Conviction of the Innocent
Lessons From Psychological Research

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Some eyewitness identifications are accurate identifications of guilty individuals, and some eyewitness identifications are misidentifications of innocent individuals. The focus of this chapter is on determining when eyewitness identification is more likely to be correct or incorrect, and what methods of inquiry and empirical evidence best inform this decision. The research is clear that although the majority of jurors and judges consider eyewitness identification to be the most persuasive type of evidence administered in criminal cases (Chapter 9, this volume; Wells & Olson, 2003), there is a growing body of research that highlights the fallibility of eyewitness memory. For example, the forensic research on postconviction DNA exonerations has revealed that of the first 239 cases evaluated, 175 (73%) involved eyewitness misidentification, with 25% of these involving two eyewitnesses and 13% involving three or more eyewitnesses (http://www.innocenceproject.org/understand/Eyewitness-Misidentification.php). One might argue that forensic and legal practices are especially careful in capital cases. However, Radelet, Bedau, and Putnam
(1992) reviewed 400 wrongful convictions in capital cases and reported, "As for the causes of the errors, our research has shown that the two most frequent are perjury by prosecution witnesses and mistaken eyewitness testimony" (p. 18). It is clear that eyewitness misidentifications play a critical role in the study of wrongful convictions of the innocent.

Although these recent cases of wrongful conviction are compelling, the fallibility of eyewitness memory is not a new subject among psychologists (Munsterberg, 1908). The history of the role of psychologists in the court is important because it reflects basic perceptions of the role of science in legal decision making. In his book, *On the Witness Stand*, Hugo Munsterberg (1908) presented scientific research demonstrating the unreliability of eyewitness perception and memory, and he argued that scientific psychology had much to offer the legal community. Attorneys and legal scholars were outraged with Munsterberg's suggestion that legal decisions should be influenced by psychological research. For example, Attorney Charles C. Moore (1907) wrote,

> Among the legal professions it is familiar learning that experiments are valuable only when the conditions are fairly identical with those attending the occurrence under investigation. . . . Imagine him [Munsterberg] butting in with his so-called scientific experiments to appraise the testimony of a witness. (p. 127)

Relevant to the thesis of this chapter, Moore's principal argument concerned the value of the scientific method and whether it contributed anything more valuable than the common sense. "On almost every topic that has a proximate and practical relation to the trustworthiness of testimony delivered in court, the judges have the psychologists 'beaten a mile'" [sic] (p. 40). Similar views were also presented by John Henry Wigmore, a leading jurist and expert in the law of evidence in the early 20th century. Wigmore (1909) argued against the utility of the methods available to psychologists for evaluating the reliability of eyewitness accounts. Although today Munsterberg receives high praise for his research on eyewitness memory, in fact, Wigmore and Moore apparently won the debate against Munsterberg at the time: The period from the 1920s to the 1960s was largely devoid of eyewitness memory research, and expert testimony on this topic in courts of law did not obtain general acceptance until the 1990s.

**SCIENTIFIC PSYCHOLOGICAL FOUNDATIONS AND SCIENTIFIC METHODS USED IN EYEWITNESS MEMORY RESEARCH**

The purpose of this chapter is to examine the research methods that have been used by eyewitness memory researchers and summarize the findings of this research, regarding the factors that affect the accuracy of eyewitness memory
and identification. To do this, we should first briefly consider the question of why scientific research is needed to assess when eyewitness identifications are more likely to be correct or incorrect. Isn’t this a matter of common sense? In fact, judges regularly rule to exclude the testimony of eyewitness expert witnesses because they consider many components of their testimony to be common sense and known by the jury (Benton, Ross, Bradshaw, Thomas, & Bradshaw, 2006). However, people make different “commonsense assumptions” about the reliability of eyewitness evidence. In addition, although jurors typically find eyewitness evidence especially compelling, and prosecutors tend to rely on the general veracity of eyewitness evidence, defense attorneys tend to be more suspicious about the reliability of eyewitness evidence (for a review, see Read & Desmarais, 2009). Thus, in the absence of commonsense agreement, it is important to have an objective system for determining when an eyewitness is more or less likely to be reliable. Empirical scientific research provides this objective system.

What are the scientific research methods that have been used by eyewitness memory researchers? Most of the research on this topic has been conducted by using the experimental method, whereby independent variables are manipulated to study their effect on specific dependent variables, usually correct identification rates (e.g., hit rate data) and incorrect identification rates (e.g., false-alarm rate data). Although the experimental method is the gold standard for scientists, for reasons explained below, other methods that are more directly linked to real eyewitnesses in real crimes are often considered more convincing to jurors and legal professionals. This chapter focuses on three methods for conducting eyewitness memory research: (a) the case study, (b) archival methods, and (c) experimental methods and meta-analyses thereof.

