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CHAPTER 14 – EYEWITNESSES AND THE USE AND APPLICATION OF COGNITIVE THEORY

ROUTE MAP

Witnesses and victims may contain the only record of a crime and so their evidence can be invaluable to a criminal investigation. This chapter reviews the different types of evidence provided by these eyewitnesses. The initial focus is on their ability to describe details of a crime and those involved, plus interviewing techniques that attempt to maximise this information recall. Next, the procedures used for identifying offenders are examined. In the final part, face construction systems are discussed along with modern methods for improving their effectiveness.

INTRODUCTION

Eyewitnesses carry out a range of tasks to help the police bring a criminal to justice. They first describe what happened during the crime and the persons involved. Later, there may be reasonable grounds for the police to believe who is responsible for the offence and this person then becomes a ***suspect***. The police may put the suspect into a lineup and ask eyewitnesses to see if they recognise the person they saw. If the suspect is picked out, this is taken as evidence that the police have arrested the correct person. They may then spend time trying to build a case to convict the suspect, or dismiss it owing to a lack of evidence. Sometimes, eyewitnesses provide testimony in a court of law.

The police may also use the given description to try to locate the offender using computer searches of previously convicted persons. If a suspect cannot otherwise be identified, eyewitnesses may construct a picture of the offender's face, a ***facial composite***. The police will circulate this image in the newspapers, or on TV crime programmes such as BBC Crimewatch, in the hope that a member of the public will recognise it and phone in with a name. Sometimes, the police circulate a wanted poster; see Figure 14.0 for an example. [FIGURE 14.0]

The focus of this chapter is on the various types of evidence from eyewitnesses. There have been many cases of wrongful conviction, as illustrated later by the conviction of Laszlo Virag, and these must be minimised. The chapter will be guided by the wealth of psychological research that has attempted to understand and improve the performance of human memory. It will be seen that eyewitness evidence can be valuable for the detection and conviction of offenders.

14.1 INFORMATION RECALL

Eyewitnesses record a massive amount of information while observing a crime. The focus of this section is on the ***recall*** of this information. The following sections explore eyewitnesses' ***recognition*** and ***face construction*** abilities.

14.1.1 The Accuracy of Recall

Yuille & Cutshall (1986) were first to formally evaluate eyewitness's recall of a real-life event. The crime involved a thief who stole guns and money from a gun shop in Burnaby, Canada. In the street outside of the shop, shots were fired between the shop owner and the thief, resulting in the death of the thief. Twenty-one eyewitnesses were interviewed within two days of the event. Each person provided a free account of what they saw and was questioned to expand upon their recall. Thirteen of these observers also took part in a second, research interview between four to five months later.

The descriptions given were surprisingly detailed and contained information about actions, people and objects. Overall accuracy was about 80% correct in each of these areas for both types of interview. The errors produced were fairly infrequent and concerned: (a) actions of the thief, shop owner and other people present, (b) descriptions of people's height, weight, age, hair, colour of clothing and (c) descriptions of objects.

Cutshall & Yuille (1989) investigated further shootings and armed robberies. Although the quantity of eyewitness recall varied among crimes and among observers,

accuracy levels remained high for police and (later) research interviews, suggesting that information in such situations is retained rather than forgotten over long periods of time. Their result runs counter to the normal research findings which suggest that information recall reduces progressively over time (Baddeley, 2004), but is perhaps retained better in memory here owing to the serious nature of the crimes and also as observers may rehearse information before being interviewed (Read, Hammersley, Cross-Calvert & McFadzen, 1989). Again, inaccuracies involved descriptions of people, especially colour of clothing and hair, and estimates of height, weight and age. Note that these descriptions are often used forensically – they appear on wanted posters, for example – but not all are errors of memory: height, weight and age are arguably more to do with estimating physical quantities.

Estimates of physical quantities: Flin & Shepherd (1986) looked at our ability to make judgements of height and weight. Over 500 people interacted with one of 14 target individuals, to obtain directions, and provided a height and weight estimate. Some interesting patterns emerged. Firstly, people were fairly accurate in general: estimates were inaccurate on average by about 8cm for height and 8kgs for weight. Secondly, there was a tendency to give *lower* estimates for heavy and tall targets, but *higher* estimates for light and short targets. The authors referred to this effect as a ***regression towards the mean***: extreme estimates are avoided in preference to those that are more similar to the average or 'norm'. Thirdly, taller participants tended not to underestimate taller targets. Therefore, some participants made judgements based on their own physical attributes.

Estimating another person's age is quite a complex task owing to the range of cues available (Ekman, 1978; see George & Hole, 2000, for a review), some of which

may not be helpful. For example, in an intriguing study reported by Sporer (1996), Deusinger and Haase found that age estimates changed according to the clothing that a target individual wore and the context in which he was seen. When appearing in an aggressive scene wearing a red 'windbreaker' jacket, he was perceived to be four years younger than the same person seen playing the role of an associate and wearing a fine leather jacket. Research carried out using photographs of faces suggest we can guess a person's age correctly on average within about 5 years (e.g. Dehon & Bredart, 2001; George & Hole, 2000; Sörqvist & Eriksson, 2007). Our estimates of age, and also of height and weight, are therefore fairly accurate, sufficient to provide a reasonable indication for use in police investigations.

The Deusinger and Haase study highlights that a visual scene provides a *context* that can influence our decisions processes. Our responses can even be influenced by the wording of a question. In a classic study, Loftus & Palmer (1974) showed participants a film of a road traffic accident. They were asked to describe what happened and answer a series of questions about it. The particular question of interest concerned the speed the vehicles were travelling when they *contacted* each other. Some participants were asked alternative questions using *hit*, *bumped*, *collided* or *smashed* instead of *contacted*. Average estimates of speed are shown in Figure 14.1.1 and increased from 31.8 mph for *contacted* to 40.5 mph for *smashed*. Simply changing a verb can therefore dramatically affect what people report. [FIGURE 14.1.1]

In a second experiment, Loftus & Palmer's participants saw a similar film and one week later were asked whether they had noticed any broken glass. There was not, in fact, any broken glass, but more people *reported* seeing it if they (1) gave higher estimates of speed and (2) were asked whether the cars *smashed* into each other. The

study emphasises the need for caution when asking questions about an event, and, without which, distortions may result (e.g. different estimates of speed). It is also possible to create a ***false memory*** (broken glass). See Loftus (1992, 1997) and Sondhi & Gupta (2007) for further examples.

Stressful events: Studies have examined the potentially negative influence of anxiety. This is not an easy area of study, because of the large number of variables involved, but the general finding is that people tend to recall less information in total, and with lower accuracy, when they have observed an event under physiological stress (Deffenbacher, Bornstein, Penrod & McGorty, 2004), although there are exceptions (Hulse & Memon, 2006; Yuille & Cutshall, 1986). In a recent eyewitness study, Valentine & Mesout (2009) examined the recall and recognition abilities of visitors in the Horror Labyrinth at the London Dungeon. This is a situation where people give their consent to be scared! Visitors who reported experiencing high levels of physiological stress (state anxiety) were found to recall fewer correct details and more incorrect details of a target individual; they also made fewer correct identifications in a lineup.

A stressful event can affect memory retrospectively. Loftus & Burns (1982) presented participants with either a violent or a non-violent film of a bank robbery and asked them a series of questions about it. In the violent version, there was an unexpected and mentally shocking conclusion involving a young person being shot in the head. Fewer participants in the violent version (4.3%) correctly answered the main 'target' question than those in the non-violent version (27.9%): what was the number printed on a football jersey seen just before the end? Also, worse retention was found for information seen in the final two minutes, an effect referred to as

retrograde amnesia, information memory loss. In addition, these effects applied to upsetting but not unexpected (non-upsetting) events, further highlighting the role played by personally-experienced stress.

The presence of a weapon can also impact upon recall. Participants in Loftus, Loftus & Messo (1987) saw a series of slides involving a gun or a cheque (payment for goods). Measurements of participants' eye-movements revealed more fixations on the gun rather than on the cheque, and each of these was for longer periods. Participants in the condition involving the gun also answered fewer questions correctly about the perpetrator. In such situations, there is a ***weapon focus***: attention tends to be drawn to the weapon and away from other objects, generally reducing the information that is available for recall. Further, Loftus et al. found a weak effect on *recognition* when a weapon was present, a reduction in correctly selecting the target from a 12-person photo lineup. This is a finding reported in other laboratory research (Steblay, 1992), but this may not be a reliable finding in the real world (Valentine, Pickering & Darling, 2003).

