CHAPTER 25
Eyewitness Memory for People and Events
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A criminal trial is, among other things, an attempt to reconstruct a past event to aid the trier of fact in determining what happened. Physical trace evidence, such as fingerprints, fibers, or blood, are often used to assist this reconstruction because, when properly collected and analyzed, trace evidence can help determine the nature of the events and the identity of the perpetrator. Eyewitness evidence can be likened to other forms of trace evidence (Wells, 1995). In effect, a criminal event involving an eyewitness leaves a trace in the brain of the eyewitness. The “memory as trace evidence” metaphor has rich implications. Like physical evidence, memory trace evidence can be contaminated, lost, destroyed, or otherwise made to produce results that can lead to an incorrect reconstruction of the event in question. Like physical trace evidence, the manner in which memory trace evidence is collected can have important consequences for the accuracy of the results.

The criminal justice system, however, has treated memory traces very differently from physical trace evidence. The collection of physical trace evidence is relatively well prescribed according to protocols that have a scientific foundation, grounded in what experts have suggested are the optimal ways to avoid contamination (Technical Working Group on Crime Scene Investigations, 1999). Police protocols for the collection, preservation, and interpretation of physical evidence are dictated largely by forensic scientists, and the practice of physical evidence collection and examination has tried to borrow as much as possible from science. Eyewitness evidence, on the other hand, is typically collected by nonspecialists who have little or no training in human memory. Police protocols for collecting, preserving, and interpreting eyewitness evidence have not integrated the results of research conducted by memory experts. Hence, science has not been the backbone of police procedures for collecting, preserving, and interpreting eyewitness evidence. Whereas the justice system’s analysis of physical evidence, especially biological traces, has advanced rapidly in the past decade, the analysis of eyewitness evidence has languished.

We believe that this gap is due in large part to the failure of the justice system to embrace the scientific model for eyewitness evidence while accepting the scientific model for physical evidence. Perhaps it is no surprise, therefore, that mistaken eyewitnesses account for more convictions of innocent persons than all other causes combined and it has been scientific analysis of biological evidence (forensic DNA) that has proven that these eyewitnesses were in error (Scheck, Neufeld, & Dwyer, 2000; Wells, Small, Penrod, Malpass, Fulero, & Brimacombe, 1998). As of the time of this writing (March 2011), there have been 267 DNA-based exonerations and 200 of those were cases of mistaken eyewitness identification (Innocenceproject.org, 2011). The idea of using a scientific model to collect, analyze, and interpret eyewitness evidence is readily apparent in the case of both memory for events and memory for people. Consider, for example, how social scientists collect data from people. In surveys about past events, great care is taken in constructing questions because of clear evidence that people’s reports are influenced by how the questions are worded (Loftus, Fienberg, & Tanur, 1985; Loftus, Smith, Klinger, & Fiedler, 1992). Scientific approaches to minimizing and detecting response biases and demand characteristics in surveys represent solid models for how law enforcement might go about the process of questioning eyewitnesses.
In the case of eyewitness identification, the “lineup as experiment” analogy is a rich scientific model that law enforcement could follow (see Wells & Luus, 1990). According to this analogy, police conducting a lineup are like experimenters conducting research. Police have a hypothesis (that the suspect is the culprit); they create a design to test the hypothesis (embed the suspect among fillers); they provide instructions (e.g., “Don’t guess; the culprit might or might not be in the lineup”); they collect responses (e.g., selection, certainty); and they interpret the results. The same factors that can make the results of a scientific experiment uninterpretable can make the results of a lineup uninterpretable (e.g., confoundings, biased instructions, experimenter expectancy effects, selective recording of results).

The failure of the criminal justice system to adopt a scientific model for memory trace evidence while embracing such a model for physical trace evidence is perhaps attributable to several related factors. We note, for instance, that eyewitness evidence was a staple in criminal investigations long before any scientific studies of eyewitnesses were conducted. The most scientific analyses of physical evidence (such as forensic DNA), on the other hand, were developed by scientists first and adopted by crime investigators later. Had the lineup been invented by scientists before it was ever used by the criminal justice system, law enforcement would be following a scientific protocol. This protocol would involve mock witness pretesting of fillers, double-blind testing procedures, carefully worded instructions, convergent measures, videotaping, careful documentation of records, and an interpretational framework for the identification responses.

The failure of the criminal justice system to adopt a scientific model for eyewitness evidence may also be attributable to the criminal justice system not having a focused theory of memory. In fact, the justice system as a whole might have no theory at all and its members may be operating under several theories. It appears that the justice system is assuming implicitly that information stored in the brain remains largely unchanged as a function of post-event information and is relatively impervious to suggestion, and that memory failures are primarily failures to retrieve information. In fact, however, memory reports are readily influenced by post-event information, are very susceptible to suggestion, and can err in numerous ways, including memory reports of entire events that were never witnessed (Loftus, 1996). In this chapter, we review major developments in the scientific literature on eyewitness evidence. There are two main sections to this review. First, we review research and theory on eyewitness memory for events. The primary lesson of the memory-for-events research is that memory for events is malleable.

