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SPECIAL ISSUE

Criminal Justice and Forensic Science Evidence: Current Controversies

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Criminal Justice and Forensic Science Evidence: Current Controversies

Forensic science has played an active role in criminal investigations and the legal process for over a century. A variety of forensic techniques, from fingerprinting and the analysis of tool-marks and bite-marks to facial-mapping and DNA analysis, has assisted law enforcement in England and Wales and America to 'catch' criminals. The legal process in both of these jurisdictions has largely welcomed the admission of such evidence into courtrooms, and juries have developed a thirst for the certainty these techniques can allegedly provide. Over time, however, scientific thought about many of these disciplines has progressed, particularly since the development of DNA technology in the 1980s. DNA analysis is now the most reliable known approximation of individualization evidence, and its development has undermined the reliability of individualization claims made by other forensic disciplines. In addition, diagnosis formulas, like that used to diagnose shaken baby syndrome have been questioned. These advances have generated a new cohort of post-conviction claims, with petitioners arguing that shifts in scientific thought undermine their conviction(s).

This Special Issue comments on each of these intersections of forensic science and the criminal legal process. The first two papers, using examples from England and America, explore how flawed forensic processes can lead to criminal investigations that can result in case construction and cognitive biases. Papers two and three assess the interpretation of the admissibility frameworks that govern the admission of such evidence in English and American trials. The final two papers consider how arguments relating to shifts in scientific thought are addressed by post-conviction courts in England and Wales and America.

Collectively, the papers in this Special Issue inform current discussions about forensic science around the world. In a world that is becoming increasingly underpinned by science and technology, these discussions are vital to engendering criminal justice systems that produce not only fair, but accurate results.



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Criminal Justice and Forensic Science Evidence: Current Controversies

CONTRIBUTORS

Justin Brooks

Professor Justin Brooks is the Director and Founder of the California Innocence Project and a Professor of Law at California Western School of Law in San Diego, CA. He has practised as a criminal defense attorney for more than 25 years in Washington DC, Michigan, Illinois, and California. He has served as counsel on several high profile criminal cases and has been successful in exonerating many wrongfully convicted clients. Professor Brooks is also involved in reforming justice systems in Latin America. He has published extensively in the areas of criminal law, clinical education, and habeas litigation and wrongful convictions.

Marika L Henneberg

Marika Henneberg is a Senior Lecturer at the University of Portsmouth, UK. She is the Director of the Criminal Justice Clinic at the University of Portsmouth and has worked with wrongful convictions since 2007, in the UK, US and Sweden. She worked in the forensic field for a number of years and her research focuses on the use and abuse of scientific evidence in criminal investigations and at trials.

Barry W Loveday

Barry Loveday is Reader in Criminal Justice Administration at the University of Portsmouth, UK. He has worked for a number of London think tanks including the Institute for Public Policy Research (IPPR) and Policy Exchange. He has published extensively in the areas of police governance, police effectiveness, crime prevention and community safety and his work has been cited in debates in the House of Lords on a number of occasions.

Sherry Nakhaeizadeh

Sherry Nakhaeizadeh is a PhD student in the Department of Security and Crime Science, Centre for the Forensic Sciences, University College, London. Her research focuses on cognitive forensics, with specific reference to forensic anthropology and the avoidance of cognitive errors within this field. She has published and presented her scholarship internationally.

Itiel E Dror

Dr Itiel E Dror is Senior Cognitive Neuroscience Researcher at the University College London, with a PhD from Harvard University. His work focuses on the cognitive architecture that underpins expertise and has been published extensively. He researches expert performance in the real world, examining medical surgeons, military fighter pilots, frontline police, and forensic analysts. Dr Dror has developed best practices and procedures to minimise bias and improve decision making. He has provided training to dozens of forensic laboratories, including the FBI, LAPD, NYPD, and many other police agencies in the US, Canada, UK, Finland, the Netherlands, Italy, Australia and other countries.



Ruth M Morgan

Dr Ruth M Morgan is Reader in Crime and Forensic Sciences, Department of Forensics and Crime Sciences, University College, London and Director of the Jill Dando Institute Centre for the Forensic for the Forensic Sciences. Her research focuses on the role of physical evidence in the detection and reconstruction of crime. Current research includes establishing the evidence dynamics of trace forensic materials and developing approaches for the interpretation of evidence. She has presented her scholarship internationally and published extensively.

Simon A Cole

Simon A Cole is Professor of Criminology, Law and Society at the University of California, Irvine. He received his PhD in Science and Technology Studies from Cornell University. He is the author of two books about forensic science, numerous book chapters and scholarly articles about the scientific validity of forensic science and its use in the courts, and contributions to general interest publications such as The New York Times, The Wall Street Journal and New Scientist.

Gary Edmond

Gary Edmond is a law professor and Australian Research Council Future Fellow in the School of Law, University of New South Wales, where he directs the Program in Expertise, Evidence and Law. Originally trained in the history and philosophy of science, he subsequently studied law at the University of Sydney and received a PhD in law from the University of Cambridge. He has published extensively on law and science, expert evidence, and the public understanding of science.

Sarah Lucy Cooper

Sarah Lucy Cooper is a Senior Lecturer in Law and founding member of the Centre for American Legal Studies at Birmingham City University. She is a barrister and Lord Denning Scholar of the Bar of England and Wales. Sarah is a Fellow at the Arizona Justice Project and lecturer for Amicus. Her doctoral research focuses on the intersection of law and science when scientific developments present the legal process with uncertainty. Sarah has published and presented her scholarship in Europe and the USA.

Lissa Griffin

Lissa Griffin is a Professor of Law at Pace Law School in White Plains, New York. She is an expert in criminal procedure and comparative criminal procedure, and has published extensively on the causes and correction of wrongful convictions, from both a domestic and comparative perspective. Before joining Pace Law School, Professor Griffin was involved in criminal and civil appellate litigation. She has also taught in the London Law Program.

Michael Mansfield QC

Michael Mansfield QC was born in 1941 and educated at Highgate School and Keele University. Called to the Bar in 1967, he established Toops Chambers, in 1984 and became Queen's Counsel in 1989. Michael has represented defendants in criminal trials, appeals and inquiries in some of the most controversial legal cases the country has seen, including cases with issues pertaining to forensic science evidence, and particularly where issues of civil liberty have arisen.

FOREWORD

George Bernard Shaw declared the United States and the United Kingdom two countries separated by a common language, but in the area of forensic evidence they are two countries struggling with the same problems, which are thoroughly analyzed in this Special Issue of the British Journal of American Legal Studies.

At trial, lawyers in both countries battle to get evidence admitted and excluded. Expert witnesses are put forth and judges with little or no scientific training must determine whether to admit their testimony. Jurors, who are often more deficient in scientific training, must then calculate the weight to give the testimony. These decisions have often led to wrongful convictions in both the United States and United Kingdom.

In post-conviction proceedings, untrained judges must again make scientific determinations as to whether new scientific evidence undermines prior evidence. Yet, even when prior forensic evidence has been proven to be unreliable, lack statistical support, and overly rely on subjective determinations, the criminal justice system in both jurisdictions demonstrates a systemic obsession with finality, making it very difficult to get cases reversed even when the conviction relies on these techniques.

In the United States, there has been very little help given by the federal courts to remedy these problems. In *Daubert v. Merrell Dow Pharmaceuticals*, 509 U.S. 579 (1993), the United States Supreme Court increased the ability of judges to admit new types of forensic evidence into the courtroom - a decision loved or hated by trial lawyers depending on whether they are trying to get a new form of evidence admitted or excluded. In *Herrera v. Collins*, 506 U.S. 390 (1993), Chief Justice Rehnquist famously declared that there is no right to have a conviction reversed based on new evidence of innocence if a defendant received a trial considered fair under the United States Constitution. Ironically, the one basis most citizens would agree should be a reason for reversing a conviction—innocence—is not as powerful as the failure to provide a fair process. And, there is no presumption that a trial resulting in an innocent person being convicted is unfair.

Without a federal constitutional right to present new evidence in federal court, and because the United States Supreme Court has continually taken a “hands off” approach to the work of the states in enforcing their criminal law, the battle to introduce new evidence of innocence largely takes place at state level. And, because the United States’ criminal justice system has a different penal code for every state and territory, as well as independent case law precedent, there are tremendous procedural differences on how and whether a post-conviction claim of new evidence can be brought. For example, under California Penal Code § 1473.6, new evidence of innocence must, “completely undermine the prosecution’s case with evidence that points unerringly to innocence,” while other states have much lower standards.

There are also great distinctions from county to county based on the politics of various prosecutors’ offices. In some counties in California (such

as San Diego) the prosecutor's office cooperates with the California Innocence Project in getting access to old trial evidence, getting testing done, and discovering whether an innocent person is in prison. If the testing results in strong evidence of innocence, the prosecutor's office joins the California Innocence Project in petitioning the court. This has led to the exoneration of two San Diegans (Kenneth Marsh and Uriah Courtney) by joint motion of the California Innocence Project and the San Diego County District Attorney's Office. In other counties, prosecutors' offices fight our office every step of the way. They impede access to the evidence, fight against testing, fight against the evidence in the court hearing, and when we win, they appeal the decision. The success of a habeas action based on new evidence of innocence is often based on the county where the action is filed and the prosecutor assigned to the case.

Although I've had no experience as a criminal practitioner in the United Kingdom, I'm sure there are inconsistencies in the application of the law that can result in miscarriages of justice. However, by having criminal laws that are applicable across the country there is likely far more uniformity in comparison to the United States, where, for example, a person can receive a death sentence for a crime committed on one side of a state border, but receive a far lesser sentence on the other side. There is also the opportunity to set up national commissions in the United Kingdom, like the Criminal Cases Review Commission, which can positively impact the entire system, whereas in the United States the principles of federalism have created such independence in the states and territories that there are few criminal justice policies that can be described as truly national.

Excellent articles such as those contained in this Special Issue shine a light on the global problems associated with science and the law and the tragedies that can result when the courts fail as gatekeepers of scientific evidence. It is scholarship truly worthy of study because the intersection of science and the law is a dangerous one, where people's lives can be destroyed if the legislators and courts get it wrong.

Professor Justin Brooks
Director, California Innocence Project
California Western School of Law
San Diego, CA USA

‘OFF TRACK’ POLICE INVESTIGATIONS, CASE
CONSTRUCTION AND FLAWED FORENSIC PRACTICES: AN
ANALYSIS OF THREE FATAL STABBINGS IN SWEDEN,
CALIFORNIA AND ENGLAND

Marika L. Henneberg* and Barry W. Loveday**
University of Portsmouth, UK

ABSTRACT

Occasionally, internal and external pressures can result in police investigations going ‘off track’. Cases that are initially difficult to solve or where the police have been subject to negative media attention, may be particularly susceptible to this. ‘Off track’ police investigations increase the risk of tunnel vision and case construction, where the focus is to build a case against a police suspect which is likely to ignore or reject evidence that points to that suspect’s innocence. This article explores the problems associated with this by analyzing three fatal stabbings, from three different jurisdictions. The murder of a prominent politician in Sweden provides an example of good practice, in contrast to the murders of two young female victims, in California and England respectively, which provide examples of police investigations going ‘off track’. The article concludes that courts in the United States of America and in England and Wales need to be more alert to substandard practices within investigations. In particular, courts need to acknowledge problems that can be expected to arise through case construction. The authors suggest a need for extreme caution when prosecuting cases based on circumstantial evidence alone, particularly where the crime itself is of such a nature that it could be expected to have left scientific evidence, and where the lack of such evidence may in fact undermine the circumstantial case against the suspect.

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I. INTRODUCTION

Martin Luther King, Jr. once wrote that “Injustice anywhere is a threat to justice everywhere.”¹ When a crime has been committed we hope that a fair and unbiased police investigation will follow. However, it has been noted that police investigations are susceptible to both internal and external pressures, which may influence how investigative decisions are made.² Inadvertent and deliberate conduct by the police, such as in relation to forensic evidence, may follow the case through to the court and result in a person being found guilty for a crime they did not commit.³ Wrongful convictions are a threat to the criminal justice system, and to the society as a whole, because they underscore the fact that the criminal justice system is fallible.⁴

Part II outlines issues that may arise within police investigations in cases where there is no clear suspect. Research has demonstrated that under certain circumstances, police investigations may go ‘off track’, with the investigation starting to focus on one potential suspect rather than searching for the truth.⁵ This kind of tunnel vision has the potential to lead to what has been described as ‘case construction’.⁶ All emphasis is placed on finding evidence of the guilt of this one suspect, and anything which points towards their innocence is ignored, or elaborate efforts are made to minimize the importance of potentially exculpatory

* Senior Lecturer, Institute of Criminal Justice Studies, University of Portsmouth, 141 High Street, Portsmouth, PO1 2HY, UK; marika.henneberg@port.ac.uk.

** Reader in Criminal Justice Administration, Institute of Criminal Justice Studies, University of Portsmouth, 141 High Street, Portsmouth, PO1 2HY, UK; barry.loveday@port.ac.uk.

Declaration of interest: Omar Benguit is a pro bono client of the Criminal Justice Clinic at the University of Portsmouth. Marika Henneberg is the Director of the Clinic and Barry Loveday is on the Board of Advisors.

¹ MARTIN LUTHER KING JR. & JAMES M. WASHINGTON, A TESTAMENT OF HOPE: THE ESSENTIAL WRITINGS AND SPEECHES OF MARTIN LUTHER KING, JR. 364 (2003).

² MARTIN INNES, INVESTIGATING MURDER: DETECTIVE WORK AND THE POLICE RESPONSE TO CRIMINAL HOMICIDE (2003).

³ HOUSE OF COMMONS HOME AFFAIRS COMMITTEE, NEW LANDSCAPE OF POLICING, Home Affairs Committee Contents, Written Evidence submitted by South Wales against Wrongful Conviction (NLP47), (Jul. 2011), at ¶2.1, available at <http://www.publications.parliament.uk/pa/cm201012/cmselect/cmhaff/939/939vw22.htm>.

⁴ BRANDON L. GARRETT, CONVICTING THE INNOCENT: WHERE CRIMINAL PROSECUTIONS GO WRONG (2011).

⁵ HOUSE OF COMMONS HOME AFFAIRS COMMITTEE, *supra* note 3.

⁶ *Id.* at ¶2.1.

evidence.⁷ As police investigations are the starting point for building a case for a prosecution, those decisions will inevitably influence any subsequent forensic investigation and analysis.

Part III describes three cases of fatal stabbings from three different jurisdictions – Sweden, California in the US, and England. These case studies have been chosen because while they are somewhat similar in nature, i.e. fatal stabbings, the way that the police and courts dealt with them proved to be very different. The first case study is the murder of Swedish Foreign Minister Anna Lindh, which is used as an example of good practice.⁸ As a politician had been murdered, there was extreme media interest in the case both nationally and internationally. The investigation was thorough and successful, with a range of physical evidence pointing to the identity of the perpetrator and linking him to the crime.⁹ In this case there has never been any reasonable doubt that the real perpetrator was identified, convicted and sentenced for the murder. The second case study involves the murder of a young girl in her family home in southern California.¹⁰ No significant physical evidence existed in this crime, but through a substandard investigation, a man was identified as the perpetrator and convicted for the crime.¹¹ However, in a subsequent retrial, he was found not guilty.¹² The third case study involves the murder of a young female student in Bournemouth, England.¹³ Even though there was no physical evidence that could identify a perpetrator, a man was eventually (after three trials) convicted for the crime, in a conviction based solely on circumstantial evidence from witness testimonies.¹⁴

Part IV discusses in detail the contrasts in how these cases have been handled during the investigation and in court. Tunnel vision and case construction arguably played a part in the cases from California and England. Substandard practices within investigations, such as in relation to the handling of evidence, exacerbated the problems which contributed to these convictions. The failure to acknowledge when a *lack of* physical evidence is significant is also problematic. The courts need to more fully understand and appreciate this as it goes hand-in-hand with tunnel vision and case construction.

The article concludes that when police investigations go 'off track', the risk for tunnel vision, case construction and a wrongful conviction increases. Courts in the United States and in England and Wales need to be more alert to substandard practices within police investigations, and acknowledge problems with case

⁷ *Id.* at ¶2.1.

⁸ Marika L. Henneberg, *Verklighetens CSI:Kontamineringsrisker*, 1 KRIMINALTEKNIK, 9, 10 (2009).

⁹ *Id.* at 10-11.

¹⁰ *Id.* at 9-10.

¹¹ *Id.* at 10.

¹² See, e.g., Rory Devine *et al.*, *Jury Clears Richard Tuite in Stephanie Crowe Slaying*, NBC SAN DIEGO, (Dec. 5, 2013, 6:04 PM) <http://www.nbcsandiego.com/news/local/Jurors-Richard-Tuite-Trial-Stephanie-Crowe-Murder-San-Diego-Escondido-234664911.html>.

¹³ *R. v. Benguit*, [2014] EWCA Crim 690, at ¶4.

¹⁴ *Id.* at ¶54.

construction. In particular, caution is needed when prosecuting cases based entirely on circumstantial evidence, where the crime itself is of such a nature that it *should* have left physical evidence.

II. POLICE INVESTIGATIONS GOING ‘OFF TRACK’

It is commonplace among both professionals and academics these days to denounce media portrayals of police investigations of serious crimes as being both highly misleading and often entirely erroneous.¹⁵ Yet it is also the case that the police will often make use of potential media coverage of active investigations for their own investigative purposes.¹⁶ The exploration of the relationship between the media and the police has been subject to substantial research in recent years.¹⁷ This research is, however, a relatively recent development with former Deputy Chief Constable for Devon and Cornwall, Brian Morgan, arguing in 1990 that at least up to that point, academics had demonstrated little interest in the process of police investigation.¹⁸

In what might be seen, in retrospect, as a revelatory assessment made by a practicing senior officer, Morgan was to expose the significant limitations of police investigation and to highlight how, contrary to popular perception, investigations might not involve a careful search for evidence or the identification of a *modus operandi*.¹⁹ At this time, suspects were often seen as ‘data banks’ that, subject to police interviews, could be expected to provide both evidence of the offence and, ultimately, an admission of guilt.²⁰ It has been argued that in the past, confession evidence was often central to clearing a case, especially in the absence of witnesses or with limited forensic evidence.²¹ However, in England and Wales the value of confession evidence has to some degree declined since the introduction of the Police and Criminal Evidence Act (PACE) 1984.²²

It has been recognised that other police strategies have arisen, that sometimes effectively replace confession evidence in the armoury of police investigation techniques. One example of this is the type of tunnel vision within an investigation which results in what is now referred to as ‘case construction’.²³ There has been an increase in the use of ‘case construction’, where police investigators

¹⁵ See ROBERT REINER, *THE POLITICS OF THE POLICE* Ch. 5 (3d ed. 2000).

¹⁶ *Id.* at 147.

¹⁷ See, e.g., FRANK LEISHMAN & PAUL MASON, *POLICING AND THE MEDIA: FACT, FICTION AND FACTIONS* (2003).

¹⁸ BRIAN J. MORGAN, *THE POLICE FUNCTION AND THE INVESTIGATION OF CRIME* 13 (1990).

¹⁹ *Id.* at 53.

²⁰ Michael McConville, *Perspective Justice in the Dock*, *TIMES HIGHER EDUCATION SUPPLEMENT*, 13 (Feb. 8, 2009).

²¹ *Id.*

²² DAVID BROWN, HOME OFFICE RESEARCH AND STATISTICS DIRECTORATE, *PACE TEN YEARS ON: A REVIEW OF RESEARCH*, 1 (1997) available at <http://www.lawteacher.net/PDF/english-legal-system/PACE%2010%20Years%20On.pdf> (last visited Aug. 28, 2015).

²³ INNES, *supra* note 2, at 256.

decide on the guilt of a suspect and view any evidence that contradicts this assumption as 'mistaken'.²⁴ With case construction, the primary aim becomes to prove the case against the suspect – not to test it.²⁵ Other options will rarely be explored and the operation itself will be closed down (and handed to the prosecution) once evidence of guilt is obtained.²⁶ Once the police are convinced of the guilt or innocence of a suspect they can be expected to 'act decisively'.²⁷ Although over time police investigation techniques may have improved, Morgan's summary of police investigation of the majority of reported crime concluded that it was: "Haphazard, unsystematic, uncoordinated and managerially un-supervisable."²⁸

Moreover, in the absence of any effective and independent oversight, the integrity of the police investigation ultimately remained dependent on the professionalism of the police investigators.²⁹ There may, however, be other factors which can play a significant part in determining the process of investigation and the potential outcome. Indeed it is interesting to note that in relation to police investigations, Morgan argued early on that the police "volunteered to be publicly judged"³⁰ on their response to crime as a measure of their effectiveness.³¹ It is not surprising then, "that a considerable body of powerful opinion within the service sees the publicity of successfully solved high profile cases as a major influence on the public perception of the police function overall."³² There are of course clear implications in adopting this assumption. For example, it may act as a motor for case construction and therefore result in wrongful convictions, as the primary aim becomes to gain a conviction, not to search for the truth.³³ This matter was explored more recently by Innes who considered issues surrounding "the small number of murders that assume a very high public profile and those cases the police fail to solve."³⁴ Noting that 'whodunit' murder investigations can expect to receive both local and sometimes national media coverage, Innes confirmed that high profile cases, can acquire a "political significance for the police, media and public alike."³⁵ Innes goes on to add that these cases "Are effectively viewed as litmus tests of police investigative competence in dealing with serious crime" and that "The level of media and public interest in such cases and the consequent demand that the investigation be successful introduces a set of particularly intense and amplified pressures upon the enquiry team."³⁶

²⁴ McConville, *supra* note 20.

²⁵ *Id.*

²⁶ *Id.*

²⁷ *Id.*

²⁸ MORGAN, *supra* note 18, at 9.

²⁹ McConville, *supra* note 20.

³⁰ MORGAN, *supra* note 18, at 12.

³¹ *Id.*

³² *Id.*

³³ House of Commons Home Affairs Committee, *supra* note 3.

³⁴ INNES, *supra* note 2, at 241.

³⁵ *Id.*

³⁶ *Id.*

Innes' research discovered that under pressure, investigations were particularly susceptible to the "mis-identification of suspects".³⁷ He noted these problems were particularly significant in those investigations that were under pressure by the media or other political motivations, and that those very pressures "could encourage officers to interpret any incriminating information against a suspect in accordance with their established hypothesis while ignoring possible alternative interpretations."³⁸

In effect, this 'tunnel vision' adopted by investigators could wholly undermine the investigation and the likelihood of identifying the real perpetrator.³⁹ Along with this, in what might be seen as an important addition in relation to the study of police investigations in general, Innes explored 'compliance drift' as a potential (and real) feature within some murder investigations.⁴⁰ Compliance drift involves officers making "adaptive responses to working practices that evade established procedures and regulations to reduce the pressure being experienced."⁴¹ Moreover, because they seem to solve the perceived problem "they can become rapidly accepted and normalised by the work group."⁴² Innes also argued that 'compliance drift' could ultimately lead to police investigators accepting that regulations and procedures "can and should be" bypassed when necessary.⁴³ This suggests that compliance with procedure was not absolute among investigators. Additionally, 'compliance drift' can also be explained by the need to ensure that an identified suspect is convicted even where the evidence based on standard investigative practices "might not support a conviction."⁴⁴

The research undertaken by Innes has served as an important reminder of the fallibility of some police investigations where the pressures, from both the police hierarchy and the media for an early arrest and conviction, can be intense.⁴⁵ In these situations, the solution may occasionally be recourse to 'police property' where case construction and the manipulation of witnesses can ultimately provide an outcome that would be unlikely to arise from established investigative procedures.⁴⁶ 'Police property' in this context, means individuals who are known to the police, such as low-level criminals and drug addicts that commit crimes to support their addictions.⁴⁷

As has been seen in the United States and England and Wales alike, when extreme flaws within police investigations are readily accepted by the prosecuting authorities and the courts and result in convictions, these are often extremely difficult to challenge. Uglow argued, in relation to the criminal justice system in

³⁷ *Id.* at 256.

³⁸ *Id.*

³⁹ See, e.g., Keith A. Findley & Michael S. Scott, *The Multiple Dimensions of Tunnel Vision in Criminal Cases*, WIS. L. REV. 291, 291-397 (2006).

⁴⁰ INNES, *supra* note 2, at 259.

⁴¹ *Id.*

⁴² *Id.*

⁴³ *Id.* at 261.

⁴⁴ *Id.* at 262.

⁴⁵ INNES, *supra* note 2, at 241.

⁴⁶ REINER, *supra* note 15, at 93.

⁴⁷ *Id.*

'Off Track' Police Investigations, Case Construction and Flawed Forensic Practices

England and Wales, that miscarriages of justice may have no *single* cause but an additional factor remains the subsequent unwillingness of the Court of Appeal and the Home Office “to admit that things had gone wrong.”⁴⁸ Uglow further stated that

In aggregate these illustrate a culture of unwillingness to see its function as the uncovering of the truth and more concerned with results-arrests and convictions; a culture moreover that refused to deal with defendants with openness and fairness and that regarded recognition of such injustices as undermining the criminal justice system.⁴⁹

It is evident that the problem of tunnel vision and case construction is now potentially a greater threat to objective and open police investigations than ever before.⁵⁰ As has been argued since 2005, police forces England and Wales have moved away from an open search for the truth, where all reasonable avenues are investigated, towards a process of building a case against an individual based on proving an hypothesis.⁵¹ In England and Wales it is now often the case that *only* evidence that supports a prosecution is entered onto the HOLMES2⁵² database and this exacerbates the problem. Wrongful convictions will happen when police investigations build a case around circumstances that are interpreted, sometimes quite unjustifiably, “in a way that builds a false picture of guilt.”⁵³ This problem was identified by Bayley who argued in relation to police investigations that: “criminal investigators begin with an identification then collect the evidence – they rarely collect the evidence and then make an identification.”⁵⁴

Along with this, there is also a more frequent use of limited (often flawed) scientific evidence which is then built upon by the interpretation of circumstances supporting the hypothesis while other lines of enquiry are sidelined.⁵⁵ Case construction may also be encouraged by the introduction of prosecution targets and pressures surrounding ‘performance led policing’.⁵⁶ In addition, the widespread adoption by police forces of intelligence-led policing can serve to further undermine any commitment to openness within a criminal investigation and may therefore only reinforce the tunnel vision of police investigators.⁵⁷

⁴⁸ STEVE UGLOW, *CRIMINAL JUSTICE* 11 (2d ed. 2002).

⁴⁹ *Id.*

⁵⁰ See, e.g., Findley & Scott, *supra* note 39, at 291-397; House of Commons Home Affairs Committee, *supra* note 3.

⁵¹ *Id.* at ¶2.1.

⁵² Home Office Large Major Enquiry System 2 (HOLMES 2) is an information technology system designed to aid the management of investigations into large scale enquiries. See *Holmes2: The Future of Crime Management Technology*, UNISYS HOLMES2, <http://www.holmes2.com/holmes2/index.php> (last visited Aug. 20, 2015).

⁵³ House of Commons Home Affairs Committee, *supra* note 3, at ¶2.1.

⁵⁴ DAVID H. BAYLEY, *POLICE FOR THE FUTURE* 27 (1994).

⁵⁵ House of Commons Home Affairs Committee, *supra* note 3.

⁵⁶ *Id.* at ¶2.3.

⁵⁷ *Id.* at ¶¶ 4.1, 5.2.

III. CASE STUDIES

A. THE MURDER OF ANNA LINDH, STOCKHOLM, SWEDEN

In January 2004 a high-profile murder trial commenced in Stockholm, Sweden. The man on trial was 25 year-old Mijailo Mijailović, the suspect in Swedish Foreign Minister Anna Lindh's fatal stabbing.⁵⁸ Mijailović had a history of psychiatric problems, including violence, and had been prescribed anti-psychotic drugs and Flunitrazepam (also known as Rohypnol) by various medical professionals prior to the crime.⁵⁹ Mijailović was found guilty, and received a life sentence for the murder,⁶⁰ after it was determined that he was not criminally insane when he stabbed Lindh.⁶¹

Lindh was attacked in a department store in Stockholm during a shopping trip on September 10, 2003 and died from her injuries the following day.⁶² The autopsy showed that Lindh had nine open injuries, all located to the upper body, and these indicated that she had been stabbed seven or eight times.⁶³ Although the attack itself only lasted for a brief moment,⁶⁴ the forensic evidence linking Mijailović to the murder was overwhelming.

Sweden has very high standards for crime scene investigations and the handling of evidence.⁶⁵ All measures were taken to avoid contamination at the crime scene and of any associated material. Investigators wore protective clothing, and the crime scene was secured, cordoned and processed.⁶⁶ Several racks of clothing around the area where Lindh was attacked were impounded for trace analysis.⁶⁷ Drops of blood on the floor were analysed and they belonged to Lindh.⁶⁸ Footprints were collected but were of little use as many people had been in the store.⁶⁹

⁵⁸ Henneberg, *supra* note 8, at 10.

⁵⁹ Several different doctors had prescribed flunitrazepam (rohypnol) to Mijailović. See Peter Letmark, *Flera läkare Skrev Ut Rohypnol Åt Mijailović*, DN, (Mar. 16, 2004 11:58 PM) <http://www.dn.se/nyheter/sverige/flera-lakare-skrev-ut-rohypnol-at-mijailovic%5C>. This case highlighted numerous problems in the field of psychiatry in Sweden. However, this article focuses on the scientific evidence relating to the attack so these issues will not be discussed here.

⁶⁰ For the full sentence (in Swedish) see HÖGSTA DOMSTOLEN, *available at* http://www.hogstodomstolen.se/Domstolar/hogstodomstolen/Avgoranden/2004/2004-12-02_B_3454-04_dom.pdf.

⁶¹ In an interview with Swedish newspaper EXPRESSEN in 2011, Mijailović admitted to faking symptoms of mental illness to get a less severe sentence. See Associated Press, *Anna Lindh Killer 'Faked Mental Illness to Get Less Severe Sentence'*, THE GUARDIAN, Aug. 29, 2011, <http://www.theguardian.com/world/2011/aug/29/anna-lindh-killer-mental-illness>.

⁶² Henneberg, *supra* note 8, at 10.

⁶³ See Zendry Svärdrkrona, *Här Är Hela Domen*, AFTONBLADET, (Mar. 23, 2004) <http://www.aftonbladet.se/nyheter/article10443098.ab>.

⁶⁴ EVA FRANCHELL, VÄNNINAN: RAPPORT FRÅN ROSENBAD 9, 278 (2009).

⁶⁵ Henneberg, *supra* note 8, at 11.

⁶⁶ EvaMarie Törnström, *Anna Lindh-utredningen*, 3 KRIMINALTEKNIK, 6, 6 (2004).

⁶⁷ *Id.*

⁶⁸ *Id.*

⁶⁹ *Id.*

A witness had seen the suspect drop a knife on the escalators.⁷⁰ The knife was recovered and tested positive for Lindh's DNA.⁷¹ Although the technique was available in Sweden, other samples from the knife were sent to the much more experienced Forensic Science Service (FSS) in England for LCN DNA analysis⁷², which confirmed the presence of Lindh's DNA and also identified Mijailović's DNA.⁷³ The knife also had green fibres on it.⁷⁴

A baseball cap was found which was believed to have been worn by the suspect as it matched CCTV images as well as witness testimonies.⁷⁵ Fibres from Lindh's jacket were found on it, and also a number of green fibres.⁷⁶ It also contained male DNA which later turned out to be Mijailović's.⁷⁷

Lindh's clothes had been put in a paper bag by the medics when she arrived at the hospital.⁷⁸ The clothes were placed in a separate room at the police station where only a limited number of technicians were allowed access.⁷⁹ Only small samples cut out from the clothes were sent to the National Forensic Laboratory to avoid possible contamination at the laboratory.⁸⁰ Green fibres were found on Lindh's jacket.⁸¹ All other evidence, such as the knife and the baseball cap, were kept in separate rooms to avoid any risk of contamination.⁸²

Mijailović became a suspect after a tip-off⁸³, and his DNA was a match to that found on the baseball cap.⁸⁴ Mijailović's mother showed the police where her son had tried to burn clothes, shoes and other items, and partially burnt clothes were collected.⁸⁵ A pair of green trousers had been hidden under a rock in the same area.⁸⁶ The trousers were later shown to be the source of the green

⁷⁰ Henneberg, *supra* note 8, at 10.

⁷¹ Törnström, *supra* note 66, at 8.

⁷² "Low template DNA or low copy number DNA (LCN) refers to samples that contain less than the 250pg (>100pg) required to produce a complete profile using the standard 28-30 cycles. LCN was launched into casework in the United Kingdom in 1999." East Midlands Forensic Pathology Unit, *Low Template DNA*, UNIVERSITY OF LEICESTER, <http://www2.le.ac.uk/departments/emfpu/genetics/explained/low-template> (last visited Aug. 16, 2015).

⁷³ Törnström, *supra* note 66, at 7-8. As Mijailović was a suspect, his DNA had been retrieved from a medical register and this was used for the comparison.

⁷⁴ *Id.* at 8.

⁷⁵ Henneberg, *supra* note 8, at 10.

⁷⁶ *Id.*

⁷⁷ Törnström, *supra* note 66, at 9.

⁷⁸ *Id.* at 6.

⁷⁹ *Id.* at 7.

⁸⁰ Henneberg, *supra* note 8, at 10.

⁸¹ *Id.*

⁸² Törnström, *supra* note 66, at 7.

⁸³ *Id.* at 8, 9. Mijailović had told his mother that he killed the Foreign Minister, and she shared this information with a friend who told the police.

⁸⁴ *Id.* at 8-9.

⁸⁵ Henneberg, *supra* note 8, at 10.

⁸⁶ Törnström, *supra* note 66, at 9.

fibres.⁸⁷ In addition, blood stains around the right pocket were consistent with DNA from Lindh.⁸⁸

Mijailović could be linked beyond any doubt to both the crime scene (through CCTV and witness testimonies), to the murder weapon (through DNA and fibres) and to Lindh (through DNA and fibres). The police had taken utmost care to avoid any possibility of contamination.

In 2011, Mijailović agreed to an exclusive interview with the Swedish newspaper *Expressen*, after keeping quiet about the crime for nearly eight years.⁸⁹ He described what happened on the day of the murder, and the motives behind the attack. Mijailović explained that he hated all politicians at that time, as he blamed them for his own personal shortcomings and failures, and he recognised Anna Lindh and followed her for a short time before the attack.⁹⁰

B. THE MURDER OF STEPHANIE CROWE, ESCONDIDO, CALIFORNIA

Twelve year-old Stephanie Crowe was found stabbed to death in the doorway of her bedroom at around 6 a.m. on January 21, 1998.⁹¹ Stephanie had been stabbed in her bed, but had crawled to the door before she passed out and died.⁹² The autopsy revealed that out of her nine stab wounds, two were fatal (one severed a major artery and the other perforated a lung), none of the wounds were below the chest, and the condition of her body indicated that she had been dead for at least six hours.⁹³

As there were no signs of a forced entry, the police believed that the murder had been an ‘inside job’.⁹⁴ It seemed highly unlikely that someone could have entered the home and carried out the murder without being detected. The front door was never used by the Crowe family and was covered in intact cobwebs, and the laundry room door, which was always used, was locked from the inside.⁹⁵ The remaining door was a squeaking sliding door in the master bedroom where Stephanie’s parents were asleep throughout the night.⁹⁶

Detectives focused on the victim’s brother, 14 year-old Michael Crowe, after noticing inconsistencies in his story about the night of the murder.⁹⁷ Michael was known to feel sibling rivalry towards Stephanie and had on occasions said that

⁸⁷ *Id.*

⁸⁸ Henneberg, *supra* note 8, at 10.

⁸⁹ See Marijana Dragic & Christian Holmén, *Mijailovic Talar Ut: Det Är Dags Att Sanningen Kommer Fram*, EXPRESSEN (Aug. 28, 2011, 08:45 AM), <http://www.expressen.se/nyheter/expressen-avslojar/mijailovic-talar-ut-det-ar-dags-att-sanningen-kommer-fram/>.

⁹⁰ *Id.*

⁹¹ *California v. Tuite*, 2006 WL 3628819, 1 (Cal.App. 4 Dist. Dec. 14, 2006).

⁹² *Id.*

⁹³ *Id.*

⁹⁴ *Id.* at 4. See also testimony by Detective Barry Sweeney, in Harriet Ryan, *Detective: No Signs of Intruder at Crowe House*, CNN (Feb. 20, 2003 11:17 PM) <http://edition.cnn.com/2003/LAW/02/20/ctv.tuite.trial/>.

⁹⁵ See Ryan, *supra* note 94.

⁹⁶ *Id.*

⁹⁷ *Tuite*, WL 3628819.

he wanted to kill her.⁹⁸ Michael and two of his friends, Joshua Treadway and Aaron Houser, were prosecuted for the murder after Joshua confessed to the police that he had acted as a lookout while Michael and Aaron killed Stephanie, and Michael had made damning admissions concerning his own involvement in the murder.⁹⁹ The teenagers soon recanted their stories, saying that during very lengthy interrogations, they felt forced by the police to make incriminating statements.¹⁰⁰ The police had indeed interrogated all three teenagers in sessions lasting up to ten hours,¹⁰¹ and a judge ruled that parts of the confessions were coerced.¹⁰² The case against the teenagers was subsequently dismissed after DNA consistent with Stephanie's was found on a red shirt worn by a man named Richard Tuite on the day of the murder.¹⁰³

Richard Tuite, a 28 year-old transient, was seen acting in what the neighbours described as a "bizarre manner"¹⁰⁴ in the neighbourhood in the days before the murder. He knocked on doors asking for "Tracy", a behaviour that continued after Stephanie's murder.¹⁰⁵ Tuite suffered from schizophrenia and had a history of crystal methamphetamine use, and had frequently been described as "a bull in a china shop" due to his clumsiness.¹⁰⁶

The Escondido police had briefly detained Tuite on January 21, 1998, when his clothes were impounded and he was released.¹⁰⁷ He became the main suspect in 1999, after DNA was discovered in a reanalysis of his red shirt.¹⁰⁸ DNA consistent with Stephanie's was also detected on his white T-shirt in 2003, less than two months before Tuite's trial started.¹⁰⁹

Tuite's defense focused on the confession evidence from the teenagers, the problems with a likely entry and exit point, and it raised arguments about contamination.¹¹⁰ A Superior Court jury convicted Tuite of voluntary manslaughter (as the threshold for murder could not be reached), and he was sentenced to 13 years in prison.¹¹¹

⁹⁸ *Id.* at 7.

⁹⁹ *Id.* at 7.

¹⁰⁰ *Id.* at 1, 6.

¹⁰¹ Mark Sauer & John Wilkens, *Haunting Questions: The Stephanie Crowe Murder Case*, UNION TRIBUNE, (May 11, 1999) <http://legacy.utsandiego.com/news/reports/crowe/crowe1.html>. The interrogations of especially Michael Crowe and Joshua Treadway sparked a heated debate about police interrogations techniques and coercion. Those arguments are, however, beyond the scope of this article.

¹⁰² John Springer, *Prosecutors to Present Evidence in Stephanie Crowe Killing*, CNN (Feb. 5, 2003, 10:23 AM) <http://edition.cnn.com/2003/LAW/02/05/ctv.tuite.trial/>.

¹⁰³ *California v. Tuite*, 2007 WL 460116, 3 (Cal.) (Appellate Petition, Motion and Filing).

¹⁰⁴ *California v. Tuite*, 2006 WL 3628819, 2 (Cal.App. 4 Dist. Dec. 14, 2006).

¹⁰⁵ *Id.* at 4.

¹⁰⁶ Sauer & Wilkens, *supra* note 101.

¹⁰⁷ *Tuite*, WL 3628819.

¹⁰⁸ *Id.* at 6.

¹⁰⁹ The defense argued that they were not given adequate time to prepare for the new evidence, *see id.* at 9-15.

¹¹⁰ *California v. Tuite*, 2007 WL 460116 (Cal.) (Appellate Petition, Motion and Filing).

¹¹¹ Sauer & Wilkens, *supra* note 101.

