The New Reality: Non-Eyewitness Identifications in a Surveillance World

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Abstract
Cognitive scientists have firmly established the risk of eyewitness misidentifications, and in response, courts have adopted legal safeguards to forestall this possibility; however, there are few safeguards against misidentifications by non-eyewitnesses. We define non-eyewitnesses as people who did not actually observe an event but nonetheless testify about who they think is depicted in a video of the event on the basis of their prior familiarity with the person they believe is depicted. In this review, we discuss the accuracy with which people typically recognize people from videos; in fact, these non-eyewitness identifications are far from perfect. We then explore seven factors that affect the accuracy of non-eyewitness identifications and organize these factors around three categories of bias—case-specific bias, person-specific bias, and general cognitive bias—that are likely to reduce the probability of a correct identification. We conclude with a proposed two-prong framework for determining the admissibility of non-eyewitness identifications in court and call for the adoption of legal safeguards against non-eyewitness misidentifications.

Keywords
eyewitness memory, eyewitness identification, surveillance video, bias, matching tasks

Cognitive science research has firmly established the risk of eyewitness misidentifications, and over the past several decades, there has been growth in research on factors that affect the accuracy of eyewitness identifications (e.g., Wells, 2020). Bolstered by these studies, researchers have made extensive recommendations for policies and procedures for collecting and preserving eyewitness evidence (e.g., Wells et al., 2020). And in the courts, there have been attempts to curb the risk of misidentifications, beginning in 1972 with Neil v. Biggers, with some courts evolving to embrace social science research in their jurisprudence, such as in the landmark case of State v. Henderson in 2011.

This article concerns a less obvious phenomenon that, although widespread, has gone largely unnoticed by the courts: non-eyewitnesses. We define non-eyewitnesses as people who did not actually perceive an event but nonetheless testify about who they think is depicted in a video on the basis of their memory for some prior encounters with that person. We focus on these identifications because in the courts, non-eyewitness identifications have long been subject to their own liberal standards of admissibility, essentially being admissible whenever the witness has any degree of familiarity with the defendant (State v. Gore, 2022).

We live in a world in which video recordings are ubiquitous—cell phones, body-worn cameras, doorbell cameras, surveillance cameras. It is not surprising, then, that many crimes are captured on video. An identification of the perpetrator in the video is made after the fact by a person who is at least somewhat familiar with the defendant—an acquaintance, a neighbor, often a law enforcement officer. (We will separately consider the case of jurors attempting to determine whether a perpetrator in a video is the defendant sitting before them.) How accurate are these identifications by non-eyewitnesses?

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One Surprising but Representative Finding

Consider a study by Megreya and Burton (2008). Participants viewed a person live or in a photo for 30 s. Immediately afterward, they viewed a 10-face photographic lineup. The correct identification rate was only 70%; in 30% of the trials, participants picked the wrong face. In other studies, even in a matching task with no memory involved, participants’ accuracy rate ranged from 68% to 85%. Further, in all of these experiments, there was no difference in accuracy between the live and the photo-presentation conditions. Even without memory being involved, participants’ accuracy rate was far less than perfect. When memory is involved, there is even more cause for concern. Although courts generally assume that non-eyewitness identifications are reliable and therefore that legal safeguards are unnecessary, clearly this is not the case.

Factors That Bias the Accuracy of Non-Eyewitness Identifications

The probability of an accurate identification will be reduced when eyewitness perception is biased. Cognitive biases are widespread (e.g., Tversky & Kahneman, 1974). They affect perception and decision making across all aspects of science, including forensic sciences (National Academy of Sciences, 2009). What factors should jurors and forensic practitioners consider when determining whether a non-eyewitness identification is likely to be biased rather than accurate? In a review of biases faced even by expert decision makers, Dror (2020) proposed three categories of bias: (a) case-specific biases that stem from the quality of the data and how the data are perceived, analyzed, and interpreted; (b) person-specific biases related to individual-differences factors and the education and experience of the person performing the task; and (c) general cognitive biases that arise from the nature of human cognition. Using Dror’s framework, we apply these three categories of bias to examine seven factors that specifically relate to the bias of non-eyewitness identifications, biases that are likely to reduce the probability of a correct identification. This framework is presented in Figure 1.

Fig. 1. Seven factors affecting bias in non-eyewitness identifications and the source of bias associated with each. The top two factors are associated with case-specific bias. The next two factors are associated with person-specific bias. The bottom three factors are associated with general cognitive bias. In the proposed two-prong framework for determining the admissibility of non-eyewitness identifications, the first factor is considered in Prong 1. The other six factors are considered in Prong 2. This framework and this figure were adopted from Dror (2020).

