest eyewitness who was trying to help solve a brutal crime actually made things worse by identifying the wrong man and helping the actual criminal to remain free. (For more on this case, go to www.sagepub.com/schwartz3e.6)

What leads people to misremember such important information? It turns out that one of the flaws of human memory is suggestibility—that our memories readily incorporate information from other sources into our original memory of an event. Think of the witness who may have misidentified the man that she saw with the doomed girl. The witness wants to help bring the guilty to justice, and the police thought they had the right man. The police, even if trying their best to be fair and impartial, may have said things that led the witness to imagine Bloodsworth’s face in place of the man that she really saw. She may have found out that other witnesses had already identified Bloodsworth. These factors may lead to a subtle but steady altering of the memory. By the time the witness reaches the courtroom many weeks after witnessing the event, she is convinced that her memory was of the indicted suspect. Let’s start examining some of the psychological research on this topic.

Effects of Wording on Memory of an Accident

Suggestibility includes incorporating information from leading questions. People assume that there is certain “given” information in questions, particularly when the questions come from authority figures, such as police officers or lawyers. This information contained in the questions then subtly influences the nature of the witness’s memory. Loftus and Palmer (1974) demonstrated this in what is considered a classic experiment on eyewitness memory (see Figure 8.7). They asked participants to watch a short film depicting a motor vehicle accident. After the film, the participants were asked one of five questions:

1. How fast were the cars going when they smashed into each other?
2. How fast were the cars going when they collided with each other?
3. How fast were the cars going when they bumped each other?
4. How fast were the cars going when they hit each other?
5. How fast were the cars going when they contacted each other?
They found that the estimates of speed given by participants were different depending on which question they were asked. Using the term *smashed* led to estimates nearly 10 miles per hour faster than when the word *contacted* was used. Everyone had seen the same crash, but the way in which the question was asked affected the estimate of speed. Thus, a subtle difference in wording affected people’s memory enough to bias their report of the accident (see Table 8.1).

Sometimes a single word can influence people’s memory. Indeed, Loftus and Zanni (1975) found that the subtle difference between the words *the* and *a* can have a strong effect on memory. In their study, participants viewed a film of an automobile accident. Later, they answered a series of questions about the accident. Half of the participants received the following question: “Did you see a broken headlight?” The other half of the participants received this question: “Did you see the broken headlight?” In fact, the film did not depict an accident with a broken headlight. In these questions, “the broken headlight” implies that there was a broken headlight and inquires whether the person noticed it, whereas “a broken headlight” implies that it is not known whether the headlight was broken and asks the witness whether it was or not. Only 7% erroneously reported a broken headlight when the word *a* was used. However, 18% reported that they had seen a broken headlight when the word *the* was used. Thus, changing from an indefinite article to a definite article raised the rate of false memory from 7% to 18%.

<table>
<thead>
<tr>
<th>Verb Used</th>
<th>Estimated Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smashed</td>
<td>41</td>
</tr>
<tr>
<td>Collided</td>
<td>39</td>
</tr>
<tr>
<td>Bumped</td>
<td>38</td>
</tr>
<tr>
<td>Hit</td>
<td>34</td>
</tr>
<tr>
<td>Contacted</td>
<td>32</td>
</tr>
</tbody>
</table>

Table 8.1 Speed Estimates From Loftus and Palmer (1974).
THE MISINFORMATION EFFECT

One of the most influential experimental paradigms ever in memory science is the misinformation effect technique developed by Elizabeth Loftus (see Loftus, 1979; Kaplan et al., 2016). It has changed the way memory researchers think about memory and the way the legal system handles witnesses. The basic methodology of the misinformation effect is as follows. Participants witness an event, usually a crime, usually by watching a film of a simulated crime. Following the event, participants receive written information about it, either implied through questions (Did you see the criminal’s gang tattoos?) or by reading a description (The thief had a tattoo of the Skull gang). Loftus embedded in these descriptions some factual information (consistent with actual event) and some misleading information (contradictory to the actual event). For example, the misleading information might be that the criminal did not have a tattoo. The critical independent variable is the presence or absence of misleading information for any particular detail of the crime. Thus, some witnesses receive misinformation about a tattoo, whereas others receive accurate information about the tattoo. The third stage is a memory test, usually recognition but sometimes recall. The critical dependent measure is the performance of participants on questions referring to the misleading information compared to control conditions. The results consistently show that providing misleading information leads to worse memory performance (see Table 8.2).