Looking at the many mistakes that the Escondido police made with the crime scene and evidence associated with Stephanie's murder, it is most likely that the DNA found on Tuite's clothing was the result of contamination. The prosecution repeatedly stated at trial that "this is a DNA case."¹¹² This DNA evidence consisted of (1) a one millimetre spot that contained DNA consistent with Stephanie's, discovered on the red shirt in 1999.¹¹³ Application of fluorescein to the shirt in 1998 had not indicated the presence of blood,¹¹⁴ and (2) two minute smears that appeared to have shared DNA from Tuite and Stephanie, discovered on Tuite's white T-shirt in 2003.¹¹⁵ Unfortunately, the samples from the white T-shirt had been consumed in the testing process.¹¹⁶

An expert on blood evidence, Brian Kennedy, stated that the spot on the red shirt "appeared to be physically altered, perhaps diluted, and looked like a dry clot."¹¹⁷ In his opinion the spot was the result of a transfer, as this would be the expected pattern if dried blood came into contact with a wet fabric, or if dried blood was deposited on fabric which later became wet.¹¹⁸

Kennedy also reviewed photographs of the white T-shirt taken in 1998 and in 2003.¹¹⁹ When the T-shirt had been impounded, some stains on the left shoulder were circled with ink, and these stains tested positive for Tuite's blood.¹²⁰ In 2003, mirror ink marks were visible on the right shoulder.¹²¹ This transfer could only have happened if the fabric got wet or damp.¹²² Kennedy testified that "a water-based product could have changed the appearance of the bloodstains"¹²³ and that "freezing and thawing a garment causes condensation that can reconstitute bloodstains and affect forensic blood analysis".¹²⁴

The contamination theory is arguably substantiated. There is ample evidence of substandard practices by the Escondido police at the crime scene and in the handling of evidence.

Homicide Detective Sweeney was a possible source of contamination. He testified that he was at the crime scene and leaned over Stephanie's body and touched her arm to see if she was cold.¹²⁵ His feet were near the victim's head. Sections of the carpet around the body were wet with blood that first day.¹²⁶ Sweeney did not wear protective clothing or shoe coverings and was, in fact, in

¹¹² *Tuite*, WL 460116.

¹¹³ *Tuite Pleads Not Guilty to Crowe Murder*, 10NEWS.COM (Mar. 17, 2003, 3:38 AM) <http://www.10news.com/news/tuite-pleads-not-guilty-to-crowe-murder>.

¹¹⁴ *Tuite*, WL 3628819.

¹¹⁵ *Id.* at 10.

¹¹⁶ *Id.*

¹¹⁷ *Id.* at 8.

¹¹⁸ *Id.*

¹¹⁹ *Tuite*, WL 3628819, 8.

¹²⁰ *Id.*

¹²¹ *Id.*

¹²² *Id.*

¹²³ *Id.*

¹²⁴ *Tuite*, WL 3628819, 8.

¹²⁵ *Id.* at 10.

¹²⁶ *Id.*

the same clothes that whole day.¹²⁷ He interacted with Tuite twice that day; when Tuite was first picked up for questioning and later in the holding cell at the police station.¹²⁸

Officer Christensen was another possible source of contamination. He was at the crime scene videotaping Stephanie's blood-soaked bedroom on the first day.¹²⁹ He did not wear protective clothing or shoe coverings and was in the same clothes all day.¹³⁰ Christensen interacted with Tuite in the holding cell later that day.¹³¹ Tuite got undressed and handed his clothes over to Christensen, who placed each item of clothing in a separate bag.¹³² All these bags sat open on the concrete floor before they were sealed.¹³³

Moreover, transfer was *known* to have occurred at least once. An evidence technician stepped in Stephanie's blood and transferred a bloody footprint onto a piece of notebook paper in Stephanie's bedroom.¹³⁴ Another person knelt on the floor and got Stephanie's blood on his knee.¹³⁵ Several officers who had been at the crime scene without protective clothing or shoe coverings also walked into the holding cell when Tuite was present.¹³⁶

A tripod and rulers were possible sources of contamination. The Police Department only had one tripod and it was used for multiple purposes, including at the crime scene and to photograph evidence at the station.¹³⁷ Protective coverings were never used on the legs of the tripod.¹³⁸ Kennedy stated that dried blood on the foot of a tripod could have transferred onto a piece of clothing without directly contacting it.¹³⁹ Rulers were also used in multiple locations and for multiple purposes.¹⁴⁰

The crime scene was overcrowded, especially during the first day of the investigation. The family, the fire fighters who responded to the 911 call, numerous police officers, detectives and crime scene technicians and a medical examiner were in the house.¹⁴¹ The forensic work in the house continued for several weeks, with many people entering and leaving every day.¹⁴²

The Police Department did not have enough storage facilities for the evidence. A large metal shipping container was bought for storage.¹⁴³ This container was placed in the police station's parking lot. The container got *extremely* hot

¹²⁷ *Id.*

¹²⁸ *Crowe v. County of San Diego*, 608 F.3d 406, 418, 423 (9th Cir. 2010).

¹²⁹ *Tuite*, WL 3628819, 4.

¹³⁰ *Id.*

¹³¹ *Id.*

¹³² *Id.*

¹³³ *Id.*

¹³⁴ *Tuite*, WL 3628819 at 4.

¹³⁵ *Henneberg*, *supra* note 8, at 10.

¹³⁶ *Tuite*, WL 3628819 at 4.

¹³⁷ *Henneberg*, *supra* note 8, at 10.

¹³⁸ *Id.*

¹³⁹ *Tuite*, WL 3628819 at 8.

¹⁴⁰ *Henneberg*, *supra* note 8, at 10.

¹⁴¹ *Id.*

¹⁴² *Id.*

¹⁴³ *Id.*

inside.¹⁴⁴ Without any exaggeration it can be said that the police department truly failed in storing vital evidence properly. The red shirt had been in this container, whereas the white T-shirt had been in a freezer elsewhere.¹⁴⁵ In addition, evidence was taken out and put back in storage many times to be viewed and processed, including Tuite's clothes.¹⁴⁶ When viewing some of this evidence, a folding table would be set up in the parking lot outside the container.¹⁴⁷

Despite spending over 600 hours, over a period of two years, on the examination of trace evidence from the crime scene, the laboratory could not find *anything* that connected Tuite to the house.¹⁴⁸ Fingernail scrapings taken when Tuite was first detained did not contain anything of interest either,¹⁴⁹ despite the fact that his unkempt appearance indicated that he had not showered properly in a while.¹⁵⁰ This seems to contradict the prosecution's theory that Tuite would have been able to get into the house undetected, despite seven family members being present in the house, and hidden for several hours before killing Stephanie and leaving the house undetected.

Apart from the spots of DNA on his shirts there was nothing that could link Tuite to Stephanie or the crime scene. However, it is well documented that protective clothing or shoe coverings were not used when working on the crime scene, and equipment was used at multiple locations and for multiple purposes without being protected from contamination.

Tuite appealed his conviction, stating that the cumulative effect of errors had rendered his trial fundamentally unfair and violated his right to due process.¹⁵¹ The appeal court disagreed and stated that they had only found *one* clear error, a limitation on a cross-examination of an expert witness, but cited that it was a harmless error.¹⁵² The court further stated even assuming there were other errors, "any so-called cumulative error was harmless even under the most exacting standard of review."¹⁵³

Tuite's conviction was finally voided by a federal appeals court in 2012 and a retrial was ordered.¹⁵⁴ A retrial on involuntary manslaughter charges commenced in 2013, and Tuite was found not guilty on December 6, 2013.¹⁵⁵ After the acquittal, Tuite's attorney pointed to two main reasons for the verdict; the fact that Tuite could not be placed near the Crowe residence the night of the killing, and that it was impossible for Tuite to get in through a door that was

¹⁴⁴ Sauer & Wilkens, *supra* note 101.

¹⁴⁵ Henneberg, *supra* note 8, at 10.

¹⁴⁶ *Id.*

¹⁴⁷ *Id.*

¹⁴⁸ *Id.*

¹⁴⁹ *Id.*

¹⁵⁰ Henneberg, *supra* note 8, at 10.

¹⁵¹ California v. Tuite, 2006 WL 3628819, 10 (Cal. App. 4 Dist. Dec. 14, 2006).

¹⁵² *Id.* at 31.

¹⁵³ People v. Cornwell, 117 P.3d 622, 654 (Cal. 2005).

¹⁵⁴ Sanders Patton, *Wrongfully Accused: The History of the Tuite Trial and What's Next?* (Dec. 12, 2013), <http://www.criminal-attorney-san-diego.com/criminal-defense-cases/richard-tuite-part-1/>.

¹⁵⁵ *Id.*

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deadlocked.¹⁵⁶ The jury had also heard detailed evidence that made a strong case for the theory that the very minute specks of blood and DNA (half of which could never be retested as the sample was consumed during the testing) were the result of contamination.¹⁵⁷

C. THE MURDER OF OKI SHIN, BOURNEMOUTH, ENGLAND

This case began in July 2002 when a young Korean language student, Jong-Ok 'Oki' Shin, was attacked in the early hours of the morning of July 12, when walking home along Malmesbury Park Road, close to the Charminster Road in Bournemouth, England.¹⁵⁸ Oki was the only witness to the attack, and before losing consciousness in hospital, stated that she had been attacked from behind by a man "wearing a mask."¹⁵⁹ Sadly, she later passed away from blood loss without regaining consciousness.¹⁶⁰

Forensic investigations revealed no evidence that the attack had been sexually motivated,¹⁶¹ and nothing had been stolen as Oki's mobile phone and handbag were still at the crime scene.¹⁶² Initial police interest was directed very clearly towards the Korean student community and a number of Oki's fellow students were interviewed.¹⁶³ After six weeks of fruitless police investigations, the Korean Embassy in London voiced grave concerns about the vulnerability of Korean students in Bournemouth.¹⁶⁴ It was at this point that Omar Benguit became a person of interest in the investigation of Oki's murder.

This development arose entirely from statements made by Beverley Brown (who along with Benguit was a heavy drug user), to the police about events that occurred during the night of the murder.¹⁶⁵ In a detailed statement, she claimed that whilst driving her Volvo car on the Charminster Road that evening, she was flagged down by three men who wanted a lift to a crack-house located some distance away.¹⁶⁶ Beverley named the men as Omar Benguit, Nick Gbadamosi and Darius Woolry. As they drove away she claimed that they saw Oki and that Benguit made a comment about Oki of a sexual nature, and then demanded her

¹⁵⁶ Devine, Stickney & Krueger, *supra* note 12.

¹⁵⁷ Kristina Davis, *Tuite Acquitted in Girl's 1998 Slaying*, SAN DIEGO UNION-TRIBUNE (Dec. 6, 2013, 11:17 AM), <http://www.sandiegouniontribune.com/news/2013/dec/06/richard-tuite-stephanie-crowe-verdict/>.

¹⁵⁸ R. v. Omar Benguit, [2005] EWCA Crim 1953.

¹⁵⁹ *Id.* at ¶8.

¹⁶⁰ *Id.*

¹⁶¹ *Id.* at ¶7.

¹⁶² *Id.*

¹⁶³ See, e.g., Barry W. Loveday, *A Briefing Paper on Issues and Events Surrounding the Omar Benguit Case Charminster and the Murder of Jong Oki Shin 12th July 2002* (Jan. 2007), http://www.ismichaelstoneguilty.info/m_s_omar.pdf. The briefing paper outlines pertinent information from Omar Benguit's case files, including witness testimonies and forensic reports.

¹⁶⁴ *Id.* at ¶¶ 3, 5.

¹⁶⁵ R. v. Omar Benguit, [2005] EWCA Crim 1953, ¶9.

¹⁶⁶ *Id.* at ¶10.

to stop the car so that he and Gbadamosi could get out and talk to Oki.¹⁶⁷ Beverley further claimed that upon returning to the car, Gbadamosi angrily claimed that Benguit had made a mistake and “hurt her”¹⁶⁸ presumably in the process of taking her purse or handbag for money to buy drugs.¹⁶⁹

Beverley further alleged that upon returning to the car, Benguit had blood all over his hands and clothes and that the men wanted to dispose of Benguit’s bloody clothes.¹⁷⁰ She claimed that Gbadamosi put the clothes in a bag which he dumped in the River Stour.¹⁷¹ After reaching the crack-house, Benguit had washed his hands of the blood.¹⁷² Beverley stated that they got back into the car, and she was ordered to drive to a location outside the city where Benguit and Gbadamosi subjected her to a serious sexual assault, in which they used a variety of tools from the car tool box to sexually assault her.¹⁷³ It is very important to note that Beverley named both men in relation to this vicious sexual assault, and she claimed that Gbadamosi said to her that “she wants this.”¹⁷⁴ She further stated that the same knife that was used to murder Oki was used to “slice her stomach” during the assault.¹⁷⁵

Despite what might be seen as a plethora of potential physical evidence arising from both the attack on Oki and the vicious rape of Beverley,¹⁷⁶ the subsequent forensic investigations revealed no evidence to link either Benguit or Gbadamosi to these attacks.¹⁷⁷ The car used by Beverley, along with the tool box, provided no DNA or other evidence linking the men with the attacks.¹⁷⁸ The forensic scientist who examined the jacket worn by Benguit on the night of the murder¹⁷⁹ had found “no components of the deceased’s DNA in any of the samples of blood found on the jacket.”¹⁸⁰ Similarly, the forensic investigators could not find anything to link Benguit to the car driven by Beverley Brown that night, and there was no evidence of the other two original defendants ever having been in her car either.¹⁸¹ The bundle of clothes in a plastic bag which Beverley alleged had been thrown into a river was never found, despite searches.¹⁸²

¹⁶⁷ *Id.* at ¶11.

¹⁶⁸ Loveday, *supra* note 163, at ¶7.

¹⁶⁹ *Id.*

¹⁷⁰ *Id.* at ¶19.

¹⁷¹ *Id.*

¹⁷² *Id.* ¶7.

¹⁷³ *Id.* at ¶¶10, 36, 37.

¹⁷⁴ Loveday, *supra* note 163, at ¶36.

¹⁷⁵ *Id.*

¹⁷⁶ *E.g.* blood in the car and on Benguit’s clothes, evidence of a serious sexual assault inside the car and on a variety of tools from the tool box.

¹⁷⁷ *R. v. Omar Benguit*, [2005] EWCA Crim 1953, ¶16. “The case for the prosecution was not supported by *any* forensic evidence.” *Emphasis added.*

¹⁷⁸ Loveday, *supra* note 163, at ¶19.

¹⁷⁹ There was CCTV footage of Benguit from a pub earlier that night, wearing his jacket. *Id.* at ¶54.

¹⁸⁰ *Id.* ¶19.

¹⁸¹ *Id.*

¹⁸² *Id.* ¶14.

CCTV footage of Charminster Road at the times identified by Beverley revealed that no vehicle of the make used by Beverley had been recorded on the tapes.¹⁸³ It was also discovered that Beverley's belated decision to make her witness statement to the police coincided with her own arrest for shoplifting,¹⁸⁴ and there were indications that she had received a financial reward for providing material evidence leading to the conviction of Benguit.¹⁸⁵

Just how tenuous Beverley's detailed account of events proved to be was demonstrated in court when Gbadamosi's defense counsel presented footage from a speed camera that showed Gbadamosi driving his car at a point miles away from the crime scene, at the very time Beverley claimed he was involved in the murder and her rape.¹⁸⁶ Subsequently, both Benguit and Gbadamosi were acquitted of the rape charges.¹⁸⁷

However, only Gbadamosi was released from custody whereas Benguit was retried for murder.¹⁸⁸ In all it took three trials, and a special permission from the Director of Public Prosecutions, to even allow for a third trial to take place,¹⁸⁹ to have Benguit found guilty for the murder of Oki. The oppressive nature of the prosecutions of Benguit becomes very clear. In the absence of any scientific evidence directly linking Benguit to the murder of Oki, all three prosecutions were based entirely on circumstantial evidence from highly questionable witnesses.¹⁹⁰

Former acquaintances of Benguit, and like him heavy drug users, stated that Benguit regularly carried a knife.¹⁹¹ A Mr Cutting, who claimed to live in the same house as Benguit, stated at the third trial that he thought he had once seen Benguit out the window of his first floor flat "sharpening a blade."¹⁹² This witness statement, though providing merely circumstantial evidence, may have been influential in persuading the jury that Benguit had indeed committed the murder.¹⁹³

Apart from the testimonies by Beverley and a group of other drug users, there was simply no evidence to implicate Benguit in the murder.¹⁹⁴ Indeed, it appeared that the lack of evidence contradicted the testimonies which had been given. Nevertheless, Benguit was convicted in 2005 and received a life sentence with a 20 year minimum for Oki's murder.¹⁹⁵

In 2014, Benguit's case went before the Court of Appeal Criminal Division (CACD) and the CACD rejected the appeal on grounds that appear difficult to

¹⁸³ R. v. Omar Benguit, [2014] EWCA Crim 690, ¶¶50-52.

¹⁸⁴ Loveday, *supra* note 163, ¶10.

¹⁸⁵ *Id.*

¹⁸⁶ *Id.* at ¶¶ 8, 59.

¹⁸⁷ R. v. Omar Benguit, [2005] EWCA Crim 1953, ¶2.

¹⁸⁸ R. v. Omar Benguit, [2014] EWCA Crim 690, ¶2.

¹⁸⁹ R. v. Omar Benguit, [2005] EWCA Crim 1953, at ¶4.

¹⁹⁰ *Id.* at ¶16.

¹⁹¹ *Id.* at ¶17, ¶18, ¶26, ¶29.

¹⁹² Loveday, *supra* note 163, at ¶10.

¹⁹³ *Id.* at ¶59.

¹⁹⁴ R. v. Omar Benguit, [2005] EWCA Crim 1953, ¶16.

¹⁹⁵ R. v. Omar Benguit, [2014] EWCA Crim 690, ¶2.

sustain.¹⁹⁶ While the court agreed that Beverley Brown had exaggerated her account to the police and jury, she did not “exaggerate for monetary gain”¹⁹⁷ and her credibility was also “fully explored before the jury.”¹⁹⁸ The Crown Court’s acceptance of the evidence presented by Beverley was not questioned by the CACD,¹⁹⁹ even though Beverley’s rape allegations proved to be nothing but extravagant fantasy. Beverley Brown *had* lied by implicating Gbadamosi in the murder of Oki and the subsequent rape.²⁰⁰ What real value could be accorded to a witness whose account was undermined by evidence from a speed camera which placed one of the two alleged culprits miles away from the crimes?

The CACD also stated that “the Crown could point to significant circumstantial support”²⁰¹ for Beverley’s account from the other witnesses who provided testimonies.²⁰² However, despite all of them (including Beverley) being heavy drug users, they demonstrated a memory recall unexampled among this category of people.²⁰³ This could suggest that they were “coached” before the third trial.²⁰⁴

In addition, the CACD had no issue with the fact that Beverley had changed her mind about the make of car she was driving on the night of the murder, suggesting two different cars of different makes, or the lack of any physical evidence linking Benguit or the others to the cars.²⁰⁵ On the contrary, in the appeal, the two experts’ failure to conclusively identify either of these cars on CCTV at the relevant times (between 02:30 and 03:05) was simply disposed of as neither *excluded* the cars.²⁰⁶

The CACD continued to support the evident fantasies of a witness who, despite being a protected witness, later went on a popular daytime TV show, the Jeremy Kyle Show, where she claimed to have witnessed the murder.²⁰⁷ This contradicted the testimony she had given at trial, where she stated that although she sat in the car and heard the knife go through Oki’s body with such force that it struck the pavement,²⁰⁸ she never actually saw the murder.²⁰⁹ Forensic evidence indicated that Oki was attacked in a standing position and Beverley had been unable to identify the right location in the road where the attack had taken place.²¹⁰

¹⁹⁶ *Id.* at ¶62.

¹⁹⁷ *Id.* at ¶53.

¹⁹⁸ *Id.*

¹⁹⁹ *Id.* at ¶2, ¶3.

²⁰⁰ Loveday, *supra* note 163, at ¶9.

²⁰¹ R. v. Omar Benguit, [2014] EWCA Crim 690, ¶54.

²⁰² *Id.*

²⁰³ Loveday, *supra* note 163, at ¶¶ 20, 37.

²⁰⁴ *Id.* at ¶20.

²⁰⁵ R. v. Omar Benguit, [2005] EWCA Crim 1953, ¶16.

²⁰⁶ R. v. Omar Benguit, [2014] EWCA Crim 690, ¶61.

²⁰⁷ Clips from the Jeremy Kyle show can be seen in this news report from Meridian News, Legal Eye, *Omar Benguit – Jeremy Kyle Show Witness*, YOUTUBE (Sept. 23, 2011), <https://www.youtube.com/watch?v=BiszoCdQaV4>.

²⁰⁸ Loveday, *supra* note 163, at ¶35.

²⁰⁹ *Id.*

²¹⁰ *Id.* at ¶9.

It might be thought that in a case which depended so heavily on circumstantial evidence from a highly questionable group of people, there would be some room for doubt. This was not considered by the CACD at all, despite the CACD noting that “Searches and science did not link Benguit to the murder.”²¹¹ As Benguit failed his appeal, he still remains in a category A prison and maintains that he is innocent of the crime.

IV. DISCUSSION

Garrett’s comprehensive 2011 study of 250 American innocence cases²¹² shows that there are some doubts around the concept of innocent until proven guilty. Garrett’s study covers exonerations through post-conviction DNA, and it must be borne in mind that DNA is not available in every example of a suspected wrongful conviction. However, the study still shows a frightening trend, where there seems to be a shift from a presumption of innocence to a more robust approach of guilty until 100% exonerated through science. This is problematic in itself as science is not infallible. This is particularly true as genuine human error, sloppy police work, poorly maintained crime scenes and questionable criminal justice procedures are also part of the picture. Similar studies have not taken place in England and Wales or in Sweden. However, the figures are useful for comparative purposes, especially in relation to England and Wales, as the adversarial systems are similar in those two jurisdictions.

Garrett’s study shows that the types of evidence most frequently supporting an innocent appellant’s original conviction were: eyewitnesses 76% (190 cases); forensic evidence 74% (185 cases); informant testimony 21% (52 cases); and confessions 16% (40 cases).²¹³ It would appear that it is during the investigatory phase that a lot of associated problems occur, and this poor evidence is then admitted into the courts. For example, in relation to eyewitness testimonies, sub-standard police procedures can be blamed, and the same is true for informant testimony and confession evidence²¹⁴. However, there may also be a link between a police investigation and questionable forensic evidence, as financial pressures might mean that only a fraction of the evidence from a crime scene will be tested; that which has been deemed to have the highest probative value.

Looking at the case studies described in Part III we can determine the following:

- The Anna Lindh murder: a conviction based on physical evidence (DNA, fibres, blood), CCTV images, and witness testimonies. This appears to be a solid conviction and was confirmed in an interview by the assailant, Mijailo Mijailović, eight years after the conviction, when he explained what had happened on the day of the murder and why he attacked the Swedish Foreign Minister.

²¹¹ *R. v. Omar Benguit*, [2014] EWCA Crim 690, ¶21.

²¹² GARRETT, *supra* note 4.

²¹³ *Id.* at 279.

²¹⁴ *Id.* at Chapter 9.

- The Stephanie Crowe murder: Tuite's original conviction was based on minute specks of DNA which were likely the result of contamination through poor, substandard practices. The conviction was eventually voided and in a retrial Tuite was found not guilty. There was no other scientific evidence to put him at the crime scene or link him to the victim, there were no witnesses that could place him sufficiently close to the crime scene, and the fact remains that the only possible entrance point was a door deadlocked from the inside.
- The Oki Shin murder: Beverly Brown can be described as something between an unreliable eyewitness and an informant. There is no physical evidence which support her, or any of the other drug addicts' testimonies. In fact, the lack of forensic evidence contradicts the stories told by these witnesses. There is no physical evidence which links Benguit to the victim or the crime scene, or to the car he was allegedly travelling in whilst covered in blood. Benguit's clothes were confiscated and tested, and nothing can link him forensically to the crime, other than the testimonies from drug addicts.

In the United States, the *favoured* mathematical level of guilt is thought to be more than a 90% certainty, but empirical studies show that jurors require as little as 70% to meet this burden.²¹⁵ Therefore it comes as no surprise that "empirical evidence suggests prosecutors typically obtain convictions on less than a reasonable doubt."²¹⁶ When there is high pressure on the police and the prosecution to obtain a conviction, there is an increased risk of tunnel vision and case construction. Unreliable witnesses and/or questionable, flimsy scientific evidence, become central to the prosecution's case, as was clearly demonstrated in Garrett's study.²¹⁷

A. TUNNELVISION, CASE CONSTRUCTION, AND 'POLICE PROPERTY'

Looking at the case studies, there are some striking similarities between the investigations which resulted in the convictions of Tuite and Benguit. People with mental health issues or significant personal problems, such as drug addiction, are vulnerable in the hands of an unprofessional police investigation as they may not have the capabilities to effectively challenge what investigators claim that they have done. This may be due to issues with mental health, intellectual impairment, or memory impairment due to drug use.²¹⁸ Tuite suffered from schizophrenia and

²¹⁵ Erik Lillquist, *Recasting Reasonable Doubt: Decision Theory and the Virtues of Variability*, 36 U.C. DAVIS L. REV. 85, 112 (2002).

²¹⁶ Kimberlianne Podlas, "The CSI Effect": *Exposing the Media Myth*, 16 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 429, 436 (2006).

²¹⁷ GARRETT, *supra* note 4.

²¹⁸ See, e.g., Antoine Bechara & Eileen M. Martin, *Impaired Decision Making Related to Working Memory Deficits in Individuals With Substance Addictions*, 18(1) NEUROPSYCHOLOGY 152 (2004); Karen D. Ersche et al., *Profile of Executive and Memory Function Associated with Amphetamine and Opiate Dependence*, 31 NEUROPSYCHOPHARMACOLOGY 1036 (2006).

had been using drugs in the past, and Benguit was a heavy drug user at the time that the crime took place.

The timing of Tuite and Benguit becoming suspects is of importance. In Tuite's case, the murder investigation had followed an entirely different track originally, resulting in a trial of three other suspects.²¹⁹ The trial collapsed after the court became aware that the three suspects had been interrogated in lengthy sessions, claiming that they were coerced by the investigators to make admissions of guilt.²²⁰ The police was put in a precarious position, with significant negative attention in the media, and there was immense pressure to 'fix' the situation. The finding of incriminating evidence pointing to Tuite's guilt coincided with the collapse of the trial against the three original suspects.²²¹ The minute specks of DNA found on Tuite's red shirt created tunnel vision that led to case construction. This is particularly true as the court in the original trial had shown that the interview evidence against the three other suspects could not be used in court, so this line of enquiry was effectively shut down.²²² In summary, a case was constructed against Tuite, where anything which pointed away from his guilt was ignored, excluded or elaborate explanations were offered to minimise the effect of such evidence.

Benguit only became a suspect after there had been significant attention in the local media, where the police had been criticised for not being able to solve the murder.²²³ This was coupled with increasing pressures from Korean authorities, which must have become a serious problem as Bournemouth's economy is dependent on language schools and general tourism. The initial evidence against Benguit was provided by Beverley Brown, who was known to the police as a result of her shop lifting activities, drug use and part-time prostitution.²²⁴ Benguit was also a drug user and known to the police.²²⁵ However, quite unlike Beverley who appeared able to recall very detailed events about the night of July 11, 2002, Benguit was unable to recall his exact whereabouts for some of that evening.²²⁶ With Benguit unable to challenge the police's hypothesis, which was based entirely on Beverley's statements,²²⁷ he became an easy target. Beverley's statements led to tunnel vision, where all emphasis was on Benguit and any alternative enquiries were closed down.²²⁸

The term 'police property' has been used to describe individuals who are known to the police, as they can become the object of often arbitrary police intervention. Reiner has defined police property as

²¹⁹ *California v. Tuite*, 2006 WL 3628819, 7 (Cal. App. 4 Dist. Dec. 14, 2006).

²²⁰ *Id.* at 1, 6.

²²¹ *Id.* at 1.

²²² Sauer & Wilkens, *supra* note 101.

²²³ Loveday, *supra* note 163, at ¶¶ 3, 5.

²²⁴ *R. v. Omar Benguit*, [2005] EWCA Crim 1953, ¶9.

²²⁵ Loveday, *supra* note 163, at ¶ 3.

²²⁶ *R. v. Omar Benguit*, [2005] EWCA Crim 1953, ¶20.

²²⁷ *Id.* at ¶2, ¶9.

²²⁸ It took three trials and a special permission from the Director of Public Prosecutions to even carry out the third trial to have Benguit convicted.

low status, powerless groups, whom the dominant majority see as problematic or distasteful. The majority are prepared to let the police deal with 'their property' and turn a blind eye to the manner in which this is done. Examples would be vagrants, skid row alcoholics, the unemployed or casually employed residuum.²²⁹

Reiner further stated that "the prime function of the police has always been to control and segregate such groups and they are armed with a battery of permissive and discretionary laws for this purpose."²³⁰ Beverley and Benguit can be seen as police property, and they were both used by the police for different purposes. As a result of the stories Beverley told the police, she was put into a witness protection scheme.²³¹ Beverley complained about many off duty visits made by police officers to her protective residence, and this was investigated by the Dorset Police Complaints and Discipline Department.²³² This may suggest that the police were, in fact, using Beverley in their case construction. Benguit was to pay a very high price for that as he was eventually convicted based on purely circumstantial evidence.²³³ Benguit's conviction demonstrates that police property can be seen to have a significant role in major police investigations, where established police investigation procedures were leading nowhere.²³⁴

The convictions of Tuite and Benguit respectively appear to have placated both the media and the public at the time, as a suspect had been identified and the murder investigations could be closed.

B. LOCARD'S EXCHANGE PRINCIPLE AND CONTAMINATION: SWEDEN V. CALIFORNIA

Forensic science, or the "application of science to the justice system",²³⁵ is a discipline which in its current form can be traced back to groundbreaking work carried out in Europe in the early twentieth century. Dr Edmond Locard, by many regarded as "perhaps the most important forensic scientist of the century",²³⁶ was responsible for many of these developments.²³⁷ The most outstanding contribution is perhaps what is commonly referred to as 'Locard's Exchange Principle', based on his understanding that whenever two objects meet there is an exchange of material from each to the other.²³⁸ In a criminal context, this was a major

²²⁹ REINER, *supra* note 15, at 93.

²³⁰ *Id.*

²³¹ Loveday, *supra* note 163, at ¶20.

²³² *Id.*

²³³ R. v. Omar Benguit, [2014] EWCA Crim 690, ¶21, ¶54.

²³⁴ Loveday, *supra* note 163, at ¶3.

²³⁵ L.J. Levine, *The Role of the Forensic Odontologist in Human Rights Investigations*, 5(4) AM. J. FORENSIC MED. PATHOL., 317 (1984).

²³⁶ F. Taroni, C. Champod & P. Margot, *Forerunners of Bayesianism in Early Forensic Science*, 38(2) JURIMETRICS, 183, 186 (1998).

²³⁷ Locard was the founding director of the world's first criminal laboratory in Lyon, France, and he wrote the seven volume masterpiece *Traité de Criminalistique*, which contains methods and techniques still used in crime scene investigations today. See EDMOND LOCARD, *TRAITÉ DE CRIMINALISTIQUE* (1940).

²³⁸ EDMOND LOCARD, *L'ENQUETE CRIMINELLE ET LES METHODES SCIENTIFIQUES* (1920).

breakthrough as evidence could link a perpetrator to a victim and a crime scene and *vice versa*. Locard fully understood the importance of evidence integrity and repeatedly stated the need to protect the crime scene (or subject) from having further material added to it, which in turn could lead to the evidence being lost due to degradation or obliteration; this is today referred to as contamination²³⁹.

The importance of avoiding contamination of the crime scene and of any physical evidence cannot be overstated. Contamination has been defined as “to soil, stain, corrupt or infect by contact or association”, “to make impure or unclean.”²⁴⁰ With that definition in mind it becomes obvious that contamination of physical evidence can occur at any time during a criminal investigation: at the crime scene; during collection, packaging and transportation of evidence to another location; whilst evidence is in storage; and during the actual analysis of evidence in a laboratory. Every time the evidence is handled there is a new potential risk.

The risk of contamination increases tremendously if protective clothing is not worn when processing and documenting a crime scene, and if equipment such as rulers, cameras and tripods are used at multiple locations and for multiple purposes. Examples include at a crime scene as well as in a laboratory, and in association with both a victim and a potential suspect. The risk is further increased if a crime scene is overcrowded, as the integrity of the crime scene is compromised with every new person entering and leaving the scene.

Sweden has a very long tradition of crime scene investigations,²⁴¹ and a standardized approach has been adopted. Training for crime scene personnel is centralized and substantial and it takes many years to qualify.²⁴² Measures are taken to ensure that all personnel have high levels of knowledge and education. The risk of contamination is an issue that everyone working within the police is informed about early on in their training. Responding police officers, who may be the first to arrive at a crime scene, and the crime scene investigators, abide by the same guidelines. One of these is to avoid contamination, which can be seen prominently displayed under the title Avoid Contamination on page 4 in the main field manual of crime scene investigation used in Sweden,²⁴³ which reads:

When two objects come into contact with each other there is always an exchange of materials between them. In fact, sometimes the objects do not even have to be in contact, since materials such as fibres are suspended in the air. This type of material exchange – contamination - must be avoided throughout

²³⁹ *Id.* See also SWEDISH NATIONAL LABORATORY OF FORENSIC SCIENCE, FIELD MANUAL OF CRIME SCENE INVESTIGATIONS 4 (2002).

²⁴⁰ *Contaminate*, MERRIAM WEBSTER, <http://www.m-w.com/dictionary/contaminate> (last visited Jun. 23, 2015).

²⁴¹ See, e.g., OTTO WENDEL & ARNE SVENSSON, BROTTSPLOTSUNDERSÖKNINAR (1950).

²⁴² See Nationellt Forensiskt Centrum – NFC, *Kvalitet och miljö*, SWEDISH NATIONAL POLICE ACADEMY (Mar. 10, 2015 10:51 AM), <http://nfc.polisen.se/om-SKL/kvalitet-och-miljo>.

²⁴³ SWEDISH NATIONAL LABORATORY OF FORENSIC SCIENCE, FIELD MANUAL OF CRIME SCENE INVESTIGATIONS (2002). The field manual has been translated into several languages, including English. All contain the same warning.

the material handling chain, from collection at the crime scene to the examination in the laboratory. Apart from the instructions in the checklists, the following rules should be followed to avoid contamination:

- Never let suspects and victims be in the same room or be transported in the same car, not even at different times.
- Use protective clothing (overalls, caps, gloves and disposable shoe coverings) when entering a crime scene and collecting trace evidence (hair, fibres, blood, secretions, small particles etc.).
- One person should carry out the crime scene investigation, another should examine the suspect's clothes, car etc., a third the suspect himself, a fourth the victim etc.
- Cars should preferably be examined on site.
- If a car must be moved, it should be towed. Avoid using the seats. If that is unavoidable, use protective clothing. If the car must be driven, the only person in it should be the driver, who should wear protective clothing. A list of the clothes worn by the driver should be given to the investigating officer.²⁴⁴

The risk of contamination has been known for approximately 100 years²⁴⁵, so it is inexcusable to fail to protect against that risk. Why were there such differences between Sweden and California?

Although the murder of Stephanie Crowe took place in 1998, and that of Anna Lindh in 2003, the earlier date is no excuse for the substandard work carried out by the Escondido police. DNA had, at the time, already been used as evidence in criminal trials in the United States for a decade,²⁴⁶ and law enforcement personnel were fully aware of issues relating to contamination after the highly publicised 1995 trial and acquittal of O.J. Simpson.²⁴⁷

Maybe one reason is that, in Sweden, there is a standardized approach. If the Swedish guidelines outlined above had been applied by the Escondido Police in the Stephanie Crowe murder, the risk of contamination would have been significantly limited. In the United States there is no standardized approach, as there are differences between federal and state jurisdictions, and not even uniformity at state level.²⁴⁸ Measures such as the Coverdell National Forensic Science Improvement Grants Program aim to improve forensic work carried out in laboratories in the US.²⁴⁹ However, it can be argued that it does not matter how good the laboratories are if the problem starts already at the crime scene, or during

²⁴⁴ *Id.* at 4.

²⁴⁵ LOCARD, *supra* note 238.

²⁴⁶ STUART H. JAMES ET AL., FORENSIC SCIENCE: AN INTRODUCTION TO SCIENTIFIC AND INVESTIGATIVE TECHNIQUES 306-07 (3d ed. 2009).

²⁴⁷ ROBIN T. BOWEN, ETHICS AND THE PRACTICE OF FORENSIC SCIENCE 93-4 (2010).

²⁴⁸ GARRETT, *supra* note 4, highlights numerous differences in how laboratories function in various states, and how reforms of the criminal justice system vary greatly between states.

²⁴⁹ See *Coverdell National Forensic Science Improvement Grant Program*, NATIONAL INSTITUTE OF JUSTICE (Apr. 7, 2015)

<http://www.nij.gov/topics/forensics/lab-operations/capacity/nfsia/pages/welcome.aspx>.

evidence handling, by not adequately protecting samples from contamination.²⁵⁰ Some money would be better spent on providing police departments with an endless supply of protective clothing, additional equipment and so on.

As seen in Part III, there were numerous opportunities for contamination to occur in the Stephanie Crowe murder.²⁵¹ The timing of the discovery of evidence which incriminated Tuite was 'perfect', as it coincided with the collapse of the case against Stephanie's brother and his friends.²⁵² It also resulted in the police investigation going off track, as it caused tunnel vision and case construction. Tuite, with his mental health issues and transient lifestyle, did not stand a chance when the heavy machinery of justice came down on him.

C. THE LACK OF ANY PHYSICAL EVIDENCE

When comparing the three cases, it is remarkable that the police in the Oki Shin murder investigation managed to put together a case that was strong enough to be accepted for prosecution (three times). Kirk has stated that "Physical evidence cannot be wrong, it cannot perjure itself, it cannot be wholly absent. Only its interpretation can err."²⁵³ There are circumstances and situations where physical evidence may not be found, for example where existing material has degraded or been destroyed by forces such as fire. Criminals may also try to avoid leaving evidence behind, for example by wearing gloves. However, this would not appear to be the case in any of the three case studies, as no witness testimonies indicate that Mijailović, Tuite or Benguit were wearing anything other than regular clothing during the time of the crimes.

The fatal stabbings of Anna Lindh and Oki Shin were similar in that they were unprovoked attacks that were over quickly. Nevertheless, there was an abundance of physical evidence tying Mijailović to the crime scene, the victim and the murder weapon despite the fact that Mijailović had done his utmost to *destroy* the evidence.²⁵⁴ The failure to find any physical evidence to connect Benguit to the crime is extraordinary as, in accordance with witness testimonies, such evidence (especially blood) should, at the very least, have been possible to detect on Benguit's clothing as well as in the car that he allegedly travelled in that night. The CACD itself had to admit that, "Searches and science did not link Benguit to the murder."²⁵⁵ It cannot be established by anything other than Beverley's testimonies (which changed over time) that Benguit was in her car or anywhere near the crime scene. In addition, testimonies about Benguit carrying a knife,²⁵⁶ and that this somehow proved that he murdered Oki, would appear to border on the ludicrous. Such interpretations do provide a perfect example of the dangerous

²⁵⁰ SWEDISH NATIONAL LABORATORY OF FORENSIC SCIENCE, *supra* note 243, at 4.

²⁵¹ *See, e.g.*, Henneberg, *supra* note 8, at 10.

²⁵² *California v. Tuite*, No. S149645, 2007 WL 460116, 3 (Cal.).

²⁵³ PAUL L. KIRK, *CRIME INVESTIGATION: PHYSICAL EVIDENCE AND THE POLICE LABORATORY* 4 (1953).

²⁵⁴ *See, e.g.*, Henneberg, *supra* note 8, at 10.

²⁵⁵ *R. v. Omar Benguit*, [2014] EWCA Crim 690, ¶21.

²⁵⁶ Loveday, *supra* note 163, ¶¶16, 17.

generalizations that leading textbooks on evidence warn about,²⁵⁷ as the majority of people who carry knives do not use them to carry out fatal stabbings. It has not been proven that Benguit carried a knife on the night of Oki's death, or if he did, that this was in fact the murder weapon.²⁵⁸ As the murder weapon has never been recovered, it was difficult for Benguit's defense to dispute the prosecution witnesses.

The inexplicable absence of any physical evidence linking Benguit to the murder contradicts the circumstantial evidence from the witness testimonies that formed the basis of his conviction. It is therefore very unfortunate that despite this central weakness, the CACD believed that there was "significant circumstantial support" for Benguit's conviction in his 2014 appeal. The fact that no physical evidence has ever been found to link Benguit to the murder, even though this is a crime where such evidence could be expected, is significant and needs to be fully explored within the context of a further appeal.