Category 1: case-specific bias

Case-specific cognitive bias relates to the quality of the data being assessed. With non-eyewitness identifications, this is the quality of the surveillance video image. Matching a poor-quality video to a suspect would make as much sense as using a smudged fingerprint to determine whether there is a match to a suspect. The quality
of the video image is perhaps the most important factor that affects non-eyewitness identification accuracy, yet it is a complex multidimensional factor. Surveillance video cameras are typically positioned high overhead (to maximize coverage and prevent theft). Consequently, the suspect is a significant distance from the camera, which often results in pixelated, low-resolution images and poor identification rates (Bindemann et al., 2013). Surveillance cameras are also likely to record events with indirect lighting, at nighttime, and often with obstructions between the camera and the suspect. Many surveillance videos also record the suspect in profile rather than in a full-frontal view, another factor associated with poor identification rates (Bindemann et al., 2013). Further, surveillance video recording and storage systems typically available in public settings produce poor image quality because of low resolution, excessive quantization, and low frame rate. Although surveillance video systems with high image quality are available, they are expensive and require excessive storage space (Maity et al., 2021).

With low-resolution images, the amount of information available is reduced and so is recognition accuracy. Lander et al. (2001) reported that participants’ accuracy identifying well-known celebrities from photographs was impaired when the number of pixels was reduced (i.e., reducing high spatial frequencies, an effect that is optically equivalent to increasing viewing distance) and when blurring of the faces was increased. The false-positive rate (i.e., erroneously judging an unknown person to be familiar) for photographs of unfamiliar faces was also higher with increased pixelation and blurring. Further, in this and other studies, a recognition advantage was reported for moving over static images; the extra information afforded by motion in the video benefited recognition.

**Category 2: person-specific biases**

Here, we consider three sources of person-specific bias that relate to individual-differences factors and the education and experience of the person performing the task.

**Familiarity.** A familiar person is one you have seen before regardless of whether you remember their name or where you encountered them. Bruce et al. (2001) assessed the advantage given by familiarity in a matching task in which participants viewed a short video clip of a person and judged whether a simultaneously presented photograph was of that same person. With familiar people, participants performed this matching task well, averaging 90% correct. However, when the person in the video was unfamiliar, matching accuracy was only 75% correct.

Although familiar people are more likely to be accurately identified than strangers, two caveats are important to consider, especially in a forensic context. First, familiarity is not an all-or-none dimension; it varies along a continuum. As described by Vallano et al. (2019), this continuum ranges from strangers to people who have been seen a few times, to people who have been seen regularly, to people who are well known. And, all things being equal, identification accuracy improves as familiarity increases.

Second, familiarity can introduce bias if a non-eyewitness incorrectly thinks they are looking at a person with whom they are familiar. In fact, people are not very accurate at determining who is familiar to them, even when looking at a high-quality image. Pezdek and Stolzenberg (2014) reported that people did not accurately judge whether yearbook photographs depicted students from their own small private high school. Although familiar students were more likely to be judged as familiar than unfamiliar, the accuracy rate at judging whom they had seen before was low (mean hit rate = .42; mean false-alarm rate = .23).

Together, these results suggest that when a non-eyewitness indicates that he or she recognizes someone from a video because they have seen them before, it is important to consider the circumstances related to the actual degree of familiarity claimed. How many times had the target person been seen? For what length of time was the non-eyewitness’s prior encounter with the target person? When was the target person last seen? Accordingly, the time delay between when a person was “recognized” and when they were last observed is highly relevant. One of the best-established principles of memory is that memory fades with the passage of time (Ebbinghaus, 1885/1964). Thus, if it has been a long time since I have seen a person, I will be less likely to recognize them accurately from a video.

**The cross-race effect.** A powerful person-specific cognitive bias affecting non-eyewitnesses stems from the cross-race effect. It is well known that eyewitnesses identify same-race faces more accurately than other-race faces, a finding reported across a wide range of classifications of race and ethnicity (Meissner & Brigham, 2001; Wilson et al., 2013). Surprisingly, however, the cross-race effect applies as well to face matching, where no memory for the initially seen face is involved. This result was first reported by Megreya et al. (2011). Egyptian and Caucasian participants simultaneously viewed a photograph of one person and a 10-person photographic lineup (that either did or did not include the target person). Half of the target faces were Egyptian; half were Caucasian. For both cohorts, matching accuracy was higher for same-race than other-race faces. When the target face was
included in the photographic lineup, the correct matching rate averaged 70% with own-race faces and 64% with other-race faces. When the target face was not included in the photographic lineup, another face was picked 34% of the time for own-race faces and 47% of the time for other-race faces. This finding is important because it suggests that the cross-race effect would likely occur for non-eyewitnesses, too, because it is a persistent finding across numerous identification tasks, including a basic matching task.

