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Facial mapping, body mapping and the duties of an expert witness

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As an anatomist and biological anthropologist, I have appeared as an expert witness in courts since 1976, initially in Poland, then in Texas (USA), South Africa and for the last 11 years in Australia. The following comments are based on my entire experience, with emphasis on the recent experience in courts in South Australia, New South Wales, Queensland and Northern Territory and assisting with some cases in Western Australia and in the ACT.

Humans are variable in their body size, shape and function. Each individual is unique, and even two identical twins can be told apart by a number of slight differences in their external anatomy. This has been realised in the 19th century when French anthropometrist Alphonse Bertillon invented the first scientific method of identification of criminals from their body dimensions and descriptive characteristics. Besides anthropometry he introduced standardised photographs of criminals – the mug shots. In the early 20th century dermatoglyphics – fingerprinting – overtook laborious measuring of a number of criminal's body dimensions. Bertillonage, as the anthropometry of criminals was known, has been criticised as of little use in crime scene investigation because criminals did not leave their body dimensions, nor anatomical characteristics at a crime scene.

With the spread of professional and amateur photography during the 20th century, images of people's faces, and sometimes, entire bodies became of interest in civil and criminal cases. They mostly concerned identification of deceased relatives or individuals who in their official capacities committed criminal acts and later changed their names and places of residence to escape punishment. Classic cases of this nature are those of Nazi criminals.

Anthropometrists developed orderly methods of examination of photographic images of persons for the purpose of legal identification (Iscan and Helmer 1993). They were helped in this task by the experience gained from the identification of skulls of deceased people by comparing them with their portraits using superimposition and by reconstruction of faces from the skulls. Underlying anatomical principles were the same in all cases. Details of these methods are still an object of vigorous research activity (Stephan and Henneberg 2001, Wilkinson 2004, Stephan et al. 2003, 2005, Clement and Marks 2005).

Another disappearing source of detailed experience with classifying and comparing anatomical details of human bodies was gained by biological anthropologists in the course of examination of cases of disputed paternity. Prior to the widespread use of DNA in paternity cases, decisions whether a particular man was a biological father of a particular child was based on thorough comparison of over 200 characteristics of external anatomy and fingerprints of the child, the mother and the man who was a probable father. This practice was still ongoing in mid-1980s. The author gained experience in such paternity cases. It now turns out to be very valuable in making an identification from images.

The end of the 20th century witnessed the increasing popularity of closed circuit television systems used to monitor security of various buildings and commercial establishments. Surprisingly, it was no longer true that criminals do not leave their anatomical characteristics at the crime scene. In some cases, faces and entire bodies of persons committing criminal acts were registered on a film or on tape. Criminals very quickly became aware of the CCTV presence and used an array of methods to thwart identification. Most commonly they covered their faces because of the realisation that their mugshots or other face photographs, are available to the police. For the same reason, police and other crime investigators concentrated their efforts on obtaining good images of faces from CCTV images. Some criminals became very ingenious – upon entering the bank they covered their faces with a cloth or a sock, conducted a robbery, spray-painted over CCTV camera lenses, uncovered their faces and walked out onto a sidewalk (R v Nylander, South Australia 2003).

We identify people by their face predominantly because the face is the anatomical region not covered by clothing and is used in non-verbal communication. Faces as anatomical structures are no more variable than other parts of the human body (Henneberg et al. 2003). Depending on cultural practices, faces are often heavily modified by cosmetic procedures, groomed facial hair and wearing of spectacles. The "naked" anatomy of a human face, that is a face without a moustache and a beard, makeup and unrelated to the head hairstyle, is hardly recognisable. In our experiments only about 10% of participants correctly identified a "naked" face with a photograph of an actual person (Stephan and Henneberg 2001, 2006). Specific features of the head such as details of the nose, and

especially those of external ears, are highly individually variables, but they escape observation by lay people untrained in detailed anatomical examination. These details are also rarely reproduced on CCTV and other commonly taken images because their reproduction requires high resolution of the lenses and of recording equipment.

