IDENTIFICATION EVIDENCE IN CRIMINAL CASES: ADDRESSING THE RELIABILITY OF NEW SCIENCES

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Abstract

Since the 1930s police and courts all over the world are using the scientific techniques in solving crime and achieving justice. In the past few decades there have been remarkable advancements in the growth of forensic (crime) laboratories serving the criminal justice system and in the sophistication of scientific techniques employed to examine and interpret physical clues. Today, the police and courts have increased their reliance on more objective forms of evidence, scientific breakthrough in such fields as DNA testing that uniquely determine the source of biological substances. In spite of these advancements and growth of forensic science services, little published work exists on the uses and effects of forensic science evidence. In criminal cases, there have been challenges on sufficiency grounds and concerns over the use of forensic evidence as the sole or primary proof of guilt. Even uncorroborated DNA matching might not be enough to satisfy the burden of establishing guilt beyond a reasonable doubt. The reliability of forensic DNA testing results might be questioned for any number of reasons, e.g., laboratory error, cross-contamination, interpretive bias or fraud, etc. In this context, more studies are needed to assess the contribution of such advancements on the role and impact of scientific evidence in criminal case processing.

Introduction

The evidence used in the criminal trials must have a scientifically valid basis before it may be admitted in the court. In this context, courts can play a major role in advancing the quality and reliability of the fact-finding process. Courts that continue to admit scientific and forensic evidence that cannot justify itself on scientific grounds are not only misleading, they are also impeding much-needed reforms in forensic laboratories. Forensic science has rarely been subjected to the kind of scrutiny and independent verification applied to other fields of applied and medical science. Instead, analysts testifying in courts about fingerprint analysis, bite marks, voice identification, polygraph, handwriting comparisons and the like have often argued that in their field the courtroom itself provided the test. New York in the United States is the only state

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that regulates crime laboratories with standards even approaching those routinely used for clinical medicine.

In criminal cases judges overwhelmingly permitted experts to testify with little or no examination of the scientific basis for their testimony—and this is true in the Commonwealth countries, the United States, and in civil law systems as well.[1] The problem in criminal evidence is that microscopic hair analysis, bite mark identification, voice spectrography, handwriting analysis, and even such time-honoured prosecutorial tools of identification as fingerprinting have crept into court with virtually no demonstration of their scientific bases. Each of these identification techniques is based on the theory that fingerprints, voice patterns, bite marks, and other identifying evidence are uniquely personal.

The dilemma for the criminal courts is that much criminal identification evidence in its current state of development cannot possibly meet the standard criteria of evidence. As Professor Twining points out, identification is not really a single issue but rather "a flow of decisions and events" covering "a complex range of mental processes and actions" requiring a "quite elaborate conceptual framework."[2] Thus, the identification of a suspect by "matching" his fingerprints, for example, with some fragments of fingerprints left at the scene of the crime requires a whole range of assumptions, from the degree of similarity required to call a "match" to the meaning of the presence of the suspect at the crime scene.[3]

There are no such court-dictated procedures in hair sample identification or, for that matter, other forensic science applications. The courts have held in other such human identification procedures that (1) cross-examination may reveal bias on the part of the expert witness and the method of evidence analysis; (2) expert witnesses, unlike lay witnesses, are emotionally detached from the prosecution and may be presented by the defense as well as the prosecution; and, (3) human identification evidence may be obtained from a suspect at any stage of criminal proceedings for further analysis.[4]

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[1] In English courts (and those that have adopted English procedure), expert witnesses may testify or submit a written report with leave of the court.

[2] William Twining, *Rethinking Evidence: Exploratory Essays*, 167-9 (1990).

[3] For an enlightening discussion of the complexities involved in the concept of identification, see Twining, *Id.*, 153-177.

[4] *Gilbert* v. *California*, 388 U.S. 263 (1967); *U..S.* v. *Mara*, 410 U.S. 19 (1973); *McFarland* v. *U.S.*, (1945) 150 F. 2d 593 (D.C. Cir.); *Brent* v. *White*, (1967) 276 F. Supp. 386 (E. D. La.).

More and more often, occupational and environmental health specialists are being asked to provide expert testimony in legal proceedings related to their line of work. Yet despite advanced study and training in the medical area, many have had little experience in the legal proceedings, documents, and standards for admissible evidence required for presenting a legal case. Legal experts, on the other hand, may be completely familiar with the legal procedures, but uninformed about medical procedures and protocols used to diagnose medical conditions, recommend treatment plans, and report work-related medical problems. This paper serves as the critical bridge between the two disciplines required to bring cases to a successful conclusion.

Fingerprint Evidence

While fingerprint evidence is accepted as a form of identification, this form of identification evidence must be given by an expert witness (a fingerprint expert). However, in order that fingerprint evidence can be used, the prosecution must be able to match a fingerprint left by a culprit at the scene of a crime with that of a set of fingerprints taken from the accused in a controlled situation (that is, taken in a police station).