**Police officers as non-eyewitnesses.** Another person-specific cognitive bias relates to the education and training of the person in the role of the non-eyewitness. Laypeople erroneously assume that police officers are more credible than civilians when they testify in court and, further, that they are more accurate eyewitnesses (Benton et al., 2006). Neither of these assumptions is supported by the available data. Although most of the evidence on this point comes from eyewitness identifications, there is no reason to believe that the situation would be different with non-eyewitness identifications.

Lindholm et al. (1997) had officers (with up to 30 years of service) and college students view a film of a simulated violent robbery. In an eight-person photographic lineup that followed, there were no significant differences between the officers and the students in either the proportion of correct identifications or the proportion of misidentifications. Similarly, Burton et al. (1999) compared officers (with an average of 13 years of service) with students in a task akin to non-eyewitness identifications. Participants first viewed a series of 10 short video clips 2 times each. They then judged whether the man in each of 20 photographs was someone they had previously seen in the video clips. The officers did not differ from the students in their accuracy discriminating between seen and unseen faces in the videos. Pezdek and Reisberg (2022) provide a review of other studies that have reported similar results.

**Category 3: general cognitive biases**

The human brain uses a highly efficient but imperfect information-processing system. Because of capacity constraints, the brain does not process all incoming information; rather, shortcuts, known as heuristics, are frequently employed (Tversky & Kahneman, 1974). Some of these heuristics are likely to bias identifications by non-eyewitnesses.

**Priming.** A salient general cognitive bias encountered in non-eyewitness identifications, especially when police officers serve as non-eyewitnesses, is priming. In the typical procedure by which officers are asked to make an identification from a surveillance video, a still frame from a video is circulated, and officers are asked whether they can identify the perpetrator. Frequently, a statement is circulated along with the still that summarizes the crime and where it occurred. This statement might say, for example, “a purse-snatch occurred at the Powell Street BART station. The perpetrator was described as a tall, thin, White male in his twenties. Can you identify the perpetrator in the attached surveillance video still?” Statements such as this can provide cues that prime officers’ memory for who the suspect may be. Whom do they know that matches this description, hangs out around the Powell Street BART station, and has been accused of purse-snatching or related petty theft? In assessing the accuracy of a non-eyewitness identification, it is critically important to determine that the identification from the video is based solely on the visual information presented and not other potentially biasing factors.

This priming may also occur in the general population when an image is circulated on the news or online with context provided about the crime. Cognitive research has firmly established that our expectations bias what we see (see de Lange et al., 2018, for a review of this research). To make matters worse, once expectations have been formed, confirmation bias leads people to perceive and interpret new evidence to verify their preexisting beliefs. And these beliefs persist even after the evidence on which they were based is discredited (Anderson et al., 1980). Similar biases can also emerge from how non-eyewitnesses are probed when viewing an image. For example, it is preferable to ask a non-eyewitness, “Do you see anyone in the video whom you can recognize?” rather than, “Do you see Person X in the video?” The phrasing of the second question introduces bias that is avoided in the phrasing of the first question. Thus, even before viewing the video, a person may be biased by expectations that prime their memory for who is likely to be depicted. When this occurs, the task of the non-eyewitness is not strictly based on the visual information presented, thus increasing the risk of a false-positive error.

**Special case of identifications by jurors.** Here, we consider the situation of jurors in the role of non-eyewitnesses. Jurors can observe the defendant in court throughout a trial. At some point, they may be shown a surveillance video and asked to determine for themselves whether the defendant is the perpetrator in the video. Although this task seems straightforward on the surface, several factors are likely to bias their decision.

First, as stated above, the quality of the video will determine how well the defendant can be compared with the person in the video. Second, this is essentially a single-suspect identification, a condition discouraged
in guidelines for best practices (Neuschatz et al., 2016; Wells et al., 2020). When only a single suspect is shown, this, like a true/false test, presents a binary choice, with an innocent suspect having a 50% chance of being identified just by chance. Third, related to the issue of confirmation bias discussed above, the jury is likely to be biased by other trial testimony insinuating that the defendant is guilty. Leaving it up to the jury to determine whether the defendant is the person in the video comes with its own concerns and biases. Given how compelling identifications are to jurors (for a review, see Boyce et al., 2007), leaving the jury to make the determination on its own would nonetheless be preferable to admitting unreliable non-eyewitness identifications. The framework proposed below was developed to prevent unreliable non-eyewitness identifications from being presented to the jury. Given the structure of a trial, it is impossible to prevent the jury from assessing whether a defendant is the person in the video, as long as that video is shown. What is possible is making sure that they are not further biased in this task by unreliable non-eyewitness identifications.