The Case Study

A case study is an in-depth study of a single individual or incident. Cognitive psychologists know that people find case studies to be especially compelling and remember them far better than the results of scientific experiments. But is the case study method a reliable one for identifying generalizable information regarding factors that affect the reliability of eyewitness memory? One of the most highly cited case studies in eyewitness memory and identification is the study by Yuille and Cutshall (1986). Yuille and Cutshall analyzed the verbatim accounts of the eyewitnesses to a gun-shooting incident that occurred on a spring afternoon outside of a gun shop in Burnaby, British Columbia. A thief, who entered the gun shop in full view of several witnesses, tied up the proprietor and stole money and several guns. As the thief ran away, the proprietor freed himself and ran outside to get the license number of his car. However, the thief had not yet entered his car, and he fired two shots at the store owner.
Seconds later, the store owner discharged all six shots from his revolver and killed the thief. Witnesses to the event viewed the incident from along the street, from adjacent buildings and from passing automobiles. There were 21 witnesses who were interviewed by the police shortly after the incident. Thirteen of these witnesses were also interviewed by the researchers 4 to 5 months later. This case was available for research purposes because the thief was dead, the police files were closed, and the research study did not interfere with the judicial process. This case was also selected because numerous witnesses had observed the incident, and the veracity of their statements could be assessed in light of other forensic evidence that was available.

The primary results were that the eyewitnesses’ descriptions were very accurate and there was little change in memory over the 5-month period (note that this study did not involve eyewitness identification because recognition memory for the thief was never tested). This is not to say, however, that eyewitness memory is always accurate. When the findings of this case study were broken down more specifically in an attempt to identify specific factors that might predict when eyewitness memory is more or less reliable, the findings were not very helpful. For example, it is important to understand whether high levels of stress enhance or diminish the reliability of eyewitness memory, and there is a great deal of research on this point (see, e.g., Deffenbacher, Bornstein, Penrod, & McCorty, 2004). Yuille and Cutshall (1986) reported that “self-reports of event related stress were unrelated to memory” (p. 300), and prosecutors are quick to use this quote to argue that eyewitnesses are no less accurate when they are reporting a highly stressful event. However, in Yuille and Cutshall’s case study, the witnesses who reported a high level of stress were closer to and more involved in the violence than those who reported a lower level of stress. That stress and involvement in the incident were confounded in this study (i.e., they vary together and both affect eyewitness memory) renders any conclusions about the effect of stress on memory invalid.

The above conundrum is a methodological problem inherent in case study research. That is, the effect of specific eyewitness conditions—alone or in interaction with each other—can rarely be isolated because in any real-world event these conditions tend to be confounded with other contextual factors. Another difficulty in case study research is that a single event can only involve a limited set of conditions and a limited number of eyewitnesses. Thus, the generalizability of the findings from any one case study to other cases is limited.

Archival Methods

If conclusions from case studies of a single event are of limited value, perhaps value can be added by examining results from across many real-world
cases. However, such cases will only be of value if the ground truth (i.e., the facts of each witnessed event including who the perpetrator was) for each case is known, and with real-world criminal cases, this is often not possible. With this in mind, Behrman and Davey (2001) analyzed 271 actual police cases in Sacramento, California, and categorized the conditions under which “suspect identifications” were more or less likely to occur. These are cases in which the suspect—who may or may not have been the perpetrator—was identified by an eyewitness. However, in few, if any, of these cases was the ground truth known, and in fact some of their findings were inconsistent with results reported elsewhere in the research literature. For example, they reported that suspect identifications from photographic lineups were higher for cross-race (i.e., the race of the witness and the perpetrator are different) than same-race identifications. The majority of the previous experimental research indicates that cross-race identifications are less reliable than same-race identifications.

Although it is rarely possible to confirm accurate eyewitness identifications in real-world cases, that is, to determine which individuals identified by eyewitnesses are actually guilty, it is relatively easy to confirm inaccurate eyewitness identifications (or which identified individuals are actually innocent). Several archival studies of eyewitness accuracy have focused on cases in which eyewitnesses positively identify from a lineup one of the filler individuals. Often the filler individuals are people who were actually incarcerated at the time of the crime, so selecting one of these individuals is clearly a misidentification. Several archival studies have been published that assessed patterns of misidentifications of filler individuals in lineups. Wright and McDaid (1996) analyzed the outcomes of 1,561 lineups in London and found that 19.9% of the eyewitness identifications were of fillers. One result by Behrman and Davey (2001) is relevant here. They reported that 24% of live lineup identifications were selections of fillers. This is similar to the reports of Valentine, Pickering, and Darling (2003), who analyzed 119 lineups in London and found that 21.6% of the eyewitnesses identified fillers. Although archival studies of cases of filler identifications are useful in documenting that misidentifications are quite common in real-world criminal cases and cause for concern, results from such studies do little to help us understand the conditions under which eyewitnesses are more or less likely to be accurate.