Fingerprint experts had conceded that the process they use—matching large, evenly pressured prints taken from suspects at the police station to smaller, unevenly pressured prints from crime scenes—is ultimately subjective and bedeviled by inconsistent standards. The French, for example, require that two fingerprints match at 16 points before they can be accepted as coming from the same person; the Australians, 12; and the Swedes, 7. The F.B.I. refuses to state a number at all, relying instead on case-by-case judgments.

Thus, the identification of a suspect by “matching” his fingerprints, for example, with some fragments of fingerprints left at the scene of the crime requires a whole range of assumptions, from the degree of similarity required to call a “match” to the meaning of the presence of the suspect of the crime scene. The fingerprints may be offered as evidence of opportunity or it may be offered as evidence bearing on a material fact.[5]

No one doubts that fingerprints can, and do, serve as a highly discriminating identifier, and digital photographic enhancement and computer databases now promise to make fingerprint identification more useful than ever before. But to what degree incomplete and imperfect fingerprints can be reliably used to identify individuals requires more scientific examination.

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[5] William Twining, *supra* note 2.

And the criminal system needs forensic examiners who can pass rigorous proficiency tests. *Daubert* transformed the jurisprudence of expert testimony by requiring judges to examine the empirical basis of statements made by experts in U.S. federal courts. *Daubert* held that scientific validity and "fit" of expert testimony to the facts in the case are questions of reliability and relevance. The rationale for gatekeeping requirement is based on relevance.

In the UK, this formulation also finds support in the case ***R.*** v. *Buckley*,[6] which holds that fingerprint evidence 'is evidence of opinion only'. Historically, however, latent print examiners have tended to blur this boundary, as evidenced by their habit of testifying that the suspect 'made' the crime scene print.[7] The Nuffield Report presents itself as dealing with 'the proper balance between police powers and individual rights to liberty, autonomy and privacy'.[8] Indeed, the report suggests that DNA and fingerprinting will be the dominant modes of bio-information, both currently and in the foreseeable future. While the importance of DNA is well understood, the report notes that fingerprinting will also remain important:

> The advent of DNA technology, with its discriminatory power and its lesser reliance upon human interpretation, has not diminished the use of fingerprints. Not only are they still used more frequently than DNA, but the development of mobile technology and of IDENT1, with its future capacity and capabilities, mean that fingerprints remain, and are likely to continue as, the dominant type of bio-information in use in the criminal justice system.[9]

The report then advocates that:

> . . . fingerprint evidence should be presented in a similar way to the presentation of handwriting evidence.. . We recommend that in presenting their opinion regarding a positive match or otherwise to the investigating officer, prosecution authority or court fingerprint experts should make it clear that their conclusion is always one of expert judgment, and never a matter of absolute scientific certainty.[10]

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[6] (1999) All ER (D) 1521.

[7] Cole, S.A., Where the Rubber Meets the Road: Thinking about Expert Evidence as Expert Testimony, *Villanova Law Review*, 52, 803–842 (2007).

[8] Nuffield Council on Bioethics, 2007: v.

[9] Nuffield Council on Bioethics, The Forensic Use of Bio-information: Ethical Issues (London, 2007), p.7.

[10] *Id.* at 68.

DNA Identification Evidence

The courts in India accept identification proved by DNA[11] evidence. DNA testing can be done on a tiny sample of blood, semen or any body tissue. These may be obtained at the scene of a crime and can also be obtained from suspects. When a DNA test is done, a profile of the DNA is taken. DNA profiling refers to the identification of particular parts of the DNA. The profile from the sample can be compared to a suspect's DNA profile to see if they match.

DNA typing has proved a boon for the defence as well as the prosecution in criminal and civil litigation. The current utility of DNA analysis to the criminal justice system arises from the comparison of DNA from two sources, such as DNA from a crime scene and DNA from a suspect, to determine the relationship between those sources. DNA typing explicitly recognizes the probabilistic nature of "matching" DNA sequences. Population genetics theory derives probabilities of randomly matching DNA sequences across different reference populations; no such statistical databases have been developed for the other forensic sciences. Underlying the forensic sciences is the idea that people have unique physical attributes, such as fingerprints, handwriting, and bite marks. Such a claim is based on an assertion that "nature never repeats."[12] DNA testing explicitly relies on the presence of a database drawn from the general population for its ability to identify an individual, and it recognizes the implausibility of making an absolute identification statement. Thus, the theory that "nature never repeats" is not grounded on valid science. It should not be accepted by the courts without empirical support. Rather, the alternative hypothesis, that individuals share many characteristics, is more scientifically sound in the absence of data to the contrary.[13]

Traditionally, the identification of a person has required the observation of that person's entire body or of localized special characteristics such as fingerprints, blood group or hair type.

