# Opening Address by Justice Susan Glazebrook[1]

**ANZFSS Symposium, Auckland**

**19 September 2016**

It gives me great pleasure to have been asked to open this very important conference.

It is trite to say that the role of a justice system and in particular a criminal justice system is to dispense justice according to law. In order to achieve justice, one of the most important tasks is to ascertain the facts. This necessarily involves a reconstruction after the event, with the inevitable challenges this presents.[2] A robust fact finding[3] exercise requires the best evidence possible and this frequently includes the best possible forensic evidence.[4]

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1 Judge of the Supreme Court of New Zealand. This paper elaborates on the opening address for the Australian and New Zealand Forensic Science Society: 23rd Symposium on the Forensic Sciences "Together Informing Justice", held on 18–23 September 2016 in Auckland, New Zealand. Thank you to Josie Beverwijk, Supreme Court clerk, for her assistance with the paper.

2 Challenges include the reliability of eyewitnesses' perception or memory of events: see for example E Loftus and J M Doyle *Eyewitness Testimony: Civil and Criminal* (Cluer Law Book, New York, 1987), at 38–39; and J Spigelman "Truth and the law" (2011) 85 ALJ 746. For more on memory issues see Matthew Gerrie, Maryanne Garry and Elizabeth Loftus "False Memories" in N Brewer and K Williams (eds) *Psychology and Law: An Empirical Perspective* (Guilford, New York, 2005) at 222–253. See also DL Schacter, *The Seven Sins of Memory: How the Mind Forgets and Remembers* (Houghton Miflan, New York, 2001); BA Cardwell, LA Henkel, M Garry, EJ Newman and JL Foster "Nonprobative photos rapidly lead people to believe claims about their own (and other people's) pasts" (2016) Memory & Cognition 1; Robert Nash, Kimberly Wage, Maryanne Garry, Elizabeth Loftus and James Ost "Misrepresentations and Flawed Logic About the Prevalence of False Memories" (2016) Applied Cognitive Psychology 1. See also British Psychological Society *Guidelines on Memory and the Law: Recommendations from the Scientific Study of Human Memory* (Revised April 2010). For discussion on issues surrounding identification evidence issues see Neil Brewer and Matthew Palmer "Eyewitness Identification Tests" (2010) 15 Legal and Criminological Psychology 77 at 90; Ian Fraser and others "The Police Line-up and Its Impact on the Justice System" (2009) 54 Crim LQ 332; and Margery Koosed "Reforming Eyewitness Identification Law and Practices to Protect the Innocent" (2009) 24 Creighton L Rev 595 at 597. Issues also arise relating to false confessions, see S Kassin "The Social Psychology of False Confessions" (2015) 9 Social Issues and Policy Review 25; S Appleby, L Hasel and S Kassin "Police-induced confessions: an empirical analysis of their content and impact" (2013) 19 Psychology, Crime & Law 111 and Gisli H Gudjonsson "False Confessions and Correcting Injustices" (2012) 46 New Eng L Rev 689. For issues with assessing credibility of witnesses see Aldret Vrij *Detecting Lies and Deceit: Pitfalls and Opportunities* (2nd ed, John Wiley and Sons Ltd, England, 2008) at 115–141.

3 I include in the term fact finding police investigations, whether or not the results of these come before a court.

4 As Stephen Breyer of the United States Supreme Court has said, legal disputes increasingly involve the principles and tools of science and as a result decisions "should reflect a proper scientific and technical understanding so that the law can respond to the needs of the public": Stephen Breyer "Science in the Courtroom" (2000) 16(4) Issues in Science and Technology 52. See also Susan Haack "A Match Made on Earth: Getting Real about Science and the Law" (2012) 36 Dalhousie LJ at 40.

From reading the programme[5] it seems that this conference has a number of themes. I will call these: cooperation, education, communication and impartiality. The "ultimate goal" is to inform the justice system, as the title of the conference indicates.