The process of recollection is reconstructive, and sources of information that are used to reconstruct are not only from the event itself but also from post-event information gleaned in various ways after the event has occurred. In some cases, mere imagination can have the power to make people believe that they witnessed or experienced an event that did not happen. The second main section reviews work on eyewitness memory for people, especially the ability of eyewitnesses to identify culprits from lineups. The primary lesson of the eyewitness identification work is that mistaken identification rates can be very high under certain conditions and many of these conditions could be avoided by the use of more scientific procedures for lineups. Before we begin our review, we describe a case that we believe illustrates many of the points that are central to this chapter.

THE MISIDENTIFICATION OF THOMAS BREWSTER

It was December 14, 1984. Terry Arendt and Sherrie Gillaspey were parked in a remote area of Shasta County, California. Terry and Sherrie were friends, not lovers, and were enjoying each other’s company when a car drove by three times. After the third time, a bullet went through the driver’s side window, killing Terry. A male approached the car and forced Gillaspey a short distance from the car, where he sexually assaulted her. The killer then left.

A few days later, Gillaspey worked with a sketch artist to develop a likeness of the killer. Thomas E. Brewster, a lifelong resident of the area, bore a resemblance to the sketch and thereby became a suspect in the killing.

On December 19, 1984, Gillaspey was shown a photo lineup with Brewster’s photo in it. She could not make a positive identification. One day later, Gillaspey was shown a live lineup in which Brewster appeared. Again, Gillaspey could not make a positive identification. Brewster was not arrested. Nearly four years later, in August 1988, detectives again showed Gillaspey a photo lineup with Brewster’s picture in it. Once again she could not make a positive identification. In 1995, 11 years after the murder, two new detectives were assigned to the case. These detectives brought photos to a meeting with Gillaspey and, after interviewing her with the photos, she signed a statement saying that Brewster was the killer. Six days later, she identified Brewster from a live lineup. The prosecutor sought the death penalty and the trial did
not commence until 1997 (California v. Brewster, 1997). Motions to suppress the identification were denied. After the trial had begun, a criminalist found a semen stain on the blouse that Gillaspey wore that evening and the stain was tested for DNA. The trial was in progress and Gillaspey was still on the stand after having positively identified Brewster in court when the DNA test results came in. Brewster was not the killer. Gillaspey was carefully debriefed and all charges against Brewster were dismissed.

At least 200 people have been released from prison in recent years after DNA proved that they had been mistakenly identified by eyewitnesses (innocenceproject.org, 2011; Scheck et al., 2000; Wells et al., 1998). In many cases, there were multiple witnesses who misidentified the defendant, many were sentenced to death, and they served an average of about eight years before being freed based on the DNA tests. Although DNA tests eventually saved these individuals from the mistaken eyewitness identification problem, DNA can be used to exonerate only a small fraction of people from mistaken identification. Forensic DNA tests cannot prevent wrongful convictions in most eyewitness cases because the biological traces needed for DNA tests are not left behind by perpetrators in the vast majority of crimes. Most murders and nearly all robberies, drive-by shootings, burglaries, hit-and-run offenses, and other common crimes involve no biological trace evidence that can be clearly linked to the perpetrator or that can be used to exonerate an innocent person. It is no coincidence that nearly all of the DNA exoneration cases involve sexual assault, which have biological evidence (semen) that is unambiguously linked to the perpetrator, whereas most other cases do not.

The Brewster case is somewhat unique in one respect: The new detectives who took over the case (13 years after the murder) tape-recorded their interview with Gillaspey. We think it is important to print excerpts from that interview because they illustrate some of the dynamics of the eyewitness problem. Keep in mind that the victim-witness, Gillaspey, had already viewed either photos or live lineups containing Brewster at least four times before the new detectives interviewed her in 1995. She had never made a positive identification of Brewster despite these numerous attempts prior to the 1995 interview. The interview itself is quite long, so we reprint only a small portion here. A full transcript of the taped interview was entered into evidence at a hearing on a motion to suppress the identification and can be obtained from the first author on request. Most of the interview involves Gillaspey recalling the events of the night of the murder.

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At some point, however, the detectives decided to show her a photospread that included yet another photo of Brewster. In the following transcript quotes from the tape, D1 is the first detective, D2 is the second detective, and SG is the witness, Sherrie Gillaspey:

**SG:** Who is this guy? (apparently pointing to the photo of Brewster).

**D1:** Why do you ask me that?

**SG:** I don’t know, he looks familiar but (unintelligible).

**D1:** Have you seen him before?

[The conversation turned to a discussion of whether she could recognize the voice of the perpetrator. The detectives then turned the conversation back to the photos.]