V. CONCLUSION

This article has explored how tunnel vision and case construction lead to 'off track' police investigations. Research by Reiner,²⁵⁹ Morgan,²⁶⁰ Innes²⁶¹ and Bayley²⁶² provided useful definitions, explanations and insights into the problems associated with these issues. Although these authors focused mainly on England and Wales, the phenomenon has also been documented in the United States by Findley & Scott,²⁶³ in relation to wrongful convictions. The research outlined in Part II suggested that police investigations are particularly susceptible to problems such as case construction where the police investigation team were subject to both internal and external pressures. In difficult cases where there is no clear suspect, or where the main suspect cannot be charged for one reason or another, there is an increased risk of trying to 'fix the problem'.

Three fatal stabbings, from three different jurisdictions, were analysed in Part III in order to illustrate problems relating to, in particular, case construction and flawed forensic practices. The case studies included the murder of Swedish Foreign Minister Anna Lindh, which provided an example of good practice, as the police investigation and any associated forensic work was carried out to a high standard and a successful conviction was achieved. In the second case study, the murder of Stephanie Crowe in Southern California, serious issues with the police investigation, the crime scene and forensic evidence were highlighted. The third case study, the murder of Oki Shin in England, provided an example of tunnel vision and case construction and showed how a conviction was achieved purely based on circumstantial evidence.

²⁵⁷ See, e.g., TERENCE ET AL., ANALYSIS OF EVIDENCE (2d ed. 2005), especially chapter 10.

²⁵⁸ Loveday, *supra* note 163.

²⁵⁹ REINER, *supra* note 15.

²⁶⁰ MORGAN, *supra* note 18.

²⁶¹ INNES, *supra* note 2.

²⁶² BAYLEY, *supra* note 54.

²⁶³ Findley & Scott, *supra* note 39.

'Off Track' Police Investigations, Case Construction and Flawed Forensic Practices

Part IV examined some specific problems relating to 'off track' police investigations, which had been identified in the three case studies. Similarities were detected in the convictions of Tuite and Benguit. Both men were known to the police and would fit the definition of "police property" as described by Reiner.²⁶⁴ Both murder investigations had experienced difficulties, and through tunnel vision and case construction cases were built against these men. Tuite was eventually acquitted in a retrial, whereas Benguit's 2014 appeal was rejected and he remains in prison. When comparing the Stephanie Crowe and Anna Lindh murder investigations, it became apparent that substandard and flawed forensic practices had caused contamination of evidence in the Stephanie Crowe case. This contaminated evidence was the only physical evidence that could link Tuite to the crime. If Swedish guidelines to avoid contamination had been followed, it is very unlikely that Tuite would ever have been prosecuted. When comparing the Oki Shin and Anna Lindh murder investigations, there was a whole range of forensic evidence linking Mijailović to Anna Lindh's murder. This was not the case in the Oki Shin murder, as Benguit was convicted based on circumstantial evidence alone after a number of different forensic investigations had failed to link him to the murder. It is remarkable that the trial and appeal courts failed to acknowledge the significance of the lack of physical evidence, as this contradicted the testimonies that made up the circumstantial case against Benguit.

The article concludes that courts in the United States and England and Wales need to be more alert to problems associated with case construction. This extends from the initial police investigation through to subsequent analysis of evidence and the presentation of evidence in court. The authors urge for extreme caution when prosecuting cases based on circumstantial evidence. This caution applies to two scenarios in particular: (1) cases where the crime itself is of such a nature that it would be reasonable to expect physical evidence, for example fatal stabbings, and (2) where the lack of physical evidence contradicts the circumstantial case against a suspect. In the absence of such caution it can be readily accepted that serious miscarriages of justice can be expected to continue to arise.²⁶⁵ This might also suggest that while the justice systems espouse a commitment to due process, the evident reality is that the motor of crime control continues to characterise many jurisdictions.

²⁶⁴ REINER, *supra* note 15.

²⁶⁵ ANDREW SANDERS & RICHARD YOUNG, *CRIMINAL JUSTICE* 651 (3d ed. 2006).

THE EMERGENCE OF COGNITIVE BIAS IN FORENSIC
SCIENCE AND CRIMINAL INVESTIGATIONS

Sherry Nakhaeizadeh*

*University College London, Department of Security and
Crime Science*

Itiel E. Dror**

University College London, Centre for the Forensic Sciences

Ruth M. Morgan***

*University College London, Centre for the Forensic Sciences,
University College London, Department of Security and
Crime Science*

ABSTRACT

The emergence of cognitive bias within forensic science and criminal investigations is being increasingly discussed and described as an issue and concern in relation to the admissibility of evidence and expert witness testimony. A review of standards and processes within the forensic science disciplines has highlighted the role of subjective interpretations and empirical research has identified and demonstrated the potential impact of unconscious cognitive bias in data collection, analysis, and decision-making. Therefore, it is imperative that the forensic science and legal communities addresses implications relating to both the presence, and potential effects of cognitive bias, and how to mitigate its manifestations. This article highlights the vulnerabilities to cognitive issues within forensic science, and discusses the importance of recognizing biases that may impact interpretation during analysis. The key issues are presented with reference to previous and new studies within the field of cognitive forensics. Furthermore, the consequences of these issues are highlighted in relation to their impact on how evidence is presented in courts of law. The possible solutions that may minimize, control, and alleviate the effects of cognitive bias to secure the creditability of the forensic examiner and the forensic science disciplines are discussed.

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I. INTRODUCTION

The use of forensic evidence in criminal procedures has been applied for over a century. In contrast to most other types of evidence, scientific experts are considered to provide impartial scientific evidence.¹ As such, their evidence is highly valued by the courts and can carry weight in criminal proceedings. Over time, expansion and recognition of forensic evidence in criminal settings has increased the role of forensic scientists in both the detection and examination of criminal events.² The value of forensic evidence in crime scene investigations has created opportunities to establish and apply contemporary methods and techniques of

¹ Saul M. Kassir et al., *The Forensic Confirmation Bias: Problems, Perspectives, and Proposed Solutions*, 2 J. APPLIED RES. MEMORY COGNITION 42 (2013).

² Ruth M. Morgan & Peter A. Bull, *The Philosophy, Nature and Practice of Forensic Sediment Analysis*, 31 PROGRESS PHYSICAL GEOGRAPHY 43 (2007).

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the highest standard, particularly when addressing crime scene evidence collection, analysis, and the interpretation of evidence presented in court.³

For the most part, for decades the courts have accepted forensic evidence as scientific, objective, and impartial, as well as highly reliable and validated. The remarkable success of forensic investigations portrayed in the media and television programmes, such as CSI, further reflects the idea that forensic evidence is very rarely inaccurate, contradictory or wrong.⁴

In reality, however, there has recently been an increase in the critique of some of the methods and techniques used in forensic science. One area of critique has been identified in regard to evidence admissibility and error rates in methods applied by forensic scientists and expert evidence presented in court.⁵ The National Academy of Sciences⁶ in the United States, and the Fingerprint Inquiry⁷ as well as the Forensic Science Regulator in the United Kingdom,⁸ have underlined the potential for subjective interpretations and bias within disciplines undertaking forensic science.⁹ New research within the field of forensic science has addressed some of the issues that have been identified, including the presence of cognitive biases.

Empirical research has been carried out across numerous forensic domains and has highlighted cognitive biases and its effect in forensic examinations. The impact of cognitive biases has begun to be evaluated at all stages of the forensic science process including data collection, analysis, evidence interpretation and final presentation in court.¹⁰ Studies within decision-making and human cognition have repeatedly and consistently demonstrated that the active nature of human information processing systematically holds a set of cognitive biases, resulting in the human mind being subjected to error.¹¹ It has been demonstrated that these vulnerabilities are not limited to a specific field, with similar cognitive biasing issues being established across law enforcements and numerous forensic science disciplines.¹²

The growing concerns over expert decision-making being influenced by cognitive processes have created heated controversy within the literature. Many have questioned the role of the forensic scientist at crime scenes and the exposure to

³ Brian Caddy & Peter Cobb, *Forensic Science in CRIME SCENE TO COURT: THE ESSENTIALS OF FORENSIC SCIENCE* (Peter C. White ed., 2d ed. 2009).

⁴ Morgan & Bull, *supra* note 2.

⁵ Jehuda Hiss et al., *The Forensic Expert Witness - An Issue of Competency*, 168 FORENSIC SCI. INT'L 89 (2007).

⁶ NATIONAL RESEARCH COUNCIL, *STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD* (2009).

⁷ FINGERPRINT INQUIRY, *THE FINGERPRINT INQUIRY SCOTLAND* (2011).

⁸ HOUSE OF COMMONS: SCIENCE AND TECHNOLOGY COMMITTEE, *THE FORENSIC SCIENCE SERVICE- SEVENTH REPORT OF SESSION 2010-12* (2011).

⁹ Itiel E. Dror & Simon A. Cole, *The Vision in "Blind" Justice: Expert Perception, Judgment, and Visual Cognition in Forensic Pattern Recognition*, 17 PSYCHONOMIC BULL. & REV. 161 (2010).

¹⁰ See Kassin et al., *supra* note 1.

¹¹ JOHN R. ANDERSON, *COGNITIVE PSYCHOLOGY AND ITS IMPLICATIONS* (5th ed. 2000).

¹² Bryan Found, *Deciphering The Human Condition: The Rise of Cognitive Forensics*, AUSTL. J. FORENSIC SCI. 1 (2014).

domain irrelevant information; potentially being one of the sources to constitute bias in forensic settings.¹³ Greater involvement of the forensic scientist in criminal procedure has resulted in decisions and interpretation regarding the source of evidence to be made on a much more regular basis.¹⁴ Therefore, understanding the underlying process of such judgments within forensic science is fundamental.

This paper will highlight the vulnerabilities to cognitive interpretation issues within the forensic science process, and discuss the significance of recognizing biases that may impact criminal investigations and forensic analysis. The paper will discuss the role of the forensic scientist, and in addition, examine how such a role could be affected by cognitive errors during different stages of the forensic conceptual framework. Furthermore, the key issues and possible consequences of cognitive biases will be highlighted and presented with reference to new and previous studies within the field of forensic science and criminal procedures with a main focus on the United States and United Kingdom. Even though organizations such as the National Institute of Standards and Technology (NIST) in the United States and the Forensic Science Regulator in the United Kingdom, have started to support the general recommendation of the National Academy of Sciences report, and recognize the effect of cognitive biases, the forensic science community have yet to fully implement the proposed solutions on how to alleviate its effect. This paper will therefore also review the possible solutions highlighted in the recent body of literature within both law, and forensic domains, to assist on how to mitigate and control the effect of cognitive bias in all stages of a criminal investigation.

Part II of this article begins with analyzing the role of forensic science in the criminal process, and continues with Part III evaluating the responsibilities of expert witness testimonies in court proceedings. Part IV explores the role of human cognition in decision-making and highlights some contemporary studies in cognitive biases in the field of psychology and social sciences, Part V summarizes how human cognition and cognitive biases could affect the legal system. Part VI then seeks to explore how these cognitive phenomena might unfavorably affect the judgment of forensic scientists, with reference to empirical research within cognitive bias in different forensic domains. Part VII introduces some proposed solutions on how to address cognitive biases in forensic science and criminal procedures, with the final Part VIII discussing possible reforms and recommended future direction to better develop our understanding of cognitive bias and minimize its impact in the practice of the forensic sciences.

II. THE ROLE OF FORENSIC SCIENCE IN THE CRIMINAL PROCESS

Forensic science concerns the implementation of science for the purpose of law.¹⁵ In general terms, forensic science is applied in the investigation of crime,

¹³ D. Michael Risinger et al., *The Daubert/Kumho Implications of Observer Effects in Forensic Science: Hidden Problems of Expectation and Suggestion*, 90 CALIF. L. REV. 3 (2002).

¹⁴ William C. Thompson, *What Role Should Investigative Facts Play in the Evaluation of Scientific Evidence*, 43 AUSTL. J. FORENSIC SCI. 123 (2011).

¹⁵ See Caddy & Cobb, *supra* note 3.

and has become increasingly important in the detection of criminal events, and crime reduction.¹⁶ The domain of forensic science is varied and includes a multitude of disciplines. Forensic scientists possess knowledge and skills that allow them to collect, analyze and interpret trace materials and evidence associated with, and found at crime scenes. Very often forensic scientists are required by law to communicate their findings to assist courts,¹⁷ and therefore, maintaining the integrity and security of evidence from its initial discovery to final presentation is crucial.¹⁸ The conceptual framework outlined by Morgan and Bull¹⁹ (2007) presents six fundamental stages of physical trace evidence within forensic investigations; division and transfer of matter, persistence and tenacity, collection, analysis/identification, interpretation and presentation. Each stage is dependent upon the previous stage being fulfilled, and the framework illustrates the importance of effectively addressing each stage to achieve accurate results and evidence in criminal investigations.²⁰

However, whilst there may be similarities between forensic investigations, the context of an individual crime scene will be specific to that particular event. This context must be incorporated into the appraisal of each crime scene and the complexity of the multiple variables and their relationship to one another acknowledged. This is vital in order to establish the best approach for the collection and analysis of physical evidence and its interpretation in a specific case.²¹

The value of forensic analysis is well recognized, and the ability of analytical techniques to provide ever more accurate and detailed empirical analysis of forensic samples has been identified.²² However, the interpretation of that evidence in specific forensic contexts is essential. There has been much debate in the literature concerning the methods and approaches that should be taken to offer robust and accurate interpretations of evidence to investigators and to the courts.²³ Indeed, a number of cases where the validity of different approaches has been questioned²⁴ (such as the case of *R. v T*²⁵ in the United Kingdom). More recently

¹⁶ Julie Mennell & Ian Shaw, *The Future of Forensic and Crime Scene Science. Part I. A UK Forensic Science User and Provider Perspective*, 157 FORENSIC SCI. INT'L S7 (2006).

¹⁷ See Caddy & Cobb, *supra* note 3.

¹⁸ Anastasia Holobinko, *Forensic Human Identification in the United States and Canada: A Review of the Law, Admissible Techniques, and the Legal Implications of Their Application in Forensic Cases*, 222 FORENSIC SCI. INT'L 394.e1 (2012).

¹⁹ Ruth M. Morgan & Peter A. Bull, *Forensic Geoscience and Crime Detection, Identification, Interpretation and Presentation in Forensic Geoscience*, 127 MINERVA MEDIOLEGALE 73 (2007).

²⁰ *Id.* See also Ruth M. Morgan et al., *The Relevance of the Evolution of Experimental Studies for the Interpretation and Evaluation of Some Trace Physical Evidence*, 49 SCI. JUST. 277 (2009).

²¹ Kirstie R. Scott et al., *The Transferability of Diatoms to Clothing and the Methods Appropriate for Their Collection and Analysis in Forensic Geoscience*, 241 FORENSIC SCI. INT'L 127 (2014).

²² See Morgan et al., *supra* note 20.

²³ Norman Fenton, Martin Neil & David A. Lagnado, *A General Structure for Legal Arguments About Evidence Using Bayesian Networks*, 37 COGNITIVE SCI. 61 (2012).

²⁴ Mike Redmayne et al., *Forensic Science Evidence in Question*, CRIM. L. REV. 347 (2011).

²⁵ *R v. T*, [2010] EWCA (Crim) 2439 available at

<http://www.bailii.org/ew/cases/EWCA/Crim/2010/2439.pdf>. In the case of *R. v. T*, The Court of Appeal for England and Wales rejected the testimony of an expert whom had applied likelihood ratios to evaluate the probative value of a shoe-print evidence. The Court of Appeal, Criminal

there has been an augmented awareness of the complexity and uncertainties surrounding the dynamics of evidence that may be recovered from crime scenes. Caution has been called for in the interpretation of physical evidence, with a focus on developing approaches that take into account an empirical evidence base that also incorporates the context specific nature of a particular scene.²⁶ The necessity for further empirical research within context specific cases has been highlighted where experimental studies, which imitate the forensic reality, are of fundamental importance in order for a measure of the significance of pertinent physical and trace evidence to be identified.²⁷

III. FORENSIC SCIENCE AND EXPERT EVIDENCE

As a result of the complexity of data analysis and interpretation of evidence in the forensic sciences, the issue of admissibility of evidence and expert witness testimonial accounts has been raised.²⁸ Issues regarding validation and error rates of techniques used by forensic scientists and the professional standards of experts have been articulated in addition to the role of expert witness testimony in court proceedings.²⁹

In the British and American systems, where trial by jury is the normal state of affairs, the role of the expert witness and the evidence that they provide in a courtroom is not only considered as a methodological question, but also an ethical one. It is not the role of a forensic scientist to determine the truthfulness of a variety of propositions related to crime. The role of the forensic scientist is to provide input to the legal process, where the accuracy of the source of various premises pertinent to the evidence presented is made generally by a judge or jury.³⁰ However, it has been documented that experts are often over confident in their abilities, and it has been observed that much of the forensic science evidence presented in court has arguably been accepted without a sufficient degree of scrutiny.³¹

Division, determined that; no attempt could credibly be made in the generalization of cases to use a formula to calculate probability estimation in the area of footwear evidence. It was also indicated that Bayes theorem and likelihood ratios should not be used outside the field of DNA. Due to the fact that likelihood ratios are used in forensic domains the decision from the court received severe criticism from leaders in the field and the forensic science community, where some of the criticism was with regards to the courts ruling being based on the misunderstandings of likelihood ratio frameworks and statistics.

²⁶ See Morgan & Bull, *supra* note 2.

²⁷ See Morgan et al., *supra* note 20.

²⁸ Angi M. Christensen & Christian M. Crowder, *Evidentiary Standards for Forensic Anthropology*, 54 J. FORENSIC SCI. 1211 (2009).

²⁹ LAW COMMISSION, EXPERT EVIDENCE IN CRIMINAL PROCEEDINGS IN ENGLAND AND WALES THE HOUSE OF COMMONS 1–206 (2011).

³⁰ See Thompson, *supra* note 14.

³¹ Jennifer L. Mnookin et al., *The Need for a Research Culture in the Forensic Sciences*, 58 UCLA L. REV. 725 (2011).

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A. EXPERT EVIDENCE STANDARDS IN THE UNITED STATES.

In the majority of American states, the admissibility criteria applied for expert evidence follows the ruling of the United States Supreme Court in the 1993 case of *Daubert v. Merrell Dow Pharmaceuticals, Inc.*³² The admissibility criteria set out in *Daubert* is widely known as the *Daubert* standard.³³ Other American states continue to use the “general acceptance” test established in *Frye v. United States*.³⁴ The purpose of the *Daubert* standard has been to ensure the dependability and significance of scientific or technical expert testimonies admitted in court.³⁵ The *Daubert* guidelines allow judges to act as gatekeeper in keeping “junk science” out of the courtroom, and aid judges to evaluate the reliability and relevance of scientific testimonies.³⁶ The *Daubert* standard requires evidence presented in court by an expert witness to be testable, subjected to peer review, have established standards, have a known or potential error rate, and be widely accepted by the relevant scientific community.³⁷ The Federal Rule of Evidence (FRE) 702 was appended in 2001 to highlight the connection between the methods and data used, and aimed to focus on the acceptability of the conclusion, rather than the qualification of the expert.³⁸

The discussion of error and expert evidence intensified in the forensic science community with the publication of the National Academy of Sciences Report (2009).³⁹ The report reviewed the standards of process within disciplines undertaking forensic science. The National Academy of Science concluded that there are issues regarding reliability and errors within some forensic disciplines.⁴⁰ Furthermore, the report emphasized the potential for subjective interpretation and cognitive bias.⁴¹ However, it has been asserted that the concept of error in this context is often misunderstood by the forensic community as well as the court. Christensen et al. (2014)⁴² discuss the difference between scientific error and statistical error rates which have been confused with practitioner errors and also highlight the importance for forensic practitioners to ensure that the potential

³² *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579 (1993).

³³ Angi M. Christensen, *The Impact of Daubert: Implications for Testimony and Research in Forensic Anthropology (and the Use of Frontal Sinuses in Personal Identification)*, 49 J. FORENSIC SCI. 427 (2004).

³⁴ *Frye v. United States*, 293 F. 1013 (D.C. Cir 1923). According to the *Frye* standard scientific evidence, procedures, techniques and principles presented to the court must be generally accepted by a meaningful portion of the associated scientific community, meaning that expert testimonies must be based on scientific methods that are adequately established and acknowledged.

³⁵ Morgan et al., *supra* note 20..

³⁶ Christopher R. Grivas & Debra A. Komar, Kumho, *Daubert, and the Nature of Scientific Inquiry: Implications for Forensic Anthropology*, 53 J. FORENSIC SCI. 771 (2008).

³⁷ See Christensen, *supra* note 35.

³⁸ Dennis C. Dirkmaat et al., *New Perspectives in Forensic Anthropology*, 47 AM. J. PHYSICAL ANTHROPOLOGY 33 (2008).

³⁹ See NATIONAL RESEARCH COUNCIL, *supra* note 6.

⁴⁰ See Found, *supra* note 12.

⁴¹ See Kassin et al., *supra* note 1.

⁴² Angi M. Christensen et al., *Error and its Meaning in Forensic Science*, 59 J. FORENSIC SCI. 123 (2014).

sources or error and limitations within methods used by forensic scientists are not only understood, but also communicated correctly to the legal community. This was also an issue raised by the National Academy of Science report, which highlighted the importance of acknowledging and addressing all possible sources of error, including cognitive biases, by the forensic science domains.⁴³

B. EXPERT EVIDENCE STANDARDS IN THE UNITED KINGDOM

In England and Wales, the Law Commission highlighted the issues regarding expert evidence in criminal proceedings in their 2011 report 'Expert Evidence in Criminal Proceedings in England and Wales' where they stated that the judicial approach to the admissibility of expert evidence in England and Wales was passive.⁴⁴ In the Criminal Procedure Rules, Rule 33.2 sets out the duty of the expert to the court, with the main objective to provide unbiased objective opinions based within his or her expertise.⁴⁵ The Law Commission report however acknowledges that too much expert opinion is admitted without adequate scrutiny, where no test is applied to determine the reliability of the evidence presented.⁴⁶ The report proposed that expert evidence in criminal trials should be subjected to a "reliability based admissibility test" before being presented to a jury to exclude unreliable expert evidence.⁴⁷ These recommendations were aimed at establishing a framework in criminal proceedings for controlling expert evidence at the admissibility stage, where possible sources of error and bias must be made clear.⁴⁸ As a result of the concerns raised by both reports, there has been a call for the development of a research agenda, with the suggested mechanism to enable this being closer collaboration between the professionals within the industry and academic research institutions.⁴⁹ Whilst this is an admirable aim, there has to date been limited funding made available for primary research within the forensic sciences to address each part of the forensic science process (crime scene investigation, sampling and analysis, interpretation of that analysis and the presentation of evidence in court).

IV. HUMAN COGNITION AND COGNITIVE BIAS

In order to understand how judgments and interpretations in forensic science and criminal investigations can be affected by cognitive mechanisms, it is important to recognize the strengths and weakness of human cognition in decision-making.⁵⁰

⁴³ See NATIONAL RESEARCH COUNCIL, *supra* note 6.

⁴⁴ See LAW COMMISSION, *supra* note 29.

⁴⁵ MINISTRY OF JUSTICE, THE CRIMINAL PROCEDURE RULES, PART 33 EXPERT EVIDENCE (2013).

⁴⁶ See LAW COMMISSION, *supra* note 29.

⁴⁷ *Id.*

⁴⁸ *Id.*

⁴⁹ BERNARD SILVERMAN, RESEARCH AND DEVELOPMENT IN FORENSIC SCIENCE: A REVIEW 24 (2011).

⁵⁰ Jean-Paul Caverni et al., *Cognitive Biases: Their Contribution for Understanding Human Cognitive Processes*, 68 ADVANCED PSYCHOL. 7 (1990).

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The information processing approach is known as human cognition, and defines the acquisition, organization and the use of knowledge.⁵¹ The study of human cognition addresses human perception, judgment and decision-making, which are all influenced by a variety of cognitive processes.⁵² However, in order for the brain to organize information and new perceptions the human mind will use *schemata* to comprehend the data derived. The power of schemata plays a vital role in judgment and decision-making, which could be defined as “scripts” that help the brain analyze the perception and judgment of an individual based on their prior beliefs.⁵³ The human mind does encode passively the information coming in, which is known as ‘bottom up’ and is considered to be purely raw data derived from the environment. The processing and interpretation of incoming data (bottom-up information) is mediated by a variety of ‘top down’ cognitive mechanisms such as knowledge, experience, motivations expectations and emotional states.⁵⁴ Top-down processing makes the processing of information much more efficient⁵⁵ however, in some cases top-down components interfere with and distort the processing of the bottom-up component.⁵⁶ For example, research within psychology and social science has demonstrated that the emotional state of individuals can have a significant impact upon the way information is processed and interpreted as perceptions and understandings are highly related to emotional conditions.⁵⁷ Mock juror studies that have addressed the issue of emotional state and decision-making have demonstrated that emotional state can influence verdict outcomes. Results have shown that presenting emotionally disturbing evidence influences the verdict of mock jurors.⁵⁸ Within forensic science, it is now acknowledged that forensic evidence can also potentially be influenced by a variety of top-down processing, with much forensic analysis arguably occurring in highly emotional contexts where evidence is associated with specific crimes against a victim(s).⁵⁹

⁵¹ Itiel E. Dror & Peter A.F. Fraser-Mackenzie, *Cognitive Biases in Human Perception, Judgment and Decision-making: Bridging Theory and the Real World* in CRIMINAL INVESTIGATIVE FAILURES 53 (Kim Rossmo ed., 2008).

⁵² Laura Hoppitt et al., *Cognitive Mechanisms Underlying the Emotional Effects of Bias Modification*, 24 APPLIED COGNITIVE PSYCHOL. 312 (2010).

⁵³ NEISSER ULRIC, COGNITION AND REALITY: PRINCIPLES AND IMPLICATIONS OF COGNITIVE PSYCHOLOGY (1976).

⁵⁴ See Kassin et al., *supra* note 1.

⁵⁵ Itiel E. Dror & Stephen M. Kosslyn, *Age Degradation in Top-Down Processing: Identifying Objects from Canonical and Noncanonical Viewpoints*, 24 EXPERIMENTAL AGING RES. 203 (1998).

⁵⁶ Peter A.F. Fraser-Mackenzie, Rebecca E. Bucht & Itiel E. Dror, *Forensic Judgment and Decision-making* in COMPARATIVE DECISION MAKING 385 (Philip H. Crowley & Thomas R. Zentall eds., 2013).

⁵⁷ Angela Byrne & Michael W. Eysenck, *Individual Differences in Positive and Negative Interpretive Biases*, 14 PERSONALITY & INDIVIDUAL DIFFERENCES 849 (1993).

⁵⁸ David A. Bright & Jane Goodman-Delahunty, *Gruesome Evidence and Emotion: Anger, Blame, and Jury Decision-Making*, 11 PSYCHIATRY PSYCHOL. L. 154 (2006).

⁵⁹ Itiel E. Dror et al., *When Emotions Get the Better of Us: The Effect of Contextual Top-Down Processing on Matching Fingerprints*, 19 APPLIED COGNITIVE PSYCHOL. 799 (2005).

Therefore, relying exclusively on top down cognitive mechanisms and operative information processing is liable to cause weakness in the interpretation of evidence.⁶⁰ This type of information may affect the analytical methods and influence the decision-making procedure when generating the final conclusion and thereby cause a biasing effect.⁶¹ These types of errors could be referred to as cognitive biases, potentially defined as the psychological and cognitive factors that unconsciously manipulate and interfere with the data processing, causing judgment and decision-making to be unreliable.⁶² This issue is also part of a concept commonly known as heuristics.

Heuristics are strategies that use mental shortcuts in decision-making, including ignoring part of the information to make decisions quicker, more prudent and accurate.⁶³ For enhanced and frugal cognition, heuristics trade off some loss in accuracy, which could lead to faulty reasoning.⁶⁴ There are differing methods where cognitive heuristics can operate, such as through anchoring and adjustments, whereby the tendency is to rely on the first piece of information presented when making a decision.⁶⁵ For example studies regarding sentencing guidelines have demonstrated that judges use different judgmental anchors when making sentencing decisions.⁶⁶ It has been demonstrated that judges were influenced by sentencing demands which resulted in people who had committed very similar crimes receiving different sentences.⁶⁷ Tversky and Khaneman (1974)⁶⁸ demonstrated in their study that people tend to rely on various cognitive heuristics, and whilst this is considered generally to be beneficial,⁶⁹ it could also create systematic errors in judgment and decision-making. This has been specifically demonstrated when it comes to prior expectations which could provide a sufficient and unconscious tendency to perceive and interpret evidence that would confirm pre-existing beliefs, otherwise known as confirmation bias.⁷⁰

⁶⁰ Itiel E. Dror, *The Paradox of Human Expertise: Why Experts Get It Wrong*, in THE PARADOXICAL BRAIN 177 (Naridner Kapur ed., 2011).

⁶¹ Vittorio Girotto & Guy Politzer, *Conversational and World Knowledge Constraints on Deductive Reasoning*, 68 ADVANCES PSYCHOL. 87 (1990).

⁶² Jonathan St. B.T. Evans & Paul Pollard, *Belief Bias and Problem Complexity in Deductive Reasoning*, 68 ADVANCES PSYCHOL. 131 (1990).

⁶³ Gerd Gigerenzer & Wolfgang Gaissmaier, *Heuristic Decision-Making*, 62 ANN. REV. PSYCHOL. 451 (2011).

⁶⁴ Arthur S. Elstein, *Heuristics and Biases: Selected Errors in Clinical Reasoning*, 74 ACAD. MED. 791 (1999).

⁶⁵ Oscar Bergman et al., *Anchoring and Cognitive Ability*, 107 ECON. LETTERS 66 (2010).

⁶⁶ Thomas Mussweiler & Birte Englich, *Subliminal Anchoring: Judgmental Consequences and Underlying Mechanisms*, 98 ORG. BEHAV. & HUM. DECISION PROCESSES 133 (2005).

⁶⁷ Birte Englich & Thomas Mussweiler, *Sentencing Under Uncertainty: Anchoring Effects in the Courtroom*, 31 J. APPLIED SOC. PSYCHOL. 1535 (2001).

⁶⁸ Amos Tversky & Daniel Kahneman, *Judgment under Uncertainty: Heuristics and Biases*, 185 SCI. 1124 (1974).

⁶⁹ See Gigerenzer & Gaissmaier, *supra* note 63.

⁷⁰ Daniel Khaneman & Shane Frederick, *Representativeness Revisited: Attribute Substitution in Intuitive Judgment*, in HEURISTICS AND BIASES: THE PSYCHOLOGY OF INTUITIVE JUDGMENT 49 (Thomas Gilovich, Dale Griffin, & Daniel Khaneman eds., 2002).

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Confirmation bias is the tendency to selectively gather and process information to confirm a hypothesis or preconception⁷¹ by looking for evidence that would validate existing beliefs and expectations, in terms of rejecting, excusing or ignoring evidence that could contradict the current assumption.⁷² Studies within reasoning have demonstrated that people attempt to find evidence, which confirms to a rule rather than finding evidence that would disconfirm it.⁷³ The fundamental mechanisms upon which confirmation bias operates are *selective information search* and *biased interpretation* of available information.⁷⁴ Selective information search within legal perspectives occurs when an individual examines information or evidence to incriminate a suspect based on a personal hypothesis, and ignores the search for evidence that could exonerate or lead to an alternative hypothesis.⁷⁵ Biased interpretations occur when experts only interpret evidence that supports, and will be in favor of their own hypotheses. This inhibits the expert from observing the evidence from multiple angles, often resulting in a subjective conclusion.⁷⁶ For example, the majority of criminal investigations are driven by a theory, which leads investigators in their search for evidence guided by their initial hypothesis regarding when, why, how and by whom a crime was committed.⁷⁷ These working hypotheses could arguably be affected by preconceptions and expectations of the investigators due to the way the brain processes and stores information, especially when dealing with ambiguous and complex evidence.⁷⁸ Thus, a variety of influences that have nothing to do with the case drive and guide the investigation, and can affect its outcome. As described earlier, a preference for confirmation over falsification, could arguably result in investigators searching for and finding confirmatory evidence against a suspect in contrast to find disconfirming and exonerating information.⁷⁹

An article by Kassir et al. (2013) "*The Forensic Confirmation Bias: Problems, Perspectives and Proposed Solutions*"⁸⁰ outlined both some of the earliest and the most contemporary work on confirmation biases. The authors traced the concept of confirmation bias back to the philosopher Francis Bacon who

⁷¹ Itiel E. Dror & David Charlton, *Why Experts Make Errors*, 56 J. FORENSIC IDENTIFICATION 600 (2006).

⁷² Paul C. Gianelli, *Confirmation Bias*, 22 CRIM. JUST. 60 (2007).

⁷³ Patricia W. Cheng et al., *Pragmatic Versus Syntactic Approaches to Training Deductive Reasoning*, 18 COGNITIVE PSYCHOL. 293 (1986).

⁷⁴ Karl Ask & Pär Anders Granhag, *Motivational Sources of Confirmation Bias in Criminal Investigations: The Need for Cognitive Closure*, 2 J. INVESTIGATIVE PSYCHOL. & OFFENDER PROFILING 43 (2005).

⁷⁵ *Id.*

⁷⁶ Barbara O'Brian, *Prime Suspect: An Examination of Factors That Aggravate and Counteract Confirmation Bias in Criminal Investigations*, 15 PSYCHOL. PUB. POL'Y & L. 315 (2009).

⁷⁷ See Ask & Granhag, *supra* note 74.

⁷⁸ Alafair S. Burke, *Improving Prosecutorial Decision Making: Some Lessons of Cognitive Science*, 47 WM. & MARY L. REV. 1587 (2005).

⁷⁹ See O'Brian, *supra* note 76.

⁸⁰ See Kassir et al., *supra* note 1.

acknowledged the impact of it in his work of 1620, by recognizing various obstacles that influence the human mind.⁸¹ The body of literature within psychology has over the years recognized different sources and fuels of cognitive bias, and confirmation bias in particular, such as time pressure,⁸² expectations,⁸³ pre-existing beliefs,⁸⁴ and motivation.⁸⁵ Empirical research has demonstrated that the beliefs held by people are resistant to change. Once people form a hypothesis they fail to adjust the tenacity of their beliefs in the light of evidence that will challenge the accuracy of those beliefs.⁸⁶ This is also known as belief perseverance, which is the tendency to continue to confirm a theory even though the evidence underlying the theory is confounded.⁸⁷ One of the earliest studies in belief perseverance was to study the effect of what is known as the *debriefing paradigm*. In a study conducted by Anderson et al. (1980)⁸⁸ subjects were presented with allegedly authentic reports of fire-fighters. After reading the reports subjects were asked to write an explanation of the relationship between fire fighting abilities and risk preference observed in the case histories given. This was done to investigate whether fictitious information about the relationship between the personality trait such as risk taking and fire fighter ability could produce a perseverant social theory. The case histories reports given to the subjects were manipulated whereby participants were led to perceive that there was either a positive or negative correlation between risk preference and fire fighting abilities. The results demonstrated that even after participants were debriefed concerning the fiction of the case reports, they persisted in the theories that they had formed from those case histories. Participants led to believe that risk taking makes better fire-fighters and those initially led to believe that risk taking makes poorer fire-fighters persevered their initial beliefs, even after being debriefed about the fictional nature of the initial information.⁸⁹ The study demonstrated that the participants adhered to their conclusions even though the evidence fundamental to the conclusions were confounded. Similarly, mock juror studies have found that jurors tend to be unable to disregard evidence that has been ruled inadmissible.⁹⁰ Equally, in a crim-

⁸¹ Itiel E. Dror, *How Can Francis Bacon Help Forensic Science? The Four Idols of Human Biases*, 50 JURIMETRICS J. L. SCI. TECH. 93 (2009).

⁸² Ian Evett, *Evaluation and Professionalism*, 49 SCI. JUST. 159 (2009).

⁸³ Paola Bressan & Maria F. Dal Martello, *Talis Pater, Talis Filius: Perceived Resemblance and the Belief in Genetic Relatedness*, 13 PSYCHOL. SCI. 213 (2002).

⁸⁴ David L. Hamilton & Mark P. Zanna, *Context Effects in Impression Formation: Changes in Connotative Meaning*, 29 J. PERSONALITY & SOC. PSYCHOL. 649 (1974).

⁸⁵ Ziva Kunda, *The Case for Motivated Reasoning*, 108 PSYCHOL. BULL. 480 (1990).

⁸⁶ Burke, *supra* note 78.

⁸⁷ Craig A. Anderson & Kathryn L. Kellam, *Belief Perseverance, Biased Assimilation, and Covariation Detection: The Effect of Hypothetical Social Theories and New Data*, 18 PERSONALITY & SOC. PSYCHOL. BULL. 555 (1992).

⁸⁸ Craig A. Anderson et al., *Perseverance of Social Theories: The Role of Explanation in the Persistence of Discredited Information*, J. PERSONALITY & SOC. PSYCHOL. 1037 (1980).

⁸⁹ *Id.*

⁹⁰ Scott A. Hawkins & Reid Hastie, *Hindsight: Biased Judgments of Past Events After the Outcomes are Known.*, 107 PSYCHOL. BULL. 311 (1990).

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inal investigation, the act of considering someone “accountable” (which is a condition necessary for turning a person into a suspect) is in itself likely to increase the belief of the investigator in the culpability of the suspect(s).⁹¹

The fact that people can be unaware of pre-existing beliefs has potential consequences in forensic settings. This is also known as the observer effect, which in general terms could be described as when the result of an observation in a particularly set of circumstances is affected by the observer.⁹² In forensic science the term observer effect is used when the motives or preconceptions of the observer are thought to influence the perception and interpretation of evidence, resulting in examiner bias.⁹³ Context effect is highly related to observer effect and is used in the forensic sciences to describe situations in which forensic analysis are affected by the context of the crime or by the contextual information available to the analyst prior to their assessment.⁹⁴

Studies have demonstrated that it is difficult for people to evaluate the strength of evidence independent of pre-existing beliefs and that there is a tendency to devalue disconfirming evidence.⁹⁵ This is because evidence is weighed to support prior beliefs to a greater degree than evidence that contradicts those beliefs.⁹⁶ The psychology and social science literature suggests that people not only demonstrate confirmation bias when seeking new information but also in the memory of stored information;⁹⁷ meaning that people search their memories in biased ways. The product of various cognitive biases that could obstruct accuracy in what is perceived, how it is perceived, and how it is interpreted is also known in criminal cases as tunnel vision. Tunnel vision has been shown to have an effect in the initial stages of criminal investigations and this is a significant issue because all subsequent stages of the investigation will potentially be impacted by the information generated at this initial stage.⁹⁸

V. COGNITIVE BIAS AND THE LEGAL SYSTEM

Research regarding cognitive biases and decision-making has also been applied within the legal system.⁹⁹ Studies conducted by Phillips et al. (1999)¹⁰⁰ in

⁹¹ See Ask & Granhag, *supra* note 76.

⁹² William. C. Thompson, *Painting the Target Around the Matching Profile: The Texas Sharpshooter Fallacy in Forensic DNA Interpretation*, 8 LAW PROBABILITY & RISK 257 (2009).

⁹³ See Risinger et al., *supra* note 13.

⁹⁴ See Thompson, *supra* note 92.

⁹⁵ Charles G. Lord et al., *Biased Assimilation and Attitude Polarization: The Effects of Prior Theories on Subsequently Considered Evidence*, 37 J. PERSONALITY & SOC. PSYCHOL. 2098 (1979).

⁹⁶ Keith A. Findley & Michael S. Scott, *The Multiple Dimensions of Tunnel Vision in Criminal Cases*, 2 WIS. L. REV. 292 (2006).

⁹⁷ See Burke, *supra* note 78.

⁹⁸ See Findley & Scott, *supra* note 96.

⁹⁹ See Kassin et al., *supra* note 1.

