

# Identification and Surveillance of Facial Images: Progress and Problems

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Eyewitness testimony is older than the law. Even today, with sophisticated forensic science, eyewitness testimony forms the bedrock of many criminal cases. Whenever a witness gives testimony in court, jurors, judge(s) or magistrate(s) are faced with two basic questions: Is this witness giving an honest account? If so, can their account be relied upon as accurate? There are many reasons why a witness may deliberately give false testimony or identify a defendant they know to be innocent. The witness may be seeking revenge, have been intimidated into giving a false account, or be motivated to deflect blame away from the true culprit. Legal procedure is designed to expose a dishonest witness. In an adversarial system, for example in the UK, US, Canada, Australia and New Zealand, the defence have the right to test the testimony of prosecution witnesses through cross-examination. Equally the prosecution cross-examines witnesses for the defence. Cross-examination has been described as “the greatest legal engine ever invented for the

### Case study

“George Davis is innocent” daubed on walls and bridges was a familiar sight around London in the late 1970s. The graffiti referred to a man convicted for an armed robbery, which targeted a wages delivery at the office of London Electricity Board (LEB), Ilford, on April 4, 1974. Acting on information received, two plain-clothed policemen were watching the building. Two guns were carried by the robbers, and as they made a desperate getaway, one of the policemen at the scene was shot in the leg, and several motorists were hijacked at gunpoint.

At trial in March 1975 the prosecution primarily relied upon identification evidence by the police officers at the scene, and by police and other witnesses at other locations as the robbers switched vehicles during a dramatic car chase. Blood samples, recovered from the scene of a crashed getaway car, did not match any of the defendants. George Davis was the only one of four defendants to be convicted. He was sentenced to 20 years in prison. The conviction was upheld by the Court of Appeal in December 1975.

There was a high-profile campaign against George Davis’ conviction, which involved much graffiti around London. The campaign gained notoriety when the Headingley cricket pitch was dug up during an England v. Australia test match, preventing play from continuing. In May 1976 the Home Secretary took the exceptional step of exercising the Royal Prerogative of Mercy to release Davis without referring the case back to the Court of Appeal. The Home Secretary deemed the conviction to be unsafe because of doubts over the police evidence, but Davis was not held to be innocent.

In 1977, George Davis was caught in the act of an armed robbery on the Bank of Cyprus. He pleaded guilty and was sentenced to 15 years in prison. He was released in 1984 but convicted of armed robbery for a third time in 1987.

George Davis’ conviction for the armed robbery of the LEB wages office was quashed by the Court of Appeal on May 24, 2011 – 37 years after the original conviction. The principal grounds were concerns about the reliability of the identification of Davis from a live identity parade (lineup) by the two police officers who witnessed the robbery. Most notably the prosecution had not disclosed that one officer, PC Grove, had previously identified a different man from police photographs. Prior to the identity parade in which George Davis was identified, the investigating officer had told PC Grove that he had been mistaken in his identification of the photograph. Confidential

government papers are normally subjected to a 30-year embargo, after which the papers are held by the Public Record Office. In 2006 the embargo of the papers relating to the Home Secretary's 1976 decision to free George Davis was extended by 20 years.

*Sources:*

*Davis v R.* (2011) EWCA Crim 1258 (24 May 2011). Retrieved from <http://www.bailii.org/ew/cases/EWCA/Crim/2011/1258.html>

Wikipedia entry for George Davis (robber). Retrieved from [http://en.wikipedia.org/wiki/George\\_Davis\\_\(robber\)](http://en.wikipedia.org/wiki/George_Davis_(robber))

discovery of truth”.<sup>1</sup> It is intended as a method to expose a dishonest witness, but psychological science shows that cross-examination is ineffective in distinguishing reliable eyewitnesses from those who are honest but mistaken (e.g., Valentine & Maras, 2011; Zajac & Hayne, 2003, 2006).

Courts have long acknowledged that a mistaken eyewitness may give convincing identification evidence. The extraordinary case of Adolf Beck, twice wrongly convicted on the basis of mistaken eyewitness identification, described in the case study in Chapter 6, resulted in the Criminal Appeal Act (1907) which established the Court of Criminal Appeal in London (Bogan & Roberts, 2011). Widespread concern about the reliability of eyewitness identification evidence in a number of English cases during the 1970s led the British government to set up an enquiry into eyewitness identification evidence (Devlin, 1976; see case study). Despite legal reforms in the UK since the 1970s, studies of police identification procedures have shown that a third of all identifications from live parades (Valentine, Pickering, & Darling, 2003; Wright & McDaid, 1996) and 40% of all positive identifications from video lineups are known to be mistaken, as the witness selected an innocent volunteer foil or filler (Horry, Memon, Wright, & Milne, 2012). The Innocence Project (2013) in New York has produced incontrovertible evidence of the devastating impact of mistaken eyewitness identification in the US. Over the last 20 years more than 300 prisoners have been exonerated by DNA evidence that proved they were actually innocent of the crimes of which they were convicted. The crimes were serious, mostly rape and murder, because physical evidence from which a DNA profile can be obtained is most likely to be available and collected in serious violent crimes. Mistaken eyewitness identification was the leading cause of wrongful conviction, and occurred in nearly 75% of cases.