14.1.2 The Cognitive Interview

Until the 1980s, the police followed a question-and-answer style interview to elicit information from eyewitness: a ***standard interview***. Sometimes, hypnosis-type techniques were used to improve recall. Based on evidence that the standard interview did not produce the most complete and accurate testimony, and that the suggestive elements of hypnosis may result in false memories being implanted, Ron Fisher, Edward Geiselman and their colleagues in the US developed an interviewing

'system' based on sound psychological principles (Geiselman, Fisher, MacKinnon & Holland, 1985). This is known as the ***cognitive interview*** (CI).

The CI is based on the idea that the memory trace of a crime comprises of different parts, or 'components'. Some of these components relate to *central*, important details, such as who did what to whom, and when, while others relate to *peripheral* details such as what people were wearing, other objects present, the lighting conditions, time of day, plus smells, sounds and personal feelings. Theoretically, best recall occurs when as many components are activated as possible. To achieve this objective, eyewitnesses are asked to think about the event and attempt to recreate it in their mind. This is known as ***reinstating the context***. Eyewitnesses are instructed to ***report everything***, even if seemingly irrelevant, as such details may be important. They then provide a ***free recall*** of the event. However, we tend to describe what we *expect* to have happened rather than what *actually* occurred. This can be partly counteracted by recalling again from a ***different perspective***; for example, "What did the cashier see happen?" More generally, repeated recall attempts take a different path through our memories and trigger previously unrecalled components. This technique can also be carried out in a ***different temporal order***, by working backwards from the most recent event.

Geiseman et al. (1985) measured the effectiveness of the CI. Participants were shown a film and then interviewed using a standard interview, a cognitive interview or a hypnosis interview. As Figure 14.1.2 illustrates, the CI outperformed the standard interview and was as good as hypnosis. [FIGURE 14.1.2]

In an attempt to further improve recall, Fisher et al. (1987) developed the ***enhanced cognitive interview*** *(ECI).* The main stages are summarised in Table 14.1.2. As a high anxiety state can hinder recall, especially for victims of traumatic

events, police interviewers start by ***building rapport***. Also, they clearly explain the interview process and avoid interrupting during critical stages: free recall and context reinstatement. Further, interviewers review the eyewitness's account, which itself provides another opportunity for recall. Laboratory tests (e.g. Fisher et al., 1987) indicate that the ECI is even more effective than the CI (36.9% to 57.7% correct details) with only a fairly small increase in incorrect recall (28%). Field trials also support an increase in performance for the new interviewing techniques (e.g. Fisher, Geiselman & Amador, 1989). [TABLE 14.1.2]

14.1.3 UK Interviewing Techniques

In the UK, the police use a ***PEACE*** interview, so called as it describes each stage: **P**lanning and preparation, **E**ngage and explain, **A**ccount, **C**losure and **E**valuation. It includes the components of the ECI, as described above, as well as further techniques for facilitating recall. These are called ***Conversation Management*** (CM) and are based on the principle that an interview is, in essence, a complex conversation between an interviewer and an eyewitness. In a conversation, peoples' behaviour affects each other and, in an interview context, will determine to some extent what a witness recalls. Important parts of CM involve listening skills, to indicate that the interviewer is interested; at the simplest level, this includes the use of 'minimal responses' to show engagement, nodding and "aha" replies. It also involves techniques to assist recall. For instance, if witnesses cannot remember a person's name, they can be asked to go through the alphabet thinking about the first letter of the name, to help trigger the memory. Also important is transferring of control at

different stages; for example, before and after free recall. For a comprehensive description of CM, see Milne & Bull (1999).

Police officers learn PEACE interviewing for use with witnesses over five stages or ***tiers***. Tier 1 is the basic level, which all police recruits receive, and this normally takes 5 days. The training includes techniques of the enhanced CI; officers gain much experience as part of normal operational duties. They may also attend further training courses to provide additional skills, such as those necessary for interviewing vulnerable and intimidated witnesses in Tiers 2 and 3. See Griffiths & Milne (2005) for a review of interviewing tiers.

14.1.4 Descriptions of Faces

Eyewitnesses also provide a description of the offender's face. As with person descriptions in general, this information is used for public appeals and computer searches. Facial descriptions play an additional role for constructing lineups and facial composites, as discussed later. Before reading this section, first complete Activity Box 1. [ACTIVITY BOX 1]

Human faces present an interesting challenge for our perceptual system: they all share the same basic design. All have ***individual facial features*** – two eyes, two brows, a nose, a mouth, two ears – and each of these is placed in roughly the same ***configuration***, or position on the face: brows above eyes, nose between eyes and mouth, etc. Men, women and people from different races have these properties in common. It is the differences in this basic template that gives rise to individuality.

Detecting offenders is likely to be more effective if eyewitnesses' descriptions contain aspects that are unusual or *distinctive*. Perhaps there was a small scar, tattoo

or blemish; a facial feature may be unusual in some way: small eyes, large eyebrows or unusual shaped ears. The facial configuration can be distinctive and provide important perceptual cues; some people, for example, have widely-spaced eyes. Facial ***distinctiveness***, due to unusual features or an unusual configuration, is an important aspect of face perception as it can enhance recognition accuracy (Shapiro & Penrod, 1986).

Patterns of face recall: Laughery, Duval & Wogalter (1986) asked participants to describe an unfamiliar face from their memory. They found that more descriptions were given for features in the upper than the lower half of the face, especially for the hair and eyes. Most adjectives described the size and shape of features, but were not specific to faces; examples include *large* eyes, *small* nose, *thin* lips and *dark* eyebrows. Face description is not an easy task, although the hair was reported to be the easiest feature to describe.

Ellis, Shepherd & Davies's (1980) participants were shown one of two unfamiliar target faces and recalled details immediately, or after one of three time delays: one hour, one day or one week. As with Laughery et al., most information was recalled for the *hair and eyes*, and then for the general structure of the face including the shape, length and size of head. Ellis et al. found that the *quantity* of information recalled reduced as the delay increased: it was greatest when recall occurred immediately and lowest after a week. This is a typical effect that occurs for verbal information in general (e.g. Baddeley, 2004).

A second group of participants matched the descriptions to a photograph of the targets. Delay had a progressively detrimental effect: descriptions were matched less accurately when produced after longer time intervals. Therefore, the *quality* of

information remembered about an unfamiliar face reduces over time. Eyewitnesses often recall an offender's face several days, or even longer, after a crime and so are likely to have forgotten information that would have been useful for identification. Even using cognitive interview techniques, unfortunately, the majority of witnesses only provide a sketchy description of the face.

Face encoding: The method we use to remember or ***encode*** a face affects our ability to describe it. Some eyewitnesses correctly suppose that they may be asked questions about an offender's face and so look in detail at the individual features, making 'mental notes' to themselves about sizes, shapes and colours. This is known as a ***feature*** encoding. Research has found that the quality of descriptions are better following such an encoding than when the face has been attended to more naturally, as part of communication, or by making *personality* judgements about it (Wells and Turtle, 1988). Observers who use the latter ***holistic*** encoding are better at whole-face type tasks such as identifying a face from alternatives (Wells & Hryciw, 1984). The effect of encoding provides insight into how our cognitive system carries out different tasks: face description involves individual features, while face recognition involves a more overall analysis of the face. It also suggests that eyewitnesses will produce a more accurate and a more complete description under feature encoding; note that the majority of us do not do this due to a natural tendency to encode faces holistically (Olsson & Juslin, 1999).

14.2 PERSON RECOGNITION

There are many cues we use to recognise a person: body shape and build, voice and accent, gait, face, behaviour and clothing. But, which of these are important for recognising a person? Burton, Wilson, Cowan & Bruce (1999) used video footage from a surveillance camera of members of Psychology staff at Glasgow University. Participants were shown original footage, or where editing had obscured the body, gait or face; examples are shown in Figure 14.2. People familiar with the staff made correct identifications at over 80% on average for each presentation format except the one with the face concealed (less than 40%). The study shows that the *face* is the most valuable cue for recognising a familiar person, someone we have seen many times. [FIGURE 14.2]

We recognise ***familiar*** faces with almost perfect accuracy, even from different viewpoints, under different lighting conditions and in various environments (contexts) (Bruce & Young, 1998). Recognition is very accurate, even under less than optimal conditions such as a grainy wedding photograph or low quality CCTV (e.g. Lander, Bruce & Hill, 2001). For this reason, TV crime programmes show CCTV images: so long as the camera has captured an un-obscured image of the offender's face, someone who knows the person should be able to recognise him or her from it.