Consider the following experiment from Loftus’s work (Loftus, Miller, & Burns, 1978). Participants saw a slide show of a small red sports car moving toward an accident with another car. One group of participants saw a slide showing a yield sign, whereas the other group saw a stop sign. Immediately after seeing the slides, the two groups were asked to answer questions about what they had seen. The important misinformation manipulation went as follows: Regardless of which sign participants had seen, half of each group were asked a question using the term stop sign, and half were asked a question using the term yield sign. Thus, if you had seen a stop sign but then were asked about a yield sign, this was the misinformation condition. If you had seen a yield sign but then were asked about a stop sign, this was also the misinformation condition. The consistent condition referred to when you witnessed and then were asked about the same sign.

A few minutes later, the participants saw slides with pictures of the event on them. The participants’ task was to choose the slide that they had seen during the original presentation. For the critical question, the participants had to choose between the photograph with the yield sign and the photograph with the stop sign (see Figure 8.8). Here’s what Loftus and her group found. When the original slide and the postevent question were consistent, participants chose the correct slide 75% of the time. However, when misinformation was present, the percent correct dropped to 40%. This means that the introduction of misinformation caused 60% of the participants to choose what they had heard after the event rather than what they had actually seen. The difference in accuracy based on whether the postevent information was accurate or not was therefore 35%.

Cochran et al. (2016) combined the misinformation paradigm with a version of the altered memory paradigm. Cochran et al. asked participants to watch a slide show depicting
a crime. Some participants then wrote descriptions of what they had witnessed immediately after the slide show. The researchers then altered these descriptions to include misinformation. Fifteen minutes later, the participants viewed their own—albeit altered—descriptions of the events. Two findings from this study are relevant. First, the majority of participants failed to detect the alteration in their own reports. And second, consistent with the misinformation effect, many participants incorporated the misinformation into their memory report in a final memory test. Thus, the misinformation effect occurs even when people’s own reports are changed to include misinformation.

The misinformation effect is a robust finding. It is easily found and easily replicated. It can work on people’s memory of people or objects in an event. It can work on central or peripheral details of an event. It works with details that arouse emotion (such as the presence of a gun) and with details that do not (whether the victim was eating potato chips or cookies; Tiwari, 2012). It can work at short- and long-retention intervals. It works when people have already engaged in retrieval of the event before the misinformation is introduced (Rindal, DeFranco, Rich, & Zaragoza, 2016). It works with sober and intoxicated individuals (Schreiber Compo, Evans, Carol, Villalba, & Ham, 2012). It works when recall is the final test and when recognition is the final test (Loftus, 1979; Paz-Alonzo & Goodman, 2008).

Explanations for the Misinformation Effect

The data from misinformation effects experiments show that people’s memories are influenced by the misinformation, leading them to falsely report what they witnessed during the crime scene. One question concerning the explanation for this phenomenon is, What happens to the representation of the event in memory. Is the memory representation altered by the misinformation? Or does the postevent information set up a second memory representation, and the participant does not know which one to report? On one hand, it is possible that the person retrieves the memory of the event and then inserts the misinformation into the original record of the event. On the other hand, the person may form a second memory—that is, a memory of hearing the postevent information.