The first theme, cooperation, encompasses the aim of working together to achieve science that is better adapted to the purpose of achieving justice.[6] This means working across scientific disciplines, as well as working with others in the justice sector, including the police, lawyers and the courts. Cooperation involves keeping what is commonly termed junk science[7] out of the courtroom,[8] but without stifling innovation so as to allow advances in scientific practice to be brought to the courts.[9] It involves ensuring that evidence is given by qualified and competent experts who do not go outside their area of expertise.[10] It mandates suitable and robust peer review to eliminate as far as possible human error.[11] Finally,

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5 The programme is available at <www.conference.co.nz/anzfss16>.

6 See also M Walport *Annual Report of the Government Chief Scientific Advisor 2015: Forensic Science and Beyond: Authenticity, Provenance and Assurance* (Government Office for Science, London, 2015) vol 1 at 6.

7 Junk science is forensic science that is invalid in the "straightforward sense that it does not 'work': tests do not measure what they purport to measure, and results do not show what they purport to show" P Roberts "Paradigms of forensic science and legal process: a critical diagnosis" (2015) Phil Trans R Soc B 370. One such example is ear print identification, which led to the conviction of Mark Dallagher in England in 1996, before it was determined that ear print evidence could not safely be used to identify a suspect. Mr Dallagher successfully appealed his conviction on this basis and the Crown later abandoned the conviction after DNA obtained from the ear print excluded Mr Dallagher as the suspect. For more, see Susan Glazebrook "Miscarriage by Expert" (paper presented at the Commonwealth Magistrates' and Judges' Association Triennial Conference, 17 September 2015, Wellington, New Zealand) available at <www.courts.govt.nz>, at 6–7.

8 The courts, however, perform the ultimate role of gatekeeper as to what evidence is admitted. In New Zealand, expert opinion evidence must meet the substantial helpfulness threshold set out by s 25 of the Evidence Act 2006. Principles of admissibility for novel scientific evidence to guide the application of the Evidence Act were discussed by the Ellen France P in her dissent in *Lundy v R* [2014] NZCA 576 at [42]–[48] (Harrison and French JJ agreeing on the analysis of these principles at [71]).

9 Just because a form of evidence is new does not mean that it should be treated as invalid: see, for example A A Moenssens "Novel Scientific Evidence in Criminal Cases; Some Words of Caution" (1993) 84 J Crim L & Criminology 1; K Belt "Novel Scientific Evidence and Judicial Gatekeeping: *R v Calder* and *Daubert v Marrell Dow Pharmaceuticals* Compared" (1998) 28 VUWLR 399; John DeWitt, James Richardson and Lyle Warner "Novel scientific evidence and controversial cases: a social psychological examination" (1997) 21 Law & Psych Rev 1.

10 See for example the case of Sally Clark in the United Kingdom. Her conviction relating to the death of her infant sons was eventually overturned, largely because information about a possible infection had not been disclosed to the defence: *R v Clark* [2003] EWCA Crim 1020, [2003] All ER (D) 223. Statistical evidence given by a medical witness was, however, a focus of concern, both in terms of its accuracy, its impact on the jury, and the fact that the witness was not a statistician and was therefore testifying outside of his area of expertise. For more, see Susan Glazebrook, above n 7, at 3–4.

11 For more on peer review methods, see Frank Peters, Olaf Drummer and Frank Musshoff "Validation of new methods" (2007) 165 Forensic Science International 216; and A W Jones "The distribution of forensic journals, reflections on authorship practices, peer-review and role of the impact factor" (2007) 165 Forensic Science International 115. See also Carr and others "Opening the Scientific Expert's Black Box: 'Critical Trust' as a Reformative Principle in Criminal Evidence" (2016) 80 The Journal of Criminal Law 364 at 379–380.

cooperation involves the existence of robust post-conviction reviews if and when science changes[12] or when something went wrong with the evidence that was presented at trial.[13]

The second theme, education, has a number of facets. The first is the obvious one of educating forensic scientists and it includes both making sure that those new to a particular field are trained but also ensuring ongoing education to keep up to date. It is important to share knowledge and best practice both within and across disciplines and, more generally, to have an understanding of other forensic science fields and their place in achieving the overall aim of informing the justice system.[14] This is the real value of conferences of this sort.