Another body of archival research from which more informative findings have resulted is the forensic research on postconviction DNA exonerations by the Innocence Project referenced earlier in this chapter. This research not only documents that eyewitness identifications are likely to occur (of the first 239 cases evaluated, 73% involved eyewitness misidentification) but also, given the data available, that researchers are beginning to assemble and statistically analyze data sets to assess factors most likely to be associated with inaccurate
eyewitness identifications (Garrett, 2008). These findings will help predict eyewitness identification accuracy for individual real-world cases.

**Experimental Methods**

An experimental study is one in which the effect of specific independent variables (e.g., exposure time, time delay, prior familiarity with the perpetrator) on specific dependent variables (e.g., correct identification of the perpetrator, false-alarm rate to innocent fillers) is assessed under conditions in which the confounding effect of other extraneous variables is controlled. Further, in an experimental study, participants are randomly assigned to conditions to exclude the confounding effect of subject variability. Only if researchers conduct an experimental study can they draw causal conclusions, and causal conclusions permit more accurate prediction. This is why the experimental methodology is the gold standard in science.

Why are causal conclusions important? The purpose of science is to help understand the relationships among variables so that some variables can be used to predict others. Assume that we are interested in predicting what changes to our diet will result in weight loss. One research approach to assessing this relationship would involve doing a large cross-cultural assessment of which cultural groups tend to have thin builds and which do not and then assessing dietary differences among these groups. In such an analysis, a researcher might find that Japanese people tend to be thin, and they eat significantly more tofu than do other cultural groups. This would be a correlational study because no variable is manipulated under controlled conditions. Another research approach would be to test the hypothesis that, for example, a lower calorie diet leads to more weight loss. In this approach, half of the participants would be randomly assigned to one treatment group in which, for example, they would be limited to a 2,500-calorie-a-day diet; the other half would be randomly assigned to another treatment group and limited to a 1,800-calorie-a-day diet. Over time, the two groups would be compared on weight loss. In such an analysis, a researcher is likely to find that people in the lower calorie condition had more weight loss than those in the higher calorie condition. This would be an experimental research design.

The results of the correlational study suggest that if people eat more tofu then they will lose weight, but this conclusion is incorrect. The reason Japanese people tend to be thin is because they eat a lower calorie diet, not because they eat more tofu, per se. In other words, eating more tofu does not cause one to lose weight. On the other hand, the results of the experimental study suggest that if people eat a lower calorie diet then they will lose weight, and this conclusion is correct. In the experimental design, extraneous variables have been excluded so that a causal relationship between the independent vari-
able (diet) and the dependent variable (weight loss) can be concluded. Causal relationships permit prediction. In this case, it can be predicted that eating a lower calorie diet will lead to weight loss.

What is the advantage of doing eyewitness memory research by using an experimental design? In other words, why does it matter in eyewitness memory research whether we can make causal conclusions or not? A good example of how not using an experimental study can be misleading is the archival study by Valentine et al. (2003), mentioned previously. They analyzed 119 lineups conducted in London and reported that cross-race identification, weapon focus, and time delay had no significant effect on identification rates for foils or suspects. These findings are inconsistent with the results of numerous experimental studies. Does this mean that experimental studies are not reliable and archival studies are reliable? This is probably not the conclusion. Rather, the findings of Valentine et al. likely resulted because in the specific cases included in their database other extraneous variables confounded these conditions and eliminated the effects. This would occur, for example, if in the cross-race cases sampled, eyewitnesses tended to have more time to observe the perpetrator than in the same-race cases. In a later section of this chapter, Relevant Research on Eyewitness Memory, the major findings on this topic are presented, findings primarily from studies in which experimental methods have been used.

The major limitation of eyewitness memory studies conducted by using the experimental method is ecological validity. That is, based on differences between the circumstances of real-world crimes and the circumstances in typical eyewitness memory studies, the results of the research studies may be of limited generalizability. However, experimental tests of this claim have received little support. For example, several critics are concerned that results of studies with college students may not generalize to those of typical crime victims. However, O'Rourke, Penrod, Cutler, and Stuve (1989) compared the effect of numerous eyewitness factors across student and nonstudent samples, ranging in age from 18 to 74 years old. O'Rourke et al. (1989) found consistent findings across subject populations. Also, in Bornstein's (1999) meta-analysis, 21 of the 26 jury decision-making studies, sampling both undergraduates and community representative mock jurors, found no main effect of participant sample; and of the five studies that did show an effect, the differences were inconsistent. Others have been concerned that mock trials may be a poor approximate to real trials for assessing the effectiveness of certain types of testimony. However, Pezdek, Avila-Mora, and Sperry (2010) reported no differences in mock jurors' perceptions or verdicts as a function of trial presentation modality. Thus, although there are certainly differences between real-world crimes and the circumstances in typical eyewitness memory studies, it appears that these differences are not likely to interact with experimental variables manipulated and thus are not likely to limit the generalizability of the findings.
Meta-Analyses of Experimental Findings