**D1:** And what photograph are you talking about?

**SG:** Number three.

**D1:** And that individual looks familiar to you, you don’t know in what respect?

**SG:** Nobody else here does, all I know is he does for some reason.

**D1:** Well, let’s go through a process of elimination. Is he somebody that you went to school with?

**SG:** Uh-uh.

**D1:** Is he somebody who works in a store where you shop?

**SG:** No.

**D1:** Is he somebody you bought a car from?

**SG:** No.

**D1:** Is he an old schoolteacher?

**SG:** Nope.

**D1:** Is he an old boyfriend?

**SG:** No.

**D1:** He work in a service station?

**SG:** No, no.

**D1:** Is he somebody that has hit on you?

It is important to note at this point that the detectives were fully aware that Sherrie Gillaspey had been shown photos of Brewster and had viewed him in a live lineup at various times over the prior 13 years. Not once, however, did they ever ask during this questioning whether he looked familiar because he was the same person that other detectives had shown her previously. The interview continued:

**D1:** Could he be the guy that assaulted Terry and you that night?

**SG:** It’s possible. I mean, I would really like to hear, I would really like to hear him talk.

**D1:** Well, I can arrange that.
Gillaspey had already heard his voice in the 1985 lineup. Again, however, the detectives offered no information to her about that fact. Instead, the discussion turned to signing a statement. She was asked to indicate number three on the statement form and to write in the comments section.

SG: So, what do you want me to put, just write...
D1: Well, let’s think about that for a minute.... One of the things that I, that I probably rely on more than anything else is body language...and emotional reaction. I think it’s safe to say that you went to number three just like that.

SG: Uh-huh, totally, yeah.
D1: And my next question is you became flushed. Why did you do that?
SG: I don’t know, well immediately, immediately in my mind, you know, in my mind thinks, is that the person, you know, kind of...
D1: That’s the answer I’m looking for. Could that be the guy that did all this?
SG: Yeah.

Notice how the detective tells Gillaspey what her emotional reaction was and interprets her body language. Then, when she says something that agrees with the detective’s suspicions about the guilt of Brewster, he tells her that was the answer he was looking for. The interview continues.

D1: Then what, see what, what I have to worry about now is if in fact you do come back over and we conduct a physical lineup and you identify this individual as absolutely unequivocally, without a doubt the guy that was there...
SG: Uh-huh.
D1: Then obviously the next thing that happens is somewhere down the line we have to think about what happens in court. And we don’t want to taint that with some, with a comment that you might inadvertently make on the back of that card.

The taped interview then ended. Six days later, Gillaspey picked Brewster from a live lineup and was absolutely positive of her identification. The Brewster case illustrates much of what concerns psychologists about eyewitness testimony. First, it illustrates what seems to be a general misunderstanding about the nature of human memory, namely, that memory might get better (or at least not deteriorate) with time. Gillaspey had already viewed a photo of Brewster a mere 5 days after the incident and viewed him again in a live lineup a mere 6 after the incident. In neither case could she identify Brewster. And yet, the police, the prosecutor, and the judge were willing to accept her identification of Brewster over 3,850 days later.

Second, this case illustrates the detective’s lack of understanding of the processes and the power of suggestive procedures in shaping an eyewitness’s recollections. Presenting Brewster, both in photos and live, to the eyewitness several times over an 11-year period is not the only suggestive aspect of the case. The key interview in 1995, as noted in the transcript, included the detective interpreting the eyewitness’s behavior for her (“You went to number three just like that...you became flushed”). It included a suggestive prediction regarding how she might behave in the subsequent live lineup (“We conduct a physical lineup and you identify this individual as absolutely unequivocally, without a doubt the guy that was there”), and suggestions that she not say anything in her photo-identification card that would not play well later in court.

Third, this case illustrates a problem of source monitoring. Gillaspey seemed to be unaware that Brewster’s familiarity was the result of her being exposed to him after the murder rather than his being the person she saw on the night of the murder. Fourth, this case illustrates how the certainty of an eyewitness is not only a poor indicator of whether the witness is accurate (Gillaspey was positive at trial even though she had mistakenly identified the defendant), but also how certainty is a product of variables other than the memory of the eyewitness.

Finally, this case illustrates how the justice system fails to take advantage of what is known about human memory and social influence to develop appropriate safeguards against mistaken identification. There was a detailed and reasonable motion to suppress the eyewitness identification evidence. The suppression motion was denied in the Brewster case, as it is rather routinely in nearly all cases, even though the identification procedures were highly suggestive (Loftus, Doyle, & Dysart, 2007; Wells & Quinlivan, 2009). As previously stated, we believe that some members of the justice system seem to operate under a theory of memory that does not give much credence to the idea that post-event information can account for serious mistakes by eyewitnesses.

MEMORY FOR EVENTS

As the Brewster case suggests, post-event viewings of a suspect’s likeness, either by photograph or in person, can
help make someone look familiar later, and this enhanced familiarity can lead to a false identification of the suspect as the person who committed the crime. But decades of research has shown that post-event information, particularly when it is misleading, can also alter recollections of other details about key events. A typical finding is that after receiving new information that is misleading in some way, people make errors when they report what they saw. The new, post-event information is often incorporated into the recollection, supplementing or altering it, sometimes in dramatic ways.