Confidence. Another general cognitive bias to be considered in assessing the accuracy of non-eyewitness identifications relates to the confidence expressed by the non-eyewitness. Recent research suggests that high ratings of eyewitness confidence at the time of the initial identification are predictive of high accuracy if memory has not been contaminated (Wixted & Wells, 2017). However, Zhou and Jenkins (2020) reported that in matching photographs of unfamiliar people, high performers tended to underestimate their face-matching accuracy, whereas low performers significantly overestimated their accuracy. These findings raise concerns about relying on self-reported confidence to assess non-eyewitness identification accuracy. Further, self-reported confidence also appears to be a biased indicator for police officers. Lindholm et al. (1997) reported that officers’ self-reported confidence in their identifications tended to be inflated and was not actually predictive of recognition accuracy. Together, the research on the cognitive bias fostered by these seven factors suggests that legal guidelines in place to protect against admitting unreliable evidence by eyewitnesses in general should also be applied to evidence presented by non-eyewitnesses, including police officers.

Implications of This Work for Legal Policy and Practice

We suggest a two-prong framework for determining the admissibility of non-eyewitness identifications (see Figure 1). In the first prong, the quality of the available video should be assessed. This factor takes priority because it is critical to determine that any identification from the video is based solely on the visual information presented in the video and not other potentially biasing factors, and a face that cannot be clearly seen in a video is not likely to be accurately identified. That said, we are not suggesting that video quality is a binary dimension; in fact, video quality can be characterized as varying along a continuum. What we are concerned with here is the minimal threshold above which an identification is possible. In legal settings, the judge, sitting as fact finder, must often make decisions under the “totality of the circumstances” standard. Although it would be helpful to have an objective metric for when video quality is too bad for an identification to be made—which may happen in the future as the field of vision science develops—for now, presenting the judges with all the information that goes into assessing video quality and requiring that the information be considered would be a significant improvement over the status quo.

An assessment of video quality is also made more complex by the fact that although an image can be low in global optical quality, additional visual information can support identification of the person. Rice et al. (2013) confirmed this hypothesis in a task that involved matching pairs of photographs of unfamiliar people. The photographs were unedited or digitally altered to show only the face or only the body of each person, and the photographs varied in image quality. Although face-matching accuracy declined with image quality, and performance was generally more accurate when participants viewed the face than the body, with poor image quality, matching accuracy was similar in the body-only, face-only, and unedited conditions. In addition, Simhi and Yovel (2020) reported that recognition accuracy was fostered by gait distinctiveness even in images low in quality (varied by viewing distance).

How then can the adequacy of image quality be determined in a forensic setting? Ideally, the adequacy of image quality could be determined through a surveillance lineup test. In this procedure, a photographic lineup is constructed and administered following best-practices guidelines (see Wells et al., 2020). Essentially the defendant’s photograph is placed in a lineup with photographs of five other people who all match the description of the perpetrator in the video. Using a double-blind procedure, an official then presents this photographic lineup to a sample of neutral people unfamiliar with the case so they can decide whether the person in the video is in the lineup. With a surveillance lineup test, the image quality is baked into the test because the poorer the video image, the more likely it is that the selections will spread across the set of six lineup faces. If this occurs, the surveillance video
should not be used by the jury to determine the identity of the perpetrator. Although this test would represent a significant improvement over leaving it to a judge to determine whether a non-eyewitness identification should be admitted, it is unlikely to be adopted by the courts given their current lax attitudes about the admissibility of non-eyewitness identifications and the resources this test requires.

Only if the available video is of adequate quality should the assessment advance to the second prong. In the second prong, the plethora of other factors that bias the accuracy of identifications by non-eyewitnesses—including the factors reviewed here—should be assessed to determine the weight that should be given to the identification. According to these recommendations, the jury should not be provided with the surveillance video and left to decide for themselves how seriously they should take the non-eyewitness identification. Rather, this two-prong framework posits that many of these non-eyewitness identifications are sufficiently biased that they should never make it to a jury at all, and if they do, the jury should be instructed on the relevance of all of these factors.

In conclusion, it is important for courts to recognize that non-eyewitness identifications carry with them the same risks as the eyewitness identifications of which we have rightfully grown skeptical. It is clear that legal safeguards are needed for non-eyewitness identifications, just as they have been adopted by the courts for eyewitness identifications. But the lag between the science and the courts on this topic is avoidable. We have the scientific understanding to minimize the risks of non-eyewitness misidentifications now.

**Recommended Reading**

Dror, I. E. (2020). (See References). Examines the fallacies and biases that scientists face and the challenges to overcoming them.

Pezdek, K., & Lerer, T. (2023). (See References). A review article that first defined the term *non-eyewitness* highlights the science and illustrates the problems with how non-eyewitness identifications are handled by courts.

Pezdek, K., & Reisberg, D. (2022). (See References). Discusses tensions between the science regarding psychological processes shaping legal evidence and the jurisprudence that relates to these issues.


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**Notes**

1. This relationship, reported across a range of tasks, is generally referred to as the Dunning-Kruger effect (Kruger & Dunning, 1999).
2. For a review of these legal guidelines, see Pezdek and Lerer (2023).

**References**