<sup>1</sup>J. Wigmore, Evidence §1367 (J. Chadbourne rev. 1974).

In addition to the strong evidence of the high risk of mistaken eyewitness identification, research also demonstrates that approximately 40% of witnesses fail to identify anyone from a lineup. In many cases the witness may not have an adequate memory of the culprit. It may be that in an unknown proportion of these cases, the culprit was not included and the witness was making the correct decision. However, justice is served by developing procedures that both reduce the likelihood of an innocent suspect being identified, and enhance the likelihood that the actual perpetrator will be identified. Identification failures may leave a guilty suspect free to offend again.

The problem of distinguishing accurate from inaccurate identification is at the heart of *Forensic Facial Identification*. In the chapters that follow, distinguished scholars grapple with the problems of identification of suspects by eyewitnesses, from CCTV imagery, and identification of deceased victims from reconstructions of their facial appearance in life.

In many criminal investigations, the first problem the police may face is to identify a suspect. This issue is addressed in Part 2. If an eyewitness is available, the first step will be to interview the witness and in the course of that interview obtain a description of the offender. In Chapter 2 Fiona Gabbert and Charity Brown evaluate the relationship between the completeness and accuracy of a witness' description of the perpetrator and the likelihood that a subsequent identification from a lineup will be accurate. This is a difficult issue for the psychology of eyewitness identification because research findings are contradictory. Most researchers accept that, contrary to common-sense expectations, there is little relationship between the quality of a witness' verbal description of the perpetrator and their identification accuracy. On balance, laboratory research shows that a witness who gives a detailed description is no more likely to be able to identify the offender than a witness who can provide only a brief description. From their analysis of the literature Gabbert and Brown show that it is the inclusion of incorrect details in a verbal description that adversely affects identification accuracy. Therefore interview procedures that produce detailed descriptions by encouraging witnesses to provide details of which they are unsure are likely to impair eyewitness memory for the perpetrator and may increase the risk of a mistaken identification. Informed by this analysis, Gabbert and Brown provide practical advice for the employment of appropriate procedures most likely to obtain accurate descriptions from witnesses. These guidelines should help to safeguard the quality of any subsequent eyewitness identification.

Having obtained a description of the offender(s), in the absence of other evidence, the police may ask a witness to create a facial composite

or likeness from memory. The image can then be publicized in the hope that somebody will recognize it as an individual they know and will provide a name to the police. In Chapter 3, Charlie Frowd reviews the development of techniques and methods used to construct facial composite images. This field has shown remarkable development in recent years. In 2007 the best recognized images were facial sketches produced by skilled police artists, and these were recognized by only 8% of people who knew the depicted person (Davies & Valentine, 2007). Since then, new systems that evolve a facial composite using artificial but highly realistic facial images have become much more effective. In addition, a range of techniques have been developed that considerably improve the quality of facial composites after production. These include a new interview technique, construction of the composites with the external features of the face occluded, viewing the composite under circumstances of either perceptual distortion or caricatured animation, and morphing composites produced by multiple witnesses, or indeed, multiple composites produced by the same witness. In the most recent research, Frowd reports recognition of facial composites by 74% of people who were familiar with the individual depicted.

If the police attend a street crime, after taking a description from the witness, they may drive the witness around the area, or allow them to view a suspect who has been stopped on the basis of the description. The aim is to secure an identification of that suspect or to eliminate them from the investigation. This procedure, known as a street identification or showup, is inherently suggestive. In Chapter 4, Victoria Lawson and Jennifer Dysart review research that shows a showup is not as reliable as a lineup, but the outcomes can be surprisingly similar. Showups are widely used, and may often be the only practical means of investigating a street robbery. Therefore, the procedure is likely to remain an essential investigative tool, but its use does need to be regulated appropriately.

If no suspect is identified from a showup, the witness may be asked to view large numbers of mugshot images of known offenders. Lawson and Dysart also review the literature on mugshot viewings, which perhaps not surprisingly, given the large numbers of images that are viewed, results in very different outcomes from that of a showup.