¹⁰⁰ Mark R. Phillips et al., *Double-Blind Photography Administration as a Safeguard Against Investigator Bias*, 84 J. APPLIED PSYCHOL. 940 (1999).

eyewitness misidentification demonstrated the power of information by indicating that when the suspect is known, it is more likely for the investigator to unconsciously steer the witness towards the suspect.¹⁰¹ Similarly, research in facial recognition and decision-making has demonstrated that when information is given concerning a suspect with regard to their guilt, people have the tendency to perceive more similarities between a facial composite and the suspect.¹⁰²

Studies carried out by Kassir and Fong (1999)¹⁰³ demonstrated variations in interrogation methods when an assumption of guilt had previously been established. The findings demonstrated that when investigators had a presumption of guilt there was sometimes an unconscious tendency to be more aggressive and intimidating in interrogation towards the suspect. Mock jury studies have demonstrated that confessions of a crime have more impact on verdicts than other forms of evidence.¹⁰⁴ This is considered to be because most people believe that people do not confess to a crime they did not commit.¹⁰⁵

For prosecutors it has also been identified that there are some cognitive pitfalls when involved in an investigation. For example, it has been observed that the prosecution can shape the investigative direction for example, by determining who to investigate, and once an arrest is made, they determine whether to bring charges or not, what charges to bring and what sentence to seek.¹⁰⁶ This processing approach for prosecutors may lead to potential ways that cognitive bias may impact upon decision-making.¹⁰⁷ Indeed, the phenomenon of confirmation bias could in complex cases lead to the natural tendency to review the case report for confirming evidence and not exculpatory evidence that might contradict the given hypothesis.¹⁰⁸ It has also been shown that people can fail to look for evidence that disconfirms a given hypothesis and this can lead to tunnel vision in investigations where investigators could potentially fail to investigate alternative theories of the crime.¹⁰⁹ People are motivated to consolidate their beliefs in a manner that strengthens their initial perspective. Numerous studies have demonstrated that expectations and motivations can affect how events, people and evidence are perceived.¹¹⁰ For example in studies where subjects were told in advance that a person had particular personality characteristics, they had the ten-

¹⁰¹ *Id.*

¹⁰² Steve D. Charman & Gary L. Wells, *Can Eyewitnesses Correct for External Influences on Their Lineup Identifications? The Actual/Counterfactual Assessment Paradigm*, 14 J. EXPERIMENTAL PSYCHOL. APPLIED 5 (2008).

¹⁰³ Saul M. Kassir & Christina T. Fong, "I'm Innocent!": *Effects of Training on Judgment of Truth and Deception in the Interrogation Room*, 23 LAW & HUM. BEHAV. 499 (1999).

¹⁰⁴ Saul M. Kassir & Katherine Neumann, *On the Power of Confession Evidence: An Experimental Test of the Fundamental Difference Hypothesis*, 21 LAW & HUM. BEHAV. 469 (1997).

¹⁰⁵ Saul M. Kassir, *Why Confessions Trump Innocence*, 67 AM. PSYCHOL. 431 (2012).

¹⁰⁶ Burke, *supra* note 78.

¹⁰⁷ *Id.*

¹⁰⁸ Findley & Scott, *supra* note 96.

¹⁰⁹ Burke, *supra* note 78.

¹¹⁰ Jerome S. Bruner & Mary C. Potter, *Interference in Visual Recognition*, 144 SCI. 424 (1964).

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endency to see those qualities in that person regardless of whether those characteristics were present or not.¹¹¹ In criminal investigations this could have severe effects, especially if an individual is being judged by investigators where the initial belief presented to each actor in the system is that the defendant is guilty.¹¹²

Research and policy makers have started to realize the significant role the science of psychology plays in the study and prevention of wrongful convictions.¹¹³ It is estimated that over 300 individuals have been exonerated by post-conviction DNA testing.¹¹⁴ Miscarriages of justice have been identified where there have been a range of causes of error, including fallible eyewitness identification, false confessions, police and prosecutorial misconduct and forensic science error.¹¹⁵

Forensic science plays a complex role in the study of wrongful convictions where it has been argued to be both part of the problem but also the solution.¹¹⁶ For example, DNA evidence has helped to exonerate scores of wrongfully convicted suspects, however in some cases, errors in the DNA evidence were identified. One example of this discussed by Thompson et al. (2009)¹¹⁷ is the case of Josiah Sutton's (1998) wrongful conviction for rape, where DNA and eyewitness identification was involved in the original case. The analyst testing for DNA in the case was aware that the victim had identified Sutton as one of the rapists. It has been argued that this information may have induced a confirmation bias and led the analyst to focus on evidence supporting Sutton's guilt and ignoring facts inconsistent with that theory.¹¹⁸ It has been asserted that if forensic scientists are aware of the desired outcome, it is possible that they might unwittingly be influenced to interpret ambiguous data to support a given theory formulated by investigators such as the police and prosecutors.¹¹⁹ The criminal justice system presumes the independence of different types of evidence but these findings suggest that the reality of criminal investigations may not afford such independence of evidence¹²⁰ where in some cases the judgments of forensic scientists could significantly be influenced by psychological factors.¹²¹

¹¹¹ Mark Snyder & Nancy Cantor, *Testing Hypotheses About Other People: The Use of Historical Knowledge*, 15 J. EXPERIMENTAL SOC. PSYCHOL. 330 (1979).

¹¹² Findley & Scott, *supra* note 96.

¹¹³ Saul M. Kassin et al., *Police-Induced Confessions, Risk Factors, and Recommendations: Looking Ahead*, 34 LAW & HUM. BEHAV. 49 (2010).

¹¹⁴ INNOCENCE PROJECT, <http://www.innocenceproject.org/> (last visited Nov. 24, 2014).

¹¹⁵ Brandon L. Garrett, *Judging Innocence*, 108 COLUM. L. REV. 55 (2008).

¹¹⁶ William C. Thompson, *Beyond Bad Apples: Analyzing the Role of Forensic Science in Wrongful Convictions*, 37 SW. U. L. REV. 971 (2009).

¹¹⁷ *Id.*

¹¹⁸ See Thompson, *supra* note 116 for more a detailed report regarding the Sutton case and also the Innocence Project's website available at

http://www.innocenceproject.org/Content/Josiah_Sutton.php. For further information, see also SIMON LEVAY, WHEN SCIENCE GOES WRONG: TWELVE TALES FROM THE DARK SIDE OF DISCOVERY 181-98 (2008).

¹¹⁹ Findley & Scott, *supra* note 96.

¹²⁰ Kassin, *supra* note 105.

¹²¹ Kassin et al., *supra* note 1.

VI. COGNITIVE BIAS AND FORENSIC SCIENCE

The judgments of forensic scientists being influenced by cognitive factors are very different to the effects in investigators' bias, problems in eyewitness identification, and other elements in criminal cases, as discussed above. The problems in these areas are well known, and jurors (as well as judges) have started to take them into account.¹²² However, scientific evidence by experts has a different status. Forensic evidence has predominantly been viewed as immune to bias effects, and regarded as objective and impartial.¹²³ Myers and Booker¹²⁴ (1991) and Dror et al. (2005)¹²⁵ highlighted the mental cognitive process behind the opinion of an expert known as elicitation. This consists of four cognitive tasks: defining the question, remembering the accurate information, making a decision and reaching a conclusion. In a forensic context this would be known as "what is classified as evidence, what is recognized as collected evidence, and what is examined and how it is interpreted."¹²⁶ The expert must first understand what has been asked of them in order to answer a question. This demands a specific focus on the accurate information, and the limitation of personal speculation.¹²⁷ However, when an expert tries to consider the accuracy of information, different cognitive factors (as mentioned previously) will play a vital role, and might cause selective attention towards information causing an observer effect.¹²⁸ This essentially means that what is remembered and perceived by the expert depends upon the perceiver themselves.¹²⁹

The power of schemata and other combined cognitive processes will affect each expert individually for what is remembered as accurate data. Forensic context generally involves large amounts of multivariate information, often too complex for one individual to process.¹³⁰ The decision-making of an expert is also dependent upon the manner in which problems are structured and presented. The same problem can result in different decisions depending on how the problem is framed and displayed.¹³¹ For example, studies have shown that forensic experts will evaluate evidence differently depending upon whether they are consulting for

¹²² Itiel E. Dror, *Cognitive Neuroscience in Forensic Science: Understanding and Utilising the Human Element*, 370 *PHILOSOPHICAL TRANSACTIONS ROYAL SOC'Y B* (2015).

¹²³ Mnookin et al., *supra* note 31.

¹²⁴ MARY A. MEYER & JANE M. BOOKER, *ELICITING AND ANALYZING EXPERT JUDGMENT: A PRACTICAL GUIDE* 459 (1991).

¹²⁵ See Dror et al., *supra* note 59.

¹²⁶ Craig Cooley & Brent E. Turvey, *Observer Effect and Examiner Bias: Psychological Influences on the Forensic Examiner* in *CRIME RECONSTRUCTION* 61 (W. Jerry Chisum & Brent E Turvey eds., 2011).

¹²⁷ See MEYER & BOOKER, *supra* note 124.

¹²⁸ Bruce Budowle et al., *A Perspective on Errors, Bias, and Interpretation in the Forensic Sciences and Direction for Continuing Advancement*, 54 *J. FORENSIC SCI.* 798 (2009).

¹²⁹ Simon E. Blackwell & Emily A. Holmes, *Modifying Interpretation and Imagination in Clinical Depression: A Single Case Series Using Cognitive Bias Modification*, 24 *APPLIED COGNITIVE PSYCHOL.* 338 (2010).

¹³⁰ Fraser-Mackenzie et al., *supra* note 56.

¹³¹ Phillips et al., *supra* note 100.

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the prosecution or defense.¹³² Internal and external factors (as discussed in section IV) could affect the decision-making outcome. It has also been demonstrated that the internal factors will vary at different times, which can cause the same expert to diverge in their judgment on the same identical decision.¹³³

The end result for a forensic scientist is to reach a scientific conclusion based on the relevant evidence and to communicate the results in a manner that can be understood by non-scientists.¹³⁴ There is a growing acceptance by the forensic science community of the value of probability frameworks as a means to offer a comprehensible format for the formulation and presentation of opinions in forensic science, such as the estimation of a likelihood ratio.¹³⁵ Uptakes of these standards have varied considerably across disciplines and jurisdictions. For example in the Netherlands, the likelihood ratio is considered as standard practice for bullet comparison and is actively being expanded to other disciplines. However in the United States, likelihood ratio comparison is not common in disciplines other than DNA analysis.¹³⁶ The debate about the best way to present the results of complex forensic analysis in court has not included the body of empirical evidence collected by psychologists in the decision-making field and reasoning under uncertainty. Numerous psychological studies suggest that people often have difficulties understanding probabilistic and statistical estimations.¹³⁷ Some have therefore suggested that a verbal equivalent to statistical approaches should be applied in order to communicate statistical data. The use of verbal equivalents may present difficulties since the research within psychology indicates that the meaning attributed to a single word can vary for each individual, and from context to context.¹³⁸ A study by de Keijser and Elffers (2012)¹³⁹ addressed the question of how a decision maker interprets evidence presented in the form of likelihood ratios. To examine how well judges, lawyers and experts in the Netherlands understood evaluative expert opinions expressed, de Keijser and Elffer provided subjects with realistic technical forensic reports using the scale recommended by the Netherlands Forensic Institute. The result indicated that the majority of experts frequently had difficulties interpreting the likelihood ratio and had a very limited insight into the conclusion of the final report.¹⁴⁰

¹³² Daniel C. Murrie et al., *Are Forensic Experts Biased by the Side That Retained Them?*, 24 PSYCHOL. SCI. 1889 (2013).

¹³³ Kassir et al., *supra* note 1.

¹³⁴ Victoria A. Springer, *Expectancy Effects in Forensic Evidence Handling: Social Psychological Perspectives*, 7 J. INST. JUST. & INT'L STUD. 311 (2007).

¹³⁵ Kristy A. Martire et al., *The Expression and Interpretation of Uncertain Forensic Science Evidence: Verbal Equivalence, Evidence Strength, and the Weak Evidence Effect*, 37 LAW & HUM. BEHAV. 197 (2013).

¹³⁶ Kassir et al., *supra* note 1.

¹³⁷ Gerd Gigerenzer & Adrian Edwards, *Simple Tools for Understanding Risks: From Innumeracy to Insight*, 327 BRIT. MED. J. 741 (2003).

¹³⁸ David V. Budescu et al., *Effective Communication of Uncertainty in the IPCC Reports*, 113 CLIMATE CHANGE 181 (2011).

¹³⁹ Jan de Keijser & Henk Elffers, *Understanding of Forensic Expert Reports by Judges, Defense Lawyers and Forensic Professionals*, 18 PSYCHOL. CRIME & L. 191 (2012).

¹⁴⁰ *Id.*

Although, it is often helpful to calculate the probability that a particular event occurred by chance when evaluating the significance of scientific data. This approach is feasible where a background database is available such as with DNA profiles. However calculations of this type could be misleading when focused too narrowly on a given outcome¹⁴¹ with epidemiologists arguing that there is a tendency to assign baseless significance to random data by viewing it post hoc in an unjustifiably narrow context.¹⁴² In DNA analysis, incomplete or partial DNA profiles are often encountered and it can be difficult to interpret such profiles and establish the number and identity of contributors to a mixed sample.¹⁴³ Therefore, if a DNA analyst presumes the DNA of a defendant might have produced the observed profile, it could potentially increase the confidence of the analyst that the defendant was a contributor.¹⁴⁴ Moreover analysts might then ignore and/or fail to identify other ways in which the same data might have arisen if the defendant was not a contributor.

The degree and content of the contextual information forensic scientists should know about a case has received minimal attention in the forensic science literature to date. Some commentators have argued that the ignorance of the facts of a case may cause forensic scientists to ask and answer the wrong questions, which could potentially be harmful to an investigation.¹⁴⁵ However, cross communication could potentially affect all stages of the elicitation task involved in a forensic investigation and cause judgment and decision-making to be unreliable from the initial analysis to the court.¹⁴⁶ The four cognitive elicitation tasks (Defining the question, remembering the accurate information, making a decision and reaching a conclusion) are all relevant to the forensic conceptual framework and any expert in the field of forensic science. As a result there has been a rise in interest across the forensic science domains as to which stages cognitive biases may arise during an investigation, with empirical research being conducted within different forensic domains to investigate the effect of cognitive biases.¹⁴⁷

Studies conducted to assess the cognitive processes and the tendency for bias within human decision-making in the forensic field are being undertaken within a number forensic domains. Research has indicated that human error due to cognitive patterns can influence and cause a reduction in the objectivity of forensic experts when analyzing evidence.¹⁴⁸ Various factors such as extraneous context, time pressure expectation, and motivational statements have been shown to have an influence on observation and decision-making.¹⁴⁹ In the following sub-sections

¹⁴¹ Thompson, *supra* note 92.

¹⁴² *Id.*

¹⁴³ Thompson, *supra* note 116.

¹⁴⁴ Thompson, *supra* note 92.

¹⁴⁵ *See* Thompson, *supra* note 14.

¹⁴⁶ *Id.*

¹⁴⁷ Kassin et al., *supra* note 1.

¹⁴⁸ William C. Thompson & Simon. A Cole, *Psychological Aspects of Forensic Identification Evidence in EXPERT PSYCHOLOGICAL TESTIMONY FOR THE COURTS* 31 (Mark Costanzo, Daniel A. Krauss & Kathy Pezdek eds., 2007).

¹⁴⁹ Dror & Fraser-Mackenzie, *supra* note 51.

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examples of empirical research undertaken within the domain of cognitive bias and forensic science, are presented.

A. FINGERPRINT COMPARISON

Within the fingerprint domain, studies have indicated that experts were more likely to be biased when they were subjected to different types of contextual information.¹⁵⁰ In many of these experiments, the majority of experts reached different conclusions and were inconsistent in their analysis when provided with new contextual information and whilst undertaking new visual imaging.¹⁵¹ These findings were most pronounced when the participating expert forensic examiners did not know they were taking part in a study, and were confident that they were undertaking casework, and most importantly, believing the contextual information.¹⁵²

It is furthermore important to recognize that cognitive biases can also affect technologies and the systems used by forensic examiners. This has been demonstrated in the AFIS system database used for fingerprint identification where the fingerprint examiners were affected by the position of the matching print in the 'line up.' This was established by demonstrating the degree of false exclusion and inconclusive identifications across a series of mark evaluations.¹⁵³

B. DNA

Research into judgment and decision-making has also been applied in the DNA domain. Studies by Dror and Hampikian (2011)¹⁵⁴ on DNA analysis were conducted using a mixed DNA sample from a adjudicated criminal case involving a gang rape where DNA experts had analyzed the complex DNA mixtures and concluded that the evidence implicated the suspects that were identified in the plea-bargain by a cooperative assailant. The DNA experts concluded in their pre-trial conclusion that the suspects could not be excluded from being providers to the mixture DNA sample. Dror and Hampikian (2011) presented the same DNA mixture to 17 neutral North American expert DNA examiners with no contextual information or case background provided. Only 1 expert agreed with the original examination. Four of the DNA experts stated the sample to be inconclusive and 12 excluded the suspect in question.¹⁵⁵

¹⁵⁰ Itiel E. Dror et al., *Contextual Information Renders Experts Vulnerable to Making Erroneous Identifications*, 156 FORENSIC SCI. INT'L 74 (2006).

¹⁵¹ Dror & Charlton, *supra* note 71.

¹⁵² Dror et al., *supra* note 59.

¹⁵³ Itiel E. Dror et al., *The Impact of Human-Technology Cooperation and Distributed Cognition in Forensic Science: Biasing Effects of AFIS Contextual Information on Human Experts*, 57 J. FORENSIC SCI. 343 (2012).

¹⁵⁴ Itiel E. Dror & Greg Hampikian, *Subjective and Bias in Forensic DNA Mixture Interpretation*, 51 SCI. JUST. 204 (2011).

¹⁵⁵ For detailed information with regards to the study see Itiel E. Dror & Greg Hampikian, *Subjectivity and Bias in Forensic DNA Mixture Interpretation*, 51 SCI. JUST. 204 (2011).

C. FORENSIC ANTHROPOLOGY

In forensic anthropology, empirical studies within cognitive bias demonstrated confirmation bias within the assessment of sex, ancestry and age at death when conducting a biological profile.¹⁵⁶ The study examined the non-metric biological profile interpretations of forty-one non-novice participants within the field of physical anthropology who all assessed the same remains. Each participant was semi-randomly assigned into one of three groups, where two of the groups were given extraneous contextual information before conducting the analysis, with a third group acting as a control with no context provided. The result of the study demonstrated that the decision-making outcome of the participants, based on visual assessments, was vulnerable to extraneous contextual information.¹⁵⁷

The effects of external manipulations that involve observer expectations have also been studied for the visual assessments of trauma analysis on skeletal remains.¹⁵⁸ The result of this pilot study indicated that the evaluation of trauma identifications were higher amongst participants assessing trauma images in a high trauma context, compared to participants evaluating the same pictures in a setting with low trauma expectations.

D. BULLET COMPARISON

Research has also demonstrated that diverse manipulations of context may affect people differently and it is often within ambiguous cases where the levels of cognitive bias will have the most affect on the outcome.¹⁵⁹ Kerstholt et al. (2010)¹⁶⁰ presented a study on bullet analysis with the intention to observe whether additional incriminating contextual information would affect the expert when observing similarities between two bullets. The results, however, indicated that the contextual information given in the case had no effect on the conclusion. It is therefore important to acknowledge that bias may affect the process but not necessarily the decision-making outcome of the forensic examiner.¹⁶¹

¹⁵⁶ Sherry Nakhaeizadeh et al., *Cognitive Bias in Forensic Anthropology: Visual Assessment of Skeletal Remains is Susceptible to Confirmation Bias*, 54 SCI. JUST. 208 (2014).

¹⁵⁷ *Id.*

¹⁵⁸ Sherry Nakhaeizadeh et al., *The Power of Contextual Effects in Forensic Anthropology: A Study of Biasability in the Visual Interpretations of Trauma Analysis on Skeletal Remains*, 59 J. FORENSIC SCI. 1177 (2014).

¹⁵⁹ William C. Thompson & Simon Ford, *The Meaning of a Match: Sources of Ambiguity in the Interpretation of DNA Prints in FORENSIC DNA TECHNOLOGY* (Mark A. Farley & James J. Harrington eds., 1991).

¹⁶⁰ Jose Kerstholt et al., *Does Suggestive Information Cause a Confirmation Bias in Bullet Comparisons?*, 198 FORENSIC SCI. INT'L 138 (2010).

¹⁶¹ Beatrice Schiffer & Christophe Champod, *The Potential (Negative) Influence of Observational Biases at the Analysis Stage of Fingerprint Individualisation*, 167 FORENSIC SCI. INT'L 116 (2007).

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E. OTHER FORENSIC DOMAINS

Within fire scene examinations, the Arson Research Project conducted studies to assess the role of expectation and contextual information involved in fire scene investigations.¹⁶² The research acknowledged that unreliable and domain irrelevant information could cause a biased interpretation when conducting fire scene examinations.¹⁶³ Similar studies have been conducted within forensic odontology where various types of contextual effects and biasing influences could impact upon the analysis of bite-marks.¹⁶⁴ This finding has also been acknowledged in other domains such as forensic handwriting and document examinations¹⁶⁵ and bloodstain analysis.¹⁶⁶

Although confirmation bias normally operates outside of conscious awareness, forensic examiners may have some insight into the cognitive motivational and emotional factors that may affect the decision-making processes. Charlton et al. (2010)¹⁶⁷ conducted a series of semi-structured interviews of fingerprint examiners where the examiners expressed a personal interest in solving crime and catching the offenders. The study indicated that cognitive motivational factors might influence the performance of a forensic expert. Training and experience could also have an effect upon expert decision-making, and the individual differences will characterize the degree to which a particular context will affect an expert.¹⁶⁸

F. COGNITIVE BIAS AND REAL CASES

The issue of bias and cognitive vulnerability has also been demonstrated to be some of the sources of error in high profile forensic cases such as those of Shirley McKie in Scotland,¹⁶⁹ Brandon Mayfield in the US,¹⁷⁰ and Amanda Knox in Italy.¹⁷¹ Commentators on these cases have asserted that it is important to acknowledge the numerous pitfalls that can occur within decision-making when

¹⁶² Paul Bieber, *Measuring the Impact of Cognitive Bias in Fire Investigation*, SCI. TECH. 3 (2012).

¹⁶³ *Id.*

¹⁶⁴ Mark Page et al., *Context Effects and Observer Bias--Implications for Forensic Odontology*, 57 J. FORENSIC SCI. 108 (2012).

¹⁶⁵ Bryan Found & John Ganas, *The Management of Domain Irrelevant Context Information in Forensic Handwriting Examination Casework*, 53 SCI. JUST. 154 (2013).

¹⁶⁶ TERRY LABER ET AL., RELIABILITY ASSESSMENT OF CURRENT METHODS IN BLOODSTAIN PATTERN ANALYSIS (2014) available at <https://www.ncjrs.gov/pdffiles1/nij/grants/247180.pdf>.

¹⁶⁷ David Charlton et al., *Emotional Experiences and Motivating Factors Associated with Fingerprint Analysis*, 55 J. FORENSIC SCI. 385 (2010).

¹⁶⁸ Schiffer & Champod, *supra* note 161.

¹⁶⁹ In January 1997 four Scottish fingerprint examiners claimed they found junior officer Shirley McKie's thumbprint on the bathroom doorframe of the home of murder victim Marion Ross. McKie claimed she had never been into the house but was arrested and charged for perjury. In 1999 vindication for Shirley McKie came when two American fingerprint experts determined that the print was not hers. See Dror & Cole, *supra* note 9 for further information.

¹⁷⁰ Robert M. Stacy, *Report on the Erroneous Fingerprint Individualization in the Madrid Train Bombing Case*, 56 J. FORENSIC IDENTIFICATION 706 (2006).

¹⁷¹ Kassir, *supra* note 105.

justice agencies arguably work too close together, and where tunnel vision, social conformity, group thinking and context biases can have significant influences resulting in a chain of biased interpretations.¹⁷² In the Shirley McKie case, the Scottish government specifically set up the Fingerprint Inquiry (under the Inquiries Act 2005) to address the steps, which were taken to identify the fingerprint associated with McKie, which led to the case of *HM Advocate v. McKie* 1999.¹⁷³ The goal of the inquiry was to report on findings of fact and determine the consequences of steps taken in this case as well as provide recommendations for the future. The inquiry report was published in December, 2011 with one of the findings articulated in the report concerning the decision-making processes in fingerprint analysis and the manner of presenting analysis conclusions.

VII. ADDRESSING COGNITIVE BIAS IN FORENSIC SCIENCE

There is still a lack of practical solutions to address such bias being applied within both the forensic sciences and criminal investigative procedures. Indeed where such solutions are implemented there is considerable variation between each discipline, jurisdiction and country. Even though there is a growing acceptance of the role of cognitive biases and its implications in forensic science and criminal investigations, in practice, procedural changes do not seem to have been structurally implemented.¹⁷⁴ One of the potential reasons for this could be the misinterpretation of cognitive biases being an ethical issue. Cognitive biases occur without awareness or intention and are the predictable result of the human cognitive and psychological systems, rather than intentional misconduct. It has been demonstrated that cognitive biases cannot be conquered by will-power, as it is not possible to be fully appreciative of the extent to which people are affected by cognitive errors.¹⁷⁵ Although education in human cognition could potentially improve the decision-making of an expert, it is not possible for education alone to minimize and reduce cognitive biasing effects.¹⁷⁶ A number of different approaches have been identified as means of addressing cognitive bias in the forensic sciences as outlined in the following section.

A. ADDRESSING COGNITIVE BIAS IN THE LEGAL SYSTEM

Within the legal system one of the proposed solutions for prosecutors is to incorporate the practice of providing pro-defense counterarguments to the prosecutorial interpretation of the evidence against the defendant.¹⁷⁷ Generating explanatory counterarguments can mitigate belief perseverance by simply switching between prosecution and defense mind-sets to produce plausible explanations of

¹⁷² Dror & Cole, *supra* note 9.

¹⁷³ See FINGERPRINT INQUIRY, *supra* note 7.

¹⁷⁴ Reinoud D. Stoel et al., *Bias Among Forensic Document Examiners: Still a Need for Procedural Changes*, 46 AUSTL. J. FORENSIC SCI. 91 (2014).

¹⁷⁵ Thompson, *supra* note 116.

¹⁷⁶ Kassin et al., *supra* note 1.

¹⁷⁷ Findley & Scott, *supra* note 96.

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both guilt and innocence for each piece of evidence.¹⁷⁸ Other solutions within law enforcement (other than educating judges, prosecutors and defense lawyers about cognitive biases) have been to include additional unbiased decision-makers in the process by providing ‘fresh look reviews.’¹⁷⁹ In addition, solutions have also been proposed regarding legal decision makers being educated with regard to the procedure by which the forensic examiner reaches their conclusion.¹⁸⁰ This is an important step given that the decision-making processes during evidence collection, analysis and interpretation are likely to be strongly related to how evidence is presented and evaluated in court.

Cross talk and information change between different units of the justice system occurs routinely in forensic investigations. However, too much communication of irrelevant information at the earliest stages of a crime scene investigation has been argued to potentially lead to system failure.¹⁸¹ The National Academy of Sciences in the United States has reported that crime laboratories should not fall under the umbrella of law enforcement, which is the case in some other countries and jurisdictions.¹⁸² For example, Washington, D.C. formally separated its laboratories from the police and instead established the District of Columbia Consolidated Forensic Laboratories. The consequence of law enforcement agencies collaborating too closely with each other creates the risk of cognitive biases altering the judgment and interpretations of an expert at the initial stage of a forensic investigation. For example, if analysts are exposed to contextual facts regarding the crime there is the potential for the effective ‘double counting’ of evidence. This may occur if the analyst is influenced by the evidence of a confession in the determination of uncertainty regarding a possible match of a fingerprint which could lead the jury to think they are receiving two independent pieces of evidence (confession and fingerprint evidence), as they are unlikely to know that the result of the print analysis was affected by the evidence of a confession.¹⁸³

B. CASE MANAGER MODEL

Some of the proposed solutions regarding the minimization of cognitive influences and prevention of double counting of evidence in forensic science have been to separate various laboratory functions by assigning them to different people.¹⁸⁴ One suggestion is to apply a case manager model. The role of the case manager typically includes communications with police officers, participation in the decisions of what specimens to collect at a crime scene and what tests to run. Case managers will therefore be responsible for placing the test results in context and assessing the importance of forensic observations with various theories of

¹⁷⁸ Burke, *supra* note 78.

¹⁷⁹ *Id.*

¹⁸⁰ Kassin et al., *supra* note 1.

¹⁸¹ Thompson, *supra* note 92.

¹⁸² Stoel et al., *supra* note 174.

¹⁸³ Thompson, *supra* note 14.

¹⁸⁴ *Id.*

what occurred.¹⁸⁵ Such an approach allows case managers to understand the context of a case and analysts to be blind to domain irrelevant context and thereby protected from contextual bias. Similar solutions have been proposed by Saks et al. (2003),¹⁸⁶ who proposed the creation of evidence and quality control officers (EQC), who could act as highly trained individuals within exhibit management units. Their main responsibilities would be to filter out domain irrelevant information, formulate the questions to be answered in the least suggestive way, and coordinate the submission of the evidence to the appropriate section.¹⁸⁷

It is crucial for the 'success' of any forensic analysis, interpretation and presentation that the collection of evidence is carried out accurately and appropriately.¹⁸⁸ By adopting these models, crime scene collections, sampling procedures, and analysis have the potential to be shielded from cognitive factors to a greater degree. This will strategically separate (to the best of our abilities) judgments and evaluations from being contaminated by cognitive biases at the earliest stage of an investigation. In addition, it will also allow forensic scientists to extract contextual knowledge that is of relevance. It is asserted that a blind procedure will only eliminate domain irrelevant information, allowing forensic scientists to deal in an effective way with the complexity and uncertainties involved at a crime scene.¹⁸⁹

C. ADDESSING COGNITIVE BIAS IN THE LABORATORY

It is understood that in forensic laboratories, the decisions, interpretation and verification stages could also be affected by human factors. In DNA analysis, sequential unmasking has been suggested as a hybrid approach to minimize the potential for contextual bias where a known DNA profile might affect the interpretation of an evidence sample.¹⁹⁰ It has been suggested that this approach addresses the issue by offering the means of analysts making an initial examination of samples prior to learning the profiles of suspects or known contributors.¹⁹¹ However, the verification stage also needs to be considered when combating cognitive biases. In many forensic laboratories verification stages are mainly performed on positive identifications, potentially causing base rate regularities.¹⁹² Very often the second examiner verifies the first examiners work knowing the decision-making outcome. One proposed solution includes blind verifications,

¹⁸⁵ Itiel E. Dror, *Practical Solutions to Cognitive and Human Factor Challenges in Forensic Science*, 4 FORENSIC SCI. POL'Y & MGMT. 105 (2013).

¹⁸⁶ Michael J. Saks et al., *Context Effects in Forensic Science: A Review and Application of the Science of Science to Crime Laboratory Practice in the United States.*, 43 SCI. JUST. 77 (2003).

¹⁸⁷ *Id.*

¹⁸⁸ Morgan & Bull, *supra* note 19.

¹⁸⁹ Dror, *supra* note 185.

¹⁹⁰ Dan E. Krane et al., *Sequential Unmasking: A Means of Minimizing Observer Effects in Forensic DNA Interpretation*, 53 J. FORENSIC SCI. 1006 (2008).

¹⁹¹ Thompson, *supra* note 116.

¹⁹² Dror, *supra* note 185.

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whereby the verifier does not know the conclusion of the first examiner, and is unaware of what decisions they are verifying.¹⁹³

Another potential solution suggested to enhance accurate judgments and decision-making in forensic science techniques using match judgments¹⁹⁴ (such as DNA analysis and fingerprint examination) is the filler control method.¹⁹⁵ This approach provides forensic examiners with a minimum of three samples rather than two for comparison, including a crime scene sample, suspect sample and filler(s) samples. It is suggested that this method will enable the forensic examiner to know which sample is from the suspect and which are from the fillers,¹⁹⁶ thereby protecting examiners from contextual influences in the estimation of error rates for the techniques used as well as the individual analysis.¹⁹⁷

It is also important to acknowledge that not all laboratories have the resources or time to apply all these procedures. Therefore, solutions have been proposed in the form of adopting a triage approach where each laboratory assesses the case in question and assigns resources where they are needed.¹⁹⁸ The degree of vulnerability to cognitive bias is dependent upon the complexity of the case (i.e., how difficult it is, how near it is to the decision threshold) as well as to the level of exposure to biasing information; each laboratory can use the triage approach to classify cases into different procedures (such as the level of blind verification) according to their vulnerabilities to bias.

D. OTHER SOLUTIONS

Discovering the different predictors of errors causing interpretation issues within each forensic domain is also an important factor. For example in the fingerprint domain, quantitative image measures for estimating error rates have been applied to discover objective predictors of error.¹⁹⁹ Within the fingerprint domain estimating an overall error rate can be challenging, though some fingerprint comparisons may be more accurate compared to others that are historically more prone to bias interpretations. The study by Kellman et al. (2014) indicated that the distribution of error rates varies depending on the visual content of the specific comparison. It highlighted how the difficulties of assessing fingerprints might impact on how judges and juries understand the admissibility of a specific fingerprint comparison²⁰⁰ and outlined the underlying factors that make some

¹⁹³ *Id.*

¹⁹⁴ In match judgments forensic experts judge whether two complex patterns are adequately similar, to determine if both derived from the same source. *See* Dror & Cole, *supra* note 9 for further information.

¹⁹⁵ Gary L. Wells et al., *Forensic Science Testing: The Forensic Filler-Control Method for Controlling Contextual Bias, Estimating Error Rates, and Calibrating Analysts' Reports*, 2 J. APPLIED RES. MEMORY & COGNITION 53 (2013).

¹⁹⁶ *Id.*

¹⁹⁷ Saks et al., *supra* note 186.

¹⁹⁸ Dror, *supra* note 185.

¹⁹⁹ Philip J. Kellman et al., *Forensic Comparison and Matching of Fingerprints: Using Quantitative Image Measures for Estimating Error Rates through Understanding and Predicting Difficulty*, 9 PUB. LIBR. SCI. 1 (2014).

²⁰⁰ *Id.*

fingerprints more difficult to compare has a strong impact upon the training of fingerprint experts and the selection of examiners.²⁰¹ The study advocates that forensic examiners need to have the cognitive ability to perform the task given to them and that developing tests that specifically focus and quantify these abilities are needed in any forensic domain in order to better allocate the manpower to the right job.²⁰²

Technological solutions to address cognitive biases could potentially be very useful. A good number of recent studies in forensic science are now based on new metric methods where statistics, algorithms and technology are applied. The increase of forensic technology has greatly improved forensic work. However it is important to acknowledge the new spectrum of cognitive challenges these technologies might provide. For example as mentioned earlier, the use of the AFIS system could potentially create base rate regularities amongst expert's expectations.²⁰³ Huge searches on databases could also create a higher chance to find incidental similarities when comparing if a mark from a crime scene comes from the same source as known marks.²⁰⁴ Therefore, forensic scientists must consider such implications in the use and establishment of technological solutions. Understanding the function of cognitive errors, in any methodology including technical ones, will allow forensic scientists to design and modify methods of the highest accuracy.

Considering how science and law continue to interrelate and that the issue of scientific standards within the forensic disciplines is rising, the forensic science community must be committed to not only continuing to address the issue of cognitive biases but also to ensuring the most effective implementation of valid solutions. Although laboratories such as the FBI and NIST have modified their standards and procedures to minimize biasing effects, few laboratories and forensic domains have followed to date.

VIII. FUTURE DIRECTIONS

The research within the field of decision-making has highlighted the dynamic and active nature of human information processing and how it can lead to the distortion of incoming data, resulting in biased conclusions. It has shifted its focus to not only concern human judgments in the social and psychological domains, but has also emerged within law enforcement agencies and forensic disciplines. The context sensitive nature of each forensic case means that human interpretations are highly important, valuable and necessary. Humans are still needed to interpret results of highly sensitive and accurate analytical techniques, and to classify and identify evidence within the forensic science process. This creates a complexity and controversy regarding how to best deal with human factors that could cause interpretation issues. Thus, it is important for the forensic science community to not underestimate and minimize the importance of these issues as they have been demonstrated not only to affect expert interpretations

²⁰¹ *Id.*

²⁰² Dror, *supra* note 185.

²⁰³ Dror et al., *supra* note 59.

²⁰⁴ Mnookin et al., *supra* note 31.

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across numerous forensic disciplines, but to also affect the human role at the different stages of the forensic science process. Recognizing the role cognition plays in the collection, analysis, interpretation and presentation of evidence will enable the forensic science community to address the concerns raised by reports such as the National Academy of Sciences report (2009) in the United States and the Law Commission (2011) in the United Kingdom.

The debates regarding the admissibility of expert opinion in court that has also been highlighted by the National Academy of Sciences (2009), Forensic Regulator in the UK and by the Law Commission for England and Wales (2011) has helped to clarify the need for research within cognitive biases in forensic science. The presentation of erroneous information has been shown to not only bias judgments of those assessing the evidence in a specific case, but also to change the way in which evidence is presented during a trial. This has been recognized in high profile cases, such as those mentioned earlier, to have a major impact upon the final verdict.

Another issue is that the parameters regarding what is considered best practice varies amongst forensic disciplines, where the handling of evidence at crime scenes and within laboratories diverges noticeably between countries and jurisdictions. In order to establish good procedures for minimizing cognitive bias it will be important to offer approaches that can be sufficiently generalizable for different investigations and sample examination, but that are also sufficiently context sensitive to each case and each sample within it. It is widely recognized that every crime scene is different and it is therefore important to incorporate context sensitivity when looking to establish universal protocols for each discipline. However, it is still important for each forensic discipline to identify measures that minimize cognitive issues at every stage of the forensic science process pertinent to that discipline. The main challenge for every forensic domain is to find an appropriate balance of which solutions to implement²⁰⁵ and under which circumstances in addition to identifying the risks and benefits associated with each approach.²⁰⁶

It is, therefore, important for the role of cognitive forensics, the understanding of the central role of cognition in forensic science, to be addressed in every forensic science domain. Cognitive forensic science goes beyond the issues of confirmation bias and context bias and deals with all forms of judgments and decision-making involved in forensic disciplines.²⁰⁷ This is essential in order to understand how human examiners reach conclusions and how research in cognition could enhance forensic science procedures and practices. In addition, it will inform and help to identify which solutions to apply in different disciplines and scenarios as well as guiding the allocation of the right people for the right task.²⁰⁸ Therefore continuation of empirical research within cognitive forensics will be at

²⁰⁵ Dror, *supra* note 185.

²⁰⁶ Christophe Champod, *Research Focused Mainly on Bias Will Paralyse Forensic Science*, 54 *SCI. JUST.* 107 (2014).

²⁰⁷ Stoel et al., *supra* note 174.

²⁰⁸ Dror, *supra* note 185.

the very least, important, if not essential, to further improving the value, weight and admissibility of forensic evidence.

The forensic science community, and in turn the law enforcement agencies, have come far in the development of highlighting cognitive bias issues. More empirical studies addressing cognitive bias are being conducted across many of the forensic science domains to establish the extent to which cognitive issues impinge on forensic investigations and analysis.²⁰⁹ By furthering the understanding of cognitive issues within specifically forensic frameworks, the evidence base for developing viable solutions to cognitive bias in practice can be further developed. In order to continue the contribution of forensic science to the realization of the true scientific value of forensic evidence, it is imperative to continue to develop our understanding of cognitive bias and the measures to minimize its impact in the forensic sciences.

²⁰⁹ Found, *supra* note 12.

ADMISSIBILITY FRAMEWORKS AND SCIENTIFIC EVIDENCE:
CONTROVERSIES IN RELATION TO SHAKEN BABY SYNDROME
/ ABUSIVE HEAD TRAUMA

Marika L. Henneberg*
University of Portsmouth, U.K.

ABSTRACT

Criminal courts increasingly rely upon scientific evidence provided by expert witnesses. This raises a number of questions for the courts including what type of science they should admit and who should be allowed to give such evidence. The admissibility framework for scientific evidence in England and Wales originates from the 1975 case of R v. Turner, [1975] QB 834. Under Turner, expert evidence is admissible as long as it is beyond the understanding of the fact-finders. This common law framework has been interpreted and developed and it now consists of a mismatch of court decisions from England and Wales, Australia, Canada and the United States of America. This framework does not seem to reflect the four decades of significant scientific advances that have taken place since Turner. There have been a number of prominent trials in the United States and in England and Wales where scientific evidence has been associated with an improper verdict. This paper suggests that controversies related to Shaken Baby Syndrome (SBS) / Abusive Head Trauma (AHT) expose the weaknesses of admissibility frameworks in the United States and, more specifically, in England and Wales. It concludes that the triad of symptoms frequently used to diagnose SBS/AHT is not reliable, and that courts need to consider more closely significant advances in the understanding of the symptoms previously believed to indicate that an infant had been shaken, before admitting such evidence in court.

