B171 A Computerized System of Human Ear Image and Print Identification

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The authors intend to present to the forensic scientific community a computerized system for the identification of the living or dead from ear images and the identification of offenders from earprints left at scenes of crime.

This system has 2 principal uses. It can be used to search and identify an offender from a known database using an earprint left at a scene of crime. It can also be used to identify an individual purely from an ear image. This could be used at immigration, customs, CCTV, or even the search for a wanted individual any where in the world with a simple photograph been sent to a central database. Therefore the question as to whether an individual is who they say they are can be accompanished with this system.

The ear was first used to identify individuals in the late 19th century when the criminologist Alphonse Bertillion devised a system of identifying individuals using 11 anthropometric measurements of the human body. These included measuring the height of the individual, as well as recording the size, shape and position of the ear on the head. However, the use of ears in human identification was largely abandoned with the advent of fingerprinting in the early 20th century. In the later part of the century there was a resurgence of interest in the use of ears to identify individuals ("earology") although despite the hypothesis that each ear on each individual is unique, the uptake of this area of identification has been slow and controversial with many Courts not accepting ear evidence. This problem is confounded by the lack of peer reviewed, scientific publications of methods used for ear identification. To date, only 2 methods have been published for ear images, those of Alexander and Iannarelli, and there is to our knowledge no peer reviewed published method for earprint identification which, to date, relies on manual comparison of a print from a scene of crime with a known suspects earprint. This one-to-one comparison could bias the interpretation.

The Division of Forensic Pathology, University of Leicester, England, in conjunction with the commercial company K9 Forensic Service Limited, Northampton, England, undertook a project to produce a computerised system of ear image and earprint identification. We first reviewed all available literature on methods used to identify individuals from their ears and realised a paucity of information and techniques. We then considered the anatomy, development, racial, genetic and medical aspects of the ear which may make it unique to an individual. Using volunteers we developed a system for ear image capture using digital photography and collected 800 images (400 right and 400 left ears). All ears were also printed. This formed the basis of 2 databases (800 images, 800 prints). Random ear images and prints known to be in the databases where then searched manually using the identified manual methods to assess ease of use, speed, intra-observer differences and accuracy of identification. All images were then entered into a computer system to create an ear image and earprint database. The computer system works by allowing the operator to apply up to 20 points to each image in a similar way to the fingerprint system. The software then uses the points to search for the same ear in the database. To enable the programme to work we had to standardize the placement of the points. This required the development of a locating grid to be applied to the ear to ensure that all points, on all ears are placed at the same point. A standardised system was developed for both ear images and ear prints. In the latter cases this is, to our knowledge the first such method to be presented and published.

The system which has been developed works for both ear images and ear prints. It can use complete images or, as often is the case for prints, partial prints. Although the operator still has to confirm the final match, the system is considerably more time efficient compared to manual methods. We have also analysed the differences between left and right ears, males and females as well as racial differences and produced a series of standard ideal ear shapes which can be used for facial reconstruction. Finally, by analysis the position of ear piercings we have identified another identifying feature of the ear and shown why earprints are often incomplete at scenes of crime.

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Ear Image, Earprint, Computer

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