If a witness does identify a suspect from a showup or a mugshot, it is common practice in both the UK and the US for the witness to view the same suspect in a lineup at a later date to collect “formal” identification evidence. The psychological science shows very clearly that repeated identification procedures with the same suspect and witness are very prone to mistaken identification. If a witness has made a mistake in a showup or mugshot, they are highly likely to repeat the same mistaken

identification from a lineup. Analysis of the Innocence Project (2013) cases show that mistaken identifications often arise when the victim identified the innocent suspect in repeated identification procedures. For example, Ronald Cotton and Johnnie Briscoe were both identified from police photographs prior to being identified from a lineup procedure by the same witness.

When human remains are found, the police may be faced with the problem of identifying the victim. A DNA profile can only identify somebody who is already on a database. In Chapter 5, Caroline Wilkinson reviews the methods used to reconstruct facial appearance, so that somebody who knew the victim may provide a name. Once the police have a possible identity, physical evidence (e.g. DNA, dental records) may be used to confirm the identification. Traditionally facial reconstruction is a highly skilled process that requires detailed anthropological knowledge and artistic skills, although computer technology now makes a substantial contribution. Using computational methods similar to those used to construct facial composites under the guidance of a witness, reconstructed facial appearances can be rotated and have global changes applied (e.g. ageing) to enhance the likelihood of identification.

Formal identification evidence from eyewitnesses is considered in Part 3. Recently there has been major reform of the identification procedures used in the UK. Until 2003, live identity parades remained the standard procedure. The Police and Criminal Evidence Act (1984) gave any suspect who disputes their identification the right to test the evidence in a formal procedure. Live parades were frequently held in purpose-built identification suites in which the witness viewed the lineup through a one-way mirror to shield the witness from the view of the lineup members. The use of such mirrors was not universal, and some witnesses were required to make their decision in full view of the suspect. The procedure was costly and difficult to administer. Half of all parades were cancelled because a bailed suspect did not attend or suitable volunteer foils could not be found (Pike, Brace, & Kyman, 2002). A police complaint was that the procedure was subject to manipulation by the defence, causing long delays. From the perspective of the witness, the procedure could be intimidating, especially for vulnerable witnesses, such as children, elderly witnesses and victims of sexual assaults.

Video identification procedures were introduced gradually in the UK between 2003, when video became an option, and 2008 when video became mandatory, unless it could be argued that a live parade was more suitable. The effect has been that video lineups have become universal. A major impact of the introduction of the video lineup has been to dramatically increase the number of procedures held. Devlin (1976) reported that 2143 live parades were held in the UK in 1973. This had increased

to 14,000 by 1994 (Slater, 1994). This increase was attributed to the effect of the Police and Criminal Evidence Act (1984). At the time of writing, current estimates are that 110,000 video lineups are held annually.<sup>2</sup>

Approximately 20% of all witnesses make a known mistaken identification of volunteer foils or distracters from live parades organized by the British police (Valentine, Pickering, & Darling, 2003; Wright & McDaid, 1996). A recent study found that 26% of all witnesses mistakenly identify a volunteer from video lineups organized in England and Wales (Horry *et al.*, 2012). This increase is difficult to interpret. Perhaps proportionally more foils are identified because video lineups are of better quality. Foils for video lineups are selected from large databases of around 25,000 video clips. Therefore foils in video lineups may be more plausible than the foils in live lineups. Alternatively, because it is now easier to run an identification procedure, there may be a greater tendency to ask witnesses who had little opportunity to view the culprit to attend an identification procedure. Whatever the explanation behind these data, it is a cruel irony that there has been a huge increase in reliance on eyewitness identification evidence, in spite of Devlin's warning of the particular risks of this form of evidence. As a result of efforts to improve eyewitness identification procedures there are, almost certainly, more mistaken eyewitness identifications presented in court than in Devlin's day.

Reform of eyewitness identification procedures in the US has followed a very different path. Identification from an array of photographs has always been widely used for formal identification evidence in the US and Canada, but has never been permissible in the UK. In the US, research effort and procedural reform has focused on the issue of whether it is more effective if the photographs are presented all at the same time (simultaneously) or one at a time (sequentially) with the witness asked to make a decision to each photograph as it is presented. Steven Clark, Molly Moreland and Ryan Rush skilfully set out in Chapter 6 the essential issues from the complicated literature on methods of identification procedures, drawing from practice in both the US and the UK.