Loftus (1992) argued that the original memory is altered by the misinformation. This view is known as the trace impairment view. The trace impairment view states that the misinformation distorts or alters the memory

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**Table 8.2 Misinformation Procedure**

1. Witnesses view crime film.
2. Receive Condition 1 (some factual information) and Condition 2 (some misleading information).
3. Take memory test.
4. Performance on Condition 2 is worse than on Condition 1.

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Trace impairment view: A theory that explains the misinformation effect. The original memory is altered by the misinformation.
for the original event. It has also been called the “blending” view, because the new memory is a blending of the original event and the memory of the later information, including the misinformation. In contrast, McCloskey and Zaragoza (1985) presented the coexistence hypothesis. This is the view that participants form one memory about the original event and then form a second memory of reading questions or a summary after the event. The second memory is composed of both retrieved information from the first event and any new information derived from the postevent questions. In this view, each retrieval attempt generates its own new memory. Moreover, it is the retrieval of these later memories that leads to the misinformation effect.

To test these two theories, McCloskey and Zaragoza (1985) designed an experiment with a simple variation of the misinformation paradigm. The variation was to examine the effect of the kind of incorrect distractors used on the recognition test. In one condition, McCloskey and Zaragoza presented two choices, an object seen in the original event (i.e., a Coca-Cola can) and the object suggested in the misinformation (i.e., a Budweiser can). This is identical to how Loftus originally measured the misinformation effect. However, in the second condition, McCloskey and Zaragoza presented the object from the original event (i.e., the Coke can) with a new distractor—that is, one that was not part of the misinformation (i.e., a 7-Up can). Thus, the comparison is between the number of times participants are incorrect when the suggested but wrong item is present and the number of times participants are incorrect when the suggested but wrong item has been replaced by a novel object.

If the trace impairment view is correct, then the misinformation should alter and distort the original memory representation. During the presentation of misinformation, the original memory is retrieved, and the misinformation then causes our memory system to replace or alter the representation, thus changing the representation to include the misinformation. In the example, in the person’s memory of the crime, the “can” becomes a visual image of the Budweiser can instead of the originally seen Coca-Cola can. If this is true, performance on the recognition test should be worse in the misinformation condition regardless of the type of test used, because the memory is altered. The alternatives now—that is, the original “Coke” and novel “7-Up”—are equally at odds with the “Budweiser” in the person’s memory. Thus, the item presented as a distractor at the time of the recognition test should not matter, because the memory trace is altered and therefore, recognition performance should be impaired even when the distractor is a totally novel item.

In contrast, if the coexistence hypothesis is correct, two memories are formed, one for the original event and one for the misinformation. There are two memories side-by-side. At the time of the test, when the recognition test is a choice between the original item and a novel item, there is no cue to induce retrieval of the second memory. Thus, under these circumstances, the coexistence view argues that the misinformation effect should disappear. This is exactly what McCloskey and Zaragoza (1985) found.

Coexistence hypothesis: A theory that explains the misinformation effect. Participants form one memory about the original event and then form a second memory of reading questions or a summary after the event.
recognition test in which there was a novel distractor, there was no misinformation effect (see Figure 8.9). The McCloskey and Zaragoza (1985) study supports the coexistence hypothesis. This means that when we choose the misinformation item during the recognition test, it is because we are recalling the misinformation from the time of its presentation rather than from a distorted view of the original event.

However, there are also data that support the trace impairment view (Belli, Windschitl, McCarthy, & Winfrey, 1992). Evidence for the trace impairment view comes from research on blending. For example, in one study, participants saw a blue car during a short film of an accident. Later, it was erroneously suggested that the car was green. At the time of test, the participants had to choose the color of the car. Participants tended to choose a blue-green
when given a palette of colors. The blue-green represented something intermediate between the blue that they saw and the green that was suggested. If the coexistence view is correct, then the participants would have chosen either blue or green but not the intermediate color. However, if trace impairment is correct, then the colors might mix in memory, and participants would choose the intermediate color (Loftus, 1992).