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* Senior Lecturer, Institute of Criminal Justice Studies, University of Portsmouth, 141 High Street, Portsmouth, PO1 2HY, UK; marika.henneberg@port.ac.uk.

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I. INTRODUCTION

Forensic science, or “the application of science in the resolution of legal disputes”,¹ has become an integral part of the criminal justice systems in the United States of America and in England and Wales. It is beneficial to the process of justice that scientific methods and techniques have the potential to draw links between victims, perpetrators and crime scenes.² Criminal and civil courts often rely upon scientific evidence provided by expert witnesses to settle different types of legal disputes. This inevitably increases the risk that ‘junk science’³ may be admitted in courts in the United States and in England and Wales.⁴

¹ ANDREW R.W. JACKSON & JULIE M. JACKSON, *FORENSIC SCIENCE* xv (2d ed. 2010).

² See EDMOND LOCARD, *TRAITÉ DE CRIMINALISTIQUE* (1940); *Id.*; STUART H. JAMES & JON J. NORDBY, *FORENSIC SCIENCE: AN INTRODUCTION TO SCIENTIFIC AND INVESTIGATIVE TECHNIQUES*, (3d ed. 2009); W. Jerry Chisum & Brent E. Turvey, *Evidence Dynamics: Locard’s Exchange Principles & Crime Reconstruction*, 1(1) *J. BEHAV. PROFILING* (2000).

³ See PETER W. HUBER, *GALILEO’S REVENGE: JUNK SCIENCE IN THE COURT ROOM* (1991). The term ‘junk science’, despite not being coined by the author, gained popularity after the publication.

⁴ For the situation in the United States, see THE COMM. ON IDENTIFYING THE NEEDS OF THE FORENSIC SCI. CMTY., NAT’L RESEARCH COUNCIL OF THE NAT’L ACADS. (NRC), *STRENGTHENING THE FORENSIC SCIENCES IN THE UNITED STATES: A PATH FORWARD* (The National Academies Press, 2009) [hereinafter NRC REPORT], and for England and Wales, see THE LAW COMMISSION,

It is, undoubtedly, a hard task for judges and jurors to adjudge topics which may have taken years for a scientist to become proficient in.⁵ Collecting, preparing, analysing and presenting scientific evidence all require high levels of training, expertise and skill, and it would be naive to suggest that the intricacies of any field of forensic science can be fully understood by judges, lawyers or jurors (or indeed scientists).⁶ Nevertheless, judges need to decide whether or not to admit scientific evidence, lawyers need to be able to use expert evidence to support their case and effectively challenge the views of the opposing side's experts during cross examination, and jurors have the important task of deciding, based on the evidence that they have heard, whether the defendant is guilty or not.

Part II reviews the admissibility of scientific evidence in the United States through an exploration of significant cases. The Supreme Court of the United States confronted concerns that the U.S. courts were admitting 'junk science' in a sequence of decisions in the 1990s.⁷ In effect, these decisions made it clear that judges had a 'gate-keeping' role to decide on the scientific validity of proffered expert evidence.⁸ Research and publications have since tried to identify what 'science' or research satisfy the U.S. Supreme Court's criteria, and to encourage the scientific education of lawyers and judges.⁹ The United States' approach to admissibility has been adopted by a number of Commonwealth jurisdictions,¹⁰ but never, formally, in the United Kingdom.¹¹

Part III reviews the development of the common law admissibility framework in England and Wales. There have been a number of prominent trials in England and Wales where scientific evidence has been associated with an improper verdict.¹² The House of Commons' Science and Technology Committee

THE ADMISSIBILITY OF EXPERT EVIDENCE IN CRIMINAL PROCEEDINGS IN ENGLAND AND WALES: A NEW APPROACH TO THE DETERMINATION OF EVIDENTIARY RELIABILITY (2009), available at http://lawcommission.justice.gov.uk/docs/cp190_Expert_Evidence_Consultation.pdf [hereinafter THE LAW COMMISSION 2009].

⁵ For more comprehensive discussions on this see, e.g., Peter W. Huber, *Junk Science and the Jury*, U. CHI. LEGAL F. 273 (1990) and Edith Greene & Lawrence Wrightsman, *Decision Making by Juries and Judges: International Perspectives*, in HANDBOOK OF PSYCHOLOGY IN LEGAL CONTEXTS, 401-422 (Ray Bull & David Carson eds. 2d ed. 2003).

⁶ Greene & Wrightsman, *supra* note 5.

⁷ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993); *General Electric Co. v. Joiner*, 522 U.S. 136 (1997); *Kumho Tire Co. Ltd. v. Carmichael*, 526 U.S. 137 (1999).

⁸ KARL POPPER, *THE LOGIC OF SCIENTIFIC DISCOVERY* (2d ed. 2002).

⁹ This includes the five volume multi-edition product edited by Faigman et al. (e.g. the 2013-2014 edition), see DAVID FAIGMAN ET AL., *MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY*, Vols 1-5 (2013-2014) and the one-thousand page document by the Federal Judicial Center, see FEDERAL JUDICIAL CENTRE, *REFERENCE MANUAL ON SCIENTIFIC EVIDENCE* (3d ed. 2011), available at

[http://www.fjc.gov/public/pdf.nsf/lookup/SciMan3D01.pdf/\\$file/SciMan3D01.pdf](http://www.fjc.gov/public/pdf.nsf/lookup/SciMan3D01.pdf/$file/SciMan3D01.pdf).

¹⁰ Simon A. Cole, *Splitting Hairs? Evaluating 'Split Testimony' as an Approach to the Problem of Forensic Expert Evidence*, 33 SYDNEY L. REV. 459 (2011).

¹¹ THE LAW COMMISSION 2009, *supra* note 4.

¹² Successful appeals include *R. v. Dallagher*, [2002] EWCA Crim 1903 (appeal taken from Eng.) where ear print comparison evidence had been the major evidence in a murder conviction, and *R. v. Clark* (No 2), [2003] EWCA Crim 1020 (appeal taken from Eng.), where improperly cited

expressed concerns about the quality of scientific evidence being admitted by the courts in England and Wales in 2005, and the Law Commission of England and Wales was tasked with investigating the issue.¹³ The Law Commission confirmed that there were some serious problems and proposed a Bill.¹⁴ The Law Commission's approach was not to focus upon the scientific status of the evidence proffered (which, broadly, had been the U.S. Supreme Court's approach), but rather its reliability.¹⁵ However, the government rejected the proposals for reform in November 2013,¹⁶ citing expenses as one of the reasons for the rejection.¹⁷

Part IV considers medical and scientific evidence in relation to Shaken Baby Syndrome (SBS) / Abusive Head Trauma (AHT). Whilst medical evidence has a long history of recognition by the courts in the United States and England and Wales, some diagnoses, such as Sudden Infant Death Syndrome (SIDS), have been associated with several alleged wrongful convictions, especially in England and Wales.¹⁸ SBS, now commonly referred to as Abusive Head Trauma (AHT),¹⁹ has also come under scrutiny after the triad of symptoms believed to be pathognomonic of SBS has been shown to have alternative natural or accidental explanations which do not indicate shaking.²⁰ In January, 2015 a group of international experts signed an open letter calling for a change in the way courts (in the United States and the United Kingdom) use the "SBS construct",²¹ as "it does not have the undivided support of the relevant professional community, an essential consideration in the assessment of expert testimony."²² Controversies around the use

statistics and a failure to disclose results of medical tests had resulted in two murder convictions. These will be discussed in detail in Part III.

¹³ THE LAW COMMISSION 2009, *supra* note 4.

¹⁴ THE LAW COMMISSION, EXPERT EVIDENCE IN CRIMINAL PROCEEDINGS IN ENGLAND AND WALES (2011), *available at* http://lawcommission.justice.gov.uk/docs/lc325_Expert_Evidence_Report.pdf [hereinafter THE LAW COMMISSION 2011].

¹⁵ *Id.*

¹⁶ MINISTRY OF JUSTICE, THE GOVERNMENT'S RESPONSE TO THE LAW COMMISSION REPORT: "EXPERT EVIDENCE IN CRIMINAL PROCEEDINGS IN ENGLAND AND WALES" (Law Com No 325), 2013 (Eng. Wales), *available at* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/260369/govt-resp-experts-evidence.pdf.

¹⁷ Skills for Justice, *Expert Evidence Changes Rejected*, Skills for Justice, (Nov. 22, 2013, 8:45 AM), <http://www.sfjuk.com/expert-evidence-changes-rejected/>.

¹⁸ John Hartshorne & José Miola, *Expert Evidence: Difficulties and Solutions in Prosecutions for Infant Harm*, 30(2) LEGAL STUD. 279 (2010); THE LAW COMMISSION 2009, *supra* note 4; THE LAW COMMISSION 2011, *supra* note 14.

¹⁹ For the purpose of this paper the terms used are Shaken Baby Syndrome (SBS) and Abusive Head Trauma (AHT). A number of scholarly papers have used alternative terms such as Non-Accidental Head Trauma/Injury, Shaken Impact Injury and Acquired Brain Injury to describe the same issue.

²⁰ See, e.g., Keith A. Findley et al., *Shaken Baby Syndrome, Abusive Head Trauma, and Actual Innocence: Getting it Right*, 12 Hous. J. HEALTH L. & POL. 209 (2012).

²¹ Lynne Wrennall et al., *Open Letter on Shaken Baby Syndrome and Courts: A False and Flawed Premise*, ARGUMENT & CRITIQUE (2015), *available at* <https://globalwrong.files.wordpress.com/2015/02/open-letter-on-sbs.pdf>.

²² *Id.*

of expert evidence relating to SBS/AHT in criminal trials have highlighted problematic issues inherent in the adversarial process in general, and in relation to the admissibility of such evidence in particular.

This article concludes that despite efforts to prevent unreliable science from being admitted in court,²³ unreliable or outdated science is still a major part of the SBS/AHT diagnosis in the United States and, especially, in England and Wales. This article suggests that medical and scientific evidence relating to SBS/AHT should no longer be considered reliable, and that courts need to consider significant developments in the understanding of the symptoms used to diagnose SBS/AHT²⁴ to avoid wrongful convictions.

II. ADMISSIBILITY OF SCIENTIFIC EVIDENCE IN THE UNITED STATES OF AMERICA

Before the 1920s, courts in the United States had applied what some scholars today refer to as the “marketplace test”²⁵ when considering admissibility. Under the test, any expert or expertise that consumers had been willing to spend money on would be considered sound enough for courts.²⁶ This raised problems as the market would not necessarily consider the reliability or validity of an opinion, as expertise of doubtful quality and soundness “may nevertheless sell well”.²⁷ In addition, markets may not necessarily reflect the needs of the courts.²⁸ Concerns about the reliability of certain scientific practices were recognised in the 1920s,²⁹ and admissibility frameworks have since evolved.

A. FRYE V. UNITED STATES, 293 F. 1013 (D.C. CIR. 1923)

The first important case to deal with admissibility of newly developed areas of science was the 1923 case of *Frye v. United States*.³⁰ In that case, James Frye had been convicted of murder in the second degree.³¹ During the original trial, defense counsel had asked that the result of a systolic blood pressure deception test was admitted as evidence, or that Frye should be subjected to such a test in the presence of the jury.³²

The claim was that this early predecessor to the polygraph, or lie detector, would detect changes in the systolic blood pressure when nervous impulses were sent to the autonomic nervous system, and that these changes corresponded to

²³ See *supra* note 4.

²⁴ Findley et al., *supra* note 20.

²⁵ E.g. Michael J. Saks & David L. Faigman, *Expert Evidence after Daubert*, 1 ANN. REV. L & SOC. SCI. 105 (2005).

²⁶ *Id.* at 107.

²⁷ *Id.*

²⁸ Roselle L. Wissler et al., *How Legal Tests for the Admissibility of Scientific Evidence Resemble Cognitive Science’s System 1 and System 2*, 17 VA. J.L. & TECH. 354, 364 (2013).

²⁹ *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923).

³⁰ *Id.*

³¹ *Id.* at 1013.

³² *Id.*

changes in the person's emotions.³³ Scientific experiments were believed to demonstrate how "conscious deception or falsehood, concealment of facts, or guilt of crime, accompanied by fear of detection when the person is under examination, raises the systolic blood pressure in a curve."³⁴ This curve would allegedly correspond to the struggle going on in the subject's mind, "between fear and attempted control of that fear, as the examination touches the vital points of which he is attempting to deceive the examiner."³⁵

Although no cases had been found which directly dealt with systolic blood pressure tests, defense counsel in *Frye* maintained that there was a general rule,³⁶ which suggested that opinions of witnesses skilled in a particular science, art or trade were admissible in evidence if the question involved required special experience or knowledge.³⁷ This would be the case with the systolic blood pressure test, as it required the testimony of a person with special knowledge and experience.³⁸

The appeal court in *Frye* did not oppose to this, but it challenged the methodology for the systolic blood pressure machine.³⁹ The court acknowledged that the level of confidence in a particular scientific methodology needed to be determined before it could be admitted in evidence, and that a threshold test would be required.⁴⁰ The court held that: "Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define,"⁴¹ and that "the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs".⁴² The court believed that the systolic blood pressure deception test had not yet gained such standing and scientific recognition among physiological and psychological authorities that it should be admitted in court.⁴³

Frye provides that if the methodology at issue is "generally accepted" by the relevant scientific community within which it belongs, it should be acceptable to the law and hence admissible in court.⁴⁴ This was a major advancement from the marketplace test as, instead of looking at the consumers of the expertise, there was a shift to look at the experts and their credentials, as well as the body of knowledge surrounding the topic.⁴⁵ It is easy to assume that the majority view will be the one that is deemed generally accepted, but general acceptance "is only

³³ *Id.*

³⁴ *Frye*, 293 F. at 1014.

³⁵ *Id.*

³⁶ *Id.*

³⁷ *Id.*

³⁸ *Id.*

³⁹ *Frye*, 293 F. at 1014.

⁴⁰ *Id.*

⁴¹ *Id.*

⁴² *Id.*

⁴³ *Id.*

⁴⁴ This is often referred to as the 'general acceptance test', see *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923).

⁴⁵ Saks & Faigman, *supra* note 25, at 107.

a very rough proxy for scientific validity.”⁴⁶ New discoveries or techniques may be developed by a minority part of the scientific community, and may take years to gain a wider acceptance.⁴⁷

Frye continues to be the admissibility test in California,⁴⁸ Illinois,⁴⁹ Maryland,⁵⁰ Minnesota,⁵¹ New Jersey,⁵² New York,⁵³ Pennsylvania⁵⁴ and Washington,⁵⁵ whereas Florida replaced it 2013⁵⁶ and Kansas in 2014.⁵⁷

B. DAUBERT V. MERRELL DOW PHARMACEUTICALS, INC., 509 U.S. 579 (1993)

The U.S. Supreme Court reformed the general acceptance test from *Frye* in the 1993 case of *Daubert v. Merrell Dow Pharmaceuticals, Inc.*⁵⁸ The petitioners in that case were Jason Daubert and Eric Schuller, two minor children born with serious birth defects, and their parents.⁵⁹ Claiming that the birth defects had been caused by the anti-nausea drug Bendectin, which had been ingested by the two mothers whilst pregnant, the petitioners had sued Merrell Dow Pharmaceuticals (MDP), the marketer of the drug, in California state court.⁶⁰

MDP had moved for summary judgment, stating that there was no evidence to suggest that Bendectin caused birth defects in humans.⁶¹ A physician and epidemiologist, acting as an expert for MDP, examined over 30 published studies on Bendectin and human birth defects.⁶² Bendectin had not been found to be a human teratogen (a substance capable of causing malformation in fetuses) in any of the published studies which covered more than 130,000 patients.⁶³

The petitioners did not contest the summary of the studies provided by MDP’s expert.⁶⁴ However, they countered this conclusion with testimonies from eight different experts, all with impressive credentials.⁶⁵ These experts drew the conclusion that there was a link between Bendectin and birth defects based on

⁴⁶ PAUL ROBERTS & ADRIAN ZUCKERMAN, CRIMINAL EVIDENCE (2d ed. 2010) at 497.

⁴⁷ *Id.*

⁴⁸ Cal. Evid. Code §801.

⁴⁹ Rule 702, Ill. R. Evid.

⁵⁰ *Frye* was adopted in Maryland in *Reed v. State*, 283 Md. 374, 391 A.2d 364 (Md., 1978).

⁵¹ Rule 702, Minn. Ct. R.

⁵² Rule 703, N.J. R. Evid.

⁵³ N.Y. C.P.L.R. §4515; *Giordano v. Market Am., Inc.*, 15 N.Y.3d 590, 601, 941 N.E.2d 727, (2010); *People v. Kanani*, 272 A.D.2d 186, 186, 709 N.Y.S.2d 505 (1st Dept. 2000).

⁵⁴ Rule 702, Penn. R. Evid.

⁵⁵ Rule 703, Wash. R. Evid.

⁵⁶ Fla. Evid. Code 90.702.

⁵⁷ Kan. Stat. Ann. 60-456.

⁵⁸ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993).

⁵⁹ *Id.* at 582.

⁶⁰ *Id.*

⁶¹ *Id.*

⁶² *Id.*, more than 130,000 patients were included in the studies.

⁶³ *Daubert* at 582.

⁶⁴ *Id.*

⁶⁵ *Id.*

malformations that had been found in various studies. These studies included animal studies (both in test tube (in vitro) and live (in vivo) studies), and pharmacological studies, which showed that Bendectin had a similar structure to other drugs known to cause birth defects. They also shaped their conclusions through “the “reanalysis” of previously published epidemiological (human statistical) studies.”⁶⁶

The District Court granted MDP’s motion for summary judgment, stating that scientific evidence would be admissible only where the principle upon which it is based is “sufficiently established to have general acceptance in the field to which it belongs.”⁶⁷ The District Court held that the evidence the petitioners presented did not meet this standard. This was because it was based on recalculations of data in previously published studies, animal studies and chemical-structure analyses.⁶⁸ In order to establish causation (and be admissible), the court opined that the expert opinion evidence should be based on epidemiological data concerning Bendectin.⁶⁹ Furthermore, the evidence the petitioners sought to rely upon had neither been subjected to peer review nor been published.⁷⁰

The United States Court of Appeals for the Ninth Circuit affirmed, stating that expert opinion “based on scientific technique is inadmissible unless the technique is “generally accepted” as reliable in the relevant scientific community”,⁷¹ and that any expert opinion which diverges significantly from the procedures or methodology accepted in that particular field cannot be considered reliable, and is therefore inadmissible.⁷² Unpublished reanalyses, where the outcome was significantly different to the original published analyses, were problematic, as no scrutiny and/or verification of those results had taken place.⁷³

The U.S. Supreme Court granted certiorari in order to determine whether the *Frye* test was still good law, and if it was, whether the test should require that expert scientific testimony had been subjected to peer review in order to be admissible.⁷⁴ Following discussions around Federal Rule of Evidence 702, the U.S. Supreme Court decided that evidence would need to be both reliable and relevant to be admissible.⁷⁵

In summary, *Daubert* lists five key factors that courts should consider when determining whether expert scientific testimony is scientifically valid and reliable. These factors are whether a theory, method or technique (1) can or has been tested; (2) has been subjected to scrutiny through peer review and publication; (3) has a known or potential rate of error; (4) has existing standards and controls;

⁶⁶ *Id.* at 582-83.

⁶⁷ *Id.* at 583-84 (citing *United States v. Kilgus*, 571 F.2d 508, 510 (9th Cir. 1978)).

⁶⁸ *Daubert* at 584-85.

⁶⁹ *Id.*

⁷⁰ *Id.*

⁷¹ *Id.*

⁷² *Id.*

⁷³ *Daubert* at 584-85.

⁷⁴ *Id.* at 585-87.

⁷⁵ *Id.* at 588-89. In brief, Rule 702 provides that scientific knowledge may be presented in court by a qualified witness if it assists the trier of fact to understand the evidence.

and (5) has been generally accepted by a relevant scientific community.⁷⁶ However, these key factors do not constitute a check list and there is a need for flexibility.⁷⁷

C. THE DAUBERT TRILOGY

The current federal standard for admissibility of scientific expert evidence in the United States has been established through three cases in particular, commonly referred to as the *Daubert* Trilogy. Although this standard is not universally incorporated at state level, many states have adopted it. The U.S. Supreme Court revisited the issue of admissibility in *General Electric Co v. Joiner*⁷⁸ and *Kumho Tire Co Ltd v. Carmichael*⁷⁹ in order to clarify *Daubert* further.

In 1983, Georgia City discovered that the dielectric fluid in some of its transformers were contaminated with polychlorinated biphenyls (PCBs), known to be hazardous to the health of humans.⁸⁰ Robert Joiner worked as an electrician for Georgia City from 1973 and came in contact with PCBs in the course of his employment.⁸¹ In 1991, Joiner was diagnosed with small cell lung cancer and in 1992 he sued General Electric Co., the manufacturer of the transformers and the dielectric fluid, in a Georgia state court.⁸² Joiner's law suit "alleged that his exposure to PCBs "promoted" his cancer; had it not been for his exposure to these substances, his cancer would not have developed for many years, if at all."⁸³ Joiner provided the court with a number of depositions by expert witnesses which stated that PCBs and their derivatives can promote cancer and that these were the likely source of his cancer.⁸⁴ However, Joiner had also been a smoker for eight years and there was a history of lung cancer in his family.⁸⁵

The case was moved to the District Court by General Electric. Although the District Court stated that there was a genuine issue of material fact as to whether Joiner had been exposed to PCBs, it granted General Electric's request for summary judgment.⁸⁶ The reasons for this was that there was no evidence that Joiner had suffered significant exposure to PCBs and that Joiner's experts had failed to establish a causal link between PCBs and small cell lung cancer.⁸⁷ The expert evidence presented by Joiner was held to be inadmissible as, according to the District Court, it was based on "subjective belief or unsupported speculation."⁸⁸

⁷⁶ *Daubert*, 509 U.S. 591-94.

⁷⁷ See, e.g., ROBIN T. BOWEN, ETHICS AND THE PRACTICE OF FORENSIC SCIENCE 69 (2010).

⁷⁸ *General Electric Co. v. Joiner*, 522 U.S. 136 (1997).

⁷⁹ *Kumho Tire Co. Ltd. v. Carmichael*, 526 U.S. 137 (1999).

⁸⁰ *Joiner*, 522 U.S. at 136.

⁸¹ *Id.* at 139.

⁸² *Id.*

⁸³ *Id.* at 139-40.

⁸⁴ *Id.* at 139.

⁸⁵ *Id.*

⁸⁶ *Id.* at 140.

⁸⁷ *Id.*

⁸⁸ *Id.* at 136.

The Court of Appeals for the Eleventh Circuit reversed this decision, based on two fundamental errors in the District Court's judgment.⁸⁹ In the Eleventh Circuit's opinion, the District Court should not have excluded the expert testimony as its role should only be to determine the legal reliability of the evidence.⁹⁰ Deciding on the weight of competing expert testimonies should be a question for the jury and the court should not exclude testimony because it draws a different conclusion than the experts.⁹¹ The Eleventh Circuit also found that there was evidence on record that supported the proposition that Joiner had been exposed to furans and dioxins.⁹²

The U.S. Supreme Court granted certiorari and subsequently reversed the Eleventh Circuit's judgment, affirming the previous ruling by the District Court.⁹³ The Court confirmed that the abuse of discretion standard should be used when reviewing a District Court's decision to admit or exclude expert scientific evidence,⁹⁴ and that a proper application of this standard would indicate that the District Court did not abuse its discretion when it excluded the evidence, as the studies were significantly dissimilar to the facts of the case.⁹⁵ The evidence which Joiner had presented was based on studies conducted on mice, none of which had actually demonstrated that adult mice developed cancer after exposure to PCBs.⁹⁶ Thus, the U.S. Supreme Court's decision in *Joiner* verified that trial judges have a gate-keeping role and may exclude expert evidence where there are analytical gaps between the data and the opinions proffered.⁹⁷

In *Kumho Tire Co Ltd v. Carmichael*⁹⁸ in 1999, the U.S. Supreme Court had the opportunity to review how the *Daubert* ruling applied to evidence provided by experts other than scientists. In 1993, Patrick Carmichael was driving a minivan when a rear tire blew out, causing the vehicle to overturn.⁹⁹ One of his passengers was killed and several others were severely injured in the accident. The Carmichaels, survivors of the accident and representatives of the deceased, sued the maker of the tire, Kumho Tire Company, and the distributors, claiming that the tire was defective.¹⁰⁰

The Carmichaels relied on expert testimony provided by a senior engineer who specialised in tire failure analysis.¹⁰¹ The engineer had concluded that the accident was caused by a defect in the design or manufacturing of the tire.¹⁰² However, as the engineer had relied on methodology which was partly disputed,

⁸⁹ *Id.* at 140.

⁹⁰ *Id.* at 141.

⁹¹ *Id.*

⁹² *Id.*

⁹³ *Id.*

⁹⁴ *Id.*

⁹⁵ *Id.* at 144-45.

⁹⁶ *Id.* at 144.

⁹⁷ See in particular Justice Breyer's concurring opinion, *id.* at 147-49.

⁹⁸ *Kumho Tire Co. Ltd. v. Carmichael*, 526 U.S. 137 (1999).

⁹⁹ *Id.* at 137.

¹⁰⁰ *Id.*

¹⁰¹ *Id.*

¹⁰² *Id.*

Kumho Tire Company asked the District Court to exclude this testimony.¹⁰³ The District Court agreed that the methodology did not satisfy current standards under Federal Rule of Evidence 702 as it was insufficiently reliable.¹⁰⁴ The testimony was excluded and Kumho Tire Company was granted a summary judgment.¹⁰⁵

The Court of Appeals for the Eleventh Circuit reversed this judgment, stating that a federal trial judge's gate-keeping role was limited to scientific testimony.¹⁰⁶ The District Court should not have excluded the testimony from an engineer, which the Eleventh Circuit referred to as being based on skills and experience.¹⁰⁷

The U.S. Supreme Court granted certiorari to determine whether a federal trial judge's gate-keeping obligations were limited to scientific evidence or if this should apply to testimonies which were based on skills and experience as well.¹⁰⁸ In a unanimous decision, the Supreme Court held that the gate-keeping obligations should apply to all expert evidence as it was virtually impossible to distinguish between technical and scientific knowledge and that "conceptual efforts to distinguish the two are unlikely to produce clear legal lines capable of application in particular cases."¹⁰⁹ The U.S. Supreme Court further concluded that the District Court had acted within its discretion when it determined that the methodology used by the engineer was unreliable and excluded this testimony.¹¹⁰ Thus, *Kumho Tire* verified that trial judges were not only the gate-keepers of scientific evidence, but that the discretion to admit or exclude extended to all types of expert evidence.¹¹¹

D. THE U.S. FEDERAL RULES OF EVIDENCE

The Federal Rules of Evidence (FRE) were developed in 1973 by codifying existing U.S. Supreme Court decisions and common evidentiary rules in place at the time,¹¹² and these were enacted and incorporated into statutory law in 1975.¹¹³

Rule 702, Testimony by Witness, states that:

A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:

(a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;

¹⁰³ *Kumho Tire*, 526 U.S. at 137.

¹⁰⁴ *Id.*

¹⁰⁵ *Id.*

¹⁰⁶ *Id.*

¹⁰⁷ *Id.*

¹⁰⁸ *Id.* at 138.

¹⁰⁹ *Id.* at 148.

¹¹⁰ *Id.* at 139.

¹¹¹ *Id.* at 158.

¹¹² Bowen, *supra* note 77, at 66.

¹¹³ David G. Owen, *A Decade of Daubert*, 80 DENV. U. L. REV. 345, 355 (2002-2003).

- (b) the testimony is based on sufficient facts or data;
- (c) the testimony is the product of reliable principles and methods; and
- (d) the expert has reliably applied the principles and methods to the facts of the case.¹¹⁴

The spirit of *Daubert* is obvious in the text of FRE 702.¹¹⁵ However, Rule 702 needs to be considered alongside Rule 703, Bases of an Expert's Opinion Testimony, and Rule 705, Disclosing the Facts or Data Underlying an Expert's Opinion.

Rule 703 states that:

An expert may base an opinion on facts or data in the case that the expert has been made aware of or personally observed. If experts in the particular field would reasonably rely on those kinds of facts or data in forming an opinion on the subject, they need not be admissible for the opinion to be admitted. But if the facts or data would otherwise be inadmissible, the proponent of the opinion may disclose them to the jury only if their probative value in helping the jury evaluate the opinion substantially outweighs their prejudicial effect.¹¹⁶

Rule 703 has attracted criticism for allowing evidence which would be inadmissible under other rules to be brought in 'through the back door'.¹¹⁷ This is because experts are still allowed to rely on such information and facts and may, in some circumstances, even be allowed to disclose this inadmissible information to the jury.¹¹⁸ In addition, under FRE Rule 705, experts *may* choose to disclose information underlying their opinion evidence, but they are not required to do so.¹¹⁹ However, even if such information is not disclosed as part of the opinion evidence given, the opposing party may still try to establish the basis for the expert's opinion during cross-examination.¹²⁰

The legal frameworks for admissibility have evolved over the last century, with the courts and legislatures attempting to acknowledge that science must be both relevant and reliable in order to be used in the legal process. The law governing admissibility has also developed over decades in England and Wales as Part III will explain.

¹¹⁴ Federal Evidence Review, FEDERAL RULES OF EVIDENCE 2015, 30 (2015), available at <http://federalevidence.com/downloads/rules.of.evidence.pdf>.

¹¹⁵ Surprisingly, *Daubert* was not incorporated into the FRE until 2001. Up until then, FRE 702 allowed the admission of scientific or technical evidence by a qualified expert if such testimony would assist the trier of fact. See Owen, *supra* note 113, at 358, 361.

¹¹⁶ FEDERAL RULES OF EVIDENCE, *supra* note 114.

¹¹⁷ Ian Volek, *Federal Rule of Evidence 703: The Back Door and the Confrontation Clause, Ten Years Later*, 80 FORDHAM L. REV. 959, 963 (2011).

¹¹⁸ *Id.* at 985.

¹¹⁹ *Id.* at 969.

¹²⁰ FEDERAL RULES OF EVIDENCE, *supra* note 114, at 31.

III. THE DEVELOPMENT OF AN ADMISSIBILITY FRAMEWORK FOR SCIENTIFIC EVIDENCE IN ENGLAND AND WALES

The admissibility framework for scientific evidence in England and Wales originates from the 1975 case *R v. Turner*.¹²¹ This framework has been criticised for being unclear, with scholars such as Roberts and Zuckerman stating that this precedent, “to where many of the phantom ‘rules’ trace their origin, has been especially vulnerable to misinterpretation.”¹²² Furthermore, with the significant advances in science over the last fifty years, it has been argued that the common law approach to the admissibility of science in England and Wales is outdated and needs to be reformed.¹²³

A. THE COMMON LAW ADMISSIBILITY TEST

The body of law relating to the admissibility of opinion evidence provided by expert witnesses in criminal proceedings in England and Wales has developed within the common law, and is referred to as “the common law admissibility test.”¹²⁴ It is generally accepted that there are four requirements which need to be satisfied under the common law test in order for an expert’s opinion evidence to be admissible.¹²⁵ These are: assistance, relevant expertise, impartiality and evidentiary reliability.¹²⁶ Each requirement has its own set of rules, which will be explored further.

i. Assistance

The assistance requirement originates from the judgment in *R v. Turner*.¹²⁷ In *Turner*, the defendant had repeatedly hit his girlfriend with a hammer after she told him that the child she was carrying was not his.¹²⁸ The defense wanted to call a psychiatrist to provide expert opinion evidence that the defendant’s personality meant that, although he did not show any signs of mental illness, he killed his girlfriend in “an explosive release of blind rage.”¹²⁹

The court confirmed that an expert’s opinion would be admissible “to furnish the court with scientific information which is likely to be outside the experience and knowledge of a judge or jury.”¹³⁰ The court further suggested that such evidence would be unnecessary (and therefore inadmissible) where the judge or jury could form their own conclusions “without help.”¹³¹ The psychiatrist’s evidence

¹²¹ *R. v. Turner*, [1975] 1 All ER 70.

¹²² ROBERTS & ZUCKERMAN, *supra* note 46, at 483.

¹²³ This is clearly highlighted by the Law Commission’s efforts in 2009 and 2011. See THE LAW COMMISSION 2009, *supra* note 4; THE LAW COMMISSION 2011, *supra* note 14.

¹²⁴ THE LAW COMMISSION 2011, *supra* note 14, at 13.

¹²⁵ *Id.*

¹²⁶ *Id.*

¹²⁷ *R. v. Turner*, [1975] 1 All ER 70.

¹²⁸ CHRISTOPHER ALLEN, PRACTICAL GUIDE TO EVIDENCE 377 (4th ed. 2008). *Id.*

¹²⁹ *Id.*

¹³⁰ *R. v. Turner*, [1975] 1 All ER 70 at 841.

¹³¹ *Id.*

was not admissible, as, in the words of Lawton LJ, people “who are deeply in love can, and sometimes do, have outbursts of blind rage when discovering unexpected wantonness on the part of their loved ones... *Jurors do not need psychiatrists to tell them how ordinary folk who are not suffering from any mental illness are likely to react to the stresses and strains of life.*”¹³² Twenty years later, the Canadian Supreme Court noted, in *R v. Mohan*,¹³³ that “to be admissible an expert’s evidence is “necessary” only in the limited sense that it has to provide helpful information which is likely to be outside a judge or jury’s knowledge and experience.”¹³⁴ This rationale has subsequently been imported by courts in England and Wales.

ii. Relevant expertise

The requirement of relevant expertise comes with two general assumptions. First, that there is a recognisable relevant field within which the issue at hand can be classified,¹³⁵ and secondly, that it is possible to gain expertise within this particular field.¹³⁶ The Law Commission has stated that in order to give expert evidence at trial, the individual “claiming expertise must be an expert in the relevant field.”¹³⁷

Notably, a lack of formal qualifications will not prevent a person from being seen as a competent expert witness. This was first seen in the 1894 case of *R v. Silverlock*,¹³⁸ where it was established that a person did not need formal or rigorous training to be seen as an expert, as long as their informal interest and study of the subject was sufficient.¹³⁹

In 1984, the requirement of relevant expertise was outlined by the Supreme Court of South Australia in *R v. Bonython*,¹⁴⁰ a judgment which has frequently been cited by the Court of Appeal (Criminal Division) (CACD) for England and Wales. The defendant in *Bonython* had been convicted of forgery after falsifying a victim’s signature to obtain money. In the judgment it was stated by King CJ that relevant expertise would be where “the witness has acquired by study or experience sufficient knowledge of the subject to render his [or her] opinion of value in resolving the issues before the court.”¹⁴¹ The court confirmed that expert opinion evidence provided by a police sergeant who had acquired expertise in the comparison of handwriting and identification of signatures (a recognised field for expert testimony), was admissible even though this expertise did not come from a formal course or study.¹⁴²

¹³² *Id.* (emphasis added).

¹³³ *R. v. Mohan*, [1994] 2 SCR 9, 10f (appeal taken from Can.)

¹³⁴ THE LAW COMMISSION 2011, *supra* note 14, at 13.

¹³⁵ ROBERTS & ZUCKERMAN, *supra* note 46, at 496.

¹³⁶ *Id.*

¹³⁷ THE LAW COMMISSION, *supra* note 14, at 13.

¹³⁸ *R. v. Silverlock*, [1894] 2 Q.B. 766 (Eng.).

¹³⁹ *Id.*

¹⁴⁰ *R. v. Bonython*, (1984) 38 SASR 45.

¹⁴¹ *Id.*

¹⁴² *Id.*

There have been some restraints on the admission of irrelevant expertise in the courts in England and Wales. For example, in the 1991 case of *R v. Robb*,¹⁴³ it was suggested that expert opinion evidence by an amateur psychologist would be inadmissible.¹⁴⁴ Nevertheless, the use of expert witnesses without formal qualifications has been seen frequently, for example in the 2003 case of *R v. Hodges*,¹⁴⁵ where drug-squad officers were allowed to give evidence on street prices and other issues relating to the drugs trade.¹⁴⁶

The Law Commission has recommended that the threshold for determining relevant expertise should be threefold and include: “a requirement of proof on the balance of probabilities”;¹⁴⁷ that “amateurs are not qualified to give some types of expert evidence”;¹⁴⁸ and that some fields, such as DNA analysis, already have explicit guidelines for determining expertise.¹⁴⁹

iii. Impartiality

It has been suggested that the CACD never tires of saying that the professional duties of expert witnesses are “owed to the court and override any obligation to the person from whom the expert has received instructions or by whom the expert is paid. It is hardly necessary to say that experts should maintain professional objectivity and impartiality at all times.”¹⁵⁰ Indeed, it is explicitly set out in Rule 33.2 of the Criminal Procedure Rules 2013¹⁵¹ that an expert’s duty is to give objective and unbiased opinion evidence to the court based on matters within their expertise.¹⁵² However, the CACD made it clear in *R v. Stubbs*¹⁵³ that apparent bias does not necessarily make an expert’s evidence inadmissible.¹⁵⁴ In *Stubbs*, fraudulent money transfers had been made from the HSBC Bank. One of the prosecution’s experts was an employee of the HSBC who had headed the internal investigation into the money transfers.¹⁵⁵ The CACD confirmed that the expert’s employment and the importance of the case to the HSBC did not disqualify the expert from giving expert evidence.¹⁵⁶ The court considered that “it

¹⁴³ *R. v. Robb*, [1991] 93 Cr App R. 161.

¹⁴⁴ *Id.*

¹⁴⁵ *R. v. Hodges*, [2003] EWCA Crim 290.

¹⁴⁶ *Id.*

¹⁴⁷ THE LAW COMMISSION, *supra* note 14, at 14.

¹⁴⁸ *Id.*

¹⁴⁹ *Id.*

¹⁵⁰ See ROBERTS & ZUCKERMAN, *supra* note 46, at 509, citing *R. v. Bowman*, [2006] EWCA Crim 417.

¹⁵¹ Part 33 of the Criminal Procedure Rules as in force on 7 October 2013, available at <http://www.justice.gov.uk/courts/procedure-rules/criminal/docs/2012/crim-proc-rules-2013-part-33.pdf>.

¹⁵² *Id.* at Rule 33.2.

¹⁵³ *R. v. Stubbs*, [2006] EWCA Crim 2312.

¹⁵⁴ *Id.* at ¶68.

¹⁵⁵ *Id.* at ¶26.

¹⁵⁶ *Id.* at ¶59.

was a matter for the jury to determine whether there was any conscious or unconscious bias or lack of objectivity” and that this was related to the weight of the evidence rather than its admissibility.¹⁵⁷

Referring to both *Bonython* and *Stubbs*, the court in *Leo Sawrij v. North Cumbria Magistrates’ Court*¹⁵⁸ in 2009 also confirmed that a commercial relationship with a party to the litigation will not disqualify a person as an expert, as “it is not appropriate in criminal cases to rule an expert's evidence as inadmissible simply on the basis that he has some connection with the party who is intending to call him.”¹⁵⁹ The court also made the point that any difference in approach to impartiality in civil cases was of no relevance as this was a criminal case.¹⁶⁰

iv. Evidentiary reliability

The requirement of evidentiary reliability has become somewhat unclear in England and Wales. Trial and appellate courts have relied on a mixture of judgments to interpret this requirement, including the American case of *Frye* and the Australian case of *Bonython*.

Although concerned with psychological evidence rather than ‘hard science’, the case of Edward Gilfoyle provides a good illustration of the blurred situation in England and Wales.¹⁶¹ Gilfoyle was convicted of his heavily pregnant wife Paula’s murder in 1993, the year after she had been found dead hanging from a ceiling beam in the couple’s garage.¹⁶² The prosecution alleged that Gilfoyle somehow made his wife write a suicide note and then forced or tricked her to climb a ladder in the garage and put her head through the noose.¹⁶³

For the trial, psychologist Professor David Canter¹⁶⁴ had been asked by the police to examine notes that Gilfoyle and Paula had written, including a suicide note from Paula that had been found in their house.¹⁶⁵ This was done in an attempt to decide whether the notes were written by Paula or dictated by Gilfoyle, and whether it was her intention to kill herself.¹⁶⁶ Without having done anything of this nature before, and without being allowed to speak to either Gilfoyle or anyone from Paula’s family, Professor Canter came to the conclusion that Paula “had probably not written the note with the intention of killing herself.”¹⁶⁷ The ‘psychological autopsy’ that Canter had produced was found to be inadmissible

¹⁵⁷ *Id.*

¹⁵⁸ *Leo Sawrij v. North Cumbria Magistrates’ Court*, [2009] EWHC 2823.