Forensic scholars should also be familiar with another methodology: meta-analysis. If numerous experimental studies have been conducted on a particular topic, with perhaps some studies finding a strong effect, others finding a weak effect, and still others finding no effect, it will be useful to do a statistical analysis pooling results across these studies to see (a) how strong the effect is on average and (b) what secondary variables are associated with the strength of the effect. For example, numerous studies have examined eyewitness identification accuracy in same- versus cross-race conditions, and although same-race identifications tend to be more accurate than cross-race identifications the effect is inconsistent across studies. To help clarify the conclusions across these studies, Meissner and Brigham (2001) reviewed 39 research studies on cross-race identification. In terms of correct identifications, averaged across these studies, eyewitnesses were 1.4 times more likely to correctly identify someone from their own race whom they had previously viewed than someone from a race other than their own whom they had previously viewed. In terms of misidentifications, selection of the wrong suspect was 1.56 times more likely with other-race individuals than with same-race individuals. This meta-analysis, therefore, allows conclusions that are likely to be more reliable than the results of any of the 39 single studies that contributed to it. Meissner and Brigham also found that, across studies, certain factors such as exposure time influence the magnitude of the cross-race effect.

Numerous meta-analyses have been published to assess the strength of eyewitness memory factors. Some of these are mentioned in the section on Relevant Research on Eyewitness Memory. On a large scale, Shapiro and Penrod (1986) conducted a meta-analysis of all facial identification studies published at that time. These included 128 eyewitness identification and facial recognition studies that included 960 experimental conditions and 16,950 subjects. In this analysis, the effect size for each of 19 different independent variables was assessed and pooled across studies. Conclusions were then made about which of these variables were significant in predicting correct hit rates to targets and false-alarm rates to nontargets, and further, the size of the effect of each variable was assessed.

There are several statistical methods for conducting meta-analyses (for an easy-to-understand summary of these methods, see Cutler & Penrod, 1995). Typically, though, meta-analyses involve effect-size analyses expressed in $d$ units (i.e., the difference in means between conditions divided by the standard deviation). A $d$ value of 0.00 indicates no effect; an absolute value larger than 0.00 indicates better recognition in one condition than another. Although meta-analyses allow researchers to draw conclusions that are likely to be more generalizable than those drawn from any single study, it should be considered...
that the value of a meta-analysis ultimately depends on the validity of the results of the individual studies pooled.

RELEVANT RESEARCH ON EYEWITNESS MEMORY

The research on eyewitness memory typically focuses on specific psychological factors that affect the accuracy of eyewitness memory either alone (i.e., statistical main effects) or in interaction with other factors (i.e., statistical interactions). Although most of this research focuses on the main effects of these factors, in this analysis readers are encouraged to consider how these factors are likely to interact as well. The eyewitness factors are generally divided into two classes of variables: estimator variables and system variables. Estimator variables are those that are not under the control of the criminal justice system and include characteristics of the witness and characteristics of the observed event. System variables are those that are under the control of the criminal justice system and relate to how a witness was interviewed and the conditions under which an identification was made. There are excellent reviews of the research on factors that affect the accuracy of eyewitness memory, including the meta-analysis by Shapiro and Penrod (1986), and reviews by Wells, Memon, and Penrod (2006) and Wells and Olson (2003). In the remainder of this chapter, I summarize this research and focus on conceptualizations of the interactive effects that these factors are likely to have. First, as background, I summarize the independent effects of these psychological factors. However, because the research on system variables is covered elsewhere (see Chapter 6, this volume), this research is not presented here.

Estimator Variables That Are Characteristics of the Observed Event

It is generally true that characteristics of the observed event have a greater impact on eyewitness memory than characteristics of the eyewitness. This is because even eyewitnesses with excellent visual memory are nonetheless likely to have impaired memory for a perpetrator if they observe him under poor conditions and are not tested until weeks or months later. It should be pointed out that most eyewitness identifications occur from a photographic lineup, in which the face of a suspect is presented along with five filler faces. Thus, at the most basic level, eyewitness identification is going to be affected by how clearly the eyewitness sees the perpetrator’s face to begin with. This is called the perception stage of memory. The perception stage is primarily affected by how long the eyewitness has to look at the face of the perpetrator, at what distance, and under what lighting conditions.
Exposure Time, Distance, and Lighting