Education does not stop there. Forensic scientists need to understand their place in the criminal justice system more generally. The criminal justice system has been described by Lord Thomas as the "customer" for forensic evidence, including counsel who rely on expert evidence to represent their clients; the judiciary who are tasked with ensuring the fairness of proceedings, correctly directing the jury and upholding the rule of law; and society in general, in ensuring innocent people are not wrongfully convicted and perpetrators are dealt with appropriately.[15] Forensic scientists are involved at each stage of the criminal justice process (including the investigation stage) but it is of course the role of the ultimate fact finder to decide the case on the basis of the whole of the evidence.

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12 It is important not to accept without question a type of evidence just because it has always been accepted as reliable. Forensic scientists and the courts must keep abreast of changes in science and the development of new methods. For more, see also Nancy Gertner "National Academy of Sciences Report: A Challenge to the Courts" (2012) 27 Criminal Justice; and National Academy of Sciences "Strengthening Forensic Science in the United States: A Path Forward" (2009). The report reviewed the forensic science disciplines with the intention of ensuring reliability and best practice in their application. The report concluded that, with the exception of nuclear DNA analysis, toxicology and drug analysis, "no forensic method has been rigorously shown to have the capacity to consistently, and with a high degree of certainty, demonstrate a connection between evidence and a specific individual or source": at 7. The report made 13 recommendations to better the application and research of forensic science. More recently, the President's Council of Advisors on Science and Technology (PCAST) *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods* (September 2016) report was released. This report effectively dismissed bite-mark analysis as a forensic science and highlighted issues with firearm analysis, footwear analysis, hair analysis, fingerprint analysis and DNA from complex-mixture samples.

13 One such example is the case of Lindy Chamberlain in Australia: *Chamberlain v R* (Acquittal decision) Reference Under S 433A of the Criminal Code by the Attorney-General for the Northern Territory of Australia of Convictions of Alice Lynne Chamberlain and Michael Leigh Chamberlain, Supreme Court of the Northern Territory of Australia, No. CA2, 1988.

14 See also Carr and others, above n 11, at 371–379.

15 Lord Thomas "Expert Evidence: The Future of Forensic Science in Criminal Trials" (Kalisher Lecture delivered to the 2014 Criminal Bar Association, London, 14 October 2014) at 2.

Another aspect of education is the education of non-scientists about forensic science. As Chief Justice French of the Australian High Court has said, scientific literacy is central to modern decision making and, as a result, courts must have the capacity to assess scientific evidence. He suggests ongoing education for judges in relation to areas of science and technology relevant to their decisions.[16]

In the United Kingdom, the Lord Chief Justice of England and Wales, the Royal Society and the Royal Society of Edinburgh recently launched a project to create a series of 'primers' relating to the most popular areas of forensic science. These are to be presented in an accessible, plain English format and are designed to assist the judiciary, legal teams and juries when handling scientific evidence in the courtroom.[17] This is sure to be viewed in a positive light by expert witnesses in light of a survey in the United Kingdom showing that nearly two thirds of expert witnesses do not believe jurors are equipped to understand scientific evidence.[18]

Of note too is the work of the Royal Statistical Society in the United Kingdom. From 2010 to 2014 the Society produced four practitioner guides on aspects of statistical evidence and probability reasoning. These guides are available to download from the Society's website and are aimed as guidance for judges, lawyers, forensic scientists and other expert witnesses.[19]

An important aspect of education of non-scientists is education about the limits of forensic science. Television crime dramas depict glamorous forensic analysts solving crimes through