14.2.1 Unfamiliar Face Recognition

Some early research studies seemed to suggest that we are also good at recognising ***unfamiliar*** faces (e.g. Goldstein & Chance, 1971). These studies used a *recognition memory* task (RMT): participants were presented with a series of faces during a *study* phase and were asked to recognise these same items when mixed in with other faces during a *test* phase. All faces were previously unfamiliar to

participants. The problem is that we can do this exercise using properties of the ***picture***: how a person looked into the camera, the specific lighting, their expression, the background scene, etc. Showing a different photograph between study and test explores our ability to process facial ***structure*** (identity). Using a RMT, Bruce (1982) found accuracy rates at about 90% correct with identical photos, but this was lower when test phase faces were changed by head pose *or* expression, and lowest when changes occurred to pose *and* expression. Her results are provided in Figure 14.2.1. Further research has confirmed that performance deficits occur following changes to the background scene, hair and lighting conditions (Cutler, Penrod & Martens, 1987; Davies & Milne, 1982; Hill & Bruce, 1996). Our performance also becomes measurably worse when an observer is not used to discriminating faces from a particular race. This is known as a cross-race effect (see Meissner & Brigham, 2001, for a review). [FIGURE 14.2.1]

Ellis, Shepherd & Davies (1979) looked at how we process different facial regions. Participants were shown well-known (celebrity) photographs of internal features – the central part of the face containing eyes, brows, nose and mouth – or external features – the region including hair, face shape and ears. Other participants saw complete faces. Naming of intact faces was about 80% correct, internal features about 50% and external features about 30%. Next, a RMT was used with *unfamiliar* faces, and internal and external features were recognised equally well. The work demonstrates a greater reliance on the internal features for recognising a familiar face, but on the external features when familiarity is low.

In police investigations, an offender's face is normally seen just once and so the external parts will have greater importance to an eyewitness than if the person was well-known. Further research has shown that ***hair*** is one of the most important

external features for unfamiliar face perception (Bruce et al., 1999; Ellis, 1986; Frowd & Hepton, 2009). This means that offenders can reduce the chances of being recognised simply by changing the colour, style and/or length of their hair.

Recognition accuracy is also strongly affected by facial similarity. Participants in Davies, Shepherd & Ellis (1977) first sorted 100 faces into piles of similar appearance. The researchers then constructed 'lineups' containing faces that had been sorted together frequently or infrequently, and presented these to further participants in an identification task. Overall accuracy was about 75% correct, but the vast majority of errors occurred for the arrays constructed from *frequently* sorted items. The work demonstrates that faces judged similar to each other are also likely to be confused. Therefore, eyewitnesses are more likely to make errors when facial similarity is high. Unfortunately, confusions also occur when similarity is much lower: see Focus Point 14.2.1. [FOCUS POINT 14.2.1]

14.2.2 Identification Procedures

Eyewitnesses in the UK participate in two types of identification procedure (PACE Code D, 2008). Firstly, the police may escort eyewitnesses to public places to see if they can spot the offender. This is known as a ***group identification***. The second procedure involves a lineup and is used when the police have a suspect. One way to do this is to place the suspect in a line with at least 8 other individuals ('foils') and ask the eyewitness to pick out the offender if present. This is known as an ***identification parade***. Alternatively, the suspect and foils may be filmed and shown to eyewitnesses as a sequence of video clips, a ***video identification***. There is a system

in the UK to do this called VIPER, or Video Identification Parade Electronic Recording (Brace, Pike, Kemp & Turner, 2009).

VIPER is an example of a ***sequential*** lineup. It is, however, not the most common format worldwide. Normally, eyewitnesses see all lineup members at the same time, a ***simultaneous*** lineup. There has been considerable debate about which presentation method is the best (e.g. Meissner, Tredoux, Parker & MacLin, 2005), but recent evidence suggests that the simultaneous format is slightly better (McQuiston-Surrett, Malpass & Tredoux, 2006); note that there are also some very promising, novel lineup procedures (e.g. Levi, 1998, 2006).

Considerable effort has been spent generally trying to understand the factors involved with lineups, with the aim of maximising the chances of an eyewitness identifying a *guilty* suspect (the person who actually committed the offence) but minimising the identification of *innocent* suspects (there are other reasons, however, some based on legal systems different to ours; see Wells, 1985). One such factor, for example, is the quality and quantity of a person's description of a face and his or her accuracy in a lineup, a ***description-identification*** relationship. The relationship turns out to be fairly complicated, but *weak* effects do appear to exist; the reader interested in this is directed to Meissner, Sporer & Susa (2008) for a review.

It is crucial that lineups are fair. If suspects stand out in some way, the chances of them being picked out will increase. When an *innocent* suspect is selected, police time is wasted and the chances of wrongful conviction will increase. One way to improve the effectiveness of lineups is to increase their size. All else being constant, this reduces an innocent suspect being selected by chance alone; for example, the chance is 1 in 10 (a probability of 0.1) for a 10-person lineup but half that for a 20-person lineup (0.05). Research suggests that increasing lineup size does

not appear to reduce identification rates of *guilty* suspects, fortunately, even for very large lineups (Levi, 2002, 2007).

A well-intentioned, but nonetheless flawed procedure is to select members of a lineup that look similar to a *photograph* of the suspect. The problem is that, if shown a series of faces, we have a tendency to form an *average* of the set in our mind. The average is known as a ***prototype*** and becomes a memory with which we will respond as if the face had really been seen (Cabeza, Bruce, Kato & Oda, 1999). So, if a lineup is constructed from a suspect's photograph, the suspect becomes the *prototype* and witnesses will tend to select it! A better procedure is to select members based on a *verbal description* of the suspect given by an eyewitness (e.g. Brigham, Ready & Spier, 1990): this is one reason to ask them for a description in the first place.

One way to test the fairness of a lineup is to administer a ***mock witness procedure*** (Doob & Kirshenbaum, 1973), which can detect prototype effects and distinctive lineup members. To do this, a group of volunteers (people who are not familiar with the suspect) are given the eyewitness's description, shown the lineup and asked to select who they think is the suspect. Any lineup member who is picked out more often than chance alone provides evidence that the lineup is biased – and, should be re-constructed. Using this procedure, video identification has been found to be less biased (Valentine & Heaton, 1999) and more ergonomic (Brace et al., 2009; Kemp, Pike & Brace, 2001) than live lineups (identification parades).

14.3 FACE CONSTRUCTION

Witnesses often participate in lineup type identification procedures many months into an investigation. In the absence of a suspect, they may help earlier on by constructing a *visual* likeness of the offender's face. These pictures are known as ***facial composites***. They are produced by a number of methods or 'systems' after a cognitive interview**,** and are shown to police officers or members of the public for identification. The use of composites therefore involves two types of perceptual process: unfamiliar face perception to construct the face (by eyewitnesses) and the familiar type to recognise it (police officers and the public). Given the potential importance of these images for the detection of offenders, composites have been the focus of considerable research and development.

14.3.1 Composite Systems: Past & Present

The earliest method of face construction was a sketch artist. This person would be skilled in portraiture and would draw the face using pencils or crayons. The first UK system for police operatives with less artistic skill was Photofit. The method used individual reference features printed onto rigid card; eyewitnesses would select the best matching hair, eyes, nose, etc., with each part being slotted together as if assembling a jigsaw. Photofit has been extensively evaluated and has led to the software systems that the police currently use; for a review, see Ellis & Shepherd (1996).

One problem with Photofit was that eyewitnesses were required to select from sets of isolated facial features. We never naturally do this: eyes, for example, are always seen in a face with a nose, brows, a mouth, etc. It turns out that we are more accurate at selecting features when they are embedded in an intact face (e.g. Davies &

Christie, 1982; Tanaka & Farah, 1993). This idea has been applied to modern software systems as part of a 'cognitive' approach to face building: witnesses are presented with features that are switched in and out of a single, intact face; the method produces more identifiable composites (Skelton & Frowd, manuscript in preparation).