In terms of how the misinformation effect has influenced our understanding of suggestibility and false memory, the contrast between these two theories is minor. Nonetheless, as you know from other sections in this book, the issue of representation is critical to understanding how memory works. Moreover, whether the representation is altered or whether the person has two separable memory traces does have practical implications. For example, Rindal et al. (in press) challenged the idea that retrieving the witnessed memory led a person to be in a vulnerable state for memory distortion. Using the modified recognition test, Rindal et al. showed that the original memory is strong when the distractor is not the misinformation introduced at the time of the initial retrieval. This suggests that—as long as concerned people can shield witnesses from misinformation—repeated retrieval does not necessarily lead to a degraded representation of the original event, a finding with encouraging implications for eyewitness memory.
SECTION SUMMARY AND QUIZ

One of the debates in the area concerns the nature of the recovery of repressed memories. Are such recovered memories real or false? Although the data suggest that many are false, new research attempts to explore the cognitive mechanisms that could produce both initial repression and subsequent recovery. Smith and Moynan (2008) investigated the hypothesis that repression occurs because of failures to rehearse, and Anderson and colleagues (2004) have conducted experiments on retrieval suppression. Witnessing a crime is a rare and emotionally laden event. Memory for that event is often important in helping police solve the crime and for the court system to prosecute an accused criminal. However, research on eyewitness memory tells us that such memories are not always accurate. Like other memories, they may be false. In particular, memory researchers have looked at the effect of suggestibility on eyewitness memory. First, subtle differences in words can affect people’s memory reports. Second, the introduction of misinformation can also distort or alter people’s memory for a crime. Elizabeth Loftus introduced a procedure, called the misinformation effect, to measure suggestibility in eyewitness memory. In the procedure, a person witnesses an event but then sees misinformation about it later. The misinformation impairs memory relative to appropriate controls. It is likely that this decrement in performance is caused by a change to the original memory as a result of its interaction with the misinformation.

Section Quiz

1. The “failure to rehearse” hypothesis explains which phenomenon?
   a. The misinformation effect  
   b. Repression  
   c. Change blindness  
   d. The coexistence view of representation

2. Benoit et al. asked participants to either suppress or rehearse more real-world stimuli, such as pictures of faces and physical locations. They found
   a. The dorsolateral region of the prefrontal cortex was a key region in suppression, and this region became most active when the act of suppressing the memory proved difficult  
   b. The medial prefrontal region was the key region in inhibiting suppression  
   c. Unlike lab stimuli, suppression was not possible with faces and physical locations  
   d. All of the above are false

3. Research on suggestibility shows that
   a. Only a small minority of people can be influenced by misinformation  
   b. Only patients with brain damage show suggestibility effects  
   c. Even the change of a single word can sometimes influence people’s memory reports  
   d. Suggestibility is the likely cause of false memories in the DRM procedure
4. The coexistence theory of the misinformation effect states that
   a. Misinformation alters the original memory
   b. Misinformation blends with the original memory
   c. The presentation of misinformation creates a second memory, which then can be confused for the original memory
   d. All of the above are true

1. b
2. a
3. c
4. c

THE COGNITIVE INTERVIEW: MORE INFORMATION WITHOUT SUGGESTION

We know that all of us may have false memories from time to time. We also know that we all may fall prey to suggestion, even in sensitive legal proceedings. Is there anything we can do about it? When the witness confidently proclaims, "I'll never forget that day—it was that man over there who committed the crime," can we ever put confidence in that statement? Should we ever trust such a statement? Are there ways of gathering information from witnesses that do not run the risk of inadvertently providing misinformation?

Ron Fisher and Ed Geiselman devised something they called the cognitive interview (Fisher & Geiselman, 1992; see Gabbert et al., 2016). The cognitive interview is a protocol designed to help police investigators obtain the maximum amount of information from witnesses with the least likelihood of inducing false memories. The cognitive interview is based on several principles of memory retrieval that we have discussed earlier in this book. It has also been tested empirically to substantiate its claim to boost memory without increasing the rate of false memory. The cognitive interview passes these tests (Fisher & Schreiber, 2007). Let's see how the cognitive interview works.