**Misinformation Effects**

Current research showing how memory can become skewed when people assimilate new data uses a three-part procedure. Experimental witnesses first see a complex event, such as a simulated violent crime or an automobile accident. Subsequently, half of the witnesses receive new misleading information about the event, whereas the other half do not get any misinformation. Finally, all witnesses attempt to recall the original event. In a typical example of a study using this paradigm, witnesses saw a simulated traffic accident. They then received written information about the accident, but some people were misled about what they saw. A stop sign, for instance, was referred to as a yield sign. When asked whether they originally saw a stop or a yield sign, those given the phony information tended to adopt it as their memory; they said they saw a yield sign (see Loftus, 2005 for a review of this study and similar research). In these and many other experiments, people who had not received the misleading information provided much more accurate memories. In some experiments, the deficits in memory performance following receipt of misinformation have been dramatic, with performance differences as large as 30 or 40% (Belli, 1993). This degree of distorted reporting has been found in scores of studies, involving a wide variety of procedures. People have recalled nonexistent broken glass and tape recorders, a clean-shaven man as having a mustache, straight hair as curly, stop signs as yield signs, hammers as screwdrivers, and even something as large and conspicuous as a barn in a bucolic scene that contained no buildings at all. In short, misleading post-event information can alter a person’s recollection in a powerful, and often predictable, manner. The change in report arising after receipt of misinformation is often referred to as the misinformation effect. (See Brainerd & Reyna, 2005 for an excellent secondary source discussion of this phenomenon.)

Even members of the military who experienced highly stressful interrogations form memories that are susceptible to post-event contamination. This has been repeatedly shown in studies of individuals who attended “survival schools” where they were trained to withstand the mental and physical stresses that they might experience if captured as prisoners of war. The survival school experience includes incarceration in a mock-POW camp, food and sleep deprivation, intense interrogation, physical threats, and assault. Their memories were susceptible to various forms of contamination, often leading to misidentification of the person who assaulted them and mistaken memory for other key details (Morgan et al., 2007, 2011). There are many questions that researchers have been interested in concerning the misinformation effect. One of them is whether there are certain types of individuals who might be particularly susceptible to the distorting effects of misinformation. We know that young children and the elderly are particularly susceptible to this type of memory distortion (Davis & Loftus, 2005; Otgaar, Candel, Smeets, & Merckelbach, 2010; Polczyk et al., 2004; Roediger & Geraci, 2007).

Several other individual difference variables have been found to be associated with the greater or lesser susceptibility to misinformation. For example, people who have lower cognitive abilities are more susceptible (Zhu, Chen, Loftus, Lin, He, Chen, Li, et al., 2010) as are persons with certain personality characteristics, such as being high in cooperativeness (Zhu, Chen, Loftus, Lin, He, Chen, Moyzis, et al., 2010).

**Planting False Childhood Memories**

During the final decade of the 20th century, eyewitness researchers took things a step further. They turned their attention to the question: just how far can we go with people in terms of distorting their memories with suggestion and misinformation? Rather than merely adding a detail to a previously acquired memory or tinkering with a detail here and there, researchers studied whether suggestive procedures can create entirely false memories for the past. Researchers devised procedures that could make people believe and remember that earlier in life they had been hospitalized when they had not (Hyman, Husband, & Billings, 1995), that they had been lost and frightened in a mall when they had not (Loftus et al., 1996), that they had been victims of vicious animal attacks as children even though they had not (Porter, 1998; Porter, Yuille, & Lehman, 1999), and even that they had witnessed demonic possession when they were very young.
(Giuliana, Mazzoni, Loftus, & Kirsch, 2001). This line of false memory research shows that it is indeed possible to create quite complex, elaborate, and “confident” false memories in the minds of research participants. To see how false memories of events can be created, we describe one method in some detail: planting a childhood memory for something that never happened. One goal of the research was to find a method for planting a memory that, if the event had actually occurred, would have been at least mildly traumatic. But the experience should not, of course, be so upsetting to the person that it would be unethical to create a false memory about it.

Loftus and colleagues settled on the idea of trying to plant a very specific memory of being a 5-year-old lost in a shopping mall, being frightened, crying, and ultimately rescued by an elderly person and reunited with the rest of the family (see Loftus & Ketcham, 1994, for a description of the origin of the idea, and Loftus et al., 1996, for more details on this research). Here is how it was done: The participants, all adults, were asked to try to remember childhood events that were supplied by their mother, father, older sibling, or other close relative. Three of the events were true, and one was the research-crafted false event about getting lost in a shopping mall, department store, or other public place. In phase I, participants completed a booklet containing four one-paragraph stories about events from their childhood provided by their relative. Three events actually happened, and the fourth, always in the third position, was false. The false event was constructed from information provided by a relative of the participant who gave the researchers details about a plausible shopping trip. The relative informed the researchers (a) where the family would have shopped when the participant was about five years old; (b) which members of the family usually went along on shopping trips; (c) what kinds of stores might have attracted the participant’s interest; and (d) that the participant had not been lost in a mall around the age of 5. This information was then used to craft the false event, which always included the following elements: (a) lost for an extended period of time, (b) crying, (c) lost in a mall or large department store at about the age of 5, (d) found and aided by an elderly woman, and (e) reunited with the family.