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16 Robert French "Measure not on the Scale of Perfection" (speech given at the 5th International Conference on Evidence Law and Forensic Science, Adelaide, 22 July 2015) at 7. See also Law Commission *Expert Evidence in Criminal Proceedings in England and Wales*, Cm 325 (2011) at 10 for comments on mandatory training for both counsel and the judiciary. The Commission made recommendations for statutory regimes regarding the admissibility of expert evidence in criminal proceedings: at 48–58. The Government did not enact these recommendations but instead introduced amendments to the Criminal Procedure Rules. For discussion on the impact of these amendments, see Gemma Davies and Emma Piasecki "No More Laissez Faire? Expert Evidence, Rule Changes and Reliability: Can More Effective Training for the Bar and Judiciary Prevent Miscarriages of Justice?" (2016) 80 The Journal of Criminal Law 327; and Michael Stockdale and Adam Jackson "Expert Evidence in Criminal Proceedings: Current Challenges and Opportunities" (2016) 80 The Journal of Criminal Law 344.

17 The Royal Society "National academies and the law collaborate to provide better understanding of science to the courts" (11 April 2016) <www.royalsociety.org>.

18 Frances Gibb and Jonathan Ames "Jurors 'fail to grasp expert evidence'" *The Times* (3 November 2016) <www.thetimes.co.uk>.

19 See <www.rss.org.uk> for more.

forensic evidence alone (and usually operating solo across a broad range of specialities).[20] While these dramas may have brought forensic evidence to the forefront of the public consciousness, they can be a double edged sword as non-scientists come to expect that forensic science will be applicable to every trial and that it operates with close to perfect accuracy.[21]

Some say that part of the difficulty with education (and communication) is that the language and methodologies[22] of science and law conflict and that the two are a "marriage of opposites".[23] Justifications for this view include that "historically the law has tended to look to science for clear answers with no ambiguity, while scientists often qualify their conclusions"[24] and that law "uses tradition and precedent to direct action, while science uses incremental advances in research to organise knowledge."[25]

By contrast, Lord Neuberger points out that, on a general level, both scientific and legal thinking rely on logical reasoning and on the evaluation of evidence. Scientists and lawyers both search for and assess facts from which they can establish the truth, whether of a particular theory or in a particular case, and they each use principles and reasoning to enable them to reach what they hope is the right conclusion.[26] I agree. Much of the perceived dichotomy may be due to the unrealistic expectations of science. The more the myth that science deals in certainties is dispelled, the less the risk of science being misunderstood or misapplied by fact finders.

This leads onto the next theme of communication. In my view this is one of the most important themes of the conference. Ultimately, good communication will serve the interests of justice and contribute to confidence in the criminal justice system and in the integrity of forensic science and scientists.

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20 For more on the "CSI Effect", see Lord Thomas, above n 15, at 7.

21 For example, a study has shown that jurors expect forensic science to be presented in trials for particular crimes before they would be willing to convict: S Dartnall and J Goodman-Delahunty, "Enhancing Juror Understanding of Probabilistic DNA Evidence" (2006) 38 Australian Journal of Forensic Sciences 85.

22 For a discussion on the difference of methodologies between the disciplines, see Lord Neuberger "Science and Law: Contrasts and Cooperation" (speech given at the Royal Society, London, 24 November 2015) at 5–9.

23 AK Wonder "Science and Law: A Marriage of Opposites" (1989) 29 Science and Justice 75 at 75.

24 Yvette Tinsley "Science in the Criminal Courts: Tool In Service, Challenge to Legal Authority or Indispensible Authority?" (2013) 25 NZULR 844 at 844.

25 Loenne Howses "Towards coherent co-presentation of expert evidence in criminal trials: Experiences of communication between forensic scientists and legal practioners" (2015) 39 Crim LJ 252 at 252.

26 Lord Neuberger, above n 22, at 5–6.

At its most basic, communication means explaining the evidence in a way that a non-specialist fact finder can understand.[27] If a fact finder does not understand the evidence, then a proper decision is not possible and the ultimate goal of achieving justice cannot be met. And I am using fact finder in a broad sense to include the police in deciding who to charge and with what, a prosecutor deciding whether or not to proceed to prosecution, a lawyer deciding how to prosecute or defend an accused and the ultimate fact finder at trial, either a judge or jury.