Although few would disagree that an individual cannot be observed in detail when seen from several hundred feet away, after dark, or if the source of lighting is behind the perpetrator’s face, the effect of brief exposure time is less obvious. If, for example, individuals incorrectly believed that eyewitness memory works like a camera, then they might assume that whether an eyewitness viewed a person for a long time or a brief duration, the eyewitness’s “picture” would still be preserved in memory. This assumption is incorrect. A wealth of research exists on the effects of exposure time on eyewitness memory. In their meta-analysis of facial identification studies, Shapiro and Penrod (1986) reported a linear trend between exposure time to a face and the probability of correctly identifying the face. Memon, Hope, and Bull (2003) demonstrated this effect under reasonably ecologically valid conditions. They had mock witnesses view a realistic videotape of a crime in which the perpetrator was visible for either 12 or 45 s. Tested only 40 min later, the probability of a correct identification in the target-present arrays (the real perpetrator was included in the lineup) was vastly higher in the 45-s than in the 12-s condition (90% vs. 32%), and the probability of an incorrect identification (i.e., a false alarm) in the target-absent arrays (the real perpetrator was not included in the lineup) was significantly higher in the 12-s than in the 45-s condition (85% vs. 41%). However, if an eyewitness observed a shooter for 45 s, but the eyewitness was 150 feet away after sunset, together, the interaction of these factors would not favor an accurate identification.

Weapon Focus

Weapon focus refers to the fact that when an eyewitness’s attention is drawn away from a perpetrator’s face to a weapon, this decreases the probability that the perpetrator will be correctly identified later. A weapon is an especially salient form of distraction that consequently decreases exposure time to the perpetrator’s face. Loftus, Loftus, and Messo (1987) recorded subjects’ eye movements when they looked at a series of slides depicting an event in a fast-food restaurant. When a handgun was present in the slides, eyewitnesses made more fixations on the gun, and the fixations were of longer duration than when the gun was replaced by a bank account check. Subsequently, when eyewitness memory was tested with a 12-person photographic lineup, eyewitnesses were significantly less likely to identify the perpetrator in the gun (.15) than the check (.35) condition. This effect was also confirmed by Steblay’s (1992) meta-analysis of 19 studies on weapon focus. This analysis indicated that the weapon focus effect was larger in target-absent lineups (higher false alarm rates to filler faces when the perpetrator was not in the lineup) and when memory was impaired by other conditions, such as the factors discussed in this chapter. This is another example of how eyewitness factors interact to affect identification accuracy.
Disguise

Often people try to disguise their appearance when they commit a crime, by wearing a hat, sunglasses, or a hood. In a number of research studies it has been reported that even these relatively commonplace disguises effectively reduce eyewitness identification accuracy. In one such study (Cutler, Penrod, & Martens, 1987), individuals viewed a videotape of a store robbery in which the robber wore a knit cap that covered his hair and hairline or had no cap. In a later videotaped lineup, the robber was less accurately identified when wearing the cap than not (hit rate = .27 vs. .45). Findings in Shapiro and Penrod's (1986) meta-analysis confirm that any alteration in a face from when it was initially viewed until it was presented in a lineup will impair eyewitness identification accuracy (this is the variable that they call transformation). However, disguises to upper facial features (i.e., eyes, forehead, hairline) are more likely to impair eyewitness memory than those to lower facial features (i.e., mouth, chin, nose) because upper facial features tend to play a more critical role in face perception and are more likely to be recognized later (Davies, Shepherd, & Ellis, 1979).

Time Delay

Regardless of how well an eyewitness perceives an individual initially, the chance of an accurate identification will dissipate with the passage of time. Knowing this, police officers typically work diligently to apprehend a suspect in the hours and days immediately following a crime while eyewitness memory is more likely to be preserved. The results of a large number of studies support the detrimental effect of time delay on eyewitness memory. It is clear from Shapiro and Penrod's (1986) meta-analysis that longer delays led to fewer correct identifications and more false identification.

A lesser known fact about the relation between time delay and memory is an effect known as Jost's law (see Britt & Bunch, 1934). According to Jost's law, weaker memories fade more quickly than stronger ones. Given that older memories are weaker than newer memories, this suggests that the passage of time following a crime will have a greater effect on eyewitness memory for faces perceived poorly and with less detail than for those perceived more clearly and with more detail. This is an example of the interactive effect of psychological factors on eyewitness memory.