A second problem was a limitation in the range of features: there were simply not enough examples to build composites of all offenders. This issue was addressed by photographing a large number of people, and then classifying and storing their facial parts in a database; also, computer graphics technology permitted each feature to be resized and positioned freely, vastly expanding system expressivity. Unfortunately, there was now too many basic examples to show to witnesses! In the UK PRO-fit software system, for example, 219 noses are stored in the White Male database, but a manageable set of 14 are 'long' and 'straight'. As with lineups, a witness's description is now an important prerequisite, in this case to specify subsets of features within the database. A cognitive interview is again administered for eliciting face recall, with the main techniques being rapport building, context reinstatement, free recall and cued recall; a 'verbal description' sheet is used by police operatives for writing down the details (see Activity Box).

14.3.2 The Effectiveness of Facial Composite Systems

Frowd et al. (2005b) evaluated Photofit, along with its descendents, E-FIT and PRO-fit, sketch and an early system in development, EvoFIT, which is described in section 14.3.4. Participants looked at a good quality target photograph, a face they did not recognise, waited three-to-four hours and then followed procedures used with 'real' witnesses. This involved a CI, to elicit a description of the face, and use of the

composite system as specified by the manufacturers to produce the best likeness possible. The targets were celebrity faces, half of which were distinctive, and half more average in appearance. Example images from the study can be seen in Figure 14.3.2.A [FIGURE 14.3.2.A]

The composites were shown to other people to name (Figure 14.3.2.B). The two UK software systems, E-FIT and PRO-fit, performed equivalently at 18% correct overall. Note that this level is only fairly good, but was significantly better than the older Photofit, at 6%. Naming was low for sketch, at 9%, and very low for EvoFIT, at 1%. The study revealed that composites of distinctive targets were named about three times better overall than composites of average targets. This target ***distinctiveness*** advantage is also found when recognising *photographs* of faces (e.g. Shapiro & Penrod, 1986); here, it suggests that an offender will be identified better from a composite if his or her face has an unusual appearance. [FIGURE 14.3.2.B]

Frowd et al. (2005a) asked participants to wait 2 days between seeing a target and constructing a face, the typical delay for real witnesses. Sketches were correctly named about the same as before, at 8%, but E-FIT and PRO-fit were less than 1% overall! This indicates that the 'feature' systems are failing to produce recognisable images when deployed after a realistic 2 day delay: the exception is sketch, and even then performance is not great. Using a similar design with a 2 day delay, other projects have found similarly disappointing performance for software feature systems (Frowd et al., 2007b, 2007d, in press).

14.3.3 Internal and External Composite Features

Frowd et al. (2007a) attempted to understand why naming should be very poor for software composites constructed after a 2 day delay. Similar to Ellis et al's (1979) study using *photographs* of faces, Frowd et al. examined two regions of the face: the internal and external features; see Figure 14.3.3 for examples. A *naming* task could not be used as levels would be too low for analysis; instead a ***sorting*** procedure was administered that required participants to match complete and part-face composites to target photographs. Scores were 33% correct for the complete and external features composites, but only 20% for composites of internal features. The study suggests that low composite *naming* was a result of poor quality internal features; also, that if this region of the face could be constructed more accurately, then better recognition would emerge for the image as a whole. [FIGURE 14.3.3]

14.3.4 Improving the Effectiveness of Composites

The following techniques have successfully improved composite naming rates. Each is in current police use.

Combining different memories: Bruce et al. (2002) considered the situation where multiple witnesses had seen the same offender. If each observer were to construct a composite, each image would be different, but all would share characteristics of the offender. This can be clearly seen in Figure 14.3.4.A. Images would also contain errors. The authors' hypothesised that if the composites were combined, then some of these errors would be cancelled out and the resulting 'average' or ***morphed composite*** would be more accurate. Their hypothesis was confirmed in a series of experiments: a morphed composite was judged to have a better likeness than an average *individual*

composite and, in an identification task, was selected as often as the *best* individual image. [FIGURE 14.3.4.A]

Prior to Bruce et al's work, the UK police guidelines did not permit more than one composite to be constructed of the same offender in a multiple witness scenario. Since then, the guidelines have been updated to allow construction of multiple images, for the purpose of producing a morphed composite for public appeals (NPIA/ACPO, 2009). This image would feature on a wanted poster (such as on Figure 14.0) in preference to any individual composite.

When there is only *one* witness to a crime, however, morphing techniques cannot be used. In this more usual situation, other methods are required for composites to be effective. Some of these are described below.

Facial caricature: Different observers, even after seeing a target face for the same length of time, *construct* different-looking images (see Figure 14.3.4.A). Individual differences are also observed when people attempt to *recognise* composites: some of us are very good at *naming* them, while others struggle. It is likely that composites tend to be quite bland in appearance, and also contain 'error', which together make their recognition generally difficult. Frowd et al. (2007c) looked at enhancing distinctive information in composites and reducing error. Participants observed a composite being *caricatured*, where the distinctive aspects were exaggerated, and then *anti-caricatured*, where these same aspects were made to look more average. This manipulation was seen over a 21 frame sequence, as illustrated in Figure 14.3.4.B. [FIGURE 14.3.4.B]

The sequence is very effective at triggering the memory of the relevant identity. The effect extends to all construction methods – 'feature', sketch and

'holistic' – but is greatest for the worst quality composites: those produced after a long delay. For these images, average naming was found to increase tenfold as a result of watching the sequence, from 3% to 30%. It is most conveniently seen using an animated GIF format on a wanted person's webpage or on TV.

Improving holistic face processing: A cognitive interview (CI) is used to *recall* information about a face, to allow subsets of features to be located within a composite system for presentation to eyewitnesses. However, eyewitnesses engage in face *recognition* when they select facial features. This is the reason why the 'cognitive' approach is used in modern systems (as described in 14.3.1). But, this idea can be taken a stage further, by *enhancing* recognition ability via personality attribution. This was first demonstrated using *photographs* of faces. Berman & Cutler (1989) demonstrated that people were better able to recognise unfamiliar faces if they had made a series of personality judgements about them than if they had made facial feature judgements.

Frowd et al. (2008b) asked one group of participants to construct a face as normal, after a CI, while another group did the same but were asked to think about the personality of the face (similar to the CI's *free recall* component) and then make a series of whole-face judgements (*cued recall*). Examples include: friendliness, honesty and distinctiveness. Naming of the resulting composites were 9% after the CI, but 41% after the 'holistic' CI (H-CI), a four fold increase. The additional procedure of the H-CI takes a few minutes to administer but is very effective for improving the quality of an individual composite.

Holistic systems: All of the techniques described above run into difficulty when a witness's description is very sketchy, as feature subsets cannot be located. This can happen for briefly-occurring or unexpected crimes (normally where witnesses do not try to remember the face). In spite of this, they report that they could recognise the face if seen again; they could, for example, participate in a lineup if only a suspect could be located. Such witnesses appear to have a memory of the face that, while not in a describable form, could potentially be accessed via a *recognition* procedure. This idea is supported by research to suggest that face recognition ability remains stable for several weeks after an event (Shepherd, 1983), unlike face recall. Several researchers have been developing so-called 'holistic' systems to help these eyewitnesses. In the UK, there are two such commercial systems: E-FIT-V (Gibson, Solomon & Pallares-Bejarano, 2003) and EvoFIT (Frowd, Bruce & Hancock, 2008a).