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[11] Deoxyribonucleic acid (DNA) is a long molecule, found in the cellular nuclei of living organisms. Since 1954, scientists have recognized that the chemical structure of an individual's DNA encodes information about that individual's inherited characteristics. The present limits on genetic science mean that a direct analysis of a person's DNA will yield only limited information about individual characteristics, although some research suggests that investigators may in the future be able to discern specific physical traits such as hair, eye and skin colour from forensic samples (National Institute of Justice 2000, pp. 18–19).

[12] Harold Gummins and Charles Midlo, *Finger Prints, Palms and Soles: An Introduction to Dermatoglyphics*, 150 (1943).

[13] Erica Beecher-Monas, *Evaluating Scientific Evidence: An Interdisciplinary Framework for Intellectual Due Process* (Cambridge: Cambridge University Press, 2007), pp. 100-101.

By contrast, DNA analysis allows identification by reference to the information contained in any human nucleic cell, irrespective of which part of the body the cell comes from. The DNA in a human cell is unique, the product of sexual reproduction that combines half of the mother's DNA and half of the father's DNA. Every cell in an individual's body is the result of cellular division, which copies the DNA in the newly fertilized cell into every other nucleic cell. As a result, DNA in a cellular nucleus is identical throughout a human body but variable between any two humans, making it a natural alternative to artificial human identifiers, such as names or tax-file numbers. The notable exception is identical twins, who develop from a single fertilized cell and hence have identical nuclear DNA.[14] The theory behind DNA analysis in general is that genetic differences exist between people and that DNA analysis can uncover those differences.[15] This theory is well accepted.[16] In brief, the human genome[17] is made up of approximately four billion organic base pairs.[18]

Malimath Committee Report on DNA Test

In respect of DNA test the Malimath committee report submitted that:

1. Sec. 313 of the Cr.P.C must also be amended so as to draw adverse inference against the accused if he fails to answer any relevant material against him therefore, making it easy for the law enforcers to use DNA tests against him.
2. A specific law should be enacted giving guidelines to the police setting uniform standards for obtaining genetic information and creating adequate safeguards to prevent misuse of the same.
3. A national DNA database should be created which will be immensely helpful in the fight against terrorism.

[14] Jeremy Gans and Gregor Urbas, DNA Identification in the Criminal Justice System, *Crime and Criminal Justice* (May 2002).

[15] For an introduction to the forensic use of DNA evidence, see, generally, William C. Thompson, Guide to Forensic DNA Evidence in Expert Evidence: A Practitioner's Guide to Law, Science and the FIC Manual, 195 (Bert Black and Patrick W. Lee, eds., 1997).

[16] See Colin Aitken and Franco Taroni, *Statistics and the Evaluation of Evidence for Forensic Scientists*, 10 (1995), discussing DNA profiling.

[17] The "genome" is the full complement of human DNA.

[18] These four base pairs consist of adenosine (A), thymine (T), cytosine (C), and guanine (G), A pairing with T and C with G on the complementary strands of DNA. See Aitken, *supra* note 16 at 10.

4. More well-equipped laboratories should be established to handle DNA samples and evidence.
5. Efforts should be taken to create more awareness among general public, prosecutors, judges and police machinery.

Hair Analysis for Criminal Identification

Humans shed an average of 100 hairs daily, particularly during physical contact that might occur while a crime is being committed. According to Douglas Deedrick of the FBI's Trace Evidence Unit, hair evidence is particularly common during violent crimes such as: homicides, assaults, burglaries, armed robberies. Longer hairs, such as those found on the scalp, are the most useful. They provide the most information, but also are subject to change due to cutting, chemical treatment or exposure to elements. These samples should be obtained from the suspect or victim soon after the crime to prevent changes from altering the forensic comparison. Pubic hairs are also used for forensic hair testing. These are less often changed like those on the scalp and may provide information for comparison as long as one year after the crime has been committed. At least 25 hairs are needed from the victim or suspect for accurate comparison.

Hair is commonly found at crime scenes and generally present on unidentified bodies. Significant information for identification can be determined through hair testing. Hair is an important part of the trace evidence found at a crime scene. Comparison of hair to the victim or suspect in an investigation helps with placing them at the scene of the crime. Initial testing can provide an empiric match, but now with DNA techniques, a more conclusive match can often be established

Examining hair evidence under a microscope yields a significant amount of information about the hair's original owner. When hair is found at a crime scene, it is examined under a microscope in order to determine several identifying characteristics such as species (animal vs human) location of body from which the hair originated, how the hair was lost, approximate age of the person, race of the person, chemical treatments of hair (dye or perm), hair cut, broken or burned hair removed in post-mortem. These characteristics can be used to develop a profile of a criminal suspect or to match evidence found at a crime scene. The hair found as evidence can then be compared to hair from the suspect or victim to confirm matching characteristics or even prove that the hair is not related. This can be particularly helpful in cases where more than one suspect or victim is involved.