Estimator Variables That Are Characteristics of the Witness

Although characteristics of the eyewitness generally have a lesser impact on eyewitness memory than characteristics of the observed event, several characteristics of the witness are significant and should be taken into consideration.
Witness Confidence

A case is more likely to go to trial if the eyewitnesses are confident in their identifications, because attorneys know that confident witnesses are perceived to be more compelling to jurors. However, is it true that more confident eyewitnesses are likely to be more accurate eyewitnesses? In a meta-analysis of the research on the accuracy-confidence relationship, Sporer, Penrod, Read, and Cutler (1995) found that across 30 studies on this topic, the accuracy-confidence relationship was $r = .29$. Although this correlation is statistically significant, it accounts for only 8% of the variance in eyewitness accuracy.

However, Sporer et al. (1995) reported a stronger accuracy-confidence relationship when they limited their analysis only to individuals who chose to make identifications. The accuracy-confidence rate for these “choosers” is more forensically relevant because the individuals who are more likely to testify in court are those who chose someone from a prior lineup, field showup, or some other type of identification test. Among the choosers, the accuracy-confidence relationship was $r = .41$. How can an eyewitness expert help a jury understand what a .41 correlation means? Wells, Olson, and Charman (2002) suggested that one way to think about this correlation is to draw the comparison to a similar relationship for which the correlation is in this same range. Using U.S. Department of Health and Human Services data, they reported that the correlation between a person’s height and gender is $r = .43$. Thus, if we assume that eyewitnesses make accurate identifications about 50% of the time, encountering a highly confident misidentification would be about as common as encountering a tall female or a short male person. Presenting the accuracy-confidence relationship to a jury in these terms would help diminish the sanctity of a highly confident eyewitness.

It is also important to recognize that witness confidence is malleable. Typically, given that witness memory declines with the passage of time, it would be predicted that witness confidence decreases as well. However, occasionally witness confidence increases over time, for example, from an identification at a field showup (“He looks like the perpetrator”) to the live lineup (“I think that’s him; yes, that’s him”) to testimony at the trial (“I’m sure that’s the man who robbed me at the ATM”). When this occurs, it is usually a red flag that something in addition to eyewitness memory is at play. For example, it has been reported that repeatedly questioning eyewitnesses inflates their confidence without affecting the accuracy of memory (Shaw, 1996). Also, if after making an identification (whether correct or incorrect), eyewitnesses

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1A field showup is the identification procedure most often used by police, in which an eyewitness is presented a suspect and asked if he or she can identify this suspect. Statistically, this is similar to a true-false test, where you have a 50% chance of being correct if you just guess. The advantage of a field showup is that it can be conducted quickly to avoid time delay.
are provided feedback that they are good witnesses, their subsequent confidence is likely to increase (Chapter 7, this volume; Wells & Bradfield, 1999). By the time that most witnesses testify in court, they have been questioned multiple times, and it would not be surprising to learn that along the way they have either inadvertently or directly received feedback that they "picked the right guy." This alone can explain why many eyewitnesses are so confident in their identification in court in front of the jury.

Cross-Race Identification

One of the strongest witness characteristics associated with identification accuracy is whether the race or ethnicity of the eyewitness and the perpetrator is the same or different. This conclusion follows from the meta-analysis of Meissner and Brigham (2001) discussed earlier in the section on meta-analyses. The cross-race effect has also been reported to be consistent across age. Pezdek, Blandon-Gilitin, and Moore (2003) compared kindergarten children, third graders, and young adults in their ability to identify a Black and a White individual from a six-person lineup after a 1-day delay. Similar sized cross-race effects were reported at each age level.

Meissner and Brigham's (2001) meta-analysis of the cross-race memory research also identified several variables that moderate the cross-race effect. For example, people often want to know whether the cross-race effect is greater for individuals who have lived in racially segregated areas than for those who have lived in racially mixed areas. Although the cross-race effect is somewhat reduced by exposure to other-race individuals, the effect of other-race contact on reducing the false-alarm rate to other-race faces is modest. People also wonder whether the cross-race effect is related to one's racial attitudes. There is no evidence of a direct influence of racial attitudes on the ability to recognize other-race faces. There is, however, a significant interaction of the cross-race effect with exposure time to the target faces. Meissner and Brigham (2001) reported that increased viewing time reduced the disadvantage for cross-race faces; that is, when a witness had more time to view a perpetrator, the false-alarm rate to other-race faces decreased. The cross-race factor influences false-alarm rates less when the other-race target face is observed for a longer period of time. This finding is interesting because it suggests an interaction among eyewitness factors such that eyewitness identification accuracy would be expected to be especially unreliable when multiple deleterious eyewitness factors co-occur.

Eyewitness Stress

In presenting an eyewitness to a jury, the prosecutor frequently claims that certainly the eyewitness would be reliable given the high rate of stress that
focused her attention during the incident. Ironically, the research evidence clearly suggests that under high levels of stress, eyewitness memory is less—not more—reliable. This conclusion follows from a meta-analysis by Deffenbacher et al. (2004). Included in the meta-analysis were 36 tests of the effects of stress on recall of crime-related details and 27 tests of stress on person identification. High levels of stress significantly impaired both types of memory, and the effect of stress was greater on (a) reducing correct identification rates than (b) increasing false-alarm rates.