Participants read what their relative had told us about each event, and then completed the booklets by writing what they remembered about each event. If they did not remember the event, they were told to write “I do not remember this.” When the booklets were returned, participants were called and two interviews were scheduled approximately one to two weeks apart. Participants were told that the researchers were interested in examining how much detail they could remember and how their memories compared with those of their relatives. The event paragraphs were not read to them verbatim, but rather, bits of information were provided as retrieval cues. In all, participants remembered something about 68% of the true events they were asked about. This figure did not change from the initial report through the two follow-up interviews. The rate of “remembering” the false event was lower, at about 25%. Statistically, there were some differences between the true memories and the false ones: More words were used to describe the true memories, and the true memories were rated by the participants as being somewhat more clear. But in many cases, if an onlooker were to watch the participant describe an experience, it would be difficult indeed to tell whether the report was of a true or a false memory.

Other investigators used a similar procedure to plant false memories of even more unusual events. In one study, college students were asked to recall actual events that had been reported by their parents and one experimenter-crafted false event (Hyman et al., 1996). The false event was an overnight hospitalization for a high fever with a possible ear infection, or a nonexistent birthday party with pizza and a clown. Parents confirmed that neither of these events had happened, yet participants were told that they had experienced one of the false events at about the age of 5. Participants tried to recall childhood experiences that they thought had been supplied by their parents, in the belief that the experimenters were interested in how people remember shared experiences differently. All events, both the true ones and the false one, were first cued with an event title (family vacation, overnight hospitalization) and an age. Hyman et al. (1995) found that participants remembered approximately 80% of the true events. As for the false event, by the end of the second interview, 20% of the participants reported remembering all or part of this creation. In a separate study, Hyman and collaborators created even more unlikely false memories, such as attending a wedding reception and accidentally spilling a punch bowl on the parents of the bride or having to evacuate a grocery store when the overhead sprinkler systems erroneously activated. This time, approximately 25% of the participants accepted all or part of the false memory by the end of the third interview (see Hyman & Billings, 1998; Hyman & Pentland, 1996).

Another impressive research project planted false memories of serious animal attacks, serious indoor accidents, and serious outdoor accidents—events that would have been traumatic had they actually occurred (Porter,
1998; Porter et al., 1999). These investigators reported that just over 25% of their participants created a rather complete false memory, and another 30% created a partial memory. In yet another study, subjects were led to believe that, as children, they had witnessed their parents have a physical fight (Laney & Loftus, 2008). These subjects rated their false memories as being rather emotional, using ratings of emotionality that were similar to those given by other subjects who had actually had the experience in childhood.

While the study involving false memories of witnessing one’s own parents having a fight revealed similarities between the false memories and true ones held by other subjects, there is other research comparing false and true memories that does show statistical differences between the true and the false. For example, Marche, Brainerd, & Reyna (2010) showed that the true memories were richer in detail than the false ones. Clearly, suggestive interventions are capable of inducing false memories in a sizable percentage of people. Once planted, these false memories can seem as “real” for some people as true memories. In discussing their findings, Porter and colleagues (1999) were particularly impressed that fully 20% of the created memories were given with the highest possible confidence rating. At the end of their study, over 33% of the participants who had created a false memory were willing to wager money that the false event occurred. Moreover, the investigators reported that at the time the participants were debriefed, most of them appeared to be “genuinely astonished” when told about the parental reports and the fact that their memories were false. Many appeared amused and wanted to talk more with the researchers about the process of memory creation, in some instances, even requesting literature in the area of research. These features of the reaction helped convince the researchers that the participants had in fact recalled the false event, as opposed to responding to demand characteristics of the study. It seems evident from these findings that participants are actually “remembering” these false experiences in the sense that they have a genuine recollective feeling about the experiences. These whole events that are planted into memory are sometimes called rich false memories (Loftus & Bernstein, 2005).

**Imagination and Memory**

It should be kept in mind that these studies used a rather strong form of suggestion in which a source with some prestige or authority suggested that an event had occurred in the past. However, such heavy-handed methods are not needed to get people to increase their confidence that they had experiences in the past that they probably did not experience. Inducing people to imagine that they have had an experience can influence people to recall having had such an experience. To explore what happens to memory when people imagine events that did not occur, Garry, Manning, Loftus, and Sherman (1996) used a three-stage procedure. Participants were first asked to rate the likelihood that 40 different events happened to them during their childhood, on a scale of responses ranging from “definitely did not happen” to “definitely did happen.” Two weeks later, the participants were asked to imagine that they had experienced some of these events. The events included falling and breaking a window with their hand, getting in trouble for calling 911, finding a $10 bill in a parking lot, or being pulled out of the water by a lifeguard. Different participants were asked to imagine different events.