A presumed match found on microscopic hair analysis often leads to further testing. Once a presumptive match is identified, hair can be further examined for forensic DNA testing that provides a more conclusive match which can result in solving a crime by identifying a victim or suspect. In *United States* v. *Medina*,[19] the court ordered a hair test to determine if a probationer had violated his parole by utilizing drugs in the preceding months. In revoking parole, after a positive hair test, the court found that:

> "Extensive scientific writings on hair analysis establish both its reliability and its acceptance in the field of forensic toxicology when used to determine cocaine use. In his decision, Judge Weinstein, the author of a treatise on evidence, analyzed the admissibility of hair analysis under the Federal Rules of Evidence and under *Frye* test. He concluded that hair analysis was admissible under both."

DNA has been considered the basic blueprint of every individual, and its analysis in hair has become a valuable part of forensic study across any fields. DNA hair analysis is a non-invasive form of gathering biological information from a person for forensic study. A single strand can identify a human with 99.999 percent accuracy. Hair, which is dead skin, carries essential biological information just as any fluid or tissue in the body would. Evaluation of DNA in hair can identify or rule out individuals in criminal investigations or determine whether people are blood-related, making hair strand analysis an effective forensic tool for legal cases. With the help of chemicals, hair strands are analyzed through a microscope in a laboratory by forensic scientists. The root of a hair is needed for DNA testing. Hair samples from any part of the body can be tested. "With the exception of identical twins, each person's genetic identity is unique, it is this very uniqueness that makes DNA profiling so accurate," according to the International Biosciences website. The quality of hair is important for DNA analysis. The root bulb must be present, so the hair should be plucked or shed, not cut, and the hair should be free of chemicals and products for the most accurate forensic analysis.

Unfortunately, hair is not the best type of physical evidence for establishing identity. It is not possible to show with any certainty that two hairs came from the same person or animal. However, hair can be used to rule out certain suspects or scenarios. It can also be used to corroborate (support) other physical evidence if it is consistent with the rest of the evidence. The FBI's "whitepaper commentary" on microscopic hair analysis asserts that the "microscopic

[19] 749 F. Supp. 59 (E.D.N.Y. 1990).

characteristics of hair can assist the examiner in determining the racial origin, body area, and whether disease damage or artificial treatment is present."[20] Although these characteristics may be "useful", the FBI recognizes that hair comparisons do not constitute a basis for personal identification and requires that microscopic hair comparisons be used in conjunction with mtDNA analysis.

The case of *Williamson* v. *Reynolds*[21] merits discussion which involved an assessment of hair-analysis claims by the government and exemplifies a court's understanding of scientific issues. The government presented an expert who testified that of the hundreds of hairs found at the murder scene and submitted to the laboratory for analysis, two scalp hairs and two public hairs were "consistent microscopically" with the defendant's. But, because the expert failed to explain which of the twenty-five characteristics he examined were consistent—due to the absence of standards for determining whether the samples were consistent—and because the expert could not explain how many other people might be expected to share the same combination of characteristics, the court disallowed the testimony. The court noted that although hair analysis "has become a familiar and common component of criminal prosecution," it has been criticized as being too subjective and having a high error rate. Judge Seymour explained that independent studies showed that the method used by the expert in this case was especially subject to erroneous conclusions because the expert knew which hair samples came from the crime scene and which came from the crime suspect.

Bite mark Identification

Identifying the source of marks found on the victim of a crime as being bite marks of a particular person is the province of experts known as forensic odontologists. The underlying theory, arising from the use of dental records to identify corpses, is that people have unique bite marks, which remain after death on the soft issue of the victim (or, in some instances, on food). Although there is little controversy about the ability of a dentist to identify a person from a complete set of dental records, especially if there are anomalies in the teeth, there is a great deal of controversy about the ability of forensic odontologists to identify marks left on a victim's body as bite marks at all, far less being able to identify the source of those marks as the teeth of a particular

[20] See FBI Responds to Questions Raised About Hair Comparison Analysis, 32 *Prosecuto*r 27 (November/December 1998).

[21] 904 F. Supp. 1529 (E. D. Okla., 1995).

individual. In the first bite mark case, *People* v. *Marx*,[22] the testifying expert conceded that "there is no established science of identifying persons from bite marks as distinguished from, say, dental records and X-rays."[23] But, in that case, the defendant had distinctive irregularities in his teeth, and the mark on the victim's nose was "one of the most definitive and distinct and deepest bite marks on record in human skin."[24] These conditions are rarely met, yet courts continue to routinely admit bite mark testimony.

The controversies about bite mark evidence once more centre on the absence of a sound underlying theory; failure to gather available evidence (i.e., there are no databases establishing the frequency of bite mark patterns); the complete avoidance of probabilistic models; the absence of blind, external proficiency testing using realistic models; and unknown error rates.[25] In at least one case, DNA evidence has later exonerated a man convicted on the basis of bite mark testimony. In *State* v. *Krone*,[26] the forensic ontologist testified that the defendant was the source of a bite mark found on the victim's body. Although Krone was convicted and sentenced to death, he was later exonerated through DNA analysis.

