

CSI – FACT OR FICTION

Tom Gyorffy QC

OWEN DIXON CHAMBERS

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1. INTRODUCTION

1.1 Recently people have come to talk about the “CSI Effect”. This was referred to in a report published by the National Research Council of the Academy of Science in Washington:

“The CSI Effect specifically refers to the real-life consequences of exposure to Hollywood’s version of law and order. Jurists and crime laboratory directors anecdotally report that jurors have come to expect the presentation of forensic evidence in every case and they expect it to be conclusive.

... Some are concerned that the conclusiveness and finality of the manner in which forensic evidence is presented on television results in jurors giving more or less credence to the forensic experts and their testimony than they should, resulting in a miscarriage of justice... “

Strengthening FORENSIC SCIENCE in the United States, A Path Forward, p 48 – 49. (“NAS Report”)

1.2 Forensic evidence is rarely challenged in Court. Barristers in general don’t know what question to ask.

1.3 In 2009 the National Academy of Science in Washington published a report called Strengthening Forensic Science in the United States: A Path Forward (“NAS”). Has anybody here heard of it?

1.4 That report, prepared by an eminent Committee of scientists and lawyers exploded the myths underpinning forensic science. It made many critical findings about practices of so called forensic scientists and the use of such evidence in the Courts.

1.5 In addition there have been a number of reports from the US, Canada and the United Kingdom which have questioned many types of forensic science and medical evidence routinely used in criminal proceedings across the common law world.

1.6 At p 53 of the NAS Report it says:

“ ... The bottom line is simple: in a number of Forensic Science disciplines, forensic science professionals have yet to establish either the validity of their approach or the accuracy of their conclusions, and the Courts have been utterly ineffective in addressing this problem. For a variety of reasons – including the rules governing the admissibility of forensic evidence, the applicable standards governing appellate review of trial court decisions, the limitations of the adversary process, and the common lack of scientific expertise among judges and lawyers who must try to comprehend and evaluate forensic evidence – the legal system is ill-equipped to correct the problem of the forensic science community.”

1.7 In this paper I cannot cover this area in depth. My aim here is to articulate the problem and refer to some important works so you can explore this area and hopefully translate it to practice in the courts.

2. WHAT IS FORENSIC SCIENCE?

2.1 The NAS report identifies the following as forensic sciences p 58:

- “1. General toxicology;
2. firearms/toolmarks;
3. questioned documents;
4. trace evidence
5. Controlled substances
6. biological/serology (including DNA analysis);
7. fire debris/arson analysis;
8. impression evidence;
9. blood pattern analysis;
10. crime scene investigations;
11. medicolegal death investigation; and
- 12 digital evidence.”

2.2 It is important to understand what identifies a field of learning as a science. The NAS Report identified it as at p 86:

“... Science embraces empirical analysis to discover truth as found in verifiable facts. Science is thus a descriptive pursuit, which does not define how the universe should be but rather describes how it actually *is*.”

2.3 In the NAS Report the Committee pointed out that the dilemma confronting the law is “the question of whether – and to what extent – there is *science* in any given “forensic science” discipline.”

2.4 The Committee considered that there were two very important questions that should determine the admissibility of such evidence:

“ ... (1) the extent to which a particularly forensic discipline is founded on a reliable scientific methodology that gives it the capacity to accurately analyse evidence and report findings and (2) the extent to which practitioners in a particular forensic discipline rely on human interpretation that could be tainted by error, the threat of bias or the absence of sound operational procedures and robust performance standards.”

2.5 The decision maker in a criminal trial are the members of the jury. They have to determine what weight if any to give to forensic evidence in a given case. How can they do that if the forensic evidence is not tested properly in the trial?

2.6 That topic was considered by Professor Gary Edmond in a paper entitled Forensic Science Evidence And the Conditions for Rational (Jury) Evaluation [2015] 39 Melbourne University Law Review 77.

3. CONDITIONS FOR THE RATIONAL EVALUATION OF FORENSIC EVIDENCE

3.1 In that paper Edmond argued (p77):

“ ... that inattention to the validity and reliability of many forensic science techniques, along with the failure to provide indicative error rates and attend to limitations, proficiency and contextual bias, means that in many cases expert opinion evidence adduced in criminal proceedings is not susceptible to rational evaluation.”