Communication does not just mean explaining the science. It also means giving the fact finder assistance in understanding the significance of the evidence for the particular case. For that assistance to be meaningful, it must be done in a manner which is understandable for laypersons. As an example, the American Board of Forensic Odontology developed a set of terms that they expected their members to use in stating their conclusions. One study asked a group of laypeople to assess the terms on a 100-point scale as to how certain the expert was that the evidence originated from the suspect. The highest scoring term of the laypeople (and therefore indicating the strongest perceived association between the evidence and the proposed source) was "match" (86 out of 100). The term "match" was intended by the forensic dentists to represent the weakest linkage, the official definition being: "some concordance, some similarity, but no expression of specificity intended; generally similar but true for large percentage of population".[28] The strongest connection term used by the dentists out of the four was ranked third in the survey, at 70.7.[29]

Further, as noted above, the limits of any evidence must be clearly explained. The New Zealand Code of Conduct for Expert Witnesses[30] requires witnesses to set out any

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27 See French, above n 16, at 2–3. For example, where the scientific meaning of words differs from the ordinary meaning, this must be explained to ensure that those in the courtroom are not talking at cross-purposes.

28 The odontology rules did require the terms to be explained when they were used, however: American Board Of Forensic Odontology "Bitemark Standards And Guidelines" (2006). The most recent guidelines only recommend describing the bite mark, indicating whether the bite mark was made by a human, and indicating whether a person can be excluded or not excluded as having made the bite mark: American Board Of Forensic Odontology "Bitemark Methodology Standards And Guidelines" (2016) at 8–9.

29 Dawn McQuiston-Surrett and Michael J Saks "Communicating Opinion Evidence in the Forensic Identification Sciences: Accuracy and Impact" (2008) 59 Hastings LJ 1159 at 1161–1162.

30 High Court Rules (New Zealand), sch 4. This code applies in civil proceedings only, although many of the principles have been set out in case law as applying in the criminal context: see *R v Carter* [2005] 22 CRNZ 476 (CA) at [47], approved in the postscript of *R v Hutton* [2008] NZCA 126. See also Tinsely, above n 24, at 850.

qualifications to their evidence[31] and to identify clearly the facts and assumptions on which their opinion is based.[32] It is very important for expert witnesses to resist being pressured into being more positive in their evidence than the science allows.[33]

Scientists must also be aware that the way evidence is framed can have an impact. Studies show for example that presenting analysis as frequencies leads laypeople to estimate greater likelihoods than if they receive the information in probabilities, even though the conclusions are numerically identical.[34] In general, there is a particular issue in presenting statistical evidence in an understandable manner so that the significance of the evidence is not over or under estimated or misunderstood.

Where the evidence is to be contested, communication also means articulating clearly the points of difference and why they have arisen. The more clearly the elements of disagreement are isolated, the more likely it is that the evidence and the real issues will be understood and properly analysed by the fact finder. There could be benefits in pre-trial conferencing of experts in this regard or in prosecution and defence experts giving evidence together.[35]

There is another aspect of communication. Being in a courtroom is out of many people's comfort zone. It is therefore important that forensic scientists communicate with the courts and others in the system about improvements in court processes and methods of presenting

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31 Clause 4.

32 Clause 3(d).

33 For more advice as to appearing as an expert witness, see Susan Glazebrook "Tax and the Courts" (address given at the Chartered Accountants Australia and New Zealand "Tax Conference 2015", Auckland, 19 November 2015) available at <www.courtsofnz.govt.nz> at 19–24.

34 Dawn McQuiston-Surrett and Michael J Saks, above n 29, at 1174–1175. See also Jonathan J Koehler "When Are People Persuaded by DNA Match Statistics?" (2001) 25 Law & Human Behaviour 493 at 494; and Paul Slovic and others "Violence, Risk Assessment and Risk Communication: The Effects of Using Actual Cases, Providing Instruction, and Employing Probability Versus Frequency Formats" (2000) 24 Law & Human Behaviour 271 at 289.