The hands are another part of the human body that are usually not covered by garments. Besides obvious dermatoglyphes on the palmar (under) side of fingers and palms, the exact shape of fingernails, shapes and proportions of fingers and palms are individually variable. The flexion creases around small joints of the digits form by the interaction of underlying anatomy and habitual use of hands and thus become unique identifiers.

Any region of the human body is infinitely variable among individuals, but by virtue of being covered by garments this variation is less useful in legal identification. Sex crimes recorded on photographs or video images are an exception, especially because of the great anatomical variation of external genital organs. This is rarely realised, because of prevailing modesty.

Despite garments, the general size, shape and proportions of the entire body vary to such an extent that they can be used in individual identification. Garments are so constructed that force of gravity fits them snugly to the shape of the shoulders and upper back, while fashions and sartorial practice often produce good fit of garments to various other body parts. Particular structure of the body, together with habits, influence stance, posture and common movements. For example, right handed people, because of the position of the entire trunk during hand use, usually carry their right shoulder slightly lower than the left one, and vice versa – left handed people may have their left shoulder lower than the right.

In cases of legal identifications, be it for purposes of civil, or of criminal law, it is crucial that transparent, objective, and repeatable methods are used as these can be subject to cross-examination. Variation of human anatomy is continuous and thus an infinite number of anatomical types can be theoretically present. The last two hundred years of biological anthropology (which is) – the science of human biological variation – codified and systematised the description of human variation. This is achieved by means of standardised methods of craniometry, anthropometry, cranioscopy and somatoscopy that were applied to thousands of people worldwide. Thus we know ranges of variation in uniformly measured, or formally described anatomical details from the total body height to the width of each finger and toe and from the general body shape to the configuration of the ear lobe. A lay person inspecting a somewhat fuzzy picture of a bank robber will describe him as a rather thin person with long face while an anatomist will say that the person of interest is ectomorphic and leptoprosopic. This description contains a wealth of background information to which anatomy of the person of interest is related.

A trained biological anthropologist looks at images of humans with the background knowledge of the full range of human variation and with a systematic analytical approach. This is the theory. In practice, human morphology undergoes rapid changes during secular trends (Henneberg 1999, 2001) while broad anthropometric surveys were carried out decades ago. Descriptive details of human faces were codified in the first half of the 20th century mostly by direct observations in standard face positions. Thus, despite a vast knowledge of human variation we still lack current information about the frequency with which specific characteristics occur in the Australian population and have no precise scales to classify the shape of various details of faces from photographs taken at various, unstandardised angles. This leaves a wide margin for the judgment of an expert. Such judgment, despite all its scientific background, is still, to a certain degree, subjective.

The simplest way to describe the practice of facial mapping or body mapping is to say that an anatomist inspects images and does what any lay person does when recognising (or not) another person from photographs or video images. The mind of the observer performs a multivariate comparison of two mental images constructed from the inspection of photographs.

The term “mapping” is used by some experts to give a semblance of a systematic, objective approach to identification from images. An expert witness inspects images and tries to describe the configuration of each anatomical detail, separately producing a “map” of the body or its part. Images of the person of interest should be inspected and described first, and the images of the known person, a “suspect”, only after the other set of images is fully described. This prevents subconscious reading of details of the ‘suspect” into the images to be identified. Usually “suspect” images are of higher quality than those to be identified, and thus “suspect” images contain detail invisible on other images. This detail may subconsciously influence the observer while examining images from a crime scene.

It is difficult to take any reliable measurements from images because of optical distortion produced by the equipment and of different angles at which bodies or faces are photographed. Thus, expert witnesses must rely on descriptive assessments. These can easily be influenced by prior knowledge of suspects. It is not the task of an anatomist to compare images. An anatomist uses images to produce a description of the anatomy of a person of interest. Once such a description is formed and recorded, an anatomist proceeds to inspect images of suspect (s) and forms an opinion about their similarity to the person of interest. Instead of inspecting images of a known “suspect” an anatomist may ask to see the live “suspect”. Observation of an actual live person provides more anatomical detail than two-dimensional small size images.