3.2 Jury researchers and others have suggested that the problems that juries have understanding this type of evidence can be overcome by better presentation of it in court.

3.3 Edmond does not accept that. He says at 79;

“ ... Liberal approaches to admissibility (specifically current interpretations of uniform Evidence Acts Ss55, 56, 79, 135 and 137) results in routine admission of expert opinion without attending to “specialised knowledge” or the kinds of information and interpretive tools necessary to unpack understand and evaluate them ... “

3.4 Edmond explained the problem in this way at 79-80:

“ ... the failure to formally test techniques means that in most cases limitations and risks cannot be gauged or credibly explored via traditional trial mechanisms such as cross examination (and testimonial concessions), the use of rebuttal witnesses, or careful judicial instruction. None of these legal safeguards can replace formal scientific evaluation. They do not provide the kinds of information that would enable a decision-maker to assess a technique or ability and rationally assign a probative value to a derivative opinion ...”

3.5 In other words, if trial lawyers are not armed with appropriate knowledge about the forensic evidence to test its reliability and accuracy the jury can't evaluate its worth or otherwise in a case. There is a real danger that the evidence could be misused by giving it weight it doesn't deserve or drawing an adverse conclusion on it which is not justifiable.

3.6 At this point alarm bells should be ringing, because this is a recipe for a substantial miscarriage of justice. Indeed the NAS Report indicates that after acceptance of the gold standard of forensic evidence - DNA testing, the Innocence Project in this United States found 223 post-conviction DNA exonerations in the United States between 1989 and 2008. Many of those cases would have relied on forensic evidence to get the original convictions.

3.7 How many wrongful convictions have occurred in Australia as a result of junk science masquerading as forensic science? We certainly know of 2 – the Splatt case in South Australia and the Chamberlain case in the Northern Territory. Are there more? Probably.

3.8 It was the emergence of DNA evidence that threw the spotlight on other forensic sciences in respect of the techniques and standards they apply. The NAS Report at 37 says:

“The capacity and quality of the current forensic science system have been the focus of increasing attention by Congress, the courts, and the media. New doubts about the accuracy of some forensic science practices have intensified with the growing number of exonerations resulting from DNA analysis.... Greater expectations for precise forensic science evidence raised by DNA testing have forced new scrutiny on other forensic techniques ...”

3.9 Edmond succinctly summarised the issue at 81:

“...At trial, the fact-finder should be placed in a position to understand and evaluate any opinion presented by a forensic analyst. They should not have to

defer to the authority or standing of the *expert* of the plausibility of the claim ...”

3.10 That then brings us to the question what does the jury have to know to be able to evaluate forensic evidence? Edmond at 83-90 sets out seven factors that need to be considered:

1. Does the “underlying techniques or process” for the testing actually work? This means consideration be given to whether or not there are independent validation studies that show – if the test works, how it will and in what conditions?
2. What are the limitations and uncertainties and the error rates associated with the technique?
3. How proficient is the analyst in using the validated technique?
4. Are there any standards applicable to the technique? Were they developed through formal testing and were they applied in this case?
5. Has there been any contextual bias?
6. What evidence is there about the frequency of a feature in relevant population? This is vital for matching a person or object to a crime.
7. Those evaluating opinions of forensic analysts need to be informed if the particular words or expressions used are “derived from and supported by independent research.”

3.11 These matters are considered and explained by Edmond et al in “How to cross-Examine forensic scientists: A guide for lawyers: (2014) 39 Australian Bar Review 174. Another excellent guide is Felicity Graham’s: Fingerprints and Expert Identification Evidence: Markers of Unreliability, October 2014 and available on line.