Prosecutors also frequently argue that findings of impaired memory under high levels of stress are restricted to laboratory tests of face recognition memory and have little to do with the high stress of a real crime. This does not appear to be true. First, in the meta-analysis by Deffenbacher et al. (2004), the effects of stress were actually significantly higher in eyewitness identification studies that involved staged crimes than in those that involved laboratory face recognition tasks. Also, in one of the most impressive real-world studies of the effects of high stress on face recognition accuracy (Morgan et al., 2004), high levels of stress impaired eyewitness memory. In their study, more than 500 active duty military personnel were tested on their ability to recognize two individuals, each of whom had interrogated them for 40 min as part of a prisoner-of-war survival training program. After 12 hr of confinement, each participant experienced both (a) a high-stress interrogation in which questioning was accompanied by physical confrontation, and (b) a low-stress interrogation without physical confrontation. A different individual had interrogated them in each condition. One day later, after recovering from sleep and food deprivation, each participant was tested on memory for the two interrogators by using a live lineup or a photographic lineup. Correct identifications were significantly lower and incorrect identifications were significantly higher under the high- than the low-stress condition.

**Intoxication of Witness**

It has long been known that alcohol consumption impairs cognitive functioning, including memory (Parker & Noble, 1977), but how does alcohol affect eyewitness memory? It is not unusual for an eyewitness to a crime to be intoxicated; this would be common in late-night fights, drug deals that have gone bad, and home-invasion robberies. The results of two studies suggest that alcohol impairs eyewitness memory and identification. In the first of these studies, the eyewitnesses were intoxicated or sober only at the time that they observed the perpetrator. In this study, Read, Yuille, and Tollestrup (1992) had intoxicated and sober individuals view a staged crime, and then 1 week later (when sober) they tested their memories for the perpetrator by using a six-person lineup. Overall, alcohol reduced the probability of correctly
identifying the target individual but did not affect false-identification rates. In a second study, Dysart, Lindsay, MacDonald, and Wicke (2002) reported that intoxicated eyewitnesses were less reliable than sober eyewitnesses, especially if they were intoxicated both at the time of observation and test. This would occur, for example, if an intoxicated eyewitness was presented a field showup shortly after observing an incident. They reported that under these conditions, although blood-alcohol level was not significantly related to correct identification of the target individual when the eyewitness was shown a target-present showup, when presented a target-absent showup, the false identification rate was vastly higher in the high (52% misidentification) than the low (22% misidentification) blood-alcohol level condition. From these two studies it is clear that sober eyewitnesses are more accurate than intoxicated eyewitnesses, whether they are tested with a one-person showup or a six-person lineup, and whether they are intoxicated or sober when tested. However, additional research is necessary to flesh out the mechanisms by which alcohol affects eyewitness memory.

In another study, Assefi and Garry (2003) assessed the effect of alcohol on the suggestibility of eyewitness memory. Individuals drank plain tonic water, but half were told that it was vodka and tonic. They all then participated in an eyewitness memory experiment in which misleading postevent information was suggested. Individuals who were told that they had consumed vodka were significantly more likely to be swayed by the suggested information than were control subjects. This finding suggests that eyewitnesses who simply believe that they are intoxicated are more likely to be misled by information that they heard from other eyewitnesses or police officers than are eyewitnesses who believe that they are sober.

**Interactive Effects of Eyewitness Memory Factors**

Every eyewitness case involves the role of numerous variables, each of which is likely to affect the accuracy of eyewitness memory alone (i.e., a statistical main effect) and in interaction with other variables (i.e., a statistical interaction). First, consider the interactive effect of several estimator variables operating together (some of these have been discussed earlier in this chapter). As a general rule, eyewitness identification accuracy would be expected to be especially unreliable when multiple deleterious eyewitness factors co-occur. For example, we discussed Meissner and Brigham’s (2001) finding that the cross-race effect was especially detrimental to the accuracy of eyewitness memory when the viewing time was relatively short. If an eyewitness observed a perpetrator for a relatively brief time, the probability of being able to correctly identify the perpetrator is reduced but especially so if the perpetrator and the eyewitness are of different races. Also, as we discussed previously, if the briefly
observed perpetrator was 100 feet away rather than 10 feet away, the probability of correctly identifying the individual is even worse.