First, the police officer or other initial investigator is instructed to ask open-ended questions. Open-ended questions limit the possibility of introducing inadvertent misinformation. For example,
an open-ended question is simply “What did you see?” rather than “Did you see the man who pulled out a gun?” It is possible that it was a woman who pulled out a gun, two men who had guns, and or there was no gun at all. So unless the investigator actually saw the crime, there is the possibility of introducing misinformation with the directed question, however plausible it may seem. Open-ended questions provide no opportunity for the introduction of misinformation. However, police officers actually conducting witness interviews have difficulty following these instructions. In a study of police officers trying to follow guidelines that encourage open-ended questions, many officers interrupted and asked more directed questions (Schreiber Compo, Gregory, & Fisher, 2012). Nonetheless, the use of open-ended questions is advisable in maximizing recall and minimizing false memories.

The cognitive interview uses three retrieval-enhancing principles. First, witnesses are encouraged to think about the physical context of the witnessed event (context reinstatement). Witnesses are asked to imagine themselves at the scene of the crime and to report what they see. However, the interviewer avoids directed questions that might mislead the witness. Context reinstatement has been shown to increase the amount remembered (Fisher & Geiselman, 1992). Second, the witness is encouraged to remember the event from different time sequences—first most recent to most distant, then from the beginning of the event to the end of the event (different temporal patterns). Third, witnesses are asked to mentally visualize the crime scene from a variety of perspectives—from their own and from that of someone looking from the outside. The hope is that different perspectives will provide different retrieval cues and more information will be provided. Again, it is especially important to avoid giving any suggestions, especially as participants will be imagining themselves at the scene of the crime. Indeed, research shows that the cognitive interview can boost the report of recalled information by 30% compared to a standard police interview without raising the percentage of information that is inaccurate (Fisher & Schreiber, 2007). Indeed, in one study in which the witnesses were children, correct recall was increased significantly and misremembering was decreased significantly (El Asam & Samara, 2015). It is worth noting that the cognitive interview is designed to work with cooperative witnesses without mental disabilities. Studies with autistic individuals show that context reinstatement does not work in improving their memories (Maras & Bowler, 2012). Also, suspects are certainly not cooperative witnesses and may lie under any interview technique. However, a 30% increase in information from well-meaning witnesses without mental disabilities may be very beneficial.

Ron Fisher, Ed Geiselman, and others who have developed the cognitive interview have worked with police departments all over the world, including in Miami, Los Angeles, Sydney, and London. As a consequence, the cognitive interview has been tested and used successfully in real-world settings (Gabbert et al. 2016). Some police investigators now swear by it. It is also possible that the cognitive interview will be useful for other kinds of investigations. For example, doctors could use it to maximize the amount of information that they get from their patients. Laguna-Camacho and Booth (2015) showed that the cognitive interview was helpful in getting people to remember instances in which they had not adhered to a prescribed diet. The technique could also be used by historians trying to investigate a historical event by probing the details of
remaining witnesses. If you are interested in more information on the cognitive interview, a recent edited book contains many chapters on the cognitive interview (Oxburgh, Myklebust, Grant, & Milne, 2016). (And for a transcript of an interview with Ron Fisher, go to www.sagepub.com/schwartz3e.

One study on eyewitness memory suggests a simple but potent means of increasing the ability of eyewitnesses to accurately recall an event: Close your eyes while you remember the event. Perfect et al. (2008) showed that simply closing one’s eyes allowed witnesses to remember more information about a crime with no increase in false memories. Because it led to an increase in the recollection of many visual details, the researchers suspected that the improved memory likely occurs because closing one’s eyes removes an important part of memory interference—namely, the currently visible world and its impingement on working memory. Perfect and his colleagues suggested that eye closure ought to be incorporated into the cognitive interview.