In collaboration with Vicki Bruce and Peter Hancock, I have been developing EvoFIT for about 10 years. Witnesses are presented with arrays of complete faces from which to select a number of faces most resembling the perpetrator's face. The selected items are bred together, to combine characteristics, and produce more faces for selection. Repeating the process a few times allows the faces to become more similar to each other and more similar to the face in the memory of the observer. The item with the best likeness is ultimately saved as the 'composite'. Therefore, witnesses engage their face recognition ability, by selecting items that look *overall* similar to the intended target, to allow a composite to be 'evolved'. EvoFIT is a working example of Charles Darwin's idea of 'evolution by *artificial* selection'. In practice, the process is refined: witnesses look at face arrays that change by *shape* – the shape and position of features – and then by *texture* – the colour of the eyes, brows and overall skin tone. [FIGURE 14.3.4.C]

In tests using the standard police procedure and a 2 day delay, this version of EvoFIT produces more identifiable composites than those from a typical 'feature' system, but naming levels are still fairly low, at 11% (Frowd et al., 2007b, in press). Two developments have improved performance. The first was to 'blur' the external facial features at the start. This helps a witness to focus on the central part of the face that is important for later recognition of the composite by another person (Frowd et al., 2008c) – see Figure 14.3.4.C. The other was to allow enhancement of an 'evolved' face using a number of psychologically-useful scales (Frowd et al., 2006). Thus, observers can make changes to the face by age, weight, masculinity, friendliness, and other holistic properties of the face; see Figure 14.3.4.D for an example. In a recent evaluation, these two improvements were very effective at evolving a face after 2 days: correct naming was 25% correct compared to 5% for the 'feature' system (Frowd et al., in press). [FIGURE 14.3.4.D]

An important part of research is to verify performance outside of the laboratory, as part of fieldwork. This was seen for the cognitive interview (e.g. Fisher et al., 1989). EvoFIT has been audited in police field trials. In spite of difficulties in controlling for variables in such research (e.g. target encoding, exposure time and delay) and, as part of a six month trial period, Lancashire police have reported EvoFIT to be valuable in 20% of cases, Derbyshire 30%. Therefore, results are similar both in the laboratory and in the hands of the intended user.

14.4 SUMMARY: EVIDENCE AND EYEWITNESSES

Evidence collected from eyewitnesses is just one of many different sources available in a criminal investigation. Criminals may unknowingly leave their DNA at a crime scene, have touched objects, left fingerprints; even fibres from clothing may fall and be collected for analysis. These sources may also produce false leads, since we naturally leave behind such physical materials: hairs fall off, we make footprints and CCTV cameras record our presence. As with the case of Laszlo Virag and others, any one piece of evidence is not sufficiently reliable as a basis on which to convict. The Crown Prosecution Service in the UK is acutely aware of this issue and will not allow a case to be brought before the courts if it is based on insufficient or potentially unreliable evidence.

In spite of the unreliable nature of human memory, eyewitnesses can be very valuable to a police investigation. There are many situations where they are the only observers, and so their memory of what happened is of paramount importance. Each of our senses produce memories that are potentially valuable, even personal feelings! Eyewitnesses can provide a range of evidence to assist in an investigation. They can provide descriptions of events and people, take part in identification procedures and construct a likeness of the offender's face. Each area of their evidence has potential problems, but research has attempted to limit bias and maximise the value of a memory. Each piece of evidence is potentially unreliable but, when combined, can provide a reliable system for identifying and convicting criminals.

(6,886 words.)

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LEARNING OUTCOMES

At the end of this chapter you should be able to answer the following questions –

1. Explain how good we are at describing unfamiliar people, objects and events.

2. Describe what the main differences are between familiar and unfamiliar face recognition, and how this relates to eyewitness memory.

3. Describe how effective facial composites are and what can be done to improve their effectiveness.

4. Outline why eyewitness evidence can be unreliable.

5. List the main techniques used in the enhanced cognitive interview.

CHAPTER 14 – KEY TERMS

Caricatured composite

Cognitive Interview (CI)

Context

Conversational Management (CM)

Cued recall

Description-identification relationship

E-FIT

Encoding

Enhanced Cognitive Interview (ECI)

EvoFIT

External facial features

Eyewitness

Facial composite

Facial configuration

False memory

Familiar face recognition

Feature composite system

Free recall

Group identification

Hair

Holistic cognitive interview

Identification parade

Individual facial features

Internal facial features

Lineup

Memory

Miscarriage of justice

Mock witness paradigm

Morphed composite

PEACE interview

Person descriptions

Photofit

Picture matching

PRO-fit

Prototype

Rapport building

Recall

Recognition

Reinstating the context

Repeated recall

Report everything

Retrograde amnesia

Sequential lineup

Simultaneous lineup

Sketch artist

Standard Interview

Structural code

Suspect

Unfamiliar face recognition

Victim

Video identification

VIPER (Video Identification Parade Electronic Recording)

Weapon focus

Witness

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CHAPTER 14

SECTION SUMMARIES

14.0 INTRODUCTION

- Eyewitnesses help the police bring a criminal to justice.
- They give description of crimes, take part in identification procedures, construct facial composites and give testimony in a court of law.
- The police may make a public appeal for information.
- When there is good reason to believe that a person has committed an offence, he or she becomes a suspect in a criminal investigation.

14.1 INFORMATION RECALL

- Information gained from an eyewitness is one source of evidence.
- Evaluations of real life crimes reveal that witnesses remember information with a high degree of accuracy and maintain this for long periods of time.
- Errors made are about colours of clothing and hair.
- Eyewitnesses are generally fairly accurate at judging estimates of height, weight and age.
- The way in which a question is asked may affect recall and may result in a false memory being created.
- Physiological stress when observing an event can result in retrograde amnesia.

- Attention can be drawn to the presence of a weapon, reducing overall recall.
- The cognitive interview is a set of techniques that has been designed to maximise the quality and quantity of information recall.
- An enhanced version of the cognitive interview is even more effective than the standard version.
- The UK police use interviews based on the enhanced cognitive interview and additional memory-enhancing techniques.
- Human faces contain individual facial features and a facial configuration.
- Descriptions of faces are valuable to a police investigation and tend to focus on the exterior facial region.
- Facial distinctiveness is an important factor for face recall and recognition.
- Information about faces is lost over time, the same as for information in general.
- Face recall is better under a feature encoding strategy.

14.2 PERSON RECOGNITION

- There are a range of cues we use to recognise a person but information from the face is arguably the most important.
- We are excellent at recognising faces with which we are familiar.
- Familiar faces are recognised more by their internal than their external features.
- Offenders are normally only seen once and therefore eyewitnesses use unfamiliar face perception to describe and recognition the face.

- Familiar face recognition is sensitive to a range of effects including lighting, head pose, expression and context.
- The external features exert a greater influence overall for unfamiliar than for familiar face perception.
- The UK police use group identification and lineups procedures with eyewitnesses.
- Lineups can involve real people or videos and are administered sequentially or simultaneously.
- They should be constructed on the basis of an eyewitness's description of an offender.
- Larger sized lineups are more effective as they protect innocent suspects.
- Lineup fairness can be tested using a mock witness paradigm.

14.3 FACE CONSTRUCTION

- Eyewitnesses may construct a picture of an offender's face when the police do not have a suspect.
- There are various methods that have been developed to build the face and these include sketch artists and 'feature' systems.
- Modern computerised feature systems contain a large number of individual facial features for eyewitnesses to select and position on the face.
- Research suggests that feature systems are somewhat effective when the target delay is up to a few hours in duration but not when it is 2 days or more, the norm for 'real' witnesses.

- There are a range of techniques developed to improve the effectiveness of facial composites when the delay is long:
- Composites from different witnesses may be combined to produce a morphed composite.
- Eyewitnesses may be asked the think about the personality of the offender's face as part of an 'advanced' cognitive interview.
- Identification of a composite (to members of the public) is improved using a caricaturing procedure.
- All these techniques are ineffective if an eyewitness cannot recall the face in detail.
- The EvoFIT system allows a composite to be constructed in situations where an eyewitness's recall of the face is very poor.
- EvoFIT presents screens of complete faces to allow a composite to be evolved.
- The system is much more effective than a feature system when the target delay is 2 days.

14.4 EVIDENCE AND EYEWITNESSES

- There are many types of evidence available to a criminal investigation, but some of these can be misleading.
- There have been many cases of wrongful conviction that have occurred due to errors of eyewitness identification.
- Convictions can be rendered more reliable by combining evidence from different sources.

CHAPTER 14

SELF-TEST QUESTIONS

14.1 INTRODUCTION

- Describe the various sources of evidence available in a police investigation.
- What is a suspect?

14.1 INFORMATION RECALL

- How well do eyewitnesses recall information?
- Describe the kinds of inaccuracies that eyewitnesses make.
- What factors affect what we recall?
- Describe the cognitive interview and say how it has been enhanced.
- The UK police use a special kind of interview. What is this called and what are the techniques it contains?
- What is weapon focus?
- How does state anxiety affect information recall?
- Do we recall different parts of a human face in different ways? If so, how?

14.2 PERSON RECOGNITION

- What cues do we use to recognise a person? Which of these is the most effective?