When a jury or judge hears testimony of eyewitness identification in court, it is necessary to make a judgement of whether the identification is reliable. The only information available to the court is the description of the event, the demeanour of the witness and any evidence of the witness' character that may be given in evidence. In Chapter 7, Hannah Ryder, Harriet Smith and Heather Flowe consider the effect that the circumstances of the event, and the characteristics of the offender and of

<sup>2</sup>Two systems provide video lineups for the British police. The estimate of 110,000 is the sum of procedures claimed to have been conducted using each system on their websites ([www.viper.com](http://www.viper.com); [www.promat.com](http://www.promat.com)).

the witness, have on the accuracy of eyewitness identification evidence. To what extent can these estimator factors be used to judge whether any given identification is accurate or not? The approach adopted by the courts in the US and the UK to address these issues is also discussed.

In Chapter 8, James Sauer and Neil Brewer evaluate the relationship between the level of confidence expressed by a witness and the quality of his or her memory for the perpetrator. These authors note that a positive identification of the suspect does not guarantee that the suspect is the culprit. Instead, an identification indicates that, of the lineup members presented, the suspect is the best match to the witness' memory of the culprit. They explain how cognitive and social factors can make a witness more or less likely to pick someone from the lineup. These influences on the witness' decision-making renders the identification less informative about the quality of the witness' memory. Basing their argument on the theoretical relationship between confidence and memory quality, Sauer and Brewer describe how, when appropriately measured, confidence can be indicative of the degree of a witness' recognition. They argue it would be foolish not to consider confidence when evaluating identification evidence. The protocols for collecting measures of confidence in the UK and the US are considered, and practical advice is given for collecting appropriate measures of confidence. Sauer and Brewer also discuss a radical new approach to collecting eyewitness identification evidence, which entirely excludes the necessity for the witness to make binary yes–no decisions, which are normally required when a witness chooses to identify one person from a lineup.

In view of the fragility of human memory, CCTV imagery appears to offer a valuable opportunity to avoid the need for eyewitnesses. At first sight, CCTV provides an irrefutable record of the appearance of the offender, and one important advantage is that when confronted with such imagery many offenders confess. But when the identification is disputed, verifying the identity of an offender caught on camera can be more difficult than expected. Identification from CCTV imagery or photographs is considered in Part 4. Josh Davis and Tim Valentine review the evidence on the human ability to match images of faces in Chapter 9. When the images are of people who are unfamiliar to the observer, 20–30% of judgements are mistaken even under ideal conditions. Using good quality images, in which the viewpoints of the images to be compared are similar, people make frequent simultaneous matching errors of judgement even under no time pressure. Two images of different people can appear very similar; and two images of the same person taken with different cameras can look very different. Both false positive and false negative errors are common. Unexpectedly, it turns out that the need to remember the appearance of an offender is not necessary



for identification to be unreliable! CCTV images available in criminal cases in court are often of poor or very poor quality. The development of high-definition cameras and video systems is often portrayed as a solution to this problem. However the science is very clear. Even with the highest quality images, people often make mistakes. High definition will no doubt improve the quality of images and be useful for many reasons, but it will not solve the problem of human face-matching error.

The effectiveness of border and other security checks is critical to security. Realization that human face-matching of unfamiliar faces is so error-prone calls into question the effectiveness of passport checks at international borders. Perhaps border guards can be trained to be more reliable? Unfortunately, so far the results of research on the effectiveness of face-matching training have been disappointing. Training border guards to spot the rare event of a potential terrorist with a false passport is likely to be challenging.

There are two bright prospects in this generally rather bleak picture. First, we are rather good at identifying faces of people we know well, even in low-quality CCTV imagery. Therefore, if the potential “remote witness” knows the depicted person well, identification is usually reliable. This phenomenon is effectively exploited by TV and other media who regularly display videos and stills captured from crime scenes. The hope is that somebody who knows the person well will provide a name, and therefore a lead for the police to investigate further. A good example is the case of David Copeland, the London nail-bomber, who was identified from CCTV shown on national TV by a work colleague.<sup>3</sup>

The second bright prospect is selection. If it is not possible to train border guards, staff who are naturally talented at matching faces can be selected for these roles. There are strong individual differences in face recognition and matching abilities. A few people show exceptional prowess at recognizing unfamiliar faces. Davis and Valentine describe how the London Metropolitan Police have capitalized on this approach. With a large number of offenders to identify from hours of CCTV imagery of the 2011 London riots, the Metropolitan Police realized that a small number of officers are talented “super-recognizers” and were astonishingly proficient at identifying suspects from the imagery.