Consider a typical 1-minute imagination exercise, one in which participants imagined breaking a window with their hand. They were told to picture that it was after school and they were playing in the house when they heard a strange noise outside. They were told to imagine themselves running toward the window, tripping, falling, reaching out, and breaking a window with their hand. While imagining the scene, the participants were asked several questions, such as “What did you trip on?” and “How did you feel?” After imagining several situations, the participants again, sometime later, were given the list of 40 childhood events to respond to. Comparison of the responses to the two questionnaires about possible childhood experiences revealed that a 1-minute act of imagination led a significant minority of participants to indicate that an event was more likely to have happened after previously identifying it as unlikely to have occurred. In the broken-window scenario, 24% of the participants directed to imagine the event showed an increase in confidence that the event had actually occurred. For those participants who did not imagine breaking the window, 12% showed a corresponding increase. In the “got in trouble for calling 911” scenario, 20% of the participants instructed to imagine the event showed an increase in confidence that the event had occurred when they were children. For those participants who did not imagine getting in trouble for calling 911, only 11% showed a corresponding increase. Numerous other investigators have used imagination to alter people’s beliefs about their past. Imagination can make people believe that they have had experiences in the distant past (Heaps & Nash, 1999), but it also can make people believe that they have had
experiences in the recent past (Goff & Roediger, 1998; Thomas & Loftus, 2001).

**Other Suggestive Procedures**

The power of suggestion to create false beliefs and false memories has been shown repeatedly. Suggestive dream interpretation has led people to believe that they were lost for an extended period of time, or that they faced a great danger from which they were rescued (Mazzoni & Loftus, 1998). Reading suggestive stories and getting false feedback about one’s fears has led people to believe that they witnessed demonic possession in the past or that they nearly swallowed an object and choked (Mazzoni et al., 2001). Suggestive false feedback about one’s visual-motor skills has led people to believe that they could remember experiences from the day after they were born (Spanos, Burgess, Burgess, Samuels, & Blois, 1999). Other “impossible memories” have been planted, such as a memory for a medical procedure that had not occurred (Mazzoni & Memon, 2003), or a memory for meeting Bugs Bunny at a Disney resort, which could not have occurred since Bugs is a Warner Bros. character and would not be seen at a Disney property (Braun et al., 2002).

In their review of the literature on rich false memories Lindsay et al. (2004) noted that, across the studies conducted at that time, an average of 31% of subjects produced false memories. Sometimes the memory was “complete” and sometimes it was partial—a distinction that can be rather fuzzy. But taken together, these findings should give pause to investigators and others who think that they are extracting recalcitrant, accurate memories from witnesses and suspects by using techniques that resemble the ones that psychologists have studied. The danger lies in planting the seed of suggestion that then takes root and grows into a mighty false memory that has the power to convict an innocent person.

**MEMORY FOR PEOPLE**

A n eyewitness’s identification of a particular person as the one who committed a crime is a powerful form of evidence. A n eyewitness who says “That’s the man I saw pull the trigger” is providing direct evidence of guilt. Even fingerprints are not direct evidence of guilt because they indicate only that a given person touched a given surface, and there might have been many innocent ways to have touched the surface. Hence, although most evidence in courts of law is circumstantial, eyewitness identification evidence is direct evidence of guilt. Eyewitness researchers’ concern about the accuracy of eyewitness identification evidence is grounded in two broad observations. First, eyewitness experiments involving staged crimes show that rates of mistaken identification can be very high under certain conditions that are often present in real-life cases (Wells, 1993). Second, real-world cases in which people have been convicted of crimes that they did not commit show that mistaken identification was the primary evidence leading to their conviction (Huff, Ratner, & Sagarin, 1986; Scheck et al., 2000; Wells et al., 1998).

**Variables Affecting Identification Accuracy**

How do mistaken identifications happen? Like most important phenomena, there are multiple causes. The scientific approach to studying the causes of mistaken identification has generally been to isolate suspected variables in controlled experiments. The list of variables that have been shown to affect rates of mistaken identification is rather large. One common approach to organizing the findings has been to categorize the variables into witness characteristics (e.g., sex, intelligence), event characteristics (e.g., exposure duration, presence of a weapon), post-event variables (e.g., suggestions from other witnesses, exposure to a sketch), characteristics of the identification task (e.g., structure of the lineup, instructions to witnesses prior to viewing the lineup), and post-identification events (e.g., feedback to the eyewitness regarding the identification). We refer to this as the chronological approach because the categories are ordered in the temporal sequence in which they unfold. Another way to organize these variables is according to whether they are controllable by the criminal justice system in actual cases (e.g., the structure of a lineup) or are not controllable in real cases (e.g., exposure duration), which is known as the system-variable versus estimator variable distinction (Wells, 1978). Wells and Olson (2001) suggested yet another distinction among eyewitness identification variables: between suspect-bias variables and general impairment variables. A suspect-bias variable is one that can account for why an eyewitness, when presented with a lineup, selected the innocent suspect rather than one of the fillers in the lineup (or simply saying “I don’t know” or “None of these people”). A general impairment variable, on the other hand, cannot account for which person the suspect picked, but can account only for poor eyewitness performance more generally. Consider, for instance, the other-race effect: There is now rather good evidence that
people have more difficulty identifying persons of another
race than their own race (Meisner & Brigham, 2001). The other-race effect is a general impairment variable in the sense
that it cannot account for why the witness would select the specific suspect in the lineup rather than one of the fillers in
the lineup. (This example assumes, of course, that all members of the lineup are of the same race, and a race different from
that of the eyewitness.)