35 The process whereby experts are called to give evidence together or are forced to work together is often referred to as "hot-tubbing". It has mostly been used in civil cases so far: see: J Christian Nemeth and Lisa Haidostian "The 'Hot Tub' Method of Taking Expert Testimony Is Gaining Steam: What You Need to Know" (2014) 19(1) IBA Arb News 91; Gary Edmond "Secrets of the "hot tub": expert witnesses, concurrent evidence and judge-led law reform in Australia" (2008) 27(1) CJQ 51; Professor Dame Hazel Genn "Getting to the truth: experts and judges in the "hot tub"" (2013) 32(2) CLQ 275; and James Green "Apotex Inc v AstraZeneca Inc: IP experts take the plunge into the hot tub" (2012) 23(12) EIPR 874.

evidence that may lead to better understanding by fact finders and ultimately to better decisions. And incidentally to a more comfortable experience for expert witnesses.[36]

The last theme I have called impartiality. This involves striving to remove both personal and what I would term institutional or systemic bias. Despite the use of objective methods of analysis in the forensic sciences the determination of, for example, a match or exclusion in pattern analysis ultimately rests with the scientist and can therefore be seen as, in part at least, subjective. The potential for bias and error exists.[37]

What is required of an expert is an independent view,[38] whether or not that accords with the interests of the party retaining him or her. Most people's personal and professional integrity would not allow overt bias. So the main issue will be unconscious bias, stemming from such factors as being briefed from the perspective of one side only and the natural desire to be of assistance to the party retaining them.[39] This is often referred to as "adversarial bias" which has been described as an "almost inevitable consequence"[40] of experts being appointed by partisans.[41] There may also be unconscious bias arising from having a particular cultural or gender perspective. Studies have shown that a number of social factors can affect what

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36 For comments on this by expert witnesses, see Paul Newman "Giving a Performance" (2006) Feb CN 109 at 110; and Michael Welner, Theresa Mastellon, Jada J Stewart, Briana Weinert and John M B Stratton "Peer Reviewed Forensic Consultation: Safeguarding Expert Testimony and Protecting the Uninformed Court" (2012) 2 Journal of Forensic Psychology Practice 1 at 26. See also discussion as to possible improvements on the process, including issues about cross-examination and delays, in Susan Glazebrook, above n 33, at 24–25.

37 Nikkita Venville "A Review of Contextual Bias in Forensic Science and its Potential Legal Implications" Australia New Zealand Policing Advisory Agency (December 2010) at 5.

38 In New Zealand, clauses 1 and 2 of the Code of Conduct for expert witnesses emphasise that the expert has an "overriding duty to assist the court impartially" and is "not an advocate for the party who engages the witness". In addition to the Code of Conduct, expert witnesses with professional memberships may already be covered by some internal code of conduct or ethical standards: Susan Glazebrook, above n 7, at 8–9 and n 47.

39 Geoffrey L Davies "Court-Appointed Experts" (2005) 5 Queensland U Tech L & Just J 89 at 91. For more, see DC Murrie, MT Boccaccini, LA Guarnera, KA Rufino "Are forensic experts biased by the side that retained them?" (2013) Psychological Science 24; and Geoffrey L Davies "Current Issues - Expert Evidence: Court-Appointed Experts" (2004) 23 CJQ 367.

40 Emily Henderson and Fred Seymour "Expert Witnesses under Examination in the New Zealand Criminal and Family Courts" (Auckland University, 2013) at 27–28.