¹⁵⁹ *Id.* at ¶23.

¹⁶⁰ *Id.*

¹⁶¹ *R. v. Gilfoyle (No 2)*, [2001] 2 Crim App. R. 5.

¹⁶² *Id.* at ¶1.

¹⁶³ *R. v. Gilfoyle*, [1996] 1 Crim App. R. 302.

¹⁶⁴ Professor Canter’s biography and resume can be viewed here: <http://www.davidcanter.com/> (last visited Aug. 17, 2015).

¹⁶⁵ David V. Canter, *Suicide or Murder? Implicit Narratives in the Eddie Gilfoyle Case*, in *THE FORENSIC PSYCHOLOGIST’S CASEBOOK: PSYCHOLOGICAL PROFILING AND CRIMINAL INVESTIGATION*, 315, 319 (Laurence Alison ed., 2005).

¹⁶⁶ *Id.* at 320.

¹⁶⁷ *Id.* at 321.

and thus never used in court.¹⁶⁸ However, Canter has stated that even though it was never used “the report itself bolstered the determination on the prosecution.”¹⁶⁹ With the absence of any hard evidence, the defense had difficulties opposing any of the claims made by the prosecution.¹⁷⁰

Following Gilfoyle’s conviction, Professor Canter re-examined the case and carried out additional research. During the second appeal in 2001, *R v. Gilfoyle (No 2)*,¹⁷¹ Gilfoyle’s defense wanted to use Canter’s more comprehensive ‘psychological autopsy’ which now stated that the evidence demonstrated that Paula had killed herself.¹⁷² The CACD confirmed that in accordance with *R v. Strudwick and Merry*,¹⁷³ the guiding principle appeared to be in line with the *Frye* test, namely that to be admissible, new and developing areas of science must be accepted by the scientific community as being able to provide an accurate and reliable opinion.¹⁷⁴ The CACD concluded that “the present academic status of psychological autopsies is not, in our judgment, such as to permit them to be admitted as a basis for expert opinion before a jury.”¹⁷⁵

It is perhaps surprising that the CACD seemingly decided to adopt the *Frye* test to keep this form of evidence out of the court room, as this test had already been replaced in several American jurisdictions in favour of *Daubert* by that time. Even though the criteria for assessing evidentiary reliability were not clearly explained in case law for England and Wales, Ormerod and Barsby suggested that the apparent approval of *Frye* by the CACD “could well create difficulties.”¹⁷⁶ In particular, the *Frye* test seems to contradict the 1991 decision by the CACD in *Robb*,¹⁷⁷ where it was suggested that the minority view of phoneticians¹⁷⁸ was admissible, and the common law principle verified in *R v Clarke*,¹⁷⁹ that it would be wrong to exclude evidence which would be of advantage to the court simply because it is based on new techniques or advances in science not yet recognised by the courts.¹⁸⁰

¹⁶⁸ *Id.*

¹⁶⁹ *Id.*

¹⁷⁰ See *R. v. Gilfoyle*, [1996] 1 Crim. App. R. 302 and *R. v. Gilfoyle (No 2)*, [2001] 2 Crim. App. R. 5. It may also be argued that the report by Professor Canter could have led to case construction, see Marika L. Henneberg & Barry W. Loveday, ‘Off Track’ Police Investigations, Case Construction and Flawed Forensic Practices: An Analysis of Three Fatal Stabbings in Sweden, California and England, 4 BR. J. AM. LEG. STUDIES 499 (2015).

¹⁷¹ *R. v. Gilfoyle (No 2)*, [2001] 2 Crim. App. R. 5.

¹⁷² Canter, *supra* note 165, at 321; *R. v. Gilfoyle (No 2)*, [2001] 2 Crim. App. R. 5.

¹⁷³ *R. v. Strudwick and Merry*, [1993] 99 Crim. App. R. 326.

¹⁷⁴ *Id.* at 332; D.C. Ormerod & Clare Barsby, *Evidence: Murder – Whether “Psychological Autopsy” of Victim Admissible, to Show Likelihood of Suicide*, CRIM. L. REV. 312, 313 (2001).

¹⁷⁵ *R. v. Gilfoyle (No 2)*, [2001] 2 Crim. App. R. 5, [25].

¹⁷⁶ Ormerod & Barsby, *supra* note 174, at 314.

¹⁷⁷ *R. v. Robb*, [1991] 93 Cr. App. R. 161.

¹⁷⁸ A phonetician is a specialist in phonetics, namely “the sounds used in speech, or the scientific study of these”, *Phonetics*, The Free Dictionary, <http://www.thefreedictionary.com/phonetics> (last visited Aug. 17, 2015).

¹⁷⁹ *R. v. Clarke*, [1995] 2 Crim. App. R. 425.

¹⁸⁰ THE LAW COMMISSION 2009, *supra* note 4, at 20-22.

A significant case which drew attention to the important issue of evidentiary reliability was that of Mark Dallagher, who was convicted of murder in 1998 based on ear print comparison evidence.¹⁸¹ The victim had been killed in her bed during a break-in and the perpetrator left ear prints on a window. During the trial, the prosecution had relied on the testimony of two experts in ear print comparisons.¹⁸² In the appeal, it was argued by Dallagher that the jury should not have been allowed to hear the ear print comparison evidence as there were misgivings about the accuracy of such evidence.¹⁸³ The CACD decided that the evidence was admissible.¹⁸⁴ However, the Court also noted that if the jury had heard evidence from three forensic scientists that questioned the reliability of ear print comparison evidence, available at the appeal, it was reasonable to assume that this would have had an impact on the jury's decision to convict.¹⁸⁵ However, the CACD also stated that "the trial judge could not possibly have concluded that the Crown's expert evidence was irrelevant, or so unreliable that it should be excluded."¹⁸⁶

Dallagher's appeal was allowed and a retrial was ordered. However, the retrial came to a halt after only ten days. In January 2004 all charges against Dallagher were formally dropped after it was confirmed that DNA recovered from the ear print excluded him as the donor.¹⁸⁷ In this case, DNA clearly showed that the ear print evidence used in the trial had been unreliable.

It is worth noting that if the court in *Dallagher* had adopted the *Frye* test, it would have been clear from American cases that ear print comparison techniques were not generally accepted by the scientific community.¹⁸⁸ Equally, if the *Daubert* test had been adopted the ear print evidence would have failed to satisfy all the criteria of that test.¹⁸⁹ However, *Daubert* is not a check list, and techniques are often admissible even when they have failed one of the criteria.¹⁹⁰

New fields of scientific expertise were also questioned in 2004, in *R v. Luttrell and Others*,¹⁹¹ where a skilled lip-reader had given evidence for the prosecution as to what was said between Luttrell and a co-accused in footage which had been caught on CCTV.¹⁹² The appellants had been convicted of conspiracy to handle stolen goods and appealed against the decision to allow lip-reading evidence at the trials, stating that such evidence had not been shown to be reliable

¹⁸¹ *R. v. Dallagher*, [2002] EWCA Crim 1903.

¹⁸² *Id.* at ¶9.

¹⁸³ *Id.* at ¶6.

¹⁸⁴ *Id.* at ¶29.

¹⁸⁵ *Id.* at ¶24.

¹⁸⁶ *Id.* at ¶29.

¹⁸⁷ Bob Woffinden, *Earprint Landed Innocent Man in Jail for Murder*, THE GUARDIAN, Jan. 23, 2004.

¹⁸⁸ D.C. Ormerod & Clare Barsby, *Case Comment – Evidence: Prosecution Relying on Expert Evidence Relating to Ear Prints*, CRIM. L. REV. 821, 823 (2002).

¹⁸⁹ *Id.*

¹⁹⁰ See, e.g., Sarah L. Cooper, *The Collision of Law and Science: American Court Responses to Developments in Forensic Science*, 33 PACE L. REV. 234 (2013).

¹⁹¹ *R. v. Luttrell and Others*, [2004] EWCA Crim 1344.

¹⁹² *Id.* at ¶10.

and a warning should have been given to the jury.¹⁹³ The CACD noted that such evidence, like facial mapping, was a type of “real evidence” which was capable of passing the ordinary tests of relevance and reliability,¹⁹⁴ and was therefore potentially admissible in evidence. Once ruled to be admissible by a judge, the “actual reliability of the evidence will be determined by the jury in the light of cross-examination of the witness and any contradictory expert evidence adduced by the opposing party.”¹⁹⁵ It was further stated that such evidence did require a special warning from the judge as to its limitations and risks of error, but the specific terms of such a direction would depend on the facts of the particular case.¹⁹⁶ The Law Commission has stated that there is “little judicial guidance, and certainly no consistent guidance, on how sufficiency of reliability is to be determined for expert evidence at the admissibility stage.”¹⁹⁷

In relation to deaths of infants, the infamous case of Sally Clark is a useful illustration of the lax attitude to evidentiary reliability that the courts in England and Wales have shown in the last couple of decades.¹⁹⁸ Clark and her husband, both solicitors, lost two baby sons to Sudden Infant Death Syndrome (SIDS). Clark had been convicted on two counts of murder in 1999, and had her first appeal dismissed in 2000.¹⁹⁹ In her second appeal in 2003, *R v. Clark (No 2)*,²⁰⁰ the CACD quashed her convictions based on two main reasons. First, the pathologist who carried out the autopsy on the second infant had failed to disclose results of microbiological tests which indicated the possibility that the infant died of natural causes.²⁰¹ Secondly, the statistical evidence given by the then distinguished Professor of paediatrics Sir Roy Meadow was erroneous.²⁰² Professor Meadow was an expert witness for the prosecution, and he testified that in his opinion there was only a one in 73 million chance of having two cases of SIDS in the same family.²⁰³ This approach completely disregarded any genetic or environmental factors affecting the likelihood of several infant deaths in the same family.²⁰⁴

The media was quick to blame this miscarriage of justice on Professor Meadow, but this is an overly simplistic explanation of a much larger problem.²⁰⁵

¹⁹³ *Id.* at ¶39. Appellants further stated that the prosecution had not disclosed all material relevant to the lip-reader’s expertise and reliability, *id.* at [49].

¹⁹⁴ *Id.* at ¶37].

¹⁹⁵ THE LAW COMMISSION 2009, *supra* note 4, at 18.

¹⁹⁶ *R. v. Luttrell*, [2004] EWCA Crim 1344 at [44].

¹⁹⁷ THE LAW COMMISSION 2009, *supra* note 4, at 19.

¹⁹⁸ *R. v. Clark (No. 2)*, [2003] EWCA Crim 1020.

¹⁹⁹ *Id.* at ¶1.

²⁰⁰ *Id.*

²⁰¹ *Id.* at ¶171. The failure to disclose the results of important tests highlighted issues which were later addressed by the field of pathology. However, these issues are beyond the scope of this article and will not be discussed in detail.

²⁰² *Id.* at [180].

²⁰³ *Id.* at [173].

²⁰⁴ Adam Wilson, *Expert Testimony in the Dock*, J. CRIM. L. 330, 343 (2005).

²⁰⁵ *Id.* at 330.

The CACD stated that it was “unfortunate that the trial did not feature any consideration as to whether the statistical evidence should be admitted in evidence.”²⁰⁶ Professor Meadow testified beyond his expertise and he got his calculations wrong.²⁰⁷ In summary, not only was the statistical evidence presented highly unreliable, but this approach also grouped the deaths together as a package even though the jury had been asked to consider separate verdicts in the two deaths.²⁰⁸

Professor Meadow had testified in other cases of SIDS.²⁰⁹ Angela Cannings lost three of her four babies when they were less than 18 weeks old.²¹⁰ She was convicted on two counts of murder after a trial where Professor Meadow had testified for the prosecution. Although Professor Meadow did not present the same statistical figures as in *Clark*, reference had been made to the rarity of multiple deaths in one family.²¹¹ In the appeal, *R v. Cannings*,²¹² the CACD looked further into the scientific basis behind claims of what would be considered natural or unnatural cases of SIDS.²¹³ It was clear to the court that there was a lot about death in infancy, including natural causes, that was still unknown.²¹⁴ Experts could not agree on whether certain cases had a natural or unnatural cause of death, which indicated to the court that the scientific or medical basis on which to make such assertions was not strong enough to provide the sole evidence for prosecution.²¹⁵ As a result of the Cannings case, there was a review of nearly 300 cases where a parent had been convicted of homicide or infanticide of a baby under the age of two.²¹⁶

Lorraine Harris was convicted of the manslaughter of her infant son in 2000, after it was determined that the baby had shown the triad of symptoms believed to establish Shaken Baby Syndrome (SBS), namely subdural hemorrhage, retinal hemorrhage, hypoxic-ischaemic encephalopathy.²¹⁷ On appeal in 2005, Harris’ case was heard together with three other convictions where infants had died or been seriously injured by a caregiver.²¹⁸ These were Faulder, Cherry and Rock, convicted of inflicting grievous bodily harm, manslaughter and murder respectively.²¹⁹ The court found that new evidence undermined the notion that

²⁰⁶ *R. v. Clark* (No. 2), [2003] EWCA Crim 1020, ¶173.

²⁰⁷ *Id.* at ¶103: “simply squaring the figure was an illegitimate over simplification”.

²⁰⁸ *R. v. Clark* (No. 2), [2003] EWCA Crim 1020 ¶173.

²⁰⁹ *R. v. Cannings*, [2004] EWCA Crim 1.

²¹⁰ *Id.* at ¶¶1, 3.

²¹¹ *Id.* at ¶¶29, 42, 130.

²¹² *Id.*

²¹³ *Id.* at ¶¶142, 145, 149.

²¹⁴ *Id.* at ¶177.

²¹⁵ *Id.* at ¶178.

²¹⁶ C.P. Walker & Carole McCartney, Case Comment – *Evidence: Expert Witnesses Seriously Disagreeing as to Whether Cause of Death of Infants Natural or Unnatural*, CRIM. L. REV. 126, 129 (2005).

²¹⁷ *R. v. Harris and Others*, [2005] EWCA Crim 1980, at ¶122.

²¹⁸ *Id.* at ¶1.

²¹⁹ *Id.* at ¶¶1, 2.

the mere presence of a triad of intra-cranial injuries would indicate a non-accidental head injury in a child.²²⁰ The court acknowledged the unreliable nature of the evidence believed to indicate SBS, and quashed Harris' conviction,²²¹ although the court also emphasised their view that developments in scientific thinking should not be excluded from court "simply because they remain at the stage of a hypothesis."²²² In *R v. Henderson and Others* in 2010, the CACD discussed in some detail how cases such as these, which rely mainly on expert evidence, should be dealt with in court.²²³

B. THE LAW COMMISSION'S PROPOSAL FOR REFORM

In its 2009 Consultation Paper,²²⁴ the Law Commission discussed the case of *Bonython*²²⁵ in some detail in relation to the admissibility of expert evidence. In *Bonython*, the Supreme Court of South Australia had confirmed that part of the admissibility test in that jurisdiction was "whether the subject matter of the opinion forms part of a body of knowledge or experience which is sufficiently organized or recognized to be accepted as a reliable body of knowledge or experience."²²⁶

The extent to which *Bonython* actually applies in England and Wales has been debated. In a 2010 speech for the Forensic Science Society and King's College, London, Lord Justice Leveson suggested that the evidentiary reliability part of *Bonython* did not at that time represent the current state of the law in England and Wales.²²⁷ However, both before and after this speech the CACD have made clear references to *Bonython* in at least two significant criminal appeals. In *R v. Reed and Reed*²²⁸ and *R v. Broughton*,²²⁹ two appeals where the reliability of Low Template DNA²³⁰ (DNA from minute samples) was questioned, the CACD seemed to accept that there was indeed a common law reliability test, at least for scientific evidence.²³¹

The Law Commission has suggested that part of the problem with evidentiary reliability is that the CACD has appeared to be reluctant to exclude new

²²⁰ THE LAW COMMISSION 2009, *supra* note 4, at 13-14.

²²¹ *R. v. Harris*, [2005] EWCA Crim 1980 at ¶153.

²²² *Id.* at ¶270.

²²³ *R. v. Henderson*, [2010] EWCA Crim 1269.

²²⁴ THE LAW COMMISSION 2009, *supra* note 4, at 13-14.

²²⁵ *R. v. Bonython*, (1984) 38 SASR 45.

²²⁶ *Id.*

²²⁷ THE LAW COMMISSION 2011, *supra* note 14, at 15.

²²⁸ *R. v. Reed and Reed*, [2009] EWCA Crim 2698.

²²⁹ *R. v. Broughton*, [2010] EWCA Crim 549.

²³⁰ "Low template DNA or low copy number DNA (LCN) refers to samples that contain less than the 250pg (>100pg) required to produce a complete profile using the standard 28-30 cycles. LCN was launched into casework in the UK in 1999." East Midlands Forensic Pathology Unit, *Low Template DNA*, Uni. Leicester, <http://www2.le.ac.uk/departments/emfpu/genetics/explained/low-template> (last visited Aug. 16, 2015).

²³¹ THE LAW COMMISSION 2011, *supra* note 14, at 16.

and developing areas of science from court²³². The reliability requirement in the common law admissibility test was considered insufficiently robust,²³³ reflecting what they termed a *laissez-faire* approach to the admissibility of expert evidence in England and Wales.²³⁴ It was also noted that juries tended to defer to an expert opinion, and that unreliable expert evidence was not effectively challenged in cross examination.²³⁵

The Law Commission made proposals for statutory reform in the Draft Criminal Evidence (Experts) Bill 2011.²³⁶ In that Bill, they advocated for an approach that did not focus upon the scientific status of the evidence proffered, but rather its reliability.²³⁷ The Law Commission attempted to reduce the likelihood of unreliable scientific evidence being admitted into court by codifying existing common law principles and adopting a number of characteristics from the U.S. Supreme Court's approach.²³⁸ However, from the National Research Council's report *Strengthening the Forensic Sciences in the US: A Path Forward* (the NRC Report),²³⁹ it appears that the American approach has often failed to prevent the admission of unreliable evidence. It is therefore unlikely that the Law Commission's proposals, which drew heavily on *Daubert*, would have prevented unreliable scientific evidence from being admitted into the courts.²⁴⁰

Edmond suggested that the Law Commission's proposals would not bring about the changes needed, and that the approach did little more than turning admissibility decisions and the reliability of expert opinions into questions of law.²⁴¹ However, some scholars have agreed that the Law Commission should be

²³² *Id.* at 4.

²³³ *Id.* at 16.

²³⁴ *Id.* at 4.

²³⁵ *Id.* at 5.

²³⁶ Draft Criminal Evidence (Experts) Bill, 2011, *see id.* at 146-158.

²³⁷ *Id.* at Art. 4.

²³⁸ Gary Edmond, *The Admissibility of Incriminating Expert Opinion Evidence in the U.S., England and Canada*, 23(8) JUD. OFFICERS' BULL. 67 (2011). *See also* *Daubert*, 509 U.S. 579 (1993); Donald E. Shelton, *Forensic Science Evidence and Judicial Bias in Criminal Cases*, 49(3) JUDGES' JOURNAL 18 (2010); THE LAW COMMISSION 2011, *supra* note 14.

²³⁹ NRC REPORT, *supra* note 4.

²⁴⁰ *See, e.g.*, Jane Campbell Moriarty, *Will History Be Servitude?: The NAS Report on Forensic Science and the Role of the Judiciary*, 2 UTAH L. REV. 299 (2010); Christine Fung & Evan Berman, *Rising to the Challenge of the NAS Report Strengthening Forensic Science in the United States: A Path Forward: A Call for Demonstrated Competence Amongst Legal Practitioners*, 37(2) WM. MITCHELL L. REV. 683 (2010); Paul C. Giannelli, *Fallout From the NAS Forensic Science Report*, 25 CRIM. JUST. 53 (2010-2011).

²⁴¹ Gary Edmond, *Is Reliability Sufficient? The Law Commission and Expert Evidence in International and Interdisciplinary Perspective: Part 1*, 16 INT'L J. EVIDENCE & PROOF 30 (2012); Gary Edmond, *Advice for the Courts? Sufficiently Reliable Assistance with Forensic Science and Medicine: Part 2*, 16 INT'L J. EVIDENCE & PROOF 263 (2012). *See also* Edmond, *supra* note 238; Gary Edmond & Andrew Roberts, *Procedural Fairness, the Criminal Trial and Forensic Science and Medicine*, 33 SYDNEY L. REV. 359 (2011); Adam Wilson, *The Law Commission's Recommendation on Expert Opinion Evidence: Sufficient Reliability?*, 3 WEB JCLI (2012).

commended for tackling this issue,²⁴² with Ward arguing that the proposals provided some well needed clarity on the issue, but that judges could use their existing powers to achieve similar results.²⁴³ Considering critical studies such as the NRC Report (2009),²⁴⁴ Garrett (2011),²⁴⁵ and the Scottish fingerprint inquiry (2012),²⁴⁶ it is questionable whether judges are equipped to act as ‘gate-keepers’ to ensure only accurate and reliable evidence is entered into the courts.²⁴⁷

The government rejected the proposed Bill in November 2013.²⁴⁸ Reasons for the rejection included the costs that extra pre-trial hearings to determine the reliability of evidence would involve.²⁴⁹ The government suggested that changes could be made to existing legislation, such as the Criminal Procedure Rules, to accommodate some of the recommendations from the proposal.²⁵⁰ As a result, to this date, there is no statutory reliability test in place in England and Wales.

IV. CONTROVERSIES RELATING TO MEDICAL AND SCIENTIFIC EVIDENCE IN CASES OF ALLEGED SHAKEN BABY SYNDROME / ABUSIVE HEAD TRAUMA

In England and Wales, three categories of miscarriages of justice caused by expert evidence have been scrutinized by the courts and the Law Commission recently.²⁵¹ According to Phillips, these are cases where the expert (1) “deliberately misled the court,”²⁵² (2) testified beyond or outside their expertise,²⁵³ and (3), where the expert has relied “on flawed or faulty forensic or diagnostic techniques.”²⁵⁴

²⁴² Gary Edmond & Andrew Roberts, *The Law Commission’s Report on Expert Evidence in Criminal Proceedings*, 11 CRIM. L. REV. 844 (2012).

²⁴³ Tony Ward, *Expert Evidence and the Law Commission: Implementation Without Legislation?*, 7 CRIM. L. REV. 561, 571 (2013).

²⁴⁴ NRC REPORT, *supra* note 4.

²⁴⁵ BRANDON L. GARRETT, *CONVICTING THE INNOCENT: WHERE CRIMINAL PROSECUTIONS GO WRONG* (2011).

²⁴⁶ THE FINGERPRINT ENQUIRY, *THE SCOTTISH FINGERPRINT ENQUIRY REPORT* (2012) *available at* http://www.thefingerprintinquiryScotland.org.uk/inquiry/files/TheFingerprintInquiryReport_Low_res.pdf.

²⁴⁷ *See, e.g., Daubert*, 509 U.S. 579 (1993); Liz Heffernan & Mark Coen, *The Reliability of Expert Evidence: Reflections on the Law Commission’s Proposals for Reform*, 73(6) J. CRIM. L. 488 (2009); Andrew Roberts, *Rejecting General Acceptance, Confounding the Gate-Keeper: The Law Commission and Expert Evidence*, 8 CRIM. L. REV. 551 (2009); Ken Shaw, *Expert Evidence Reliability; Time to Grasp the Nettle*, 75(5) J. CRIM. L. 368 (2011); NRC REPORT, *supra* note 4.

²⁴⁸ MINISTRY OF JUSTICE, *supra* note 16.

²⁴⁹ Skills for Justice, *supra* note 17.

²⁵⁰ *Id.*

²⁵¹ THE LAW COMMISSION 2011, *supra* note 14; Edward Phillips, *Miscarriages of Justice and the Forensic Expert: The Impact of the Law Commission’s Reforms*, 79 MED. LEG. J. 94 (2011).

²⁵² Phillips, *supra* note 251, at 94.

²⁵³ *Id.*

²⁵⁴ *Id.* at 95.

The CACD has acknowledged that SBS/AHT cases are largely relying on expert evidence of a complex nature.²⁵⁵ However, the adversarial system does not appear to be an objective ‘truth-finder’, and Roberts²⁵⁶ supports the notion that the “adversarial procedure is sometimes suboptimal for truth-finding.”²⁵⁷ This is also apparent when looking at what has been aptly described as “litigation-driven science”,²⁵⁸ where arguments from both sides of the SBS/AHT debate have been exacerbated.²⁵⁹ At the heart of this debate is whether a triad of symptoms, namely subdural hemorrhage, retinal hemorrhage and hypoxic-ischemic encephalopathy, is pathognomonic of SBS/AHT.²⁶⁰

The reliability of evidence relating to alleged SBS/AHT cases appears to be particularly problematic in the heavily polarized debate around SBS/AHT, especially in relation to the triad of symptoms thought to be pathognomonic of SBS/AHT.²⁶¹ In order to improve our understanding of the symptoms included in the triad, studies and experiments have been carried out in a variety of different disciplines, including anatomy, engineering, medicine and pathology.²⁶²

In 2003, Geddes *et al* suggested a new hypothesis around the triad of symptoms, which is often referred to as “Geddes Unified Hypothesis” or Geddes III.²⁶³ The unifying hypothesis is a proposition that the triad of symptoms associated with SBS can be caused by severe hypoxia (lack of oxygen in the tissues).²⁶⁴ This may lead to brain swelling.²⁶⁵ This, combined with raised intracranial pressure, could produce both subdural and retinal hemorrhages and can be seen in *natural* deaths as well as in alleged SBS cases.²⁶⁶ Accordingly it was asserted that any

²⁵⁵ Andrew Roberts, *Case Comment: Evidence: Expert Evidence in Cases Involving Sudden Death of Child*, 12 CRIM. L. REV. 945 (2010).

²⁵⁶ Paul Roberts, *Renegotiating Forensic Cultures: Between Law, Science and Criminal Justice*, 44 STUD. HIST. & PHIL. BIOL. & BIOMED. SCI. 47 (2013).

²⁵⁷ *Id.* at 55.

²⁵⁸ See, e.g., Susan Haack, *What’s Wrong with Litigation-Driven Science? An Essay in Legal Epistemology*, 38 SETON HALL L. REV. 1053 (2008); Jo lle A. Moreno and Brian Holmgren, *The Supreme Court Screws up the Science: There Is No Abusive Head Trauma/Shaken Baby Syndrome “Scientific” Controversy*, 5 UTAH L. REV. 1357 (2013).

²⁵⁹ *Id.*

²⁶⁰ See Findley et al., *supra* note 20.

²⁶¹ See, e.g., Deborah Tuerkheimer, *Science-Dependent Prosecution and the Problem of Epistemic Contingency: A Study of Shaken Baby Syndrome*, 62 ALA. L. REV. 513 (2011).

²⁶² See, e.g., D.C. Batterbee et al., *Computational Model of an Infant Brain Subjected to Periodic Motion Simplified Modelling and Bayesian Sensitivity Analysis*, 225 J. ENGINEERING MED. 1036 (2011); Jingmin Cheng et al., *Study of an Infant Brain Subjected to Periodic Motion Via a Custom Experimental Apparatus Design and Finite Element Modelling*, 43 J. BIOMECHANICS 2887 (2010); John W. Finnie et al., *Diffuse Neuronal Perikaryal Amyloid Precursor Protein Immunoreactivity in an Ovine Model of Nonaccidental Head Injury (the Shaken Baby Syndrome)*, 17(2) J. CLIN. NEUROSCIENCE 237 (2010); Steven A. Hanset et al., *A Finite Element Infant Eye Model to Investigate Retinal Forces in Shaken Baby Syndrome*, 247(4) GRAEFES ARCHIVE FOR CLIN. & EXPER’ TAL OPHTHALMOLOGY 561(2009).

²⁶³ J.F. Geddes et al., *Dural Haemorrhage in Non-Traumatic Infant Deaths: Does It Explain the Bleeding in ‘Shaken Baby Syndrome’?*, 29 NEUROPATH. & APP. NEUROBIO. 14 (2003).

²⁶⁴ *Id.* at 20.

²⁶⁵ *Id.*

²⁶⁶ *Id.* at 18, 20.

incidents of apnea (the cessation of breathing) set in motion a cascade of events leading to the triad of symptoms often associated with SBS.²⁶⁷ This questions the validity of the triad as a diagnostic tool and suggests that apnea may have many different causes, including trauma or abuse.

Squier and Mack researched structures of the cranium, including the dura, arachnoid barrier and the bridging veins, and how these developed in infants.²⁶⁸ Their findings challenged beliefs that bridging vein rupture was the cause of subdural hemorrhage in this particular age group, and suggested that rupturing of a rich plexus of intradural vessels may be the cause of subdural hemorrhage without trauma.²⁶⁹ A similar study noted decreased levels of cerebrospinal fluid in subdural hemorrhage without trauma, and acknowledged that the dura was incredibly complex and that a better understanding of it would provide important insights into subdural hemorrhages.²⁷⁰

A study of ten teenage athletes who had suffered acute subdural hemorrhage drew multiple parallels between these teenage athletes and infants diagnosed with non-accidental trauma.²⁷¹ The study suggested that a “second impact syndrome”,²⁷² which occurs when a second injury is sustained before the first injury has healed, may be relevant to the SBS debate.²⁷³ In addition, the higher representation of males in cases of SBS/AHT was considered in a study which provided several biological explanations for such an overrepresentation,²⁷⁴ which further undermined the case for the triad as pathognomonic of SBS as these causes mimicked child abuse.²⁷⁵

Retinal hemorrhages in infants have also been studied. In 2009, Togioka *et al* analyzed 66 academic articles that covered the subject, and concluded that although the presence of retinal hemorrhages did not guarantee SBS, it was rare in cases of non-accidental head injury whereas it appeared to be common in abused children.²⁷⁶ However, studies have since explored a number of alternative

²⁶⁷ *Id.* at 20.

²⁶⁸ Waney Squier & Julie Mack, *The Neuropathology of Infant Dural Haemorrhage*, 187 FORENSIC SCI. INT'L 6 (2009).

²⁶⁹ *Id.* at 12.

²⁷⁰ Julie Mack et al., *Anatomy and Development of the Meninges: Implications for Subdural Collections and CSF Circulation*, 39(3) PED. RADIOL. 200 (2009).

²⁷¹ Robert C. Cantu & Alisa D. Gean, *Second-Impact Syndrome and a Small Subdural Haematoma: an Uncommon Catastrophic Result of Repetitive Head Injury with a Characteristic Imaging Appearance*, 27(9) J. NEUROTRAUMA 1557 (2010).

²⁷² Second-impact syndrome (SIS) is often seen in athletes. It involves a person suffering post-concussive symptoms following a head injury, and if sustaining a second head injury within a short time span this can lead to the brain swelling rapidly, and catastrophically. For a thorough discussion see Tareg Bey & Brian Ostick, *Second Impact Syndrome*, 10(1) W. J. EMERGENCY MED. 6 (2009).

²⁷³ Cantu & Gean, *supra* note 271.

²⁷⁴ Rubin Miller & Marvin Miller, *Overrepresentation of Males in Traumatic Brain Injury of Infancy and in Infants with Macrocephaly: Further Evidence That Questions the Existence of Shaken Baby Syndrome*, 31(2) 165 AM. J. FORENSIC MED. & PATH. 165 (2010).

²⁷⁵ *Id.* at 165.

²⁷⁶ Brandon M. Togioka et al., *Retinal Hemorrhages and Shaken Baby Syndrome: An Evidence-Based Review*, 37(1) J. EMERGENCY MED. 98 (2009).

causes for retinal hemorrhages in infants.²⁷⁷ For example, it was suspected that a five-week old child had sustained a non-accidental injury after experiencing a rapid onset of symptoms including drowsiness and hypotonia, unilateral retinal hemorrhages and an intracranial hemorrhage in the posterior fossa.²⁷⁸ An arteriovenous malformation was discovered at a repeat neuroimaging scan weeks later, which would have contributed to the retinal hemorrhages and this removed the suspicion of a non-accidental injury.²⁷⁹ The autopsy findings from four children aged three or younger found that retinal hemorrhages, which had been caused by fatal consequences of infection complications, mimicked some patterns in retinal hemorrhages associated with non-accidental trauma.²⁸⁰

In addition, a study which looked at two babies who had experienced fatal head injuries *in utero* following motor vehicle accidents, noted that both had extensive retinal hemorrhages and optic nerve sheath hemorrhages with peripapillary intrascleral hemorrhages.²⁸¹ The authors commented that, on the rare occasions that they were discussed in the relevant literature, peripapillary intrascleral hemorrhages were considered pathognomonic for abusive head trauma.²⁸² As the babies had been *in utero* a shaking motion was highly unlikely. Therefore, peripapillary intrascleral hemorrhages should not necessarily be considered conclusively diagnostic of abusive head trauma.²⁸³

Experiments to improve our understanding of the symptoms of SBS/AHT have been carried out. These have had varying results, but no experiment has unequivocally confirmed that the triad of symptoms is pathognomonic to SBS/AHT. For example, the shaking of a computational model of an infant eye suggested that shaking alone was enough to cause retinal hemorrhaging.²⁸⁴ The shaking of an automotive dummy showed that biomechanical investigations of SBS provided more accurate results “if the skull with paediatric features and the brain-skull interface are correctly represented.”²⁸⁵ The vigorous shaking of anesthetized lambs found only minimal axonal injury, subdural hemorrhages and retinal hemorrhages, although there was widespread neuronal perikaryal amyloid precursor protein expression.²⁸⁶ Finally, a computational model of an infant brain was subjected to periodic motion and the findings “provided an enhanced understanding of the effects of parameter uncertainty on the dynamics of SBS.”²⁸⁷

²⁷⁷ Findley et al., *supra* note 20, at 229-240; Aravind R. Reddy et al., *Unilateral Retinal Hemorrhages with Subarachnoid Hemorrhage in a Five-Week-Old Infant: Is This Nonaccidental Injury?* 20(4) EUR. J. OPTHAMOLOGY 799 (2010); Marcus C. Salvatori & Patrick E. Lantz, *Retinal Haemorrhages Associated with Fatal Paediatric Infections*, 55 MED. SCI. LAW 121 (2015).

²⁷⁸ Reddy, Clarke & Long, *supra* note 277.

²⁷⁹ *Id.* at 799.

²⁸⁰ Salvatori & Lantz, *supra* note 277.

²⁸¹ Candace H. Schoppe & Patrick E. Lantz, *Are Peripapillary Intrascleral Hemorrhages Pathognomonic for Abusive Head Trauma?*, 58(1) J. FORENSIC SCI. 228 (2013).

²⁸² *Id.* at 228.

²⁸³ *Id.* at 231.

²⁸⁴ Hans et al., *supra* note 262.

²⁸⁵ Cheng et al., *supra* note 262, at 2887.

²⁸⁶ Finnie et al., *supra* note 262.

²⁸⁷ Batterbee et al., *supra* note 262, at 1048.

As early as 2006, it was widely recognized, that there were many “mimics” of SBS/AHT.²⁸⁸ In a 2011 article, Squier discussed alternative and common causes for the triad of symptoms, including accidental falls, cortical vein and sinus thrombosis, inflicted injury, vitamin D deficiency, second impact syndrome, aneurysm rupture, rare genetic conditions, and resuscitation related injuries.²⁸⁹

In contrast, also in 2011, Narang argued that evidence-based medical literature supported the scientific soundness of AHT and, therefore, satisfied all the criteria under *Daubert*.²⁹⁰ Narang further disregarded Geddes’ Unified Hypothesis and Squier and Mack’s dural immature vascular plexus theory, pointing out that studies existed that showed that retinal hemorrhages and subdural hemorrhages were statistically significantly correlated with AHT.²⁹¹

Findley *et al* responded to the criticism and identified methodological problems with Narang’s article, including statistical misinterpretations and observer bias, and went on to clearly state the main scientific points behind the “new paradigm.”²⁹² Furthermore, as Findley *et al* point out, “Changing the name of the syndrome from SBS to AHT does not, however, resolve the disagreement.”²⁹³

What emerges from the above discussions is that this is a field in crisis. Medical, legal, academic and other scholars have voiced concern about the use of the SBS/AHT triad of symptoms as a tool for diagnosis and prosecution, as significant medical and scientific evidence discredits its very existence. Each of the symptoms contained in the triad have several natural and accidental causes in addition to abuse, so it is therefore difficult to see how the triad could be considered reliable in a medical or scientific sense. Maintaining that the triad is reliable in a legal sense is simply absurd.

Furthermore, it needs to be questioned how objective the science around the triad and identification of SBS/AHT really is. Although the identification of symptoms might be objective (i.e. symptoms are present and correctly identified), concluding that these symptoms are indeed evidence consistent with non-accidental injuries appears to be a completely subjective exercise.²⁹⁴

In the American case of *Del Prete v. Thompson* in 2014, the court was explicitly suspicious of the SBS/AHT diagnosis.²⁹⁵ In a footnote to the opinion, the court wrote that the testimony and evidence presented “arguably suggests that a claim of shaken baby syndrome is more an article of faith than a proposition of

²⁸⁸ Findley et al., *supra* note 20, at 239-40.

²⁸⁹ Waney Squier, *The “Shaken Baby” Syndrome: Pathology and Mechanisms*, 122(5) ACTA NEUROPATHOLOGICA 519 (2011).

²⁹⁰ Sandeep Narang, *A Daubert Analysis of Abusive Head Trauma/Shaken Baby Syndrome*, 11 HOUS. J. HEALTH L. & POL’Y 505, 576-83, 592 (2011).

²⁹¹ *Id.* at 595.

²⁹² Findley et al., *supra* note 20, at 297-98.

²⁹³ *Id.* at 215.

²⁹⁴ Science is regularly presented, and understood, as being objective, even where the results presented are, in fact, subjective. Courts frequently admit subjective science, such as fingerprints, as evidence. *See, e.g.*, Kola Abimbola, *Reason and Proof in Forensic Evidence*, 11 J. FORENSIC RES. 1 (2013); Simon A. Cole & Andrew Roberts, *Certainty, Individualisation and the Subjective Nature of Fingerprint Evidence*, 11 CRIM. L. REV. 824 (2012).

²⁹⁵ *Del Prete v. Thompson*, 2014, WL 296094 (N.D. Ill. Jan. 27, 2014).

science.”²⁹⁶ A year later, in early 2015, an open letter signed by an international group of 34 doctors, medical professionals, and international experts outlined the problems with how cases of SBS/AHT were being prosecuted by the courts in the United States and England and Wales.²⁹⁷ In the letter, the authors noted that “SBS has never been proved as anything more than an hypothesis”,²⁹⁸ and urged both criminal and civil courts to listen to both sides of the disagreements around the diagnosis.²⁹⁹

Despite the controversies outlined above, in England and Wales the Crown Prosecution Service (CPS) still rely on guidelines from March 2011 on how to prosecute cases of “non accidental head injury” (NAHI).³⁰⁰ Changing the term from SBS to non accidental head injury does not change the fact that it is still the triad of symptoms that will be relied upon for a prosecution. The CPS states that “cases will usually be diagnosed by a Triad of internal head injuries”³⁰¹ and “will *usually* require the Triad of injuries plus supporting evidence.”³⁰² It also states that Geddes’ Unified Hypothesis has not been endorsed by the CACD.³⁰³ Although a positive step has been taken by acknowledging that the triad alone should *usually* not be the sole basis for a prosecution, there are still dangers associated with the supporting evidence, as this also needs to be reliable, relevant and objective. As discussed by Henneberg and Loveday in this special issue, the mere finding of the triad of symptoms may influence the police investigation, leading to tunnel vision and case construction.³⁰⁴ Case construction occurs when the police and prosecution only focus on evidence which will support their hypothesis that a particular suspect is guilty, and any evidence to the contrary is excluded or its importance is minimized.³⁰⁵ This may result in the prosecution having insufficiently reliable evidence against a suspect admitted in court in order to bolster its case.³⁰⁶

V. CONCLUSION

This article has examined the admissibility of scientific evidence in criminal trials in the United States and in England and Wales. The American approach was found to be more robust than that in England and Wales, although in relation to controversies around SBS/AHT, weaknesses have been noted in both. The

²⁹⁶ *Id.* at 96.

²⁹⁷ Wrennall et al., *supra* note 21.

²⁹⁸ *Id.* at 3.

²⁹⁹ *Id.* at 4.

³⁰⁰ CPS guidelines are available online. See *Non-Accidental Head Injury Cases (NAHI, Formerly Referred to As Shaken Baby Syndrome [SBS]) – Prosecution Approach*, CPS.Gov.UK, (Mar. 24, 2011) http://www.cps.gov.uk/legal/l_to_o/non_accidental_head_injury_cases/.