- How are familiar and unfamiliar face recognition different to each other and how does this relate to eyewitnesses?
- Describe the different types of identification procedures.
- What are the potential problems with constructing lineups and how can these be overcome?
- What kinds of errors are made when recognising unfamiliar faces?

14.3 FACE CONSTRUCTION

- What is a facial composite?
- Describe the traditional systems that the police use to construct faces with eyewitnesses.
- How effective are composite systems?
- When do feature system run into difficulty?
- Various developments have improved the effectiveness of traditional feature composites. What are these?
- Describe the alternative approach to construction by individual features.
- How effective is one of these 'holistic' systems? What has been done to improve its performance even further?

14.4 EVIDENCE AND EYEWITNESSES

- What is the problem with evidence collected at a crime scene?
- What happened in the investigation of Laszlo Virag?
- Can eyewitness evidence be reliable? If not, why? (also see 14.2.)

CHAPTER 14

RESEARCH QUESTIONS

(This section is to be used by teachers/instructors to lead class discussions on eyewitness research issues.)

14.0 INTRODUCTION

- What are the different sources of evidence collected in a criminal investigation?

14.1 INFORMATION RECALL

- What is the difference between recall and recognition?
- What type of errors do eyewitnesses make when they recall information?
- What do witness's recall the best about another person's face and why?
- Why might it be possible to accurately describe details of a crime but not details of a person's face?
- Why is facial distinctiveness an important factor for face perception?
- What are the techniques that assist information recall in the PEACE interview?

14.2 PERSON RECOGNITION

- What sources of information do we use when we try to recognise a person? Which one is likely to be the most important?
- What is the consequence of becoming familiar with a person's appearance?
- What kinds of errors do eyewitnesses make with face recognition?
- There is a consequence of constructing lineups directly from a picture of a suspect's face. Describe what this is.
- Suggest good procedures for building lineups.

14.3 FACE CONSTRUCTION

- What are the three main methods used to construct a facial composite?
- What is the 'cognitive' approach and why is it effective?
- How useful are facial composites?
- When building a composite system's database, why must only a *sample* of facial features be taken from each photographic subject?
- Why should composite quality be poor when a person constructs a composite two days after seeing the face?
- Which region of the face is important when recognising a composite, and why?
- Why are the recent techniques likely to be effective for improving the performance of facial composites?

14.4 EVIDENCE AND EYEWITNESSES

- How reliable is eyewitness evidence?
- What methods can be used to improve their effectiveness?

CHAPTER 14

FORENSIC ISSUES

(This section is to be used by teachers/instructors to lead class discussions on forensic issues.)

14.0 INTRODUCTION

- Should evidence be collected from an eyewitness in any order? If so, what might this be?

14.1 INFORMATION RECALL

- What normally happens to information in our memory over time, and does this occur in real crimes?
- What is a false memory and how is it created?
- Why might it be possible to accurately describe details of a crime but not details of a person's face?
- Why is hair the easiest to describe?
- What techniques are used to maximise the recall of information?

14.2 PERSON RECOGNITION

- What type of face perception do eyewitnesses normally engage in and why might this be a problem?

- What is a major source of error in person recognition?
- What are good procedures for constructing lineups?
- Why is it best to use lineups with a large number of foils?
- What problem occurs if an offender substantially changes their hair between the crime and a lineup?

14.3 FACE CONSTRUCTION

- Which techniques are used in the cognitive interview with eyewitnesses for obtaining a description of an offender's face? Which are not used?
- What do the Frowd et al. (2005a) naming data imply for police practice?
- When is it permissible for a composite to be constructed and when is it not?
- What are the implications of an offender's face being distinctive?
- In what way can good quality composites be constructed from traditional systems, and what techniques are available to improve their performance?
- Does an eyewitness need to have good face recall to use EvoFIT?

14.4 EVIDENCE AND EYEWITNESSES

- What is the main reason for miscarriages of justice?

CHAPTER 14

ACTIVITY BOX 14.1

Have a go at describing the appearance of a good friend of yours from memory. First try to *visualise* his or her face in your mind and then describe as much as you can. If you wish, write down what you remember using the following verbal description sheet. When done, compare your pattern of recall with section 14.1.4 that describes general findings from the face recall literature.

Verbal Description Sheet

Overall observations

Face shape

Hair

Brows

Eyes

Nose

Mouth

Ears

FOCUS POINT 14.2.1

In 1969, Laszlo Virag was convicted of theft of money from parking meters in Liverpool and Bristol, and with the subsequent use of a firearm while attempting to escape arrest. Laszlo's conviction was based solely on the evidence of eight eyewitnesses who identified him from a lineup. He was sentenced to 10 years in prison. Two years later, as part of a separate investigation, fingerprint and other evidence were found to implicate another person, Georges Payen, and Laszlo was exonerated and compensated for his time served in prison. [FIGURE Focus Point 14.2.1]

The case of Laszlo Virag is just one of many unfortunate convictions that have been overturned and innocent people set free. The case against him was based on eyewitness testimony that appeared to be both accurate and convincing. The observers felt confident in their judgement, and so clearly feelings cannot always be relied upon, even though they may sound convincing to a jury (Wells, Olson & Charman, 2002). One of the eyewitnesses was even reported to have spent several minutes in a hotel bar with the accused but still mistakenly picked out Virag in a lineup. Virag and Payen share a *passing* but not a *striking* resemblance to each other. A formal inquiry into such miscarriages of justice was carried out by Lord Devlin in the 1970s with the conclusion that eyewitness evidence was unreliable. There are many other cases involving honest but nonetheless incorrect identification; for further examples, see Davies & Griffiths (2008) or Rattner (1988).

TABLE 14.1.2

The following table lists the main stages of the enhanced cognitive interview (ECI) developed by Fisher et al. (1987).

1. Rapport building
2. Describe the aims of the interview
3. Context reinstatement and free recall
4. Open questions (cued recall)
5. Repeated recall (different orders and perspectives)
6. Summary
7. Close

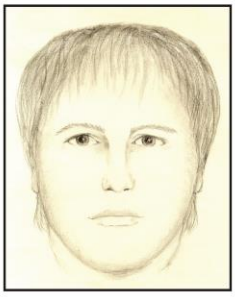
FIGURE 14.0.

A Wanted Poster released by Northants police as part of Operation Mallard. The criminal investigation involved a series of sexual assaults in Southern England in the late 1990s and January 2000.

OPERATION MALLARD

SERIOUS INDECENT ASSAULT
Wednesday 12 January 2000
A509 "Duffys Track", Bozeat, Northamptonshire

This offence is DNA linked to offences in St Neots, Cambridgeshire on 14 August 1998 and Yately, Farnborough, Hampshire on 20 February 1998.



Light coloured transit size/style van
No side windows
Black writing/lines on driver's side

12 Jan 2000 - Bozeat

Black lace up shoe, wedge style heel with two raised bars stitched in upper.

12 Jan 2000 - Bozeat

WHITE MALE 25-30 Years

5'8" to 5'10" TALL
LARGE BUILD
UNFIT LOOKING
OVERWEIGHT BUT NOT FAT
SHORT BROWN FAIR HAIR

12 Jan 2000 ***Bozeat, Northamptonshire*** **-** White T-shirt with large blue circle, intersected by red and yellow geometrical shapes, possibly triangle or square

