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Of earprints, fingerprints, scent dogs, cot deaths and cognitive contamination—a brief look at the present state of play in the forensic arena

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Abstract

Over the last decades, the importance of technical and scientific evidence for the criminal justice system has been steadily increasing. Unfortunately, the weight of forensic evidence is not always easy for the trier of fact to assess, as appears from a brief discussion of some recent cases in which the weight of expert evidence was either grossly over- or understated. Also, in recent years, questions surrounding the value of forensic evidence have played a major role in the appeal and revision stages of a number of highly publicized criminal cases in several countries, including the UK and the Netherlands. Some of the present confusion is caused by the different ways in which conclusions are formulated by experts working within the traditional approach to forensic identification, as exemplified by (1) dactyloscopy and (2) the other traditional forensic identification disciplines like handwriting analysis, firearms analysis and fibre analysis, as opposed to those working within the modern scientific approach used in forensic DNA analysis. Though most clearly expressed in the way conclusions are formulated within the diverse fields, these differences essentially reflect the scientific paradigms underlying the various identification disciplines. The types of conclusions typically formulated by practitioners of the traditional identification disciplines are seen to be directly related to the two major principles underpinning traditional identification science, i.e. the uniqueness assumption and the individualization principle. The latter of these is shown to be particularly problematic, especially when carried to its extreme, as embodied in the positivity doctrine, which is almost universally embraced by the dactyloscopy profession and allows categorical identification only. Apart from issues arising out of the interpretation of otherwise valid expert evidence there is growing concern over the validity and reliability of the expert evidence submitted to courts. While in various countries including the USA, Canada and the Netherlands criteria have been introduced which may be used as a form of input or output control on expert evidence, in England and Wales expert evidence is much less likely to be subject to forms of admissibility or reliability testing. Finally, a number of measures are proposed which may go some way to address some of the present concerns over the evaluation of technical and scientific evidence.

Keywords: Forensic identification; Individualization; Dactyloscopy; DNA analysis; Interpretation of expert evidence

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1. Problems in assessing the weight of forensic evidence: some examples

1.1. Mitochondrial DNA: 'incontrovertible evidence'

In a recent, highly publicized criminal case in which a revision was granted by the Dutch Supreme Court, a prosecutor insisted that a DNA profile obtained from a pubic hair found on the victim's jersey which matched the profile of one of the two male suspects constituted damning evidence against this suspect.[1] However, the profile obtained was a mitochondrial profile. Mitochondrial DNA is passed on unchanged from mother to child.[2] While this is in itself a remarkable genetic fact which has led to the claim that all Caucasians are descended from only a handful of women,[3] its relevance here is that an unknown number of relatives of the suspect on the suspect's mother's side, as well as an unknown number of unrelated individuals,[4] could have the same profile. The assessment of the evidential weight of the DNA-match was therefore clearly erroneous.

1.2. Semen in a rape case: 'non-perpetrator trace'

In the same case, a full nuclear DNA-profile that was obtained from semen found on the thigh of the strangled rape victim was declared a non-perpetrator trace by the prosecution when it turned out not to match the profiles of the two main suspects. The two men eventually confessed to raping and killing the girl, a 23-year-old flight attendant, who was found dead in her grandmother's house, but only after they had undergone what later turned out to have been prolonged and somewhat unorthodox questioning by the police. When the suspects later retracted their confessions both in front of the district court as well as the appeal court, police and prosecution were singularly unimpressed. They explained the non-match by arguing that the semen found on the victim's thigh originated from an earlier consensual sexual contact, and had been dragged from the victim's vagina to its position on her thigh as a result of the subsequent involuntary sexual intercourse. Largely because it was backed by an expert opinion proffered by a highly qualified but non-professional ad hoc forensic expert, an emeritus professor of gynaecology, this argument, which came to be known as the 'drag theory', was accepted by both the district court and the appeal court. The two men were convicted and sent to prison. Several years later, when the case came up for review, the professor retracted his theory, on the grounds that he had not given due consideration to the fact that there was no 'drag trail' on the woman's leg to mark the route the semen had travelled. The two men were released in 2002, after serving 7 years in prison.

1.3. Fingerprints: 'absolute identification'

About 5 years ago, Detective Constable Shirley McKie was charged with perjury when she denied entering a crime scene where a fingerprint was found which the Scottish Criminal Records Office claimed was hers. Two years later some of the world's leading dactyloscopists pointed out that the latent print did not match the policewoman's reference fingerprint and could not be hers.[5] Today Ms. McKie is still fighting for rehabilitation.[6]

A similar example involving the FBI occurred in May 2004, when—following the Madrid train bombings on 11 March 2004—37-year-old US born attorney and Muslim convert Brandon Mayfield was arrested as a 'material witness' and spent 2 weeks in solitary confinement in a federal jail. Three FBI dactyloscopists categorically—but wrongly—identified a fingermark on a plastic bag containing detonators found in a van parked near the station from which three of the four affected trains had departed as his.[7] An independent expert appointed by the judge reached the same conclusion. In spite of the fact that the Spanish authorities had advised the FBI that Mayfield's reference print did not match the finger mark even before Mayfield was arrested, it was only after Mayfield had been detained for 2 weeks and the Spanish authorities had informed the FBI that the mark in fact originated from an Algerian national that Mayfield was released.

[1] Court of Appeal (Hof) Leeuwarden 24 April 2002, LJN-number AE1877.

[2] Mutations are thought to occur only once every 6500 years.

[3] Sykes, B. (2002) *Seven Daughters of Eve: The Science that Reveals our Genetic Ancestry*, W.W. Norton & Co: New York.

[4] The fragment at hand is a short hypervariable fragment of the D-loop and it has been shown that unrelated individuals can share identical fragments because of recurrent and fast mutation processes, leading to so-called homoplasy (Dr. Peter de Knijff: personal communication).

[5] *H.M. Advocate v. Detective Constable Shirley McKie* (visit: www.clpex.com/Articles/McKie).

[6] See also: Grieve, D.L. (1999) 'Built by Many Hands', *Journal of Forensic Identification* 49(5), 565–579; McKie, I.A.J. (2003) 'There's nane ever fear'd that the truth should be heard but they whom the truth would indite', *Science & Justice* 43(3), 161–165, and the recently opened internet site www.ShirleyMcKie.com.

[7] On the forensic implications see: Rudin, N. & Inman, K. (2004) 'Fingerprints in Print – the Apparent Misidentification of a Latent Print in the Madrid Bombing Case', *CACnews*, 4, 14–21. For a description of the case by the defence see: Wax, S.T. & Schatz C.J. (2004) 'A Multitude of Errors', *The Champion*, September/October, 6. An international committee of fingerprint experts asked by the FBI to examine the case concluded that: '*. . . the failure was in the application of the ACE-V methodology during this particular examination.*' (Robert B. Stacey (2004) 'Report on the Erroneous Fingerprint Individualization in the Madrid Train Bombing Case' *Journal of Forensic Identification* 54(6), 706–718). The problem with this analysis, which tries to save the method by blaming the expert is that the method and the expert cannot be separated because the expert plays an essential role as judge/measuring instrument in the fingerprint examination process.