However, consider the problem of structurally biased lineups. In a structurally biased lineup, the suspect fits the
description that the eyewitness had given of the culprit, whereas the fillers (known innocents, distractors, or foils) do not.
Structural lineup bias is a suspect-bias variable rather than a general impairment variable because it can account for why
the eyewitness selected the suspect rather than one of the lineup fillers. Table 25.1 lists a number of variables known to
affect the accuracy of eyewitness identification. Although not exhaustive, this list includes the variables that have been
studied most often. Each variable is then listed according to each of the three types of categorization. The last column
of Table 25.1 lists one representative publication dealing with each variable. We recommend a meta-analysis by Shapiro
and Penrod (1986), which included many of these variables, for information on estimates of

<table>
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<tr>
<th>TABLE 25.1 Eyewitness Identification Variables and Their Categories</th>
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<tr>
<td>Variable</td>
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<tr>
<td>Witness intoxication</td>
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<td>Witness sex</td>
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<td>Witness intelligence</td>
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<td>Witness personality</td>
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<tr>
<td>Face recognition skills</td>
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<tr>
<td>Source confusion (familiarity unrelated to crime)</td>
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<tr>
<td>View</td>
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<tr>
<td>Culprit disguise</td>
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<tr>
<td>Exposure time to culprit</td>
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<tr>
<td>Witness and culprit same versus different race</td>
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<tr>
<td>Weapon focus</td>
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<td>Retention interval</td>
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<tr>
<td>Mugshot exposure prior to lineup</td>
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<tr>
<td>Overheard descriptions</td>
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<td>Pre-lineup instruction warning that culprit might not be present</td>
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<tr>
<td>Fillers do not fit description</td>
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<td>Simultaneous versus sequential procedure</td>
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<td>Suggestive behaviors during lineup administration</td>
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<td>Post-identification feedback</td>
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Note: WC = witness characteristics, EC = event characteristics, PE = post-event factors, ID = identification test variables, PI = post-identification variables, S = system variable, E = estimator variable, GI = general impairment variable, SB = suspect-bias variable.
some control over the retention interval, such as when investigators show eyewitnesses a lineup that could have been conducted at an earlier point in time. Also, exposure to mugshots might normally be considered a general impairment variable because it generally interferes with the witness’s ability to keep the perpetrator’s face in mind later, when viewing the lineup. At other times, however, exposure to mugshots could be a specific-suspect-bias variable if it makes an innocent suspect seem familiar because he or she was seen in the set of mugshots.

Each of the three ways of categorizing eyewitness identification variables has a different utility. The chronological categorization assists in developing a temporal understanding of the order in which these variables come into play in the witnessing experience. The system versus estimator categorization is useful for developing methods for increasing the accuracy of eyewitness identification evidence via system variable recommendations to the justice system. The general impairment versus suspect-bias categorization is relevant to understanding how jurors might reason about eyewitness identification in a given case.

The relevance of the general impairment versus suspect-bias distinction to jurors’ judgments of eyewitness identification evidence requires more explanation. Consider a case in which it is argued to the jury that the eyewitness had a very poor view of the perpetrator, was of a different race than the perpetrator, and did not view a lineup until two months after the crime. Wells and Olson (2001) argued that these variables might not matter much to jurors when they deliberate because they fail to explain why the eyewitness picked the suspect out of the lineup and did not pick a filler. If the other-race effect made the lineup members “all look alike,” then how was the witness able to pick out the suspect? The problem with general impairment variables is that they tend to beg the question for the jury as to why the eyewitness picked the suspect instead of one of the fillers. Suspect-bias variables, on the other hand, tend to answer that question. A structurally biased lineup, for instance, serves to explain why the eyewitness preferred the suspect rather than one of the fillers. Hence, the general impairment versus suspect-bias variable distinction may be very useful in terms of understanding why some variables might be more important to jurors than others in terms of their willingness to accept identification testimony.

The Process of Lineup Identification

One of the simplest and most useful ideas in understanding mistaken identifications from lineups is the relative judgment conceptualization. According to this conceptualization, eyewitnesses tend to identify the person from a lineup who most closely resembles the eyewitness’s memory of the perpetrator relative to the other members of the lineup (Wells, 1984). This process of identification works reasonably well as long as the actual perpetrator is in the lineup. When the perpetrator is not in the lineup, however, there is still someone who looks more like the perpetrator than do the other lineup members, and eyewitnesses have a propensity to identify that person. There are several reliable phenomena that support the relative judgment conceptualization. For example, failure to give explicit instructions to the eyewitness that emphasize that the perpetrator might not be in the lineup leads eyewitnesses to pick someone from the lineup at high rates regardless of whether the perpetrator is present (Malpass & Devine, 1981). Even with these instructions, eyewitnesses tend to use relative judgments. For example, removing the perpetrator from a lineup without replacement leads most eyewitnesses who otherwise would have selected the perpetrator to instead select the “next best” person in the lineup rather than indicate that the perpetrator is not there (Wells, 1993). In addition, eyewitnesses who report that they used a relative comparison process (e.g., “I compared number three to number two”) or an elimination process (e.g., “I knew it wasn’t number one”) are more likely to have made a mistaken identification than are those who report that the face “just popped out” (Dunning & Stern, 1994). This makes sense to the extent that the relative judgment process is an effortful, deliberate elimination strategy whereas absolute judgments are automatic, rapid, true recognition responses.