In another DNA exoneration case involving bite mark testimony, *Brewer* v. *State*,[27] the court ordered a new trial, but refused to vacate the defendant's capital conviction. In two cases involving the notorious Dr. Michael West (who claimed to be able to identify marks by shining a blue light on them, a technique no one else could replicate, and which caused his suspension from the American Board of Forensic Odontology and resignation from the International Association of Identification), the challenges were not to the scientific validity of the testimony but to the expert's qualifications,[28] where, although the defence made no objection to the bite mark testimony at trial, "because of the controversial nature of bite mark evidence," the court took the opportunity to announce—without analysis—"that bite mark identification evidence is

[22] 126 Cal. Rptr., 350 (Cal. Ct. App., 1975).

[23] *Id*., 355.

[24] *Id*., 354, explaining that most are on softer tissue and not very deep.

[25] Erica Beecher, *supra* note 13 at 110.

[26] 182 Ariz. 319 (1995).

[27] 819 So.2d. 1169 (Miss., 2002).

[28] See, e.g., *Brooks* v. *State*, 748 So.2d., 736, 738 (Miss., 1999).

admissible in Mississippi." In *Brewer*, (quoting *Ormond* v. *State*, 599 So.2d 951, 962 (Miss.1992)), the Mississippi Supreme Court held that:

> Newly discovered evidence warrants a new trial if the evidence will probably produce a different result or verdict; further, the proponent must show that the evidence "has been discovered since the trial, that it could not have been discovered before the trial by the exercise of due diligence, that it is material to the issue, and that it is not merely cumulative, or impeaching."

In *Brewer* v. *Mississippi*,[29] Kennedy Brewer was sentenced to death row for the murder of his ex girlfriend's three-year-old daughter. Dr. West, a general dentist practicing in Mississippi, was the state's forensic orthodontist. West opined that Brewer's teeth inflicted the bite marks located on the girl's body.[30] West based his conclusion on several tests he performed, including a direct comparison test that revealed that none of the dental impressions from the individuals tested matched the bite marks on the three-year-old body except Brewer's.[31] West also observed a chip in Brewer's front tooth and that his upper teeth were much sharper than his lower teeth. These unique characteristics were consistent with the marks left on the girl.[32] However, despite the results from this evidentiary technique, exculpatory DNA evidence was later found which conclusively exonerated Brewer. The Brewer case demonstrates that DNA collected from a crime scene can prove actual innocence in cases even where other seemingly reliable evidence is substantial.[33] Additionally, unidentified remains found at a crime scene can be analyzed by comparing these remains through relatives' DNA.[34] This technique was used extensively in the identification of victims.

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[29] 725 So.2d 106, 108 (1998).

[30] *Id.* at 116

[31] *Ibid.*

[32] *Ibid.*

[33] Eunyung Theresa Oh, Innocence After "Guilt": Post-conviction DNA Relief for Innocents Who Plead Guilty, 55 *Syracuse Law Review*, 161, 171 (2004).

[34] President's DNA Initiative, Advancing Justice through DNA Technology, available at: http://www.dna.gov/basics/analysis.

Expert Evidence on Polygraph

Regarding the admissibility of expert evidence on the polygraph, according to Freckelton[35] there has been no reported judgment on the use of the polygraph by a superior court in England, U.S., Australia, New Zealand, Canada or India. In the United States the preponderance of authority is against the admission of polygraph evidence. However, the New South Wales District Court in Australia in *R*. v. *Murray*,[36] admission of expert evidence on behalf of an accused person was rejected on the basis of the common knowledge rule. In Canada, in *R*. v. *Beland*,[37] the majority of the court rejected admission of polygraph testimony on the grounds that it ran counter to well established rules of evidence and its admission would serve no purpose which was not already served.

The polygraph basically measures changes in: (a) blood pressure; (b) electrodermal activity (that is, the galvanic skin reflex (GSR)); (c) respiration. The polygraph has been traditionally used in criminal investigation, employment screening, and for security screening.[38] The GSR refers to the electrical resistance of one's skin, especially that on the palm or other hairless surfaces. The GSR varies with the activity of the sweat glands and is a convenient measure of sympathetic activity.

The polygraph is not used in a number of countries such as Australia, the Netherlands, the U.K., Germany and France but it s used in a number of countries in addition to the United States, namely Turkey, Israel, Canada, South Korea, Philippines, Taiwan, Thailand, Japan and Poland.[39] In the United States, the polygraph is admissible in court in thirty two states and is widely used by law-enforcement agencies as an investigative tool to verify witness statements, to clear suspects and to provide leads for interrogations.[40] The polygraph can also be used by

[35] I. Freckelton and H. Selby, *Expert Evidence: Law, Practice, Procedure and Advocacy* (Sydney: Lawbook Company, 2002), p. 201.