41 Geoffrey L Davies "Current Issues - Expert Evidence: Court-Appointed Experts" (2004) 23 CJQ 367 at 368; Suzanne Blackwell and Fred Seymour "The Role of the Psychologist in Criminal Proceedings" in Fred Seymour, Suzanne Blackwell and John Thorburn (eds) *Psychology and the Law in Aotearoa New Zealand* (New Zealand Psychological Society, Wellington, 2011) at 129.

scientific research is conducted and what results may be accepted by the scientific community.[42]

In terms of systemic bias, I point to matters such as confirmation and contextual bias which can arise in any review process where the conclusions of others are known.[43] Confirmation bias, in general terms, can be described as the tendency to interpret information in a way that confirms an existing hypothesis.[44] This is sometimes referred to as an example of a "hot" bias where, although often unintentional and even unconscious, an expert is directionally motivated because he or she wants or expects a particular outcome to prevail.[45]

More specific is "forensic confirmation bias" which refers to the "class of effects through which an individual's pre-existing beliefs, expectations, motives, and situational context influence the collection, perception, and interpretation of evidence during the course of a criminal case."[46] Confirmation bias is a "natural and automatic feature of human cognition that can occur in the absence of self-interest". All involved in the justice system need to remain aware of this.

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42 Tinsley, above n 24, at 846. See also David Faigan "Scientific Realism in Constitutional Law" (2008) 73 Brook L Rev 1067. For more on the research culture in forensic science see Jennifer L Mnookin and others "The Need for a Research Culture in the Forensic Sciences" (2011) 58 UCLA Law Review 725.

43 For more on forensic biases in general, see Forensic Science Regulator "Cognitive Bias Effects Relevant to Forensic Science Examinations" (2015) available at <www.gov.uk>.

44 For more examples of this bias, see John Rafeal Pena Perez "Confronting the Forensic Confirmation Bias" (2014) 33 Yale Law & Policy 457 at 459–461.

45 Robert J MacCoun "Biases in the Interpretation and Use of Research Results" (1998) Ann Rev Of Psychol 259 at 268. This can be contrasted with "cold" biases: those which occur even without a desire for a certain outcome: at 268.

46 Saul M Kassin, Itiel E Dror and Jeff Kukucka "The forensic confirmation bias: Problems, perspectives, and proposed solutions" (2013) 2 Journal of Applied Research in Memory and Cognition 42 at 45; see Carr and others, above n 11, at 380–384; and further Itiel E Dror & Greg Hampikian, "Subjectivity and Bias in Forensic DNA Mixture Interpretation" (2011) 51 Sci & Just 204 at 204–205. See also Itiel E Dror, David Charlton and Ailsa E Péron "Contextual information renders experts vulnerable to making erroneous identifications" (2006) 156 Forensic Science International 74. This study was conducted in the aftermath of the case of Brandon Mayfield, whose fingerprints (held on an electronic database) were found to be a 100 per cent match with those found at the site of the Madrid bombings that occurred in March 2004. Mr Mayfield was arrested before being released two weeks later when the Spanish National Police identified an Algerian national as the source of the fingerprints. In this later study five international fingerprint examiners were given a pair of prints they were told were from the Mayfield case, when in reality they were prints from fingerprint sets each examiners had previously testified in unrelated cases were a conclusive match. Three out of the five examiners, thinking they were re-examining the flawed Mayfield prints, said that the prints did not match; one said he could not decide; and only one of the five said that the prints were a match: see also Susan Glazebrook, above n 7, at 8–9.

Contextual bias, again in general terms, refers to being swayed by extraneous information or influences.[47] Extraneous information such as police suspicion, irrelevant details of the case and institutional pressure can lead to contextual bias.[48] The objectivity of an expert can be influenced and lead to the subconscious development of expectations about the outcome. This bias is difficult to overcome given the natural human tendency to see what we expect to see.[49]

We all use prior knowledge, experiences and contextual clues in order to interpret and understand the events that occur in our everyday lives. But we are unaware of the processes that we rely on and that carries the risk of bias.[50] While we have over time become aware of the dangers of physical contamination of evidence, more needs to be done to address the risks of "cognitive contamination".[51] I know you will be talking during the conference about ways this can be reduced.