14 Aug 1998 Eaton Socon, ***St Neots, Cambridgeshire*** **-**

White shorts, white top with New Zealand written on it

20 Feb 1998 ***Farnborough, Hampshire*** - Blue & white broad banded rugby shirt or T-shirt

Likeness of 'T' shirt as worn by offender on

12 Jan 2000 - Bozeat

Likeness of Rugby shirt as worn by offender on

20 Feb 1998 - Farnborough

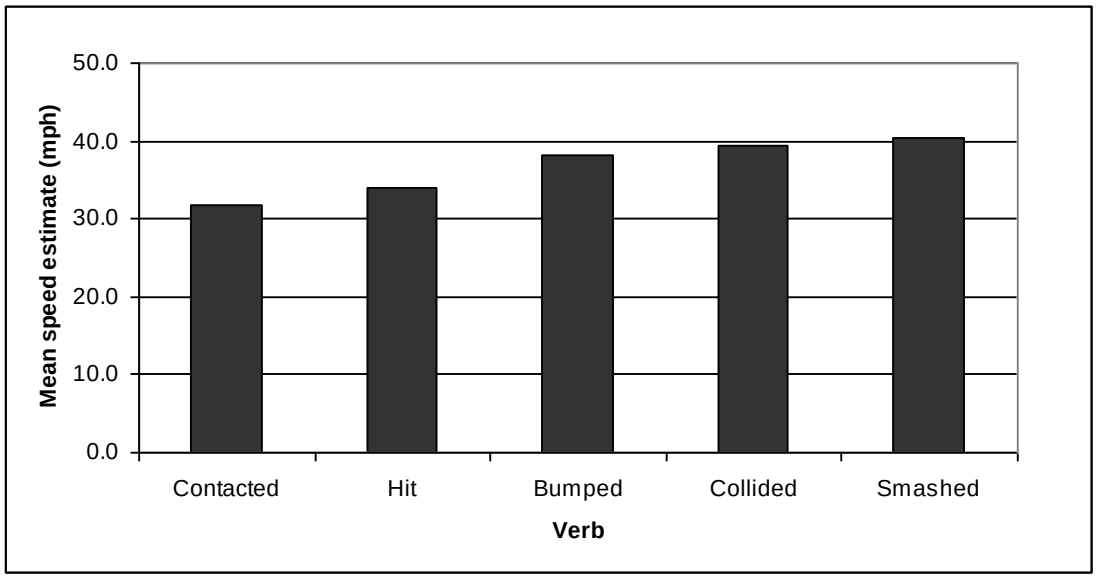
APPEAL FOR INFORMATION

1 We need this man's name
2 We need to know the origin of this T-shirt

INCIDENT ROOM
01933 304370
or (FHQ) on
01604 700700

FIGURE 14.1.1

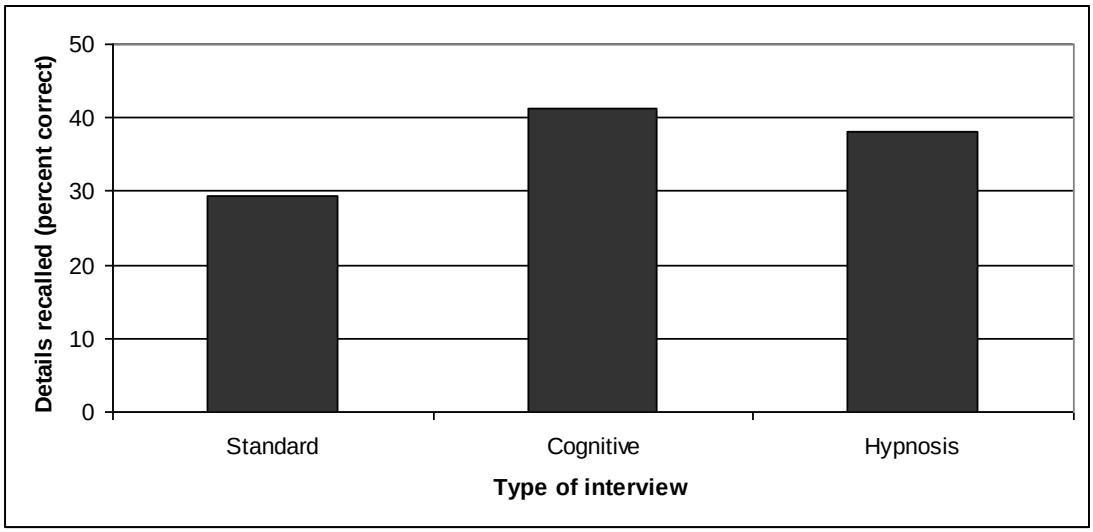
The influence of people's perception of vehicle speed following the verb used in Loftus & Palmer (1974). Average estimates of speed increased from 31.8 mph using 'contacted' to 40.5 mph using 'smashed'.



Redrawn from Table 1, Loftus & Palmer (1974).

FIGURE 14.1.2

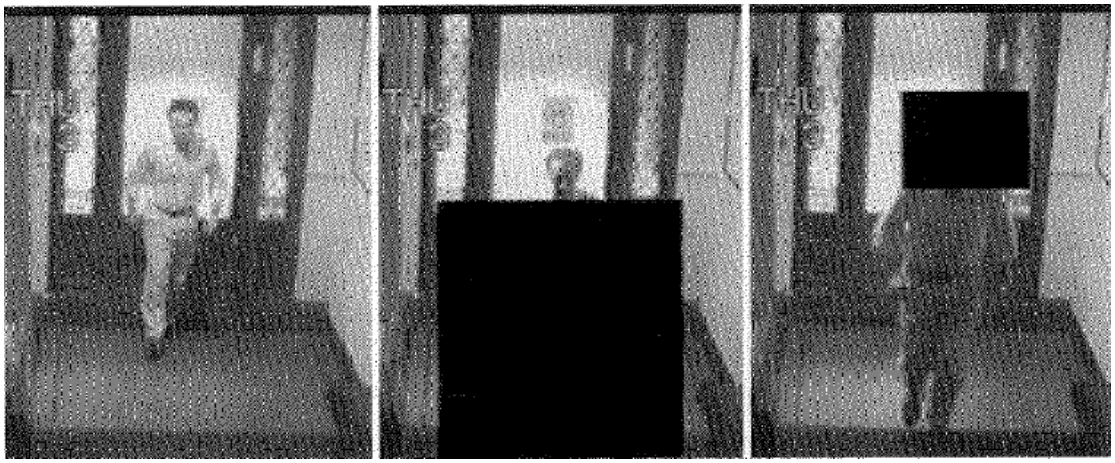
The figure illustrates the influence of interviewing on information recall. Correct information recalled was found to be best for the cognitive interview and worst for the standard interview.



Redrawn from Table 1, Geiselman et al. (1985).

FIGURE 14.2

Example stimuli from Burton et al. (1999). Participants were presented with (left to right) un-edited CCTV footage, or footage with the body obscured or the head obscured. Also included was a condition where gait was disrupted. The greatest disturbance to face recognition occurred with the face obscured (far right image), indicating the importance of this part of a person's appearance.



Reprint of Fig. 3 from Burton et al. (1999) with permission. [Editor: please obtain permission]

FIGURE 14.2.1

The graph demonstrates that the changes made to a face between study and test affect our ability to recognise the face. Participants in Bruce (1982), Experiment 1, saw the same picture at study and test (far left bar), a change in *either* pose or expression (centre bar), or a change in *both* pose and expression (far right bar).

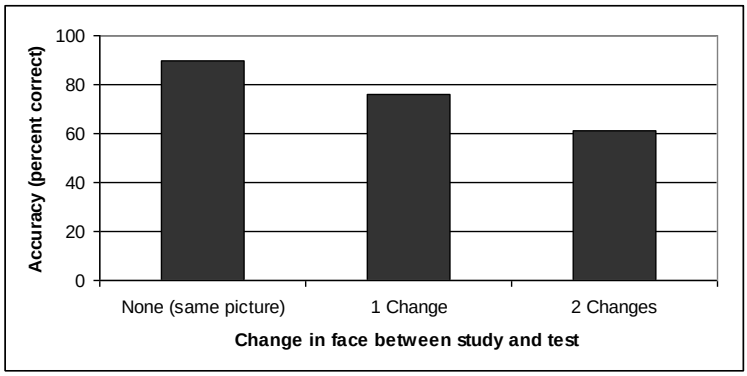


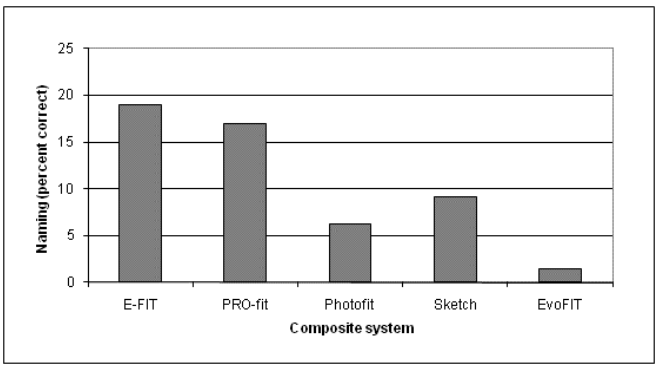
FIGURE 14.3.2.A

Example composites from Frowd et al. (2005b). All were constructed from different peoples' memories. The identity is the same throughout: can you guess who it is? The answer is listed in section 14.5. From left to right, they were constructed from E-FIT, PRO-fit, Photofit, Sketch and EvoFIT.