[36] (1982) 7 A. Crim. R. 48.

[37] (1987) 4 DLR (4th) 641 at 655.

[38] Office of Technology Assessment, 1983.

[39] Wojcikiewicz, j., Polygraph in Poland, in G.B. Traverso and L. Bagnoli (eds.), *Psychology and Law in a Changing World: New Trends in Theory, Practice and Research* (London: Routledge, 2001).

[40] Honts, C.R. and Perry, M.V., Polygraph Admissibility: Changes and Challenges, *Law and Human Behaviour,* 16, 357-78 (1992).

criminal suspects wishing to convince the police of their innocence, as did Russell Jewell who was arrested for the bomb explosion in Centennial Park in Atlanta during the 1996 Olympic Games.[41] Its wide use in some countries should not, however, blind us to the controversy surrounding its reliability as a method of identification of criminals by detecting deception.

Voice Identification

In the early days of this identification technique there was little research to support the theory that human voices are unique and could be used as a means for identification. There was also no standardization of how identification was reached, or even training or qualifications necessary to perform the analysis. Today voice identification analysis has matured into a sophisticated identification technique, using the latest technology the science has to offer. The research, which is still continuing today, demonstrates the validity and reliability of the process when performed by a trained and certified examiner using established, standardized procedures.

Vice identification has been accepted in English courts since the case of *Hulet* in 1660[42] but the general public on both sides of the Atlantic became more aware of its importance in the baby Lindbergh kidnapping case about seventy-five years ago in the United States.[43] In that case, Colonel Lindbergh, positively recognized the kidnapper's voice almost three years after the crime was committed, evidence that was very important in securing the conviction of the defendant. The Lindbergh case also provided the stimulus for the early, pioneering work into voice recognition.[44] In England and Wales, evidence from police officers during the course of conversations with the accused when they recognized his voice as that of a person recorded on tapes is admissible but there would be strong grounds for excluding that evidence.[45] As regards the voice identification by humans versus the voice identification by machine is concerned, Bull concluded that, there is evidence that the performance of electro-mechanical spectrographic

[41] Cited by Vrij, A., *Detecting Lies and Deceit: The Psychology of Lying and the Implications for Professional Practice* (Chichester: Wiley, 2000), p. 169.

[42] Hollien, H. Bennett, G. and Gelfer, M.P., Criminal Identification Comparison: Aural versus Visual Identification Resulting from a Simulated Crime, *Journal of Forensic Sciences*, 28, 208-21 (1983).

[43] *United States* v. *Hauptman* (1935) *Atlantic Report*, 180, 809-29.

[44] McGehee, F., An Experimental Study of Voice Recognition, *Journal of General Psychology*, 17, 249-71 (1937).

[45] Archbold, *Criminal Pleading, Evidence and Practice* (London: Sweet and Maxwell, 2000), p.1332.

voice identification systems is no more accurate than that of human listeners.[46] However, Hammersley and Read stated in their literature review that computers can exceed human listeners in voice recognition accuracy, even achieving an error rate of only 5 per cent.[47]

The road to admissibility of voice identification evidence in the courts of the United States has not been without its potholes. Many courts have had to rule on this issue without having access to all the facts. Trial strategies and budgets have resulted in incomplete pictures for the courts. To compound the problem, courts have utilized different standards of admission resulting in different opinions as to the admissibility of voice identification evidence. Even those courts which have claimed to use the same standard of admissibility have interpreted it in a variety of ways resulting in a lack of consistency. Although many courts have denied admission to voice identification evidence, none of the courts excluding the spectrographic evidence have found the technique unreliable. Exclusion has always been based on the fact that the evidence presented did not present a clear picture of the technique's acceptance in the scientific community and as such, the court was reluctant to rely on that evidence. The majority of courts hearing the issue have admitted spectrographic voice identification evidence.[48]

The first non-military case to review the admissibility of voice identification evidence was the New Jersey Supreme Court in *State* v. *Cary*. In this case the court stated that "the physical properties of a person's voice are identifying characteristics".[49] The court also noted that trial courts in the states of New York and California have admitted voice identification evidence but that these admissions have not been subject of appellate review.[50] The court declined to rule on the admissibility issue and remanded the case to determine if the equipment and technique were sufficiently accurate to provide results admissible as evidence. The Superior Court of New Jersey, on appeal from a denial of admission after remand, held that the majority of evidence

[46] Bull, R., Voice Identification by Man and Machine: A Review of Research, in S. Lloyd-Bostock (ed.), 28-42 (1981), pp. 40-41.

[47] Hammersley, R. and Read, J.D., Voice Identification by Humans and Computers, in S.L. Sporer, R.C. Malpass and G. Kohnken (eds.), *Suspect Identification: Psychological Knowledge, Problems and Perspective* (Hillside, NJ: Erlbaum, 1995), pp.117-52.