Perhaps the best evidence that relative judgments are involved in mistaken identification comes from research examining simultaneous versus sequential presentation procedures for identifications. Simultaneous lineups are ones in which all members of the lineup are shown to the eyewitness at one time, whereas a sequential procedure involves showing the eyewitness one lineup member at a time and forcing him or her to make a recognition decision (yes or no) before viewing the next lineup member. The sequential procedure prevents relative judgments because, even though the eyewitness can compare the lineup member being viewed to those who have already been shown, the eyewitness cannot be sure what the next lineup member looks like and cannot even be sure how many more lineup members there are to be viewed. The sequential procedure forces eyewitnesses to use a more “absolute” criterion for making an identification. (Cutler & Penrod, 1988; Lindsay, Lea, & Fulford, 1991; Lindsay & Wells,
DNA exonerations are somehow a significant share of the convictions: the assumption that the 200 mistaken-identification procedures. Even more profound is that the Brewster case exemplifies the failure of courts to suppress eyewitness identifications that were obtained under clearly suggestive procedures. It is not contaminate the evidence. It exemplifies source misattribution error in which the witness attributed familiarity of Brewster’s face to the assault rather than the many times the witness had been shown Brewster’s photo. It exemplifies the failure of the investigators to accept earlier non-identifications of Brewster by the victim-witness. It exemplifies the failure of courts to suppress eyewitness identifications that were obtained under clearly suggestive procedures. Even more profound is that the Brewster case exemplifies a too-often-ignored fact about DNA exonerations: the assumption that the 200 mistaken-identification DNA exonerations are somehow a significant share of the mistaken identifications to be found. In fact, Brewster is not one of the DNA exonerations even though DNA proved him to be innocent. This is because the DNA test results were not known until the trial opened but, once known, the trial was halted and the charges were dismissed. The more than 200 DNA exonerations involving mistaken eyewitness identifications (innocenceproject.org, 2011) are cases in which the innocent person was convicted and imprisoned before DNA tests were completed. There is no way of knowing how many cases like Brewster’s have occurred. Moreover, estimates indicate that 5% or fewer cases involving eyewitness identification evidence have the potential to have DNA evidence that could “trump” the eyewitness (Smalarz & Wells, in press). Hence, for every one DNA-proven mistaken-identification exoneration discovered, there may be 20 undiscovered due to the absence of DNA to the innocence claim. The need for close collaboration between eyewitness researchers and the legal system is more apparent than ever.

CONCLUSIONS AND PROSPECTUS

We began this chapter with a metaphor in which human memory is likened to trace evidence. Although the legal system shows considerable concern and exercises caution to avoid contaminating physical traces at a crime scene (e.g., blood, fibers), similar cautions tend not to be exercised in avoiding the contamination of human memory in eyewitnesses. We have described research showing how suggestive questioning and suggestive lineup procedures can have immense effects on the testimony of eyewitnesses. Memories for events that never occurred are readily confused with memories for actual events, and mistaken eyewitness identifications are readily confused with accurate eyewitness identifications. Although there has been some recent success in getting many jurisdictions to make use of psychological science in its procedures for collecting eyewitness evidence (Wells, 2006; Wells et al., 2000), there remains a large gap between what psychological science advises for collecting eyewitness evidence and actual practices of criminal investigators in most jurisdictions.

Finally, we return to the case of Thomas Brewster, which was described above. That case exemplifies much of the eyewitness problem. It exemplifies the tragedy of mistaken eyewitness identification. It exemplifies the way the justice system seems to hold a dangerously incorrect theory of memory, a theory that assumes that all memories are permanent and that repeated suggestive procedures do not contaminate the evidence. It exemplifies source misattribution error in which the witness attributed familiarity of Brewster’s face to the assault rather than the many times the witness had been shown Brewster’s photo. It exemplifies the failure of the investigators to accept earlier non-identifications of Brewster by the victim-witness. It exemplifies the failure of courts to suppress eyewitness identifications that were obtained under clearly suggestive procedures. Even more profound is that the Brewster case exemplifies a too-often-ignored fact about DNA exonerations: the assumption that the 200 mistaken-identification DNA exonerations are somehow a significant share of the mistaken identifications to be found. In fact, Brewster is not one of the DNA exonerations even though DNA proved him to be innocent. This is because the DNA test results were not known until the trial opened but, once known, the trial was halted and the charges were dismissed. The more than 200 DNA exonerations involving mistaken eyewitness identifications (innocenceproject.org, 2011) are cases in which the innocent person was convicted and imprisoned before DNA tests were completed. There is no way of knowing how many cases like Brewster’s have occurred. Moreover, estimates indicate that 5% or fewer cases involving eyewitness identification evidence have the potential to have DNA evidence that could “trump” the eyewitness (Smalarz & Wells, in press). Hence, for every one DNA-proven mistaken-identification exoneration discovered, there may be 20 undiscovered due to the absence of DNA to the innocence claim. The need for close collaboration between eyewitness researchers and the legal system is more apparent than ever.

REFERENCES