[Editor: if a picture of Michael Owen can be obtained, this could be included here for reference. I do not have one with copyright clearance.]

FIGURE 14.3.2.B

The graph demonstrates how effective composites are when the delay-to-construction is fairly short (three to four hours). Frowd et al. (2005b) found composite naming to be only *fairly* good (less than about 20% correct). The two main UK software systems, E-FIT and PRO-fit, were equivalent and better than the older Photofit.



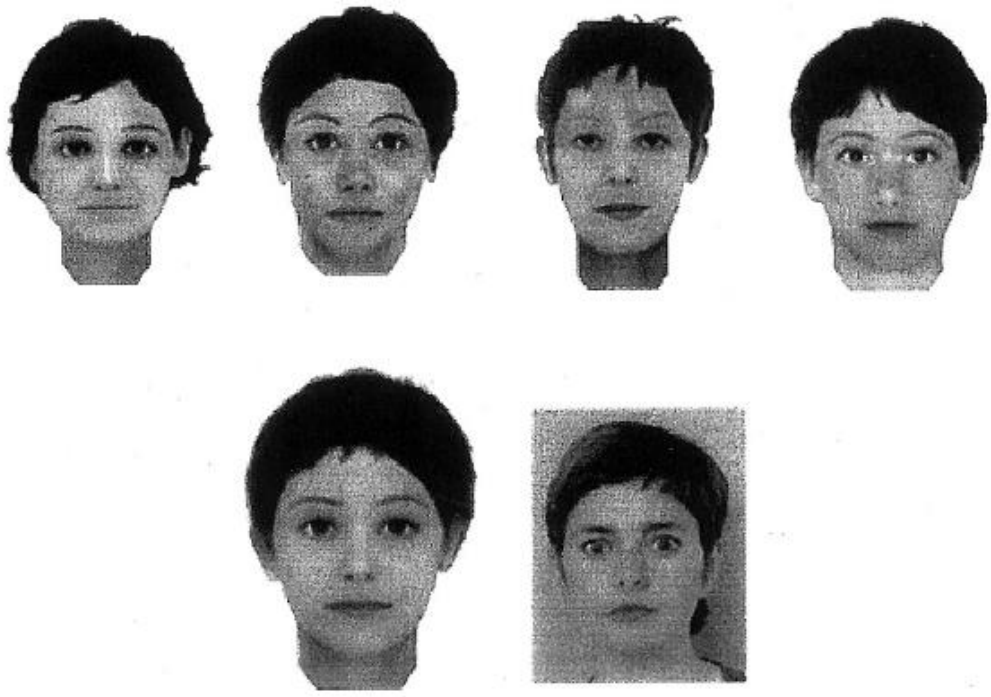
(Note that 100% on this scale would mean that all composites from a particular system would have been correctly named by all participants.)

FIGURE 14.3.3

Example stimuli used in Frowd et al. (2007a): internal and external composite features, and the corresponding complete composite. In the study, participants matched complete composites, or one of these part-composite images, to target photographs. The internal feature composites were not matched as well as the other types of image, indicating poor construction of the central facial region.

FIGURE 14.3.4.A

Example composites (top row) constructed by participants in Bruce et al. (2002). The morphed image of these individual composites is shown on the bottom left; the researchers demonstrated that this is an effective probe for the target face (in this case, the image on the bottom right).



Reprinted from Figure 4, Bruce et al. (2002) with permission. [Editor: please obtain permission]

FIGURE 14.3.4.B

Caricaturing a composite of the former Prime Minister, Tony Blair. Shown are negative and positive caricature levels: -50%, -25%, 0%, 25% and 50% exaggerations. The image in the centre (0%) is the original composite constructed by a participant-witness. A sequence of such images (with 21 frames) is valuable for face recognition. An animated example may be seen at www.uclan.ac.uk/caricature.

FIGURE 14.3.4.C

An example array of EvoFIT faces as would be presented to eyewitnesses. The external parts of the face have been blurred, to allow them to focus on the important, central region. At the end of evolving, the blur is disabled to allow the entire image to be seen clearly.

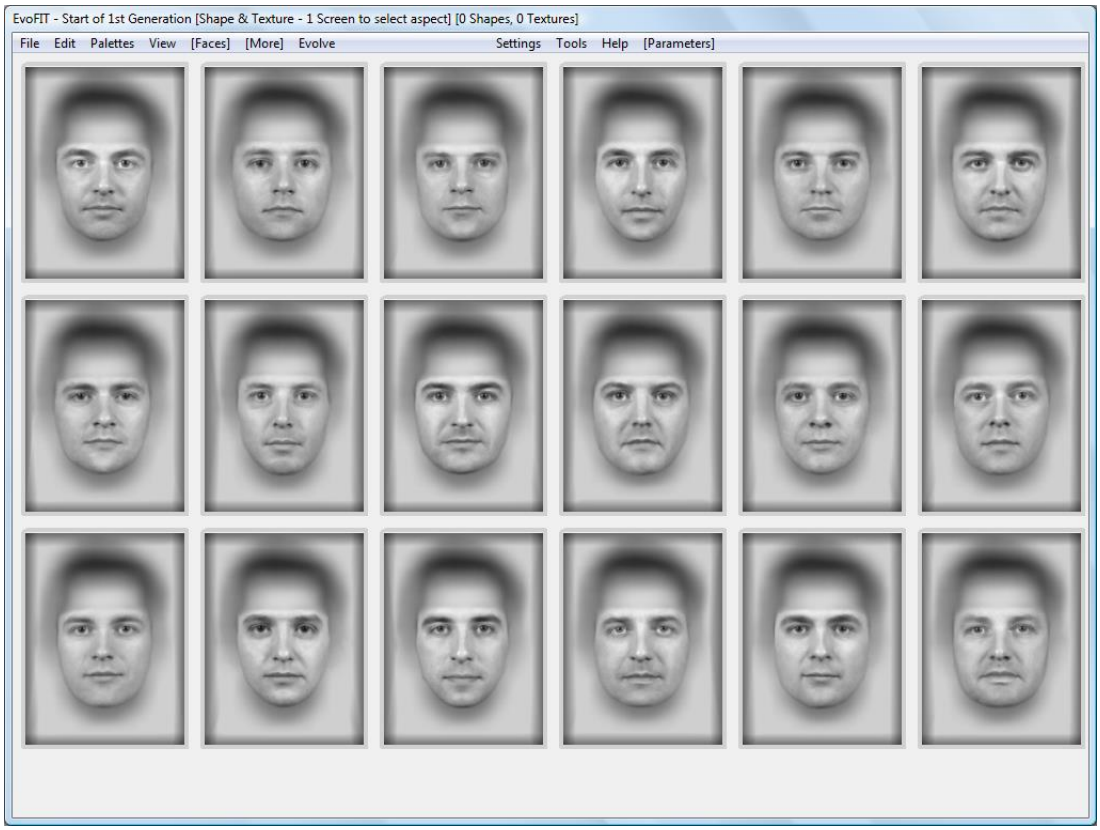


FIGURE 14.3.4.D

An example of the ageing (top row) and pleasantness (bottom row) scales in EvoFIT. At the end of evolving, eyewitnesses are given the opportunity to manipulate their final face using these and other 'holistic' scales. The centre image is veridical, negative changes on the scale are to the left and positive changes are to the right. Can you guess the identity of the evolved face being manipulated here? The answer is listed in section 14.5.

Figure for FOCUS POINT 14.2.1

The case of Laszlo Virag. The photograph on the left is of Laszlo Virag, convicted in 1969 of a series of bank robberies in NW England. The image on the right is of Georges Payen who was later found to be responsible for the offences. The images share a *passing* but not a *striking* resemblance to each other.

Reproduced from Devlin (1986) with permission. [Editor: please obtain permission]

14.5 ANSWERS

Composites in Figure 14.3.2.A are of the UK footballer, Michael Owen. The images in Figure 14.3.4.D are based on a composite of Simon Cowell.

Acknowledgement

The author would like to thank Dr Faye Skelton, University of Central Lancashire, Preston, for her insightful comments on a draft of Chapter 14, and Emma Walker for proof reading a near-final version.