[48] Michael C. McDermott, Tom Owen, and Frank M. McDermott, Voice Identification: The Aural/Spectrographic Method, Owl Investigations, Inc. (1996).

[49] *Worley* v. *State*, 263 So.2d 613 (Fla. 1972).

[50] *Alfa* v. *State*, 265 So.2d 96 (Fla. 1972).

"indicates, not that the technique is not accurate and reliable, but rather that it is just too early to tell and at this time lacks the required scientific acceptance".[51] The New Jersey Supreme Court reviewed this decision and once again remanded for additional fact finding "in light of the far-reaching implications of admission of voiceprint evidence".[52] The State of New Jersey was unable "to furnish any new and significant evidence" by the third time the New Jersey Supreme Court reviewed this issue and as such affirmed the trial court's opinion excluding voice identification evidence.[53] California came to a similar holding when the issue first reached the appellate level in *People* v. *King*.[54] The State brought in Lawrence Kersta as the voice identification expert to testify as to the reliability of the technique. The defense brought in seven speech scientists and engineers to rebut Kersta's claims. The court held that "Kersta's claims for the accuracy of the 'voiceprint' process are founded on theories and conclusions which are not yet substantiated by accepted methods of scientific verification".[55] The court cited the *Frye* test as the proper standard for admissibility.[56]

In the case of *State* v. *Andretta*,[57] the New Jersey Supreme Court stated that there was much more support for the admission of spectrographic voice identification evidence than at the time they decided *Cary*, but refused to address the issue further since the only issue before them was whether the defendant should be compelled to speak for a spectrographic voice analysis.[58] In California the Court of Appeal affirmed the trial court's admission of voice identification evidence in the case of *Hodo* v. *Superior Court*.[59] Here the court found the requirements of *Frye* had been met in that there was now general acceptance of spectrographic voice identification by

[51] *U.S.* v. *Askins*, 351 F. Supp. 408 (1972).

[52] *State* v. *Andretta*, 296 A2d 644 (N.J. 1972).

[53] *Hodo* v. *Superior Court*, 30 C.A.3d 778 (Calif. 1973).

[54] *People* v. *Chapter*, 13 CrL 2479 (Calif. 1973).

[55] *U.S.* v. *Sample*, 378 F. Supp. 44 (Penn. 1974).

[56] *U.S.* v. *Addison*, 498 F. 2d 741 (DCDC 1974).

[57] *U.S.* v. *McDaniel*, 538 F. 2d 408 (D.C. Cir 1976).

[58] *Commonwealth* v. *Topa*, 369 A.2d 1277 (Penn. 1977).

[59] *People* v. *Evans*, 393 N.Y.S.2d 674 (1977).

recognized experts in the field. The court cited Dr. Tosi's testimony that "those who really are familiar with spectrography, they are accepting the technique".[60] Tosi also pointed out that the general population of speech scientists are not familiar with this technique and thus cannot form an opinion on it.[61]

The New Jersey Supreme Court specifically limited its decision in *Windmere* v. *International Insurance Company*[62] excluding spectrographic voice identification evidence to the present case. The court stated that the future use of voice identification evidence "as a reasonably reliable scientific method may not be precluded forever if more thorough proofs as to reliability are introduced" and they will "continue to await the more conclusive evidence of scientific reliability".

Under investigative conditions, individuals can reliably identify voices that are well known to them, but the accuracy rate drops to approximately 78% to 83°/o when unfamiliar voices are compared to known voice samples. The use of expert witnesses does not improve the accuracy rate of aural only voice comparisons. The use of the spectrographic technique continues to decline, even with the establishment of new standards.

Visual Identification

In criminal procedures for a person to be found guilty of an offence all elements of the offence need to be proven by the prosecution and further it must be proven for the judge/magistrate to be sure that it was the accused who committed the offence. Therefore, in a number of cases the biggest issues turn to be based on identification and possible mistakes as to who did the act alleged or complained of.

In response to those troubles, there are prescribed ways in which the link between the accused and the crime can be established. In broad terms there are two situations where the accused is identified by a person giving live evidence at court or where the accused is being identified before the trial begins. People who are suspects in a criminal investigation are often identified by witnesses and the identification of a suspect will be relied on by the prosecution in a criminal trial. Visual identification evidence is considered unreliable and innocent people have

[60] *People* v. *Tobey*, 257 N.W.2d 537 (Mich. 1977).

[61] *U.S.* v. *Williams*, 443 F. Supp. 269 (S.D.N.Y. 1977).

[62] 522 A. 2d 405 N.J. 373 (N.J. 1987).

been convicted of crimes based on visual identification evidence. There are a number of logical reasons why such identification evidence is not reliable. Among these are:

1. Poor lighting conditions, bad weather or the distance from which the witness saw the person.
2. The eye-sight of the witness may be in question.
3. The witness may have been in shock or may have only seen the person for a brief moment.