³⁰¹ *Id.*

³⁰² *Id.*, emphasis added.

³⁰³ *Id.*

³⁰⁴ See Marika L. Henneberg & Barry W. Loveday, ‘Off Track’ Police Investigations, Case Construction and Flawed Forensic Practices: An Analysis of Three Fatal Stabbings in Sweden, *California and England*, 4 BR. J. AM. LEG. STUDIES 499 (2015).

³⁰⁵ *Id.* at 502-03

³⁰⁶ *Id.* at 505.

NRC Report suggested that sciences should be improved before they could be considered reliable in court.³⁰⁷ In England and Wales, the focus has been on legal reliability rather than scientific reliability, which makes the common law admissibility framework relatively weak in comparison to the approach in the US.³⁰⁸

Studies referred to in this article show that medical and scientific evidence believed to be pathognomonic of SBS/AHT need to be considered as highly unreliable.³⁰⁹ Edmond and San Roque state that adversarial legal systems assume that science and medical evidence is “epistemologically robust”³¹⁰ although when scrutinized, a lot of such evidence “is either unreliable or of unknown reliability.”³¹¹ Litigation-driven science may be part of the problem, at least in the US, as it keeps the SBS/AHT debate extremely polarised.³¹²

The Law Commission identified a number of problems relating to the reliability of scientific evidence in criminal courts.³¹³ A contradiction can be seen as although courts have been shown to have a lax attitude towards evidentiary reliability, for example by allowing weak science such as ear prints into court, they appear to be holding on to outdated science for far too long. The question of admissibility then becomes a double-edged sword, and this is a problem in both the United States and in England and Wales. To avoid this, courts need to recognize and consider significant developments relating to SBS/AHT, and use this to improve the quality of medical and scientific evidence before it is admitted into court. As weaknesses in the admissibility frameworks have been identified, this would be beneficial in both the United States and in England and Wales.

³⁰⁷ NRC REPORT, *supra* note 4.

³⁰⁸ Rhonda M. Wheate & Allan Jamieson, *A Tale of Two Approaches – The NAS Report and the Law Commission Consultation Paper on Forensic Science*, 7(2) INT’L COMMENTARY ON EVIDENCE, Art. 3 (2009).

³⁰⁹ *See also, e.g.*, Findley et al., *supra* note 20.

³¹⁰ Gary Edmond & Mehera San Roque, *The Cool Crucible: Forensic Science and the Frailty of the Criminal Trial*, 24(1) CURRENT ISSUES CRIM. JUST. 51, 51 (2012).

³¹¹ *Id.* at 51.

³¹² *See, e.g.*, Haack, *supra* note 258; Moreno & Holmgren, *supra* note 258.

³¹³ THE LAW COMMISSION 2009, *supra* note 4; THE LAW COMMISSION 2011, *supra* note 14.

SCIENCE WITHOUT PRECEDENT: THE IMPACT OF THE
NATIONAL RESEARCH COUNCIL REPORT ON THE
ADMISSIBILITY AND USE OF FORENSIC SCIENCE EVIDENCE
IN THE UNITED STATES

Simon A. Cole¹

Professor of Criminology, Law & Society, University of California, Irvine

Gary Edmond²

Professor, School of Law, University of New South Wales

ABSTRACT

This article treats the 2009 publication of a report on forensic science by the United States National Research Council (NRC or NAS report) as a watershed that illuminates the recent controversy around the forensic sciences. The NRC Report enabled a heterogeneous set of voices with a variety of perspectives and credentials, to momentarily speak univocally “for science”, through an authoritative national institution. The NRC produced a report that was surprisingly critical of both the forensic sciences and the performance of legal institutions. We might expect this temporary univocality and the directed criticism to pose challenges for law, particularly any attempt to dismiss or counter the epistemic authority of scientists and “science.” This article explores this issue by reviewing legal decisions on forensic science evidence published after the NRC report. We found that courts gave relatively little weight to “science” even when available as an official report from an authoritative institution. The article then reviews several rhetorical devices used by courts to justify their limited engagement with the NRC Report. The article concludes with some reflections on what this episode may reveal about the relationship between science and law more generally.

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¹ Professor of Criminology, Law & Society, University of California, Irvine. A.B., Princeton University, 1989; Ph.D., Cornell University, 1998.

² Professor, School of Law, University of New South Wales and Research Professor (fractional), School of Law, Northumbria University. B.A.(Hons) University of Wollongong, 1993; L.L.B.(Hons) University of Sydney, 1996; Ph.D. University of Cambridge, 2001.

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1. INTRODUCTION: CHALLENGING FORENSIC SCIENCE EVIDENCE

Science and law are social institutions enjoying great epistemic legitimacy and authority in contemporary post-industrial societies.³ Not surprisingly, they are, on occasion, seen as competing for epistemic legitimacy. One area in which this competition has seemed particularly acute is in controversies around the use of forensic science evidence in criminal law that forms the subject of this special issue.⁴ To summarize: self-appointed advocates of “science” have claimed that criminal courts in the United States have been unreasonably permissive in the reception of forensic science evidence, failing to hold it to the standards of genuine science.⁵

For at least two decades such arguments have been mounted by scientists and scholars; asserting an authority to speak on behalf of science.⁶ Such assertions can, of course, be contested. Resistance by individual forensic practitioners and the institutionalized forensic sciences generally found favor with trial judges and appellate courts.⁷ In 2009, however, the National Research Council (NRC), the research arm of the United States National Academies, published a substantial report on the forensic sciences, entitled *Strengthening Forensic Science in the United States* [hereafter *Strengthening*].⁸ This report has generally been interpreted as quite critical of forensic science evidence. Alternative readings are among the topics we explore, though we accept that *Strengthening* is indeed critical and perhaps intentionally controversial. We note that the press release ac-

³ This epistemic legitimacy, or authority, is not experienced consistently and has to be negotiated and in some ways ‘earned’.

⁴ An earlier, and perhaps more conspicuous controversy focused on the role of expert evidence (and so-called ‘junk science’) in civil proceedings in the United States. Another example involves disputes over creation science and intelligent design under the First Amendment.

⁵ Many of these issues pertain to other countries as well, but the United States is widely seen as a site where controversy has been particularly open. The literature on this controversy has been voluminous; see generally works by Michael Saks, Jonathan Koehler, William Thompson, Peter Neufeld, Barry Scheck, David Faigman, D. Michael Risinger, Margaret Berger, Erica Beecher-Monas, Paul Giannelli, and David Kaye.

⁶ Rather than advocates for science, some commentators have been concerned that legal standards have been interpreted in ways that are inconsistent with overarching legal principle, thereby admitting too much insufficiently reliable incriminating expert opinion evidence. See, e.g., Gary Edmond & Andrew Roberts, *Procedural Fairness, the Criminal Trial and Forensic Science and Medicine*, 33 SYDNEY L. REV. 359 (2011).

⁷ We use the terms “forensic practitioner”, “forensic analyst” and “forensic scientist” interchangeably, although many forensic scientists do not possess scientific qualifications from a university.

⁸ COMMISSION ON IDENTIFYING THE NEEDS OF THE FORENSIC SCIENCE COMMON, NATIONAL RESEARCH COUNCIL OF THE NATIONAL ACADEMY OF SCIENCE, *STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD* (2009) [hereinafter NRC report]. The report is also referred to as the NAS report (after the National Academy of Sciences) and just ‘the report’.

companying the publication of the report was titled “‘Badly Fragmented’ Forensic Science System Needs Overhaul: Evidence to Support Reliability of Many Techniques Is Lacking.”⁹

Strengthening changed the nature of the controversy because it could reasonably be represented as a quasi-official utterance of the American scientific establishment in a way that complemented, or perhaps eclipsed, the conclusions of both individual scientists and self-organized collectives who had been raising their own concerns. The NRC convenes between 200 and 300 expert committees each year to produce “consensus studies” that are published as Reports. Because of the National Academies’ reputation, NRC reports command a special authority on scientific and technical matters. As one scholar has observed, “[n]o other U.S. institution has the same mix of characteristics: unquestionable scientific and technological expertise; an official congressional charter to provide scientific advice to the federal government; and independence from the political chain of command. NRC reports draw a great deal of credibility from these aspects of the Academy’s identity.”¹⁰ Indeed, the National Academies have often been called a “court of last resort” on scientific controversies.¹¹

Historically, American courts “have treated the reports of the NRC as authoritative works for purposes of determining generally accepted standards within the scientific community.”¹² *Strengthening*, therefore, provides an opportunity to explore whether American courts are, as many have suggested, unusually resistant to criticism or, in the alternative, protective of forensic science evidence. If they are not particularly protective we might expect the shift from individual and group criticism to quasi-official criticism by the NRC to have an effect on the response to forensic science evidence by trial and appellate courts, especially in those jurisdictions with formal reliability standards governing the admission of expert opinion.¹³ If, on the other hand, there is no such effect, then the apparent insensitivity to authoritative expressions of concerns about the condition of the modern forensics warrants attention. This issue may be of interest not only to those concerned with controversies in criminal law and the forensic sciences, but also to those interested more generally in the struggle for epistemic authority between law and science.

⁹ ‘Badly Fragmented’ Forensic Science System Needs Overhaul; Evidence to Support Reliability of Many Techniques is Lacking, NATIONAL ACADEMIES (Feb. 18, 2009), <http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=12589>.

¹⁰ STEPHEN HILGARTNER, SCIENCE ON STAGE 45 (2000).

¹¹ Zoë Corbyn, *NAS: Speaking the Truth to Power for 150 Years*, 381 THE LANCET 713, 713 (2013).

¹² *Com. v. Gaynor*, 820 N.E.2d 233, 250 (Mass. 2005). See, e.g., *People v. Reeves*, 109 Cal. Rptr. 2d 728, 749 (Cal. Ct. App. 2001) (“[C]ourts have recognized that ‘the [NRC] is a distinguished cross section of the scientific community.... Thus, that committee’s conclusion... can easily be equated with general acceptance of those methodologies in the relevant scientific community.’”) (quoting *People v. Venegas*, 954 P.2d 525, 552 (1998)). We are relying here on research performed by Professor Nina Chernoff and the Public Defender Service of the District of Columbia, and are grateful for their contribution.

¹³ Following the decisions in *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579 (1993) and *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999).

Recent research illuminates this issue. Cooper studied post-*Strengthening* judgments across four disciplines, namely fingerprints, firearm and toolmarks, bite marks, and arson investigation.¹⁴ Although she does not specify the number of cases analyzed, her data set clearly overlaps with our own. Cooper found that, while the courts were more critical of these forms of evidence post-*Strengthening*, “[t]o date, the NAS Report has not led any court to conclude that evidence from any of these four disciplines is inadmissible.”¹⁵ This finding supports the contention that courts are protective, perhaps exceptionally protective, of forensic science evidence adduced by prosecutors. However, Cooper identified multiple rulings limiting in some way the testimony that forensic experts could proffer, a phenomenon we have discussed under the label “split testimony.”¹⁶ She also found that “untraditional evidence” was excluded, such as “simultaneous impressions” in latent print identification.¹⁷ In supporting these rulings the courts, according to Cooper, relied heavily on precedent and varied widely in their degree of engagement with the NRC report.¹⁸

Epstein analyzed 65 post-*Strengthening* judicial decisions.¹⁹ He found that “courts have overwhelmingly declined to revisit admissibility determinations or circumscribe the proposed testimony in pattern and impression evidence cases.”²⁰ Epstein notes that “[o]verall the Report has had virtually no impact on trial court acceptance of latent print evidence,”²¹ and “[t]o date, no reported decision has relied on the NAS Report to restrict a handwriting analyst’s conclusion.”²² He concluded that “[t]o date, only two prominent examples responding to the NAS Report can be identified.”²³ Both instances (one is not even a case) concern firearm and toolmark analysis, leading Epstein to conclude that this is the only discipline for which *Strengthening* might seem to have changed the courts’ stance toward forensic science evidence.²⁴ Though, “[e]ven in regard to that discipline,”

¹⁴ Sarah Lucy Cooper, *The Collision of Law and Science: American Court Responses to Developments in Forensic Science* 33 PACE L. REV. 234 (2013).

¹⁵ *Id.* at 301.

¹⁶ Simon A. Cole, *Splitting Hairs? Evaluating ‘Split Testimony’ as an Approach to the Problem of Forensic Expert Evidence*, 33 SYDNEY L. REV. 459. See also, Betty Layne DesPortes, *Friction Ridge Opinion Evidence after Daubert and the NAS Report*, in WILEY ENCYCLOPEDIA OF FORENSIC SCIENCE (Allan Jamieson & Andre A. Moenssens eds., 2014).

¹⁷ Cooper, *supra* note 14, at 301, discussing *Commonwealth v. Patterson*, 840 N.E.2d 12 (Mass. 2005).

¹⁸ *Id.* at 300.

¹⁹ Jules Epstein, *Preferring the “Wise Man” to Science: The Failure of Courts and Non-Litigation Mechanisms to Demand Validity in Forensic Matching Testimony*, 20 WIDENER L. REV. 81, 101 (2014). See also, Gabriel A. Fuentes, *Toward a More Critical Application of Daubert in Criminal Cases: Fingerprint Opinion Testimony After the National Academy of Sciences Report*, 12 EXPER. EV. REP 549, 10/22/12.

²⁰ *Id.*

²¹ *Id.* at 103.

²² *Id.* at 104.

²³ *Id.* at 106.

²⁴ Nancy Gertner, *Commentary on the Need for a Research Culture in the Forensic Sciences* 58 UCLA L. REV. 789, 792 (2011). The other instance is *Commonwealth v. Pytou Heang*, 942 N.E.2d 927 (2011).

Epstein notes, “the remediation by the courts is modest at best.”²⁵ Epstein attributes this state of affairs to the weakness of the *Frye* and *Daubert* admissibility standards, the lack of scientific literacy among courtroom actors, and “a stasis or inertia resulting from decades or more of reliance on these disciplines and their perceived continued utility.”²⁶

Given these findings, we were interested in investigating the apparent reluctance to accept the *science advice* of the NAS.²⁷ Our interest is rooted in our common background in Science & Technology Studies (STS) and expert evidence in legal proceedings. Studies of legal controversies rooted in STS have drawn attention to the substantial flexibility that legal actors, including judges, have with regard to choosing whether or not to treat scientific accounts as authoritative.²⁸ This essay reviews responses to *Strengthening*, particularly whether judicial discretion and interpretive flexibility is diminished when the account is a deliberately constructed consensus document produced under the imprimatur of an institution with great authority within mainstream science.²⁹ Exploring judicial rationales for accepting, not accepting, and even an apparent refusal to engage with, *Strengthening’s* critique may advance our understanding of the circumstances in which “science” and scientific institutions can hope to influence legal practice.

A. MATERIALS AND METHODS

i. The NRC Report: *Strengthening the Forensic Sciences in the United States* (2009)

Obviously, *Strengthening* is a key material in our study. The report reviews forensic science domains, including: biology, controlled substances, friction ridge analysis, shoeprints and tire tracks, toolmark and firearms, hair and fibres, documents, paints and coatings, explosives and fire debris, odontology, bloodstains, digital and multimedia. Summarizing the findings of the 350-page report is challenging and risks counter-claims of misrepresentation.³⁰ For our purposes, we highlight a single sentence:

²⁵ Epstein, *supra* note 19, at 83.

²⁶ *Id.* at 84. See also *United States v. Frye*, 293 F 1013 (D.C. Cir. 1923); *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579 (1993).

²⁷ Of course, the term ‘advice’ might be a way of neutralizing attempted intervention. Whether the report constitutes advice (or meddling) and the perceived audience(s) all seem to be up for grabs. The nature of the ‘advice’ is especially interesting.

²⁸ SHEILA JASANOFF, *SCIENCE AT THE BAR* (1995); Sheila Jasanoff, *Making Order: Law and Science in Action* in *THE HANDBOOK OF SCIENCE AND TECHNOLOGY STUDIES* 761 (Edward J. Hackett et al. eds., 3d ed. 2007); DAVID S. CAUDILL & LEWIS H. LARUE, *NO MAGIC WAND: THE IDEALIZATION OF SCIENCE IN THE LAW* (2006); Gary Edmond, *Judging Facts: Managing Expert Knowledges in Legal Decision-Making*, in *EXPERTISE IN REGULATION AND LAW* 136 (Gary Edmond ed., 2004).

²⁹ MICHAEL LYNCH ET AL., *TRUTH MACHINE: THE CONTENTIOUS HISTORY OF DNA PROFILING* 106 (2008).

³⁰ See also Gary Edmond, *What Lawyers Should Know About the Forensic “Sciences”*, 36 *ADELAIDE L. REV.* 33 (2015).

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.³¹

We believe this sentence is crucial because the issue of the validity of forensic science claims was at the crux of two decades of skirmishes over forensic science evidence that preceded publication of the report.³² We also contend that, far from being a cherry-picked criticism, the claim made in this sentence is explicated and supported throughout the text of the report. Finally, we wish to emphasize that the sentence contains two propositions: first that many forensic science disciplines failed to establish their validity and accuracy; and, second, that courts across the United States failed to demand such evidence as a condition of use in criminal proceedings. With this second proposition, the NRC Committee itself has expressed a view relevant to the central question posed in our study: whether the courts have revealed a peculiar resistance to criticism of forensic science evidence. The NRC Committee would seem to answer this question in the affirmative.³³

Closely related to this issue is the question of whether *Strengthening* speaks to legal practice and admissibility gatekeeping in particular. NRC Committee Co-Chair, Judge Harry Edwards' statement to a Congressional committee contained the important disclaimer: "whether forensic evidence in a particular case is admissible under applicable law is not coterminous with the question whether there are studies confirming the scientific validity and reliability of a forensic science discipline."³⁴ A number of prosecution briefs invoked these words in response to defense attempts to enlist the findings of *Strengthening* in contests over the admissibility of forensic science evidence. One brief stated: "[i]n fact, the Honorable Harry T. Edwards, Co-Chair of the NRC Forensic Science Report, has stated on

³¹ NRC report, *supra* note 8, at 53. Lest we be considered (to have become) positivists, an additional caveat is in order. We interpret *Strengthening* as a critical response to the forensic sciences and legal institutions routinely relying on their evidentiary products. Further, we believe that the findings and recommendations should be taken seriously and considered at a policy level, especially by appellate and supreme courts. The NAS Report should have exerted a stronger and more conspicuous influence on admissibility jurisprudence and decision making, the form of opinions admitted, and shaken judicial confidence in the value of trial safeguards and judicial review. We believe that *legal* values, such as the commitment to "truth and justice" require directing attention to the validity and reliability of forensic science techniques in routine use in criminal proceedings. Notwithstanding these commitments, we are reluctant to buy into the essentialist way in which *Strengthening* characterizes "science" when strategically juxtaposing it to the contemporary *forensic sciences*. The sciences, and here we deliberately move beyond the forensic sciences, are more complex and variegated than such a reductionist reading suggests.

³² The so-called "DNA wars" form part of these skirmishes. The early controversy around DNA evidence was contested in and out of courts and was largely resolved through a series of extra-legal reports produced by NRC committees. See JAY D. ARONSON, *GENETIC WITNESS: SCIENCE, LAW, AND CONTROVERSY IN THE MAKING OF DNA PROFILING* (2007) and DAVID H. KAYE, *THE DOUBLE HELIX AND THE LAW OF EVIDENCE* (2010).

³³ See, e.g., NRC report, *supra* note 8, at 85, 12, 53, 96, 109, 110.

³⁴ Statement of Judge Harry T. Edwards, Co-Chair, Committee on Identifying the Needs of the Forensic Science Community, Committee on the Judiciary, United States Senate (Mar. 18, 2009).

the public record that the report is not intended to affect the admissibility of any forensic evidence.”³⁵ The slippage, of course, is between a report focused on questions of admissibility and a report explicitly directed to validity which, as such, might reasonably be expected to “affect” a *court* determining admissibility. *Strengthening* is not the former. Few NRC reports are. Of eight NRC reports on forensic science evidence, only one explicitly rendered an opinion on the admissibility of the evidence.³⁶ However, it seems more difficult to question the contention that *Strengthening* is a scientific report that should “affect” a court’s assessment of the admissibility of forensic science evidence; especially in federal (and some state) courts in the aftermath of *Daubert*, *Kumho* and revision to rule 702 of the Federal Rules of Evidence (FRE). Revealingly, Judge Edwards subsequently characterized prosecutors’ invocation of his words as “a blatant misstatement of the truth. I have never said that the Committee’s Report is ‘not intended to affect the admissibility of forensic evidence’ ... To the degree that I have commented on the effect of the Report on admissibility determinations, I have said something quite close to the opposite of what these briefs assert.”³⁷ Thus, while it is undoubtedly correct to say that *Strengthening* does not advise on admissibility, it would seem to be misleading to suggest that it is not relevant to admissibility determinations. Nonetheless, the confusion persists, as we shall see.

B. CASES

In order to generate our dataset, we conducted a Westlaw search for the terms “Strengthening the Forensic Sciences”, “National Research Council”, “NRC”, “National Academy of Sciences” and “NAS” after 2008. This produced 82 cases in which *Strengthening* was cited.³⁸ Obviously, this is not a representative sample of events in American courtrooms. However, it is a (near) comprehensive sample of reported cases that, for one reason or another, have attempted to engage with *Strengthening*, usually in response to challenges to the admissibility or probative value of incriminating forensic science evidence. These judicial responses form part of the set of texts that American lawyers treat as “the law.” Indeed, they represent official legal responses to the NRC report and its implications. Already, in the few years since it was published, the cases in our sample provide authoritative resources for managing (defendants’) recourse to the report. These cases, particularly some of the earlier appellate decisions, provide legally-based means of qualifying the applicability and significance of criticisms embodied in *Strengthening*. The exclusionary, inoculating and avoidance strategies employed in initial trials and appeals have been rehearsed in subsequent litigation. See Table 1 for descriptive statistics about this set of cases.

³⁵ United States v. Faison, 393 Fed. Appx. 754 (2010). See also United States v. Rose, 672 F. Supp.2d 723, 725 (D. Md. 2009); United States v. Cerna, 2010 WL 3448528 (N.D. Cal. 2010).

³⁶ Simon A. Cole, National Academy of Sciences (NAS), *ENCYCLOPEDIA OF FORENSIC SCIENCES* 190 (2013); David H. Kaye, *Bullet-proofing the NRC Bullet Lead Report: Should Science Committees Make Legal Findings?*, 46 *JURIMETRICS* 91 (2005). See also Section IV.

³⁷ Harry T. Edwards, *The National Academies of Sciences Report on Forensic Sciences: What it Means for the Bench and the Bar*, 51 *JURIMETRICS* 1 (2010).

³⁸ Search conducted 2 June 2014.

Table 1. Descriptive statistics of cases comprising data set.

Jurisdiction	Count
US Supreme Court	2
Federal Circuit Court	3
Federal District Court	23
Total Federal	28
State Supreme Court	28
State appellate court	25
State trial court	1
Total State	54
Total	82
Year	Count
2009	5
2010	20
2011	18
2012	14
2013	16
2014	9
Total	82
Primary types of forensic evidence (some cases include more than one)	Count
Latent prints	27
Firearm and toolmark	22
Drug analysis	7
Forensic pathology	5
DNA	4
Arson evidence	2
Bite marks	2
Shoe prints	2
Hair comparison	2
Blood spatter	2
Handwriting	2
Addiction medicine	1
Canine	1
Gunshot residue	1

Alcohol testing	1
Image analysis	1
Psychological assessment	1
Tire prints	1
Trace evidence	1
Procedural Posture	Count
Direct appeal	44
Trial motion	19
Habeas corpus action	9
Other post-conviction action	7
Consolidated direct and post-conviction appeal	1
Interlocutory appeal	1
Sentencing hearing	1
Total	82
Success of challenge	Count
Successful	14
Unsuccessful	68
Total	82

C. LEGAL CONTEXT

In undertaking this analysis, and endeavoring to develop a clearer understanding of legal responses to *Strengthening* in the United States, it is vital to recognize the institutional and professional position of judges (and lawyers).³⁹ There are many factors influencing the circumstances in which *Strengthening* may come before courts, as well as the terms on which it may be considered, accepted or avoided. All references to the report appear in relation to specific cases; whether during prosecutions, direct appeals or some other post-conviction review process.

Most references to the NRC report in our dataset are in response to: claims through direct appeal (e.g. failure to have had an admissibility hearing, failure to exclude or qualify opinions, and sometimes ineffective counsel or evidence insufficient; n=44); admissibility challenges in the trial court (e.g. motions to hold an admissibility hearing and/or motion to exclude; n=19); habeas corpus petitions

³⁹ *Strengthening* has a life of its own in foreign jurisprudence. See, e.g., the following English and Canadian cases: R. v. Otway, [2011] EWCA Crim 3; R. v. Smith, [2011] EWCA Crim 1296; R. v. Aitken, [2012] BCCA 134; R. v. Bornyk [2013] BCSC 1927; Tuite v. The Queen [2015] VSCA 148.

(to federal courts; n=9) and other post-conviction relief applications (to state courts, sometimes based on legislation enacted or refined in response to DNA exonerations; n=7) claiming that the incriminating forensic science evidence was insufficiently reliable to have been admitted or that concerns about reliability raise fresh doubts about the original conviction.⁴⁰ There are quite a few references to jurisdictional admissibility standards, particularly ‘general acceptance’ in relation to the admissibility challenges in state courts.

It is, in consequence, necessary to direct attention to legal procedures and rules that govern: the admissibility of expert evidence (such as *Frye*, FRE r702 and *Daubert/Kumho*); the manner of determining admissibility (e.g. *Frye/Kelly* or *Daubert/Lanigan* hearing); the use of the NRC report as a learned treatise; the obligation to take notice of previous admissibility decisions and whether they are binding on the court; the standard of review for the discretionary decisions of trial judges (and whether timely objections were made); and habeas corpus and post-conviction applications.⁴¹ As we shall see, the intense focus on the case, the particular witness, their opinion and its relation to facts in issue, tends to make it difficult to introduce, let alone transform, general concerns from *Strengthening* into specific case-based evidence relevant to prosecutions and appeals. These difficulties tend to be magnified with displacement from the trial.

We can obtain some sense of the way legal processes shape the reception and representation of *Strengthening* through direct appeals. Those questioning the admissibility of forensic science evidence and its significance on appeal are required to show not only that the evidence might be insufficiently reliable (or was exaggerated) according to the jurisdictional admissibility standards—in a manner that might resonate with some of the findings and recommendations in *Strengthening*—but that the judge made a substantial error or abused a discretion. This is an onerous standard, and it does not involve the court of review substituting its own preference for what the trial judge did. For the appeal to succeed, the original decision must be shown to be manifestly mistaken (or misguided)—an abuse of the broad discretion conferred upon trial judges. However, even where a party convinces an appellate court that evidence was admitted in error, abuses of discretion and other mistakes might be excused where a court of appeal is satisfied, notwithstanding the erroneous admission (or exaggerated claims by a forensic analyst), that the conviction nevertheless remains sound. In the absence of strong evidence of innocence (e.g. fresh evidence, such as exonerating DNA testing results), serious prosecutorial misconduct, or egregious performances by defense lawyers, appellate judges encounter genuine difficulty interfering with convictions. The difficulty of retrospectively persuading an appellate court that a jury verdict is mistaken, a trial was substantially unfair, or involved an abuse of rights, reinforce the importance of having unreliable and speculative expert evidence excluded or moderated before admission (and the need to raise objections and reliability issues before trial). The chance of having admissibility decisions treated as mistaken, in a manner that provides access to a re-trial or acquittal, is remote.

⁴⁰ There was also one interlocutory appeal, one sentence hearing and one consolidated hearing.

⁴¹ See *Commonwealth v. Lanigan*, 419 Mass. 15, 20, 641 N.E.2d 1342 (1994); *People v. Kelly*, 17 Cal.3d 24 (1976).

At every stage, from pre-trial motions to exclude evidence or hold admissibility hearings to (re-)consider admissibility, to post-trial review of admissibility, to determinations of whether the NRC report creates sufficient doubt to unsettle conviction (as newly discovered evidence), legal rules and categories mediate the claims of defendants, appellants and petitioners as well as the evidence that will be recognized and received. Legal rules and standards predominate to the extent that courts can even avoid engaging with the NRC report by insisting that any implications raised by it are not properly before them. That is, the applicant/appellant has not embedded the NRC report in a legally recognizable form.⁴²

Moreover, trial and appellate judges in adversarial systems are generally not in a position to unilaterally invoke reports—however authoritative—or to undertake their own inquiries. The evidence adduced in trials and reviewed on appeals is selected and presented by the parties. Trial and appellate judges are dependent on the way prosecutors, and poorly resourced defendants (and prisoners), respond to allegations, exogenous critique, and contest the admissibility and use of evidence.⁴³ Legal rules, traditions of practice and an institutional conservatism, particularly an aversion to some types of risk, all shape judicial decision-making. A commitment to finality along with confidence in adversarial trial procedures means that the disruptive implications of reversing earlier accommodating admissibility practices exert particularly strong professional influences that constrain the way critical perspectives might be read or incorporated into the jurisprudence dedicated to admissibility and proof.⁴⁴

This is not to suggest that trial and appellate judges are hamstrung, or without autonomy and discretion. Most of the judges and courts in our sample could have been far more receptive to the NRC report and its implications. There are, however, a range of pressures, assumptions and commitments. By way of forewarning, the commitment to adversarial (i.e. party controlled) proceedings, systemic under-resourcing of the defense, poor performances by many defense lawyers, along with the lack of disclosure or engagement by prosecutors and forensic analysts, and the threat to social legitimacy and finality raised by formally acknowledging widespread problems, helps to explain the marginal status of *Strengthening* in courts and judgments five years after its publication. Of the tens of thousands of contested cases where the state relied substantially on expert comparison and identification evidence, less than one hundred published cases have even cited *Strengthening* and less than a fifth of these have responded in a manner that might be considered broadly consistent with the concerns expressed in the report. *Strengthening* appears to have been little more than a legal hiccup, and its influence is likely to recede over time, particularly as some of the recommendations gradually work their way into forensic science practice under the supervision of the National Institute of Standards and Technology (NIST), and

⁴² See, e.g., *Ohio v. Langlois*, 2 N.E.3d 936 (2013); *Jones v. United States*, 27 A.3d 1130, 1137-8 (2011).

⁴³ But see Gertner, *supra* note 24.

⁴⁴ See, e.g., *United States v. Watkins*, 450 Fed. Appx. 511 (C.A.6 (Ohio) 2011); *Dennis v. Florida*, 109 So.3d 680 (2013); *Gee v. United States*, 54 A.3d 1249 (2012).

threats are inoculated by early legal evasions solidifying into precedent—see Section III.⁴⁵

D. CASE-ORIENTED LAW (AND A GENERAL REPORT)

One vitally important aspect of the legal context is the common law obsession with the particular case.⁴⁶ In terms of evidence and proof, proceedings are profoundly case-based. Courts are interested in relevant—that is, probative—evidence bearing on facts in issue in the *specific* proceedings. *Strengthening* affords a general review focusing on prominent areas of forensic science and medicine. The recommendations flowing from the NRC report tend to be of a general nature: aimed at reforming the organization of the forensic sciences as well as the quality of the evidentiary products. As we shall see, the very specific (or *sui generis*) nature of adversarial legal proceedings, in contrast, has been used to limit the application and perceived implications of the report. Courts repeatedly suggest that *Strengthening* does not directly address the particular facts in issue in the case before them, even though findings and recommendations appear to have direct implications for the relevance and reliability of techniques used to generate the specific opinion evidence as well as its presentation.⁴⁷

More problematic at an institutional level is the reluctance of individual courts, especially courts of appeal and supreme courts, to engage with some of the broader evidentiary, institutional and policy implications embedded in *Strengthening*. Courts of review have been unwilling, an unwillingness implicitly grounded in the case-based nature of legal practice, to make critical statements about the forensic sciences that might have implications for other trials and appeals, older convictions, or the performance of the system more generally. Such criticism would simultaneously question the effectiveness of trial safeguards and appeals and even the soundness of some convictions. But the opposite is not true, for courts have been willing to seed the case law with statements in support of forensic sciences—with the potential to become binding.

In theory, there is an expectation that issues will be resolved in the instant proceedings where well-informed parties carefully select and competently present evidence and legal argument to trial (and appellate) courts. This essay illustrates how far from this ideal we have ventured. Our study exposes the credulity of courts toward the effectiveness of their own process, a curiously persistent confidence in forensic science evidence adduced by the state, and the development and interpretation of rules and rationales that allow judges to insulate legal proceedings and performances from exogenous influences and perspectives without appearing to be ignorant, indifferent or even unjust. Presiding over legal systems with limited resources, appellate courts are reluctant to equate poor performance

⁴⁵ With the National Institute for Justice, NIST was jointly responsible for EXPERT WORKING GROUP ON HUMAN FACTORS IN LATENT PRINT ANALYSIS, LATENT PRINT EXAMINATION AND HUMAN FACTORS: IMPROVING THE PRACTICE THROUGH A SYSTEMS APPROACH (2012).

⁴⁶ See, e.g., BRUCE A. KIMBALL, THE INCEPTION OF MODERN PROFESSIONAL EDUCATION: C. C. LANGDELL, 1826–1906 (2009) and more generally, see John Forrester, *If P, Then What? Thinking in Cases*, 9 HIST. HUM. SCI. 1 (1996).

⁴⁷ David L. Faigman et al., *Group to Individual (G2i) Inference in Scientific Expert Testimony*, 81 U. CHI. L. REV. 417 (2014).

and the impact of deficient resourcing with ineffectiveness and jury misunderstanding, or to conclude that weaknesses in the forensic science evidence were sufficient to render proceedings unfair.

II. SUCCESSFUL CHALLENGES: CONFRONTATION, DRUG TESTS AND “BALLISTIC CERTAINTY”

With this background in mind, we move to consider our case sample. We begin with cases where legal outcomes seem to be consistent with the thrust of the NRC report. We coded 14 of the 82 cases (17%) as resulting in “successful” *Strengthening*-based challenges to forensic science evidence.⁴⁸ This is not quite as bleak a picture as that conveyed by Cooper and Epstein. What accounted for these “successes”?

A. CONFRONTATION IN MELENDEZ-DIAZ

Given the widespread impression that *Strengthening* has exerted little impact on American courts, it might be thought curious that within a year of publication the report had been cited approvingly by the highest court in the land.⁴⁹ Perhaps even more surprising is the fact that the citation is found in a Supreme Court opinion written by Justice Scalia, a conservative law-and-order judge not generally considered sympathetic to criminal defendants trying to restrict the admission and use of forensic science evidence.

As is well known, however, Justice Scalia’s originalist judicial philosophy leads him to be pro-defendant in cases involving the Sixth Amendment (i.e. the “confrontation clause”) of the United States Constitution.⁵⁰ Thus, in his opinion in *Melendez-Diaz*, overturning a conviction in which a defendant was not able to cross-examine the analyst who had performed the drug testing, Scalia J cited *Strengthening* in response to the notoriously technophilic Justice Breyer’s argument that confrontation was not necessary for something as reliable as forensic science evidence. In this context, Justice Scalia invoked *Strengthening*—in a manner consistent with our suggested reading—as authority for his rejoinder: that cross-examination should be available because the forensic science evidence might not be as reliable as Justice Breyer asserted.

⁴⁸ For the purposes of this essay we applied a binary coding scheme in which all cases were coded either “successful” or “unsuccessful.” Obviously, many cases yielded mixed results of one sort or another. In some cases, one type of forensic evidence was admitted and another excluded. These cases were resolved by determining whether the challenge that was grounded on *Strengthening* was successful or unsuccessful. In other cases, the forensic evidence was admitted, but the testimony was limited in some way. We have analyzed these decisions under the label “split testimony”.

⁴⁹ *Melendez-Diaz v. Massachusetts*, 129 S. Ct. 2527 (2009).

⁵⁰ Jennifer L. Mnookin & David H. Kaye, *Confronting Science: Expert Evidence and the Confrontation Clause*, SUP. CT. REV. (2012).

Melendez-Diaz spawned a wave of confrontation clause litigation, and 5 of the 14 “successful” cases are confrontation clause cases decided in its shadow.⁵¹

B. PRESUMPTIVE DRUG TESTING

In only two of the eight other “successful” cases was *Strengthening* drawn upon as authority in justifying the outcome. Both of these cases concerned presumptive drug tests.⁵² Significantly, half of the six successful “confrontation clause” cases also involved presumptive drug tests.⁵³ In these cases *Strengthening* is used as an authoritative source for the limits of presumptive testing and the need for more reliable gas chromatography-mass spectrometry (GC-MS) analysis in order to make scientifically-based conclusions about the type of substances recovered by police officers.⁵⁴ Here, the report was invoked to discipline investigative performance. For, in contrast to most of the forensic techniques criticized in *Strengthening*, the report confirmed the existence of a validated instrumental technique for analyzing unknown substances that was widely available but had not been utilized by investigators.

At one level the presumptive drug tests are easy to distinguish from some of the other forensic science practices. There are, after all, standardized assays from mainstream chemistry suited to determining the composition of questioned substances—such as the type and purity of suspected narcotics. And, many of the police and others purporting to proffer opinions were not trained in these methods or did not use them. In these cases, attentive courts could simply juxtapose the performance of police and forensic analysts with what was widely accepted should have been done (and is done routinely in many jurisdictions across the U.S.).⁵⁵ When unequivocally reliable methods exist, courts seem unwilling to condone the use of *insufficiently* reliable methods.⁵⁶ Judges and courts seem willing to denounce the failure to use validated tests and empirically-derived standards *where they are available*.⁵⁷ However, as we shall see in subsequent sections, where validated alternatives are not available, the lack of validation is not used to constrain admissibility. Rather, the lack of demonstrably reliable alternatives seems to lead judges to allow analysts to persist with their traditional, though untested, practices and claims, albeit sometimes requiring modification to the forms of ex-

⁵¹ *Melendez-Diaz*, 129 S. Ct.; *New York v. Carreira*, 893 N.Y.S.2d 844 (2010); *Commonwealth v. Vasquez*, 923 N.E.2d 524 (2010); *New Mexico v. Jaramillo*, 272 P.3d 682 (2011); *Commonwealth v. King*, 960 N.E.2d 894 (2012); *New Mexico v. Navarette*, 294 P.3d 435 (2013).

⁵² *North Carolina v. Ward*, 694 S.E.2d 738 (2010); *Connecticut v. Martinez*, 69 A.3d 975 (2013).

⁵³ *Melendez-Diaz*, 129 S. Ct.; *King*, 960 N.E.2d; *Vasquez*, 923 N.E.2d.

⁵⁴ *Melendez-Diaz*, 129 S.Ct. at 2537, recognizes that there are common errors in the use of GC-MS that may make cross-examination desirable; *King*, 960 N.E.2d, 898 n5; *Martinez*, 69 A.3d at 536. Note the use of legal authority alongside non-legal authority in *Martinez*, at 567.

⁵⁵ Compare *Commonwealth v. Fernandez*, 934 N.E.2d 810 (2010) and *United States v. Aman*, 748 F. Supp.2d 531 (E.D. Va. 2010).

⁵⁶ In *North Carolina v. Ward*, 694 S.E.2d 738 (2010) the court chides the state for its failure to fund “[s]upremely qualified”—i.e. tertiary trained and highly experienced—chemists to use appropriate testing regimes.

⁵⁷ See, e.g., *King*, 960 N.E.2d; *Fernandez*, 934 N.E.2d; *Martinez*, 69 A.3d.

pression. Prior admission, confidence in trial safeguards and the lack of alternative techniques make (precipitous) exclusion a difficult and institutionally disruptive response.