The delay factor also interacts with other estimator variables. As discussed above, based on Jost's law it can be predicted that weaker memories will fade more quickly than stronger memories. Thus, if, for example, an eyewitness is tested 3 months after a crime, this relatively long time delay will detrimentally affect memory more for a cross-race individual seen only briefly than for a same-race individual with whom the eyewitness had a face-to-face conversation for 15 min. Whether the combined effect of multiple estimator variables is cumulative (i.e., simply the sum of the effect of each variable alone) or interactive (i.e., the combined effect of the variables is some more complex function) is yet to be determined empirically. Nonetheless, in predicting the probability that an eyewitness identification is accurate, it is important to consider the full list of psychological factors operating in the case and the combined effect of these factors. It is rare that the accuracy of an eyewitness identification will rest with an appraisal of a single factor.

What about the interactive effect of estimator variables and system variables? As a general rule, when eyewitness memory is weak, system variables are likely to have a stronger impact. Consider the situation in which two coworkers in a doctor's office are having lunch. The office is closed, so when they hear some noise in the adjacent room, they walk over to see who might be there. When they see an unfamiliar man packing up a box, they ask him what he is doing. He claims to be looking for the restroom and leaves when confronted. The coworkers call the police, who have a suspect apprehended within 30 min. Both coworkers, standing together, confidently identify the defendant at a field show up at which they are told, "We've got him." Under the conditions of observation in this situation, these eyewitnesses would be expected to have a strong memory for the perpetrator—they were close to him, the lighting was good, they were face-to-face talking to him for about 45 s, their attention was directed to the perpetrator by the witnesses' suspicion, and they identified him only 30 min later. The witnesses should have been tested independently, and they should not have been given the biased comment "We've got him." Nonetheless, we have sufficient reason to believe that these witnesses have a strong and enduring memory for the perpetrator's face, and such a memory is less likely to be influenced by flawed system variables.

APPLICATIONS OF RESEARCH ON EYEWITNESS MEMORY

Psychological research on factors that affect the accuracy of eyewitness memory and identification can be used by the legal system in various ways that serve to increase conviction rates for individuals more likely to
be guilty and decrease conviction rates for individuals more likely to be innocent. Two such applications are presented here. The most obvious way that these research findings are applied is through eyewitness expert testimony. According to Federal Rule of Evidence 702, an expert witness is an expert in his or her field who by virtue of education, training, skill or experience has specialized knowledge in a particular area that has been determined to be beyond the stock of common knowledge and potentially of assistance to the jury. Basically, an eyewitness expert witness is usually called by the defense to testify during a trial in which the prosecution’s case against a defendant involves eyewitness evidence, evidence that is deemed dubious by the defense.

Most of the substance of the eyewitness-expert testimony pertains to what is referred to in the landmark California eyewitness case of People v. McDonald (1984) as “the psychological factors that may have impaired the accuracy of a typical eyewitness identification, . . . with supporting references to experimental studies of such phenomena.” Generally, this is done by having the expert present the estimator variables and system variables that are likely to have affected the reliability of the eyewitness identifications. For a detailed discussion of how eyewitness expert witnesses work with attorneys and what type of testimony they tend to give, see Pezdek (2009).

Another way that research findings on the accuracy of eyewitness memory and identification can be applied is through continuing education of prosecution and defense attorneys. Although the Sixth Amendment of the U.S. Constitution guarantees all criminal defendants the right to a trial, in fact, the majority of criminal cases do not result in a trial. Approximately 90% of criminal cases are resolved through plea bargaining, and it is crucial to assure that such bargains produce justice on both sides of the bar. Legal scholars suggest that attorneys’ decisions in regard to whether to plea bargain a case are largely based on the strength of the evidence against the defendant (Burke, 2007; Pritchard, 1986). When the evidence is weak, prosecutors are more likely to offer a plea bargain; when the evidence is strong, defense attorneys are more likely to recommend a plea bargain. However, in eyewitness identification cases, attorneys are not always accurately assessing the strength of the eyewitness evidence, because they are unfamiliar with the eyewitness memory research. Knowing what factors tend to be associated with accurate versus inaccurate eyewitness identification, prosecution and defense attorneys are more likely to discriminate accurately between strong and weak eyewitness evidence and thus avoid proceeding to trial with cases that might lead to convictions of the innocent. Police officers can also apply this knowledge in their investigations. With a better understanding of eyewitness memory, perhaps they would follow fewer false leads and put together stronger cases for prosecutors.
CONCLUSION

Eyewitness evidence is the leading cause of erroneous convictions of innocent individuals. Fortunately, there is now considerable scientific research on this topic, research conducted using rigorous scientific methods. This research, if effectively disseminated to jurors as well as prosecution and defense attorneys, could reduce conviction rates for the innocent. Although attorneys and forensic practitioners have historically been difficult to impress with scientific evidence, this is less likely to be true today. The impressive scope of the psychological research on eyewitness memory and identification has bolstered the admissibility of eyewitness expert testimony in court and expanded forensic continuing education opportunities in this area.

REFERENCES


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