The danger of misidentification is not a new thing. In England, after fifteen witnesses mistakenly identified Alfred Beck, it led to a committee of inquiry in 1905 that was instrumental in establishing the Court of Appeal by the Criminal Appeal Act 1907.[63] Similar concern about miscarriages of justice as a result of mistaken eyewitness identification in the early 1970s led to the Devlin Committee making, *inter alia*, the following recommendations to avoid such misidentifications:

1. If the only evidence against an accused is that of eyewitness testimony, the case should be dropped by the prosecution.
2. Should such a case be brought to trial, the judge should direct the jury to acquit.

Identification Parade

Very often, the identity of the perpetrator of a crime is not an issue or it can be readily established by the prosecution. In such cases, the primary concern of police investigators is to establish the necessary points of proof regarding the charges laid against the accused. However, in some cases the identification of the accused may be the main issue. Identification may involve one of the following: single confrontation identification, photograph identification, or photo-board identification, video-film identification and, finally, identification by means of a line-up (that is, an identification parade). Courts have discretion to exclude witness identification evidence which has been obtained illegally, unfairly or improperly, as when a suspect was forced into taking part in a line-up or a police officer somehow communicated to a witness who the suspect was before a line-up was conducted, or when a line should have been conducted but was not or, finally, when the suspect's photograph 'stands out' in a photo-board or video-frame.[64] The U.S. Supreme Court in a number of cases held that (1) participants in line-ups should be

[63] Archbold, *Criminal Pleading, Evidence and Practice*, *supra* note 45 at 1303.

[64] Kapardis, Andreas, *Psychology and Law* (Cambridge: Cambridge University Press, 2003), p. 260.

physically similar to the suspect; (2) individual identification confrontations between the victim and the suspect should be non-suggestive; and, (3) the police should refrain from imposing their beliefs as to the guilt or innocence of a particular person.[65]

The issue of person identification has been of central concern to eye witness researchers since 1970s. At the same time, there is widespread concern about biases in police identification practices and procedures that result in the false identification of innocent citizens. Wells *et al*. describe forty cases in which DNA analysis established retrospectively that persons had been wrongly convicted; of those convictions, 90 per cent were based on identifications in which one or more witnesses falsely identified the accused as the perpetrator of the crime.[66] As Wells *et al*. point out, 'the DNA cases are useful in showing that mistaken identification by eyewitnesses is probably the largest single cause of the conviction of innocent persons'.[67]

Conclusion

In conclusion, we live in the age of science and technology with the help of that we can identify the criminals. This is, of course, a very difficult job because each technology has its own limitations. Even with a process as simple as a lineup, we risk incarcerating the wrong person. When the people within the system make these mistakes, it tarnishes the reputation of the system. DNA has been one of the most effective means of identifying the actual offenders and overturning a sentence for a person who was wrongly sentenced. It is so effective because it has such a diminutive allowance for error. Fortunately for those who have been wrongly sentenced, DNA has become a truly more effective method to rectify the errors.

Fingerprints have not always been a method that investigators were able to use. This is a method along with DNA testing that can solve criminal identification problem. The main problem with fingerprints is that investigators were not always able to lift the latent prints from objects. Brain fingerprinting (polygraph) is a new method and has not been tested enough to show significant results or statistics. It may be beneficial in the future to law enforcement

[65] See, *U.S.* v. *Wade*, 388 U.S. 218 (1967); *Foste*r v. *California*, 394 U.S. 440 (1969); *Kirby* v. *Illinois*, 406 U.S. 682 (1972).

[66] Wells, G.L., Small, M., Penrod, S., Malpass, R., Fulero, S.M. and Brimacombe, C.A.E., Eyewitness Identification Procedures: Recommendations for Line-Ups and Photospreads, *Law and Human Behaviour*, 22, 603-47 (1998).

[67] Wells, G., Wright, E.F. and Bradfield, A.L., Witness to Crime: Social and Cognitive Factors Governing the Validity of People's Reports, in R. Roesch, S.D. Hart and J.R.P. Ogloff (eds.), *Psychology and Law: The State of the Discipline* (New York: Kluwer Academic Plenum Publishers, 1999), pp. 53-87.

agencies, detectives and other authorities trying to solve crimes. As for now, it is still in the testing phase and is criticized by the science and legal community. It is apparent to the court that handwriting opinion testimony on unique identification does not have the validity and reliability of fingerprints or DNA evidence. By way of comparison to handwriting analysis, objective standards are employed in fingerprint and DNA analysis. In a number of cases, the experts admitted that hair and voice comparisons are not absolute identifications like fingerprints.

In the light of the above, we can say that independence and scientific rigor should be the norm for forensic science. Crime victims, the wrongly accused, and the public will all have more confidence in the system if forensic scientists and their laboratories are completely independent, not beholden to prosecutors or defense attorneys.

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