Finally on this topic I mention fair trial rights and the need for the defence to have the means to challenge and test expert evidence presented on behalf of the prosecution.[52] This includes

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47 Itiel E Dror and Simon A Cole "The Vision in "blind" justice: Expert perception, judgment, and visual cognition in forensic pattern recognition" (2010) 17 (2) Psychonomic Bulletin and Review 161 at 161.

48 G Edmonds and others "Contextual bias and cross-contamination in the forensic sciences" (2015) 14 Law, Probability and Risk 1 at 2. See also Sophie Stammers and Sarah Bunn "Unintentional Bias in Forensic Investigation" (Parliamentary Office of Science and Technology, October 2015). One example is the case of Detective Constable McKie. In 1997 Ms McKie was alleged to have left a fingerprint at a murder scene. Ms McKie testified that she had not been at the home and therefore could not have left a fingerprint. She was arrested and charged with perjury. The jury rejected the fingerprint evidence and she was found not guilty. A later inquiry, prompted in part by this case, identified a variety of cognitive bias risk factors in the investigation, including that verifying examiners who know the conclusions made by initial examiners might be influenced to confirm their conclusions; and that establishing a hypothesis prematurely can lead to discounting evidence which contradicts the hypothesis: *The Fingerprint Inquiry Report*, The Fingerprint Inquiry Scotland, 2011 at 626–628.

49 Nikkita Venville, above n 37, at 5; and William C Thompson "Subjective interpretation, laboratory error and the value of forensic DNA evidence: three case studies" (1995) 96 Genetica 153.

50 Edmonds, above n 48, at 2–4.

51 At 2.

52 For more, see Susan Glazebrook, above n 7, at 10–12 where the case *Hinton v Alabama* 571 US – (2014) is discussed. Mr Hinton's appointed lawyer for his murder trial mistakenly thought he would not be allocated sufficient funds to hire a qualified firearms examiner. Instead, he retained a visually-impaired (blind in one eye) civil engineer with no expertise in firearms identification and who admitted in court that he could not operate the microscope properly to examine the evidence. In the closing argument, the prosecutor said, when comparing the defence firearms witness and the expert called for the prosecution: "[t]here is no comparison. One man just doesn't have it and the other does it day in and day out, month in and month out, year in and year out, and is recognized across the state as an expert". Mr Hinton was convicted and sentenced to death. He was to spend 30 years on death row before being released in April 2015. This highlights the inequality between the resources of a prosecuting state and a defendant. See also D Dwyer "The Judicial Assessment of Expert Evidence" (Cambridge University Press, Cambridge, 2008) at 32.

access to experts of the same calibre as those for the prosecution.[53] This is becoming more and more of an issue in these times of financial constraint.[54]

None of the above is intended to suggest that forensic evidence ought to be treated with trepidation or with undue suspicion. Despite the recent report of the President's Council of Advisors on Science and Technology,[55] I consider forensic science is of upmost importance in helping the legal system reach its ultimate goal of achieving justice, from the start of an investigation until the final conclusion of any trial and any appeal or review processes.

"Together Informing Justice" is indeed a very apt title for this conference and I wish you well for the rest of the conference.

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53 The majority of forensic scientists in New Zealand are employed by the police or other law enforcement agencies, or by the Institute of Environmental Science and Research (ESR): *Forensic Evidence* (NZLS CLE Ltd, 2008) at 1. In turn, the ESR is the sole forensic science provider to the New Zealand Police and provides services to other Government agencies including Customs and Defence: <www.esr.cri.nz>.

54 See Ronald Young "Has New Zealand's Criminal Justice System been compromised?" (Harkness Henry Lecture, University of Waikato, 7 September 2016) at 5–7.

55 PCAST report, above n 12. While the report recommended that bite mark evidence, firearms identification, footwear analysis and hair analysis not be admitted into evidence, US Attorney-General Loretta Lynch has released a statement saying that the US Justice Department will not adopt the recommendations of the report: Gary Fields "White House Advisory Council Report is Critical of Forensics Used in Criminal Trials" *Wall Street Journal* (20 September 2016) <www.wsj.com>.