4. A CONSIDERATION OF THE RELIABILITY OF SOME TECHNIQUES

4.1 The NAS reported that, at 38:

“The term “forensic science” encompasses a broad range of disciplines, each with its own distinct practices. The forensic science disciplines exhibit wide variability with regard to techniques, methodologies, reliability, level of error, research, general acceptability and published material ... Some of the disciplines are laboratory based (e.g. nuclear and mitochondrial DNA analysis, toxicology and drug analysis); others are based on expert interpretation of observed patterns (e.g. fingerprints, writing samples, tool marks and bite marks). Some activities require the skills and analytical expertise of individuals trained as scientists ..., other activities are conducted by scientists as well as individuals trained in law enforcement ... medicine... or laboratory methods. Many of the processes ... are largely empirical applications of science – that is, they are not based on a body of knowledge that recognises the underlying limitations of the scientific principles and methodologies used for problem solving and discovery ...”

4.2 The problems largely occur in the nether world of pseudo-science where non-scientists give subjective evidence about pattern recognition largely in the absence of agreed standards and statistical analysis.

Finger Printing

4.3 Fingerprinting has been the subject of adverse findings in two recent reports.

4.4 First, there was the “Experts Working Group on Human Factors in Latent Print Analysis: Improving the Practice through a Systems Approach”, US Department of Commerce, National Institute of Standards and Technology (2012), the “NIST Report”. A good summary of the NIST Report is found in Edmond at pp 53-66.

4.5 The NIST Report was quite critical on Fingerprint evidence. At p 72 the Group commented:

“a fingerprint identification was traditionally considered an ‘individualisation’ meaning that the latent print was considered identified to one finger of a specific individual as opposed to every other potential source in the universe, however, the recent attention focused on this issue reveals that this definition needlessly claims too much, has not been adequately established by fundamental research, and is impossible to validate solely on the basis of experience. Nor does fingerprint evidence have objective standards or a well validated statistical model that can provide an objective

measure of the strength of the fingerprint evidence in a given instance. Therefore, examiners should not claim to be able to exclude every other finger in the world as a potential source. Rather, an identification decision suggests a substantial enough similarity that the examiner believes that the two impressions originated from a common source ...”

4.6 Second, there was Lord Campbell, *The Fingerprint Inquiry Report* (AFS Group Scotland, 2011) the “SFI Report”. A good summary is found in Edmond at p66-71.

4.7 The SFI Report considered a prosecution of a police officer for perjury. The officer’s fingerprint was allegedly found in a shower where a person was murdered. She denied leaving it there and gave evidence at the trial that she never entered the bathroom where the alleged print was found. This evidence formed the basis for perjury.

4.8 With the help of foreign fingerprint experts the officer was acquitted. The controversy around that conviction led to a number of Inquiries with SFI being one.

4.9 Lord Campbell made 86 recommendations as a result of his Inquiry. The 10 most important are set out at p 67-68 of Edmond. Two of those were:

“1. Fingerprint evidence should be recognised as opinion evidence, not fact, and those involved in the criminal justice system need to assess it as such on its merits...

2. Examiners should discontinue reporting conclusions on identification or exclusion with a claim of 100% certainty or any other basis suggesting that fingerprint evidence is infallible ...”

4.10 There have been a number of publicised cases in the U.S. where errors have resulted in wrongful identification of people in a commission of a crime.

4.11 The NAS Report considers “Friction Ridge Analysis” which includes fingerprints at p 136-145. Its summary assessment at 142:

“ACE-V provides a broadly stated framework for conducting Friction ridge analyses. However, this framework is not specific enough to qualify as a validated method for this type of analysis. ACE-V does not guard against bias; is too broad to ensure respectability or transparency: and does not guarantee that two analysts following it will get the same results ... merely following the steps of ACE-V does not imply that one is proceeding in a scientific manner or

producing reliable results “We have reviewed available scientific evidence of the validity of the ACE-V method and found none.”

Other Pattern/Impression Evidence: Shoe Prints and Tyre Tracks

4.11 The NAS Report deals with these at p 145-150. Its summary at 149:

“The scientific basis for the evaluation of impressions evidence is that mass-produced items ... pick up features of wear that, over time individualize them... However, there is no consensus regarding the number of individual characteristics needed to make a positive identification, and the committee is not aware of any data about the variability of class or individual characteristics or about the validity or reliability of the method. Without such population studies, it is impossible to assess the number of characteristics that must match in order to have any particular degree of confidence about the source of the impressions.”