The reliability of the final anatomist's opinion depends on several factors:

(1) nature and quality of original images
(2) type of anatomical characteristics of a person of interest that can be reconstructed from images
(3) nature and quality of images of a "suspect" or observation of a live suspect
(4) knowledge and experience of the anatomist.
Some crime scene images, even though of good quality, show persons of interest only from the back, or depict only a portion of the face; some others, though showing numerous complete views of the entire person, are so distorted by lenses and so fuzzy due to the equipment quality that it is difficult to form a good anatomical description.

Some individuals have very average, common anatomical features, which render them similar to many other individuals, while some other people have rare anatomical variants, or specific malformations which make them unique at the first glance. The simplest example is the presence of scars, broken nose or loss of a finger. It is also important to note that even if each separate anatomical trait of a given person is fairly common, their combination may be rare.

Due to the tradition of taking just mug shots, police often do not have full body pictures of suspects, or have full body pictures taken many years apart from the date of the crime. Body weight, and habitual movements may differ after several years have passed. There are cases in which criminals grow facial hair or alter it, being conscious that this limits an expert's ability to perform identification.

Some anatomists have more, others less experience with studying people of specific geographic origin, or of particular regions of the body. Powers of observation also differ amongst individual experts. All these factors influence the correctness and reliability of the final opinion. Ultimately, this opinion is a result of the anatomist's experience and quality of the material provided for examination. Like any human opinion, it can be coloured by the personal interest of an expert.

The role of an expert witness, unlike that of other witnesses, is not only to describe facts, but also to provide an opinion which the court of law may treat as evidence (Plueckhahn and Cordner 1991). In inquisitorial legal systems expert witnesses are called by the court, while in adversarial systems they are called by the parties. It should be remembered however, that in any legal system the role of an expert witness is to provide the court with an objective description of facts and an unbiased opinion. This is the theory.

In practice, it is difficult to achieve full objectivity of an opinion of an expert witness presented in court for a number of reasons (Kassin et al. 1990, Freckelton et al. 1999, McAbee and Freeman 2006). This is so not only because of a degree of free, possibly biased, judgment exercised by an expert witness in assessing, interpreting and presenting facts during court proceedings, but also because of the constantly changing nature of scientific knowledge providing the background for expert opinions.

Despite the public image of exactness and precision, natural sciences rely on theories that are but approximations of the actual state of affairs, and in the process of research and debate these theories are subject to modifications. In scientific practice greater objectivity is achieved by the process of peer review. In its simplest form it consists of a review of results and conclusions arrived at by one scientist by his/her colleagues. In its most complex forms it involves extensive public debates in print, at conferences and in the media. The evolution of living organisms is just one example of vigorous debate that continues for over two centuries. Despite its pitfalls (Henneberg 1996, 1997) the process of peer review produces greater reliability of results of scientific work than the opinion of a single expert, however good.

In order to make the expert anatomist's evidence more reliable it is necessary to minimise possible biases. This can be achieved in three ways:

(1) by ensuring that the expert is given only information relevant to the expert's role in the case, because any "extraneous" information may produce biases of judgment
(2) by ensuring the independence of the expert from arguments of the parties; ideally by calling an expert by the court, practically by establishing a system in which an expert's rewards and reputation are independent of providing evidence for or against a particular party
(3) by assessing the reliability of the expert's statements and opinions through a peer review process - ideally by calling a second independent expert in each case; practically, by requiring experts to subject their opinions to the scrutiny of colleagues before they are presented to the parties and the court.
As with any activity involving human opinions, it is impossible to achieve an absolute objectivity of results of an anatomical identification, but strict adherence to good scientific practice and legal procedures, (eg Federal Court of Australia. 1998, Supreme Court of South Australia. SCR 38.01 A. 2002) together with ongoing research into human biological variation can ensure the usefulness of an anatomist's expertise in legal matters.

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