The widespread availability of CCTV imagery has posed a new problem for the courts. In the UK, if an image is of sufficient quality, the jury can be invited to compare it to the appearance of the defendant in the dock. As people, generally, are rather error-prone in matching unfamiliar faces, this procedure might carry some risk of wrongful conviction. Another approach, reviewed by Josh Davis, Gary Edmonds and Tim

<sup>3</sup>[http://en.wikipedia.org/wiki/David\\_Copeland](http://en.wikipedia.org/wiki/David_Copeland)

Valentine in Chapter 10, is to admit opinion evidence from an expert in facial image comparison. Such experts come from varied backgrounds. In the UK, expert evidence from anthropologists, psychologists, medical artists and medical imaging experts, computer and video experts, and military intelligence experts has been admitted. These experts employ a number of methods to analyse facial images. The scientific literature on these methods is limited, but studies that are available demonstrate limitations and weaknesses in all of them. It may be the case that work of this nature attracts people who are naturally very good face recognizers and their judgements are often accurate, but there is no scientific evidence that the methods advocated by facial comparison experts are reliable.

As human face-matching is error-prone, perhaps computers can do a better job. The latest research on automatic face recognition is reviewed by Alice O'Toole and Jonathon Phillips in Chapter 11. There has been a steady improvement in the proficiency of automatic face recognition systems. In ideal environmental conditions, computers can now match facial identities more effectively than most humans can match unfamiliar faces. However, automatic recognition systems cannot yet achieve the proficiency of the human ability to match images of familiar faces in environmentally challenging conditions (e.g., from external CCTV images captured from above head height). In a practical application, such as checking passport images, automatic face-matching systems are likely to be used to support human decision-making, with the final decision being made by a human operator. O'Toole and Phillips address the issue of how automatic processing of facial images can be integrated with human judgements.

In the final part of the book the implications for the criminal justice system of the psychological science of facial identification is considered in detail. In Chapter 12, Andrew Roberts applies a legal analysis to many of the issues discussed by the authors of the previous chapters. Sequential presentation of lineup images, blind administration of lineups and recording of witness confidence are considered in detail. He reviews legal procedure and case law on identification by eyewitnesses, evidence of recognition from images, and facial image comparison, in the UK, the US, Australia and New Zealand. Roberts considers how investigatory procedures can mitigate risks of mistaken identification, and the extent to which appropriate procedures have been adopted. He argues that the legal response to the risk of mistaken identification from images has been slow and suggests that, compared with the well-known risk of mistaken identification by eyewitnesses, without legal and procedural safeguards the risk of mistaken identification from images may be consequently greater.

In the final chapter Tim Valentine and Josh Davis draw upon the extensive research considered by the authors of this volume to recommend best practice for a wide range of forensic applications. In recent years there has been very significant progress in the practical application of science to interviewing witnesses, constructing facial composites and automatic face recognition. In other areas, extensive research has led to better theoretical understanding of the issues and, as a result, clear recommendations can be made to mitigate against the risks of mistaken identification; examples include understanding the effects of repeated identification procedures, construction and administration of lineups, recording of witness confidence, and selection of personnel for security tasks involving face-matching. Expert analysis of facial comparison has attracted comparatively little research activity, but much critical analysis. It remains one of the most difficult problems to address. Valentine and Davis also consider “confirmation bias”, a ubiquitous psychological phenomenon in which human judgement, memory and perception is interpreted in a way that is consistent with prior beliefs. Many areas of forensic science rely on subjective evaluation of evidence to determine whether there is a match (e.g., analysis of latent fingerprints, analysis of CCTV imagery), and therefore can be subject to bias derived from expectations due to an awareness of the background of information or other evidence. The US National Research Academy (2009) has identified confirmation bias as an issue that needs to be addressed by the forensic science community.

Scientific research and technological development have made identification of a suspect’s face more available as a potential source of evidence during a criminal investigation. The fallibility of human facial identification has been acknowledged by scientists and in the legal system since early in the 20th century (Munsterberg, 1908; Bogan & Roberts, 2011). A hundred years later, development of photographic, video and computer technology has resulted in many more suspects being identified by eyewitnesses or from an image. Undoubtedly many more offenders have been convicted as a result. However, technology has had hardly any impact on reducing the risk of mistaken identification. Over the years there have been very clear warnings of the effect of mistaken identification. The risk was very clearly acknowledged in the UK by Devlin (1976). There have been over 300 DNA exonerations in the US, three-quarters of which convictions were a result of mistaken eyewitness identification. Because we have allowed technology to facilitate wider use of identification evidence, which has well-known flaws, innocent citizens are more at risk of wrongful conviction caused by mistaken identification than they have ever been.

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