Toolmark and Firearms Examination

4.12 This topic is dealt with in the NAS Report at p150-155. The summary assessment at 154:

“Toolmark and firearms analysis suffers from the same limitation discussed above for impression evidence. Because not enough is known about the variabilities among individual tools and guns we are not able to specify how many points of similarity are necessary for a given level of confidence in the result ...”

Analysis of Hair Evidence

4.13 This topic is examined at p 155-161 of the NAS Report. The summary at 160:

“No scientifically accepted statistics exist for the frequency with which particular characteristics of hair are distributed in the population. There appear to be no uniform standards on the number of features on which hair must agree before an examiner may declare a “match”.”

Analysis of Fibre Evidence

4.14 Set out at pp 161-163 of the NAS Report. Summary as at p 163:

“Because the analysis of fibres is made largely through well characterised methods of chemistry, it would be possible in principle to develop an

understanding of the uncertainties associated with those analysis. However, to date, that has not been done ... “

Questioned Document Examination

4.15 This topic is considered at p 163-167 of the NAS Report. The summary assessment is more optimistic at p 166-167:

“The scientific basis for handwriting comparisons needs to be strengthened. Recent studies have increased our understanding of the individuality and consistency of handwriting and computer studies and suggests that there may be a scientific basis for handwriting comparison ...”

Analysis of Paint and Coatings Evidence

4.16 This topic is dealt with at p 167-170 of the NAS Report. This has a strong chemical basis and there are studies to back up a high degree of reliability of results.

Analysis of Explosives Evidence and Fire Debris

4.17 Analysed at p 170-173 of the NAS Report. The conclusion was that a scientific basis exists for this type of analysis but much more research is required to determine natural variability of burn patterns and damage characteristics.

Forensic Odontology

4.18 Considered at p 173-176 of the NAS Report. Conclusion:

“Although the majority of forensic odontologists are satisfied that bite marks can demonstrate sufficient detail for positive identification, no scientific studies support this assessment, and no large population studies have been conducted ...”

5. CONCLUSION

5.1 While some forensic sciences such as DNA analysis and other laboratory based disciplines are capable of resulting in accurate and meaningful evidence in courts, there are many deficiencies in other types of forensic evidence. Those deficiencies occur where there is no scientific discipline underpinning the work, the people giving the evidence lack understanding of proper scientific methods and the limits of procedures.

5.2 Another major deficiency is that witnesses often overstate the results that they present to courts, claiming a positive match when there is no large and reliable database of population studies to support that conclusion.

5.3 The rules of expert evidence and the adversarial system has not resulted in a proper vetting of “forensic evidence” presented to the court. Much of the evidence is unsubstantiated assertions of opinion. In many cases there are no agreed standards, no proficiency testing and no reproducibility of results which means the evidence is worthless to the fact finder.

5.4 For generations, now, lawyers have been asleep on the job when it comes to forensic evidence. It is time to inform ourselves of the appropriate way to test it in court and to be more proactive. If not, miscarriages of justice, not capable of being fixed on appeal, will occur on our watch.

SOURCES

1. National Research Council of National Academies, “STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES – A PATH FORWARD”, Washington DC, 2009.
2. Gary Edmond, “WHAT LAWYERS SHOULD KNOW ABOUT THE FORENSIC SCIENCES”, (2015) 36 Adelaide Law Review 33.
3. Gary Edmond, “FORENSIC SCIENCE EVIDENCE AND THE CONDITION FOR RATIONAL (JURY) EVALUATION (2015) 39 Melbourne University Law Review 77.
4. Felicity Graham, “FINGERPRINTING AND EXPERT IDENTIFICATION EVIDENCE: MARKERS OF UNRELIABILITY”, October 2014, on line.
5. Edmond, Martire and Rogue, “UNSOUND LAW: ISSUES WITH (EXPERT) VOICE COMPARISON EVIDENCE: (2011) 35 Melbourne University Law Review 52.
6. Gary Edmond et al, “HOW TO CROSS-EXAMINE FORENSIC SCIENTISTS A GUIDE FOR LAWYERS”, (2014) 39 Australian Bar Review 174.
7. A source of ongoing research on these issues is Euroforgen Network of Excellence at www.euroforgan.eu