**MNEMONIC IMPROVEMENT TIP 8.1**

*The cognitive interview:* When trying to recall details of a particular event, use the three principles of the cognitive interview: (1) context reinstatement, (2) different temporal patterns, and (3) different spatial patterns. Recall as much as possible and sort out what is relevant later.

**MNEMONIC IMPROVEMENT TIP 8.2**

Close your eyes when trying to remember episodic events, such as an eyewitness memory. Closing your eyes may allow you to recall more details without a cost in false memories.

**SUMMARY**

False memories are the relatively small amounts of information that we recall that do not correspond to reality. Accuracy measures correspondence or the extent to which retrieved memories correspond to the factual past. False memories have been highly controversial and well studied in two domains, the recovery of repressed memories of childhood abuse and eyewitness memory. Because of the controversies surrounding these two areas, cognitive psychologists have devised a number of ways to study false memory in the laboratory. These methods include the Deese-Roediger-McDermott (DRM) procedure, the visual false memory procedure, the false memory induction procedure, imagination inflation, and the misinformation effect. Explanations for false memories vary, but some center on source monitoring, remembering the gist instead of specific details, and suggestibility. Hypnosis can also lead to an increase in false memories. New research suggests, however, that repressed memories may occur under
some circumstances. Two mechanisms for repression may be failure to rehearse the information and active suppression. In the legal context, eyewitness memory is fallible, and the dangers of misinformation are well documented. The cognitive interview provides a way for witnesses to recall lots of details from a crime scene without increasing the risk of false memories.

### KEY TERMS

- active suppression
- amount of information
- coexistence hypothesis
- cognitive interview
- contextual associations
- correspondence
- critical intrusion
- Deese-Roediger-McDermott procedure
- failure to rehearse
- false memories
- false memory induction procedure
- fuzzy-trace theory
- hypnosis
- imagination inflation
- misinformation effect
- open-ended questions
- reality monitoring
- recovery of repressed memories
- repression
- retrieval bias
- source monitoring
- suggestibility
- trace impairment view
- visual false memory procedure

### REVIEW QUESTIONS

1. **What are false memories?** Do they only happen to people who have been traumatized, or are they a more general phenomenon?

2. **What does correspondence mean?** Why is reporting the amount that people recall not enough to fully describe memory ability?

3. **What is the Deese-Roediger-McDermott (DRM) procedure?** What does it measure, and how does it do so?

4. **What is the false memory induction procedure?** What does it measure, and how does it do so?

5. **What is hypnosis?** Why is it not considered advisable to help eyewitnesses remember more information from a crime scene?

6. **What evidence exists to show that repression is a real phenomenon?** Why would cognitive scientists have doubted repression in the first place?

7. **What cognitive mechanisms have been postulated to explain repression?** What experimental data support that these cognitive mechanisms are real?
8. What is suggestibility? What evidence exists to show how it influences eyewitness memory?

9. What are the two explanations for the misinformation effect? What evidence supports each one?

10. What is the cognitive interview? How is it used to prevent false memories but still produce good recall?

**ONLINE RESOURCES**

1. For more on Dr. Thompson’s ordeal, go to http://www.spring.org.uk/2008/02/how-memories-are-distorted-and-invented.php.

2. For the transcript of an interview with Dr. Clancy, go to http://www.nuforc.org/npr.html.


4. For an article on this topic by Elizabeth Loftus, go to http://faculty.washington.edu/eloftus/Articles/sciam.htm.

5. To find out more about imagination inflation, go to http://faculty.washington.edu/eloftus/Articles/Imagine.htm.

6. Visit the website of the Innocence Project for other cases in which people have been wrongly convicted: http://www.innocenceproject.org.


Go to [www.sagepub.com/schwartz3e](http://www.sagepub.com/schwartz3e) for additional exercises and study resources. Select *Chapter 8, False Memory* for chapter-specific resources.