C. QUALIFIED “SUCCESS”

In several motions and appeals, the defendant/appellant was able to persuade a court that there were problems with the expert evidence, in part relying upon the NRC report. In most cases where a defendant/appellant was able to influence the court to modify its approach to a type of evidence, the change was in the way the expert’s conclusion was expressed rather than exclusion. The two most prominent responses were, first, to require the analyst to make clear that the evidence they are proffering is merely their opinion.⁵⁸ This is sometimes described as *opinionization*.⁵⁹ The second response is to require the analyst to temper the strength of the claim. We can observe both of these responses in the following extracts:

However, because of the limitations on the reliability of firearms identification evidence discussed above, Mr. Nichols will not be permitted to testify that his methodology allows him to reach this conclusion as a matter of scientific certainty. Mr. Nichols also will not be allowed to testify that he can conclude that there is a match to the exclusion, either practical or absolute of all other guns. He may only testify that, in his opinion, the bullet came from the suspect rifle to within a reasonable degree of certainty in the firearms examination field.⁶⁰

While we accept that some of these forms of tempering, or “splitting,” the evidence may be more appropriate (or, more precisely, less misleading), we have elsewhere raised questions about whether the tempered formulations capture or meaningfully convey actual limitations.⁶¹ Such legal responses tend to produce compromises that appear, at least superficially, to accommodate findings and recommendations from the NRC report but in actuality may not make any practical difference. For example, in one case, the court wrote:

In light of our ruling today and the findings of the NRC report, we offer the following guidelines to ensure that expert forensic ballistics testimony appropriately assists the jury in finding the facts but does not mislead by reaching beyond its scientific grasp. First, before trial, the examiner must adequately document the findings or observations that support the examiner’s ultimate opinion ... Second, before an opinion is offered at trial, a forensic ballistics expert should explain to the jury the theories and methodologies underlying

⁵⁸ Commonwealth v. Joyner, 4 N.E.3d 282, 289-90 (2014) quoting Commonwealth v. Gambora, 457 Mass. 715, 736-37 (2010), concurring and harmless error. See also Commonwealth v. Wadlington, 467 Mass. 192, 205-06 (2014).

⁵⁹ Simon A. Cole, *The ‘Opinionization’ of Fingerprint Evidence*, 3 BIOSOCIETIES 105 (2008).

⁶⁰ United States v. Taylor, 663 F. Supp.2d 1170, 1180 (D.N.M. 2009). See also United States v. Sebborn, 2012 WL 5989813 (E.D.N.Y. 2012); Melcher v. Holland, 2014 WL 31359, 13 (N.D. Cal. 2014); United States v. Willock, 696 F. Supp.2d 536, 546 (D. Md. 2010).

⁶¹ Cole, *supra* note 16; Simon A. Cole, *Individualization Is Dead, Long Live Individualization! Reforms of Reporting Practices for Fingerprint Analysis in the United States*, 13 LAW, PROBABILITY & RISK 117.

the field of forensic ballistics. ... Third, in the absence of special circumstances casting doubt on the reliability of an opinion ... [w]here a qualified expert has identified sufficient individual characteristic toolmarks reasonably to offer an opinion that a particular firearm fired a projectile or cartridge casing recovered as evidence, the expert may offer that opinion to a ‘reasonable degree of ballistic certainty.’⁶²

These kinds of responses seem to be a triumph of form over substance.

Neither opinionisation nor tempering expressions in subtle gradations would seem to provide credible responses to the substantial issues raised in the NRC report and elsewhere.⁶³ Does opinionisation overcome the lack of validation testing and standardization at the heart of the NRC critique? Does it really matter if a claim about a match is described as a match between prints or the examiner’s opinion about two prints matching? Tweaking the form of expression, and subtle manipulation of the level of certainty, would not appear to capture limitations or render the evidence susceptible to comprehension and rational evaluation by those charged with fact-finding or reviewing facts.⁶⁴

As “successes”, the cases in this group might be interpreted as something of a pyrrhic victory.

III. UNSUCCESSFUL CHALLENGES: MEDIATING AND INOCULATING “SCIENCE”

What of the “unsuccessful” cases? We sought to understand what rationales enabled courts to render defendants’ challenges “unsuccessful” despite the invocation of *Strengthening*. We identified several themes that featured among the judicial justifications.

A. SCIENCE OR LAW? THE NRC REPORT IS NOT LEGAL

Consistent with Cooper’s finding, one very prominent means of marginalizing the report and its apparent implications is by characterizing it as a text that is not legal or legally oriented.⁶⁵ Numerous judges and courts referred to the report as an important intervention, and even an intervention that was unsettling

⁶² Commonwealth v. Pytou Heang, 458 Mass. 827, 842-8 (Mass. 2010).

⁶³ See, e.g., Adina Schwartz, *A Systemic Challenge to the Reliability and Admissibility of Firearms and Toolmark Identification*, 6 COLUM. SCI. & TECH. L. REV. 2 (2004). Consider the treatment of Schwartz’s evidence in United States v. Otero, 849 F. Supp.2d 425 (D.N.J. 2012); Willock, 696 F. Supp.2d; United States v. Taylor, 663 F. Supp.2d 1170 (D.N.M. 2009); Henry v. Florida, 125 So.3d 745, 751 (2013).

⁶⁴ See Dawn McQuiston-Surrett & Michael J. Saks, *The Testimony of Forensic Identification Science: What Expert Witnesses Say and What Factfinders Hear*, 33 LAW & HUM. BEHAV. 436 (2009).

⁶⁵ Consider GEOFFREY C. BOWKER & SUSAN STAR, SORTING THINGS OUT: CLASSIFICATION AND ITS CONSEQUENCES (1999); THOMAS F. GIERYN, CULTURAL BOUNDARIES OF SCIENCE: CREDIBILITY ON THE LINE (1998).

and required institutional responses.⁶⁶ These responses would, however, need to take place elsewhere. For the judges characterizing *Strengthening* as scientific, policy or reform-oriented, this threw light on the condition of the forensic sciences but provided limited insight into how legal institutions should respond to forensic science evidence either in general or more specifically. Most judges and courts responded to the report on the basis that it was not a legal document, did not have much (for many, anything) to say about specific legal (as opposed to forensic science) practice and that any revelations could be adequately managed through conventional legal trial safeguards and protections (such as vigorous cross-examination, rebuttal witnesses and careful instructions from trial judges).⁶⁷

Perhaps the clearest expression of this response can be found in the *Melendez-Diaz* dissent:

The Court [the majority] therefore errs when it relies in such great measure on the recent report of the National Academy of Sciences. That report is not directed to this Court, but rather to the elected representatives in Congress and the state legislatures, who, unlike Members of this Court, have the power and competence to determine whether scientific tests are unreliable and, if so, whether testimony is the proper solution to the problem.⁶⁸

In both *Frye* and *Daubert* jurisdictions, courts were unwilling to conclude that findings and recommendations from the NRC report dictated admissibility:

While certainly important for advancing the methodologies of the various forensic sciences, the NRC reports are simply not dispositive of the legal issue here.⁶⁹

As noted above, the claim that the NRC report is not oriented to law and legal practice was sometimes reinforced by direct appeal to the words of Judge Edwards. Many courts, possibly through poor defense presentation and/or judicial confusion, construed defense challenges based on *Strengthening* to be arguing that the report dictated a particular admissibility outcome, rather than that, as an authoritative statement, it should carry weight with a judge required to make an admissibility (or some other) determination.

⁶⁶ See, e.g., *Minnesota v. Hayes*, 831 N.W.2d 546 (2013); *Pennsylvania v. Edmiston*, 65 A.3d 339 (2013); *Robbins v. Texas*, 360 S.W.3d 446 (2011); *Illinois v. Mitchell*, 955 N.E.2d 1180 (2011); *United States v. Zajac*, 749 F. Supp.2d 1299 (2010); *Willock*, 696 F. Supp.2d.

⁶⁷ *Ohio v. Langlois*, 2 N.E.3d 936, 945-6 (2013); *United States v. Aman*, 748 F. Supp.2d 531, 536 (E.D. Va. 2010); *Pettus v. United States*, 37 A.3d 213, 228 (2012); *Commonwealth v. Gambora* 457 Mass. 715, 725 (2010); *Melendez-Diaz v. Massachusetts*, 129 S.Ct. 2527, 2555 (2009).

⁶⁸ *Melendez-Diaz*, 129 S. Ct. at 2555.

⁶⁹ *Langlois*, 2 N.E.3d at 945-46. The *Langlois* Court also referred to NRC, BALLISTIC IMAGING (2008). See also *Johnston v. Florida*, 27 So.3d 11, 21 (2010); *Illinois v. Luna*, 989 N.E.2d 655, 674 (2013); *Pettus*, 37 A.3d at 227.

B. LIBERAL ADMISSION: “SUFFICIENTLY RELIABLE” FORENSIC SCIENCE EVIDENCE

In other cases, courts recognized the existence of criticisms but were unwilling to accept that they rendered techniques of considerable provenance insufficiently reliable for admission—under *Frye* or *Daubert*.⁷⁰ One of the overarching or background factors informing courts’ approaches to admissibility is a commitment to the admission of relevant evidence. This is part of a long tradition flowing through Thayer and Wigmore (from Bentham) and associated with recent and more accommodating interpretations of rules regulating expert evidence (in criminal proceedings).⁷¹ *Daubert*’s rejection of “general acceptance” as the sole or primary admissibility criterion was said to reflect the “liberal thrust’ of the Federal Rules and their ‘general approach of relaxing the traditional barriers to ‘opinion’ testimony’”.⁷² The commitment to a liberal admissibility scheme has the benefit of being consistent with overarching principle and simultaneously explaining the admissibility of less than perfect forensic science evidence.⁷³

The NAS report does not conclude that fingerprint evidence is so unreliable that courts should no longer admit it.⁷⁴

Notwithstanding explicit admissibility standards based around reliability and/or acceptance, on review some courts were apparently satisfied with the foundational claims of forensic science techniques being “plausible.”⁷⁵

Liberal admission enables courts to contrast legal admissibility—including standards requiring reliability—with much more onerous expectation of certainty or even infallibility credited to science. The courts’ notion of “sufficient” reliability is more a *gestalt* judgment than a specified degree of reliability. Indeed, in extreme cases, courts deemed it not an abuse of discretion to admit testimony even when the judge accepted that the state’s expert witness was overstating the probative value of the evidence.⁷⁶ For instance, in one case, it was reasonable for the court to admit testimony that a technique (latent fingerprint identification)

⁷⁰ *United States v. Cerna*, 2010 WL 3448528, 4-5 (N.D. Cal. 2010). *See also* *Coronado v. Texas*, 384 S.W.3d 919, 927-28 (2012); *Aman*, 748 F. Supp.2d at 542; and *Johnston*, 27 So.3d at 20-21. *Dennis v. Florida*, 700 (2013) and *Henry v. Florida* (2013) both cited *Johnson*. *See also* *Foster v. Florida*, 132 So.3d 40, 72 (2014); *Enderle v. Iowa*, 2014 WL 956818, 9; *Hooper v. Warden, Northern New Hampshire Correctional Facility*, 2010 WL 1233968, 6-7; *Gambora*, 457 Mass. at 725; *United States v. Herrera*, 704 F.3d 480, 485-7 (2013).

⁷¹ WILLIAM TWINING, *THEORIES OF EVIDENCE: BENTHAM AND WIGMORE* (1985).

⁷² *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 588 (1993).

⁷³ *United States v. Otero*, 849 F. Supp.2d 425, 438 (D.N.J. 2012).

⁷⁴ *Gambora*, 457 Mass. at 725-27.

⁷⁵ On plausibility, *see* *Illinois v. Luna*, 989 N.E.2d 655, 674 (2013); *United States v. Willock*, 696 F. Supp.2d 536, 568 (D. Md. 2010); *Commonwealth v. Gambora*, 933 N.E.2d 50, 60 (2010); *North Carolina v. Leonard*, 726 S.E.2d 647, (2013); *Commonwealth v. Joyner*, 4 N.E.3d 282, 289-90 (2014); *Minnesota v. Hayes*, 567.

⁷⁶ *See* examples of exaggeration in BRANDON L. GARRETT, *CONVICTING THE INNOCENT: WHERE CRIMINAL PROSECUTIONS GO WRONG* (2012) and NATIONAL RESEARCH COUNCIL, *FORENSIC ANALYSIS: WEIGHING BULLET LEAD EVIDENCE* (2004).

was “100% accurate” because “even a less than-perfect fingerprint-identification method can still be scientifically valid.”⁷⁷ In another,

The Court further recognizes, as did the National Research Council’s report, that claims for absolute certainty as to identifications made by practitioners in this area [toolmark comparison] may well be somewhat overblown. The role of this Court, however, is much more limited than determining whether or not the procedures utilized are sufficient to satisfy scientists that the expert opinions are virtually infallible.⁷⁸

Here the court uses the familiar tactic of invoking the straw man of “infallibility,” attributing to the defendant the absurd position that *Daubert* requires scientific evidence to be error free. When the exaggerated expectation is debunked, the court suggests that admissibility must be the logical conclusion. There is an irony here because it was forensic science disciplines—notably fingerprints, firearms and toolmarks—that originally invoked infallibility. Indeed, the commitment to the possibility of “infallibility” lay behind *Strengthening’s* contention that some of the forensic sciences are basically “unscientific.”⁷⁹

C. ENDORSEMENT

Another tactic was not to treat *Strengthening* as critical of the forensic sciences, either in general or in relation to the evidence in question. Through selection and emphasis, treating descriptive statements as evaluative, and over-interpreting faint praise, a number of courts construed *Strengthening* as an endorsement of the impugned evidence:

In our view, however, it exaggerates the measured conclusions and recommendations of the Report to read them as a rejection of the scientific basis for all pattern-matching analysis, including handwriting identification. The Report is much more nuanced than that. It ranges over a wide variety of forensic science disciplines and identifies weaknesses (and some strengths) of varying degrees in each. Thus, while pointing to the ‘simple reality... that the interpretation of forensic evidence is not always based on scientific studies to determine its validity,’ it finds “important variations [in terms of validity] among the disciplines relying on expert interpretation [of observed patterns].”⁸⁰

In another case:

In any event, and contrary to Luis’s contention, the report does not conclude that blood spatter analysis is unreliable. The report notes that ‘[u]nderstanding how a particular bloodstain pattern occurred *can be* critical physical evidence, because it *may help* investigators understand the events of the crime.’⁸¹

⁷⁷ United States v. Watkins, 450 Fed. Appx. 511, 4 (C.A.6 (Ohio) 2011). See also The People v. Jones, 2013 WL 5397389 (Cal. App. 2 Dist 2013).

⁷⁸ *Otero*, 849 F. Supp.2d at 438.

⁷⁹ See also Michael J. Saks & Jonathan J. Koehler, *The Individualization Fallacy in Forensic Science*, 61 VAND. L. REV. 199 (2008); Simon A. Cole, *Forensic Without Uniqueness, Conclusions Without Individualization: The New Epistemology of Forensic Identification*, 8 LAW, PROBABILITY & RISK 233 (2009).

⁸⁰ *Pettus v. United States*, 37 A.3d 213, 227 (2012).

⁸¹ *Commonwealth v. Vasquez*, 923 N.E.2d 524, 798-99 (2010) (emphasis added).

D. PRECEDENT (AND UNSTATED INSTITUTIONAL IMPLICATIONS)

Courts were also able to discount pejorative implications attributable to *Strengthening* on the basis that jurisdictional practice both before and after the report had tended to dismiss challenges to the admissibility of most forensic science techniques:

... counsel cites a 2009 National Research Council (NRC) report, which opined that latent fingerprint analysis, as well as other forensic identification methods, has not ‘been rigorously shown to have the capacity to consistently and accurately demonstrate a connection between evidence and a specific individual source.’... However, over 100 years ago, our supreme court found that there is a scientific basis for fingerprint identification and that courts are justified in admitting this class of evidence. Since then, federal and state appellate courts have uniformly rejected challenges to latent fingerprint analysis.⁸²

Another court was less diplomatic: “[w]e are not prepared to throw out decades of precedent based on a single report.”⁸³

And, the nature of precedent is such that once one court has invoked earlier decisions as a means of mediating *Strengthening*, that opinion itself may be cited as persuasive, or even binding, authority:

The Attorney General responds: ‘The [N.R.C.] study appellant cites has not persuaded other courts that it established any change in the opinion of the scientific community or warranted exclusion of latent fingerprint evidence.’⁸⁴

E. FIELD-WORK

Whatever authority *Strengthening* may be said to possess derives in large measure from its claim to represent “science” or—to use legal terminology derived from the *Frye* decision—“the relevant scientific community” (RSC). However, what counted as the RSC in court was open to contestation and strategic “boundary-work.”⁸⁵

In any case, it does appear that the use of ‘pattern matching’ to determine whether or not there is a match, an approach which, in one form or another, underlies both AFTE [Association of Firearm and Toolmark Examiners] and CMS [consecutive matching striae], is generally accepted among firearms examiners in the field.⁸⁶

Another court acknowledged the “kernel of truth” that “[t]he NAS report does demonstrate some hesitancy in accepting latent fingerprint analysis on the

⁸² *Illinois v. Morris*, 997 N.E.2d 847, 871 (2013). In *Morris* at 860, the analyst ‘identified the print as defendant’s to the exclusion of all other individuals in the world.’ See also Cooper, *supra* note 14.

⁸³ *North Carolina v. Leonard*, 726 S.E.2d 647 (2013) cited Ulery et al. See also *United States v. Rose*, 672 F. Supp.2d 723, 725 (D.Md. 2009); *Jones v. United States*, 27 A.3d 1130, 1137-38 (2011).

⁸⁴ *People v. Jones*, 2013 WL 5397389, (Cal. Ct. App. 2d, 2013).

⁸⁵ Thomas F. Gieryn, *Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists*, 48 AM. SOC. REV. 781 (1983).

⁸⁶ *United States v. Taylor*, 663 F. Supp.2d 1170, 1178-79 (2009).

part of the broader scientific community.”⁸⁷ However, the defendant did “not dispute that the forensic science and law enforcement communities strongly support the use of friction ridge analysis,” and the court felt that “[a]cceptance in that narrower community is also relevant to the *Daubert* inquiry,” enabling it to conclude “that the general acceptance factor at least weakly supports the admission of latent fingerprint evidence.”⁸⁸

Contestation over whether the RSC should be construed narrowly or broadly is endemic to a *Frye* analysis. Previous work has discussed some of the history of these disputes, noting that narrow interpretations tend to favor proponents of contested evidence whereas broad interpretations tend to favor opponents and exclusion.⁸⁹ Rhetorically, breadth seems easier to defend as a legal principle. As a document authored by an interdisciplinary committee of eminent scientists and other high-profile professionals, very few of whom had experience as “bench” or “line” forensic practitioners, *Strengthening* is generally interpreted as representing a very broad construction of the RSC. In one case, though, the court turned this logic on its head, arguing that to credit *Strengthening* would be to unacceptably *narrow* the RSC. Appropriating breadth as a virtue, the court “broadened” the RSC to forensic practitioners (latent print examiners in this case) whose favorable opinion of their own practice then trumped the views of the “narrow” NRC Committee composed of a few chemists, statisticians and engineers.⁹⁰

F. STANDARD OF REVIEW AND HARMLESS ERROR

In most criminal proceedings, admissibility is governed by *Frye* or a version of FRE 702 and *Daubert*. Upon conviction, the standard for reviewing the admission of expert evidence changes. As we explained in the introduction, the question of whether expert evidence was properly admitted is reviewed by an appellate court on the basis of whether there was a mistake of law or whether the trial judge abused her discretion in admitting the evidence. Though rarer, a mistake of law is usually easier to detect because the trial judge has, for example, applied the wrong standard. Abuse of discretion is a more difficult claim to support. For, in reviewing the trial judge’s decision, the appellate court allows considerable leeway to the trial judge. Only where the trial judge is manifestly wrong or unreasonable will an appellate court intervene to find that evidence was improperly admitted.⁹¹

Review of decisions can be formalistic and remarkably insensitive to what might be thought of as substantial limitations with the relevant forensic science techniques. In *Watkins*, for example, the Sixth Circuit Court of Appeals was un-

⁸⁷ United States v. Love, 2011 WL 2173644, 7 (S.D. Cal. 2011).

⁸⁸ *Love*, 2011 WL. See also United States v. Otero, 849 F. Supp.2d 425, 431ff (D.N.J. 2012).

⁸⁹ Simon A. Cole, *Out of the Daubert Fire and into the Fryeing Pan? The Admissibility of Latent Print Evidence in Frye Jurisdictions*, 9 MINN. J. L. SCI. & TECH. 453 (2008); DAVID L. FAIGMAN ET AL., SCIENCE IN THE LAW: FORENSIC SCIENCE ISSUES 294 (2002).

⁹⁰ Illinois v. Luna, 989 N.E.2d 655, 675 (2013).

⁹¹ See General Electric Co. v. Joiner, 522 U.S. 136 (1997).

willing to find an abuse of discretion in the admission of latent fingerprint evidence, where the examiner testified that there was no error rate, in part because *Strengthening* had not been before the trial judge.⁹²

Where a court finds that some evidence was inadmissible, or inadmissible in the form it was presented at trial, that does not end the matter. On review, the appellate court considers the significance of the error in relation to the overall case and the soundness of the conviction. In most cases this means that admissibility errors are found to be “harmless:”

In any event, we conclude any error in admitting the fingerprint evidence was harmless. The erroneous admission of scientific analysis evidence requires reversal only if it is reasonably probable the verdict would have been more favorable to the defendant in the absence of the error. ... Here, there is no reasonable probability of a different result.⁹³

Even judges writing in dissent, against the apparent complacency of their brethren, appear constrained by overarching standards of review.⁹⁴

Confidence in the original conviction affords an opportunity for appellate judges to occasionally express concerns about forensic science evidence that have few practical implications. The appellant is unsuccessful in the attempt to secure a re-trial and the legal significance of concerns, or even dissent, tend to be limited, especially where the appellate court concludes that a technique, such as latent fingerprint evidence, remains admissible as positive evidence of identity.⁹⁵

G. GOOD-FAITH PROGRESS

Other courts did not seriously contest the conclusions in *Strengthening*, but rather found that its criticisms were blunted by the forensic science community’s efforts to reform following its release. Thus, as Cooper found, evidence of good-faith progress toward reform became the basis for admissibility or continuing admissibility:

The court recognizes that the NAS Report and other publications cited by Love critique some aspects of latent fingerprint analysis. However, the forensic science community generally and the FBI in particular have begun to take appropriate steps to respond to that criticism.⁹⁶

The confidence in institutional responses was oriented toward the present (and the future) and reinforces the primacy of the specific case before the court rather than the historical legacy.

⁹² United States v. Watkins, 450 Fed. Appx. 511, 4 (6th Cir. 2011). See also *People v. Jones*, 2013 WL 5397389 (Cal. App.2 Dist. 2013).

⁹³ *Jones*, 2013 WL at 4.

⁹⁴ *Minnesota v. Hull*, 788 N.W.2d 91, 110 (2010).

⁹⁵ *In re Personal Restraint of Trapp*, 165 Wash. App. 1003, 1, 4-8 (2011).

⁹⁶ *United States v. Love*, 2011 WL 2173644, 8 (S.D. Cal. 2011).

H. PRIVILEGING THE CASE AND THE SPECIFIC OPINION:
INSENSITIVITY TO GENERAL CRITICISMS

In the absence of evaluative research, and empirically-based standards and forms of expression, the experience of testifying forensic analysts was an important feature in many judgments admitting or upholding the admission of incriminating opinions. This is not surprising given that once a technique is deemed admissible—that is, has survived a *Frye* or *Daubert*-style admissibility hearing or has been admitted for a long time (i.e. “grandfathered” before *Daubert* or even *Frye*)—then subsequent admission tends to be contingent upon the analyst being trained and experienced with the otherwise admissible technique.⁹⁷ The value of the technique, like the experience of the analyst, is open to challenge at trial but not the admissibility of the technique or the *experienced* analyst’s opinion.

In some instances courts drew upon *Strengthening* to reinforce the importance of experience in the subjective judgments the analysts were making.

Because such determinations ‘involve subjective qualitative judgments... the accuracy of [an] examiner[’s] assessment[] is highly dependant on [her] skill and training.’ See... *Strengthening*...⁹⁸

Most courts were satisfied with references to formal training, prior experience (not always very long or from the precise domain – see Section IV) and previous appearances in courts.⁹⁹

A common response to challenges to forensic science evidence was to point to the fact that no criticism of the specific finding was raised by the defendant/apellant.

Notably, Langlois offered no contrary testimony to refute the state’s ballistic experts. Apart from a thorough cross-examination, he presented no credible challenge to the underlying theory of how marks are transferred from a firearm to the primary components of a cartridge, nor to the methodology of identifying a match between a particular gun and a shell case found at a crime scene.¹⁰⁰

This is interesting because it reinforces the courts’ limited attention—only wanting to hear about specific problems (and actual errors) in the instant case—and tendency to implicitly accept the value of underlying techniques. Courts were largely unreceptive to general criticisms, particularly those of a methodological or statistical nature—in the absence of a viable alternative technique.¹⁰¹ Such ap-

⁹⁷ Simon A. Cole, *Grandfathering Evidence: Fingerprint Admissibility Rulings from Jennings to Llera Plaza and Back Again*, 41 AM. CRIM. L. REV. 1189 (2004).

⁹⁸ United States v. Smallwood, 456 Fed. Appx. 563, 566 (6th Cir. 2012).

⁹⁹ See, e.g., Rodriguez v. Delaware, 30 A.3d 764 (2011); North Carolina v. Adams, 212 N.C.App. 235 (2011); Molina v. Tennessee, 2011 WL 1344287 (Tenn. Crim. App. 2011); Illinois v. Robinson, 2 N.E.3d 383 (2013); United States v. Campbell, 2012 WL 2374528 (N.D. Ga. 2013).

¹⁰⁰ Ohio v. Langlois, 2 N.E.3d. 936, 950-51 (2013).

¹⁰¹ See, e.g., The People v. Price, 2011 WL 2043957 (2011); Commonwealth v. Gambora, 457 Mass. 715, 725 (2010); United States v. Cerna, 2010 WL 3448528 (N.D. Cal. 2010).

proaches discount the potentially corrosive implications of methodological frailties and oversights.¹⁰² Admission and reliance on defense counsel to identify problems trivializes the real difficulty of conveying technical problems during an adversarial proceeding. It also elides the difficulty of obtaining a credible expert who might be able to disagree on specifics (from inside the “community”), especially where the challenge is around the limits of the technique and perhaps even the foundations of the legally-recognized field.¹⁰³

Once a technique had been admitted, only specific criticisms appear to be capable of seriously compromising the weight an appellate court might attribute to the admissible and implicitly reliable derivative opinion.

... the fingerprint identification method used by the police is generally accepted within the scientific community. ... Once the scientific community accepts a methodology, application of the methodology to a particular case is a matter of weight ... the reliability of fingerprint identification has been tested in our adversarial system for over a century and routinely subjected to peer review. ... Once the evidence is accepted as scientifically acceptable, the question of admissibility turns on whether the witnesses qualify as experts and whether proffered testimony would be helpful to the trier of fact.¹⁰⁴

Focusing on case specifics privileges an individualized assessment of the experience and interpretation of the forensic analyst over “field” destabilizing criticisms around validation, reliability and standards. While focusing on specifics might make sense in relation to the case-based nature of Anglo-American dispute resolution, it seems undesirable to disregard fundamental, broadly-based methodological criticisms on the basis that the case is concerned with a specific application of a technique and a derivative opinion. Such tactics tend, however, to be rationalized through recourse to precedent, prior admission and reliance, along with the inability to identify an actual error.

I. THE GALILEO EFFECT: THE IMPLICATIONS OF PRIVILEGING SPECIFICS AND “FIELDS”

In addition to disputes around the boundaries of fields, the membership of the RSC and the meaning of acceptance (see Sub-section III.E), by privileging longstanding practice and experience, the decisions reveal a number of occasions

¹⁰² See Faigman et al., *supra* note 47. We find the legal tendency to focus on individual cases and the use of techniques in relation to particular permutations of evidence in criminal proceedings curious, at the very least. We have concerns about focusing on the use of techniques in individual cases thereby requiring every defendant to identify specific errors or persuade a particular jury of the significance of fundamental methodological issues rather than have appellate courts endeavor to address and provide guidance on general problems, or problems associated with a technique or set of techniques in a systematic way.

¹⁰³ See Michael Lynch & Simon A. Cole, *Science and Technology Studies on Trial: Dilemmas of Expertise*, 35 SOC. STUDIES SCI. 269–311 (2005); Simon A. Cole, *A Cautionary Tale About Cautionary Tales About Intervention*, 16 ORG. 121 (2009). See also *Hinton v. Alabama*, 134 S. Ct. 1081 (2014).

¹⁰⁴ *State of Washington v. Piggott*, 2014 WL 1286564 (Wash. App. Div. 1), 2 (2014). See also *Campbell*, 2012 WL at 5-6 quoting *United States v. Stone*, 848 F. Supp.2d 714, 717-18 (2012).

where individual forensic analysts explicitly reject the findings and recommendations in *Strengthening*.¹⁰⁵ In the following extract the analyst implicitly dismissed the need for the trappings of mainstream science—i.e. validation studies, standards, error rates and so forth—because of his belief in an ability to determine whether bullets had been discharged from a particular gun based largely on experience doing precisely that.

On cross-examination, Smith acknowledged that the [NRC report] concluded that additional studies should be conducted to ‘make the process of individualization more precise and reputable.’ ... However, he disagreed with the NRC’s assessment that ‘[b]ecause 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...’¹⁰⁶

Remarkably, on most occasions when an analyst stands against *Strengthening*, the court tends to allow their evidence in a manner that privileges past legal practices and the experience of the analyst. Issues identified by the NRC committee are, at best, issues for cross-examination and, perhaps, weight.¹⁰⁷

This kind of response to the NRC report constitutes *ipse dixit*.¹⁰⁸ It represents the bare assertions or the impressions of individual (and occasionally groups of) forensic analysts, who sometimes lack formal scientific training.¹⁰⁹ In making this point, it is important to acknowledge that a large proportion of the expert reports and testimony appearing in our dataset (and beyond) do the same sort of thing, albeit implicitly. Few prosecutors and expert witnesses unilaterally advert to *Strengthening* or its implications. Any engagement tends to be responsive and critical. When the report is raised by defendants/appellants, prosecutors regularly marginalize its legal and scientific significance.

¹⁰⁵ See, e.g., Wayne G. Plumtree, *A Perspective on the Appropriate Weight to be Given to the National Academy of Sciences' Report on Forensics in Evidentiary Hearings: The Significance of Continued Court Acceptance of Fingerprint Evidence*, 42 Sw. L. REV. 605 (2013). American forensic disciplinary organizations have varied widely in their response to *Strengthening*. Some have issued official responses that are highly respectful of the NRC and its scientific authority, while emphasizing interpretations of *Strengthening* that suit their preferences, but others have denounced the committee and its report as incompetent, primarily on the basis of its failure to include practitioners, of the various forensic disciplines discussed in the report, as members.

¹⁰⁶ *Melcher v. Holland*, 2014 WL 31359, 5-6, 11 (N.D. Cal. 2014). See also *Commonwealth v. Joyner*, 4 N.E.3d 282, 289 (2014); *Illinois v. Luna*, 989 N.E.2d 655, 663 (2013); *Commonwealth v. Wadlington*, 467 Mass. 192, 205 (2014); *Illinois v. Robinson*, 2 N.E.3d 383, 390 (2013).

¹⁰⁷ *United States v. Rose*, 672 F. Supp.2d 723, 724 (D. Md. 2009); *United States v. McCluskey*, 954 F. Supp.2d 1224, 1238 (D.N.M. 2013); *United States v. Council*, 777 F. Supp.2d 1006, 1010-11 (E.D. Va. 2011); *Pettus v. United States*, 37 A.3d 213, 228 (2012); *Stone*, 848 F. Supp.2d at 719; *New Mexico v. Jaramillo*, 272 P.3d 682, 770 (2011); *Turner v. Indiana*, 953 N.E.2d 1039, 1050, 1053 (2011).

¹⁰⁸ *Contrast General Electric Co. v. Joiner*, 522 U.S. 136, 137 (2007).

¹⁰⁹ Jennifer L Mnookin et al, *The Need for a Research Culture in the Forensic Sciences*, 58 UCLA L. REV. 725 (2011).

J. IT'S NOT A LEGAL DOCUMENT BUT IT'S NOT REALLY SCIENTIFIC EITHER

Few of the judgments were willing to countenance *Strengthening* as a document that had much to say about law or legal practice. Much more surprising, perhaps, is the apparent reluctance to recognize the report as an authoritative contribution to our understanding of the forensic sciences or as a learned treatise. "Learned treatise" is a legal term with significance because it renders a text admissible as an exception to the hearsay rule (FRE 803(18)) or allows a lawyer to use it explicitly in cross-examination.¹¹⁰ One court denied "learned treatise" status to *Strengthening* on the basis that it was not an abuse of discretion for the judge to decline to take "judicial notice" of the report.¹¹¹ In so doing the court made an evaluative argument:

The relevant scientific fingerprint community does not consider the NAS Report a learned treatise. The people on the scientific working group on fingerprints, SWGFAST, do not consider it a learned treatise. The FBI at Quantico does not consider it a learned treatise. The fingerprint unit at Scotland Yard does not consider it a learned treatise. These are the leaders in the field. These are the people that are brought together to issue protocols and standards for those folks who are practicing in the field. And they don't consider it a learned treatise. What they consider it to be is a policy statement.¹¹²

Here, boundary (or field) work is used to marginalize the (non-forensic) scientists, engineers and statisticians responsible for *Strengthening*. Within our sample, this constituted the most extreme example of a court explicitly rejecting the epistemic authority of *Strengthening*. Far more common were the aforementioned tactics, where the authority of *Strengthening* was never explicitly denied, even if its implications were represented as insufficient to affect admissibility or the original outcome.

IV. TRIAL SAFEGUARDS: "VIGOROUS CROSS-EXAMINATION" AND "SHAKY" EVIDENCE

Commitment to the liberal admissibility thrust, in conjunction with the traditionally accommodating approach to the state's forensic science and medicine evidence, means that most forensic science evidence continues to be deemed admissible. Though for some testimony this now requires minor qualifications to the form of expression, such as "to a reasonable degree of ballistic certainty." Apart from a principled commitment to admitting as much relevant evidence as possible, liberal admissibility policies are grounded in longstanding confidence in the effectiveness of trial safeguards and the capabilities of jurors and judges. Trial and appellate courts routinely invoke the ability to confront witnesses, to call

¹¹⁰ *Gee v. United States*, 54 A.3d 1249, 1265 (2012).

¹¹¹ *Gee*, 54 A.3d at 1266.

¹¹² *Id.* at 1262-63, 1266. See also Simon A. Cole, *The Innocence Crisis and Forensic Science Reform in WRONGFUL CONVICTION AND CRIMINAL JUSTICE REFORM* (Marvin Zalman & Julia Carrano eds., 2014).

rebuttal witnesses and, where appropriate, for judges to offer careful guidance as the appropriate means of dealing with “shaky” expert evidence.

In the extract below, a latent fingerprint examiner is allowed to proffer opinions about tire tracks and shoeprints because of his “substantial experience” with “impression evidence.” Revealingly, this extract incorporates a quotation from the *Daubert* decision reinforcing the centrality of trial safeguards as the primary means of managing incriminating evidence while maintaining a profound optimism about the abilities of American jurors.

Hegman’s expertise in fingerprint analysis was relevant to his experience with impression evidence. While tire track and shoeprint analysis may be viewed as a distinct forensic discipline from fingerprint analysis because it involves mass-produced items, the analytic process is similar. Specifically, tire tracks, shoeprints, and fingerprints are all forms of impression evidence. ... while Hegman’s substantial experience in fingerprint analysis does not alone support his admission as an expert in other forms of impression analysis, the trial judge did not abuse his discretion in considering that experience and training as relevant. ... Finally, the defense had the opportunity to cross-examine Hegman on the stand regarding his background, experience, and methodological approach. ‘Vigorous cross examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence.’ ... By probing Hegman on his particular experience in tire track and shoeprint analysis, defense counsel challenged his credibility before the jury and the weight to be given the impression evidence.¹¹³

Lacking information about validity and reliability, and in the midst of an adversarial proceeding, jurors are somehow expected to rationally evaluate the state’s *expert* opinion evidence. There are reasons to believe that jurors may be impressed by forensic science testimony that purports to be scientific and that defense counsel are often ill-equipped to expose and convey limitations and their significance through cross-examination.¹¹⁴

¹¹³ *Rodriguez v. Delaware*, 30 A.3d 764, 769-70 (2011). See also *United States v. Rose*, 672 F. Supp.2d 723, 724 (D. Md. 2009); *United States v. McCluskey*, 954 F. Supp.2d 1224, 1238 (D.N.M. 2013); *United States v. Council*, 777 F. Supp.2d 1006, 1010-11 (E.D. Va. 2011); *Pettus v. United States*, 37 A.3d 213, 228 (2012); *United States v. Stone*, 848 F. Supp.2d 714, 719 (E.D. Mich. 2012); *New Mexico v. Jaramillo*, 272 P.3d 682, 770 (2011); *Turner v. Indiana*, 953 N.E.2d 1039, 1050, 1053 (2011).

¹¹⁴ See generally Sarah Lucy Cooper, *Judicial Responses to Challenges to Firearms Identification Evidence: A Need for New Perspectives on Finality*, 31 T.M. COOLEY L. REV. 457 (2014); Gary Edmond & Mehera San Roque, *The Cool Crucible: Forensic Science and the Frailty of the Criminal Trial*, 24 CURRENT ISSUES CRIM. JUST. 51 (2012). *Though consider* Gary Edmond et al., *How to Cross-Examine Forensic Scientists: A Guide for Lawyers*, 39 AUSTRALIAN BAR REV. 174 (2014).

V. INCONCLUSIVE: STRENGTHENING'S DELPHIC DIMENSIONS

The issue of complex scientific evidence in legal disputes has been widely discussed as a growing problem in our increasingly technological society.¹¹⁵ It is widely believed that courts face difficulties due to a combination of factors including the lack of scientific training for lawyers and judges, the unsettled nature of scientific knowledge, and the presentation of scientific information to those without scientific and technical competence by interested parties in an adversarial forum. The use of authoritative documents such as NRC reports offers an appealing research site because they promise the—perhaps illusory—appearance of scientific consensus and clarity. For just a moment, on a single issue, or narrow set of issues, “science” actually seeks consensus and “speaks” univocally. If courts were ever going to defer to, or *align* themselves with, “science,” one might think it would be at such moments.¹¹⁶ Our study, however, suggests that deference requires more than (apparent) scientific consensus—at least when forensic science evidence is concerned. For, by and large, *Strengthening* has not been received as a scientific statement requiring engagement, let alone deference or alignment, by most judges. Indeed, with the recent creation of an elaborate set of scientific committees, through a joint effort of NIST and the Department of Justice, *Strengthening's* impact will probably be most conspicuous outside American courtrooms.

There is, however, little doubt that scientists can influence legal proceedings and practice, particularly through independent and authoritative consensus reports. Nonetheless, our study illustrates how courts have considerable scope for maneuver and resistance. Courts are able, and sometimes feel obliged, to mediate (even inoculate), the terms and conditions on which they engage with exogenous knowledges and their implications. In doing law, and appealing to legal practices, processes and values, courts are able to manage the terms of engagement, though always at some risk to attempts to achieve espoused goals and maintain public legitimacy.

Notwithstanding the apparent reluctance to formally embrace *Strengthening*, consensus statements and formal reports have previously assisted courts with controversial forensic science evidence.¹¹⁷ All previous NRC reports on forensic

¹¹⁵ See, e.g., Learned Hand, *Historical and Practical Considerations Regarding Expert Testimony*, 15 HARV. L. REV. 40 (1901); PETER HUBER, *GALILEO'S REVENGE: JUNK SCIENCE IN THE COURTROOM* (1991); STEVEN GOLDBERG, *CULTURE CLASH: LAW AND SCIENCE IN AMERICA* (1994); Jasanoff, *supra* note 28.

¹¹⁶ The term ‘accommodation’ might not capture some of the nuance here, where it is not always obvious that courts fully comprehend, let alone incorporate, particular claims about science. Consider Sheila Jasanoff, *Beyond Epistemology: Relativism and Engagement in the Politics of Science*, 26 SOC. STUDIES SCI. 393 (1996); Gary Edmond, *The Building Blocks of Forensic Science and Law: Recent Work on DNA Profiling (and Photo Comparison)*, 41 SOC. STUDIES SCI. 127 (2011) and Gary Edmond & David Mercer, *Conjectures and Exhumations: Citations of History, Philosophy and Sociology of Science in U.S. Federal Courts*, 14 LAW & LITERATURE 309 (2002). More generally, see GUNTHER TEUBNER, *LAW AS AN AUTOPOIETIC SYSTEM* (Anne Bankowska & Ruth Adler trans., 1993).

¹¹⁷ ARONSON, *supra* note 32; KAYE, *supra* note 32.

science, however, have been about specific forensic techniques.¹¹⁸ *Strengthening* stands in stark contrast to these reports. Responding to its formal mandate the Committee's approach and report were broad in their conceptualization. The report itself offers sweeping criticisms of many areas of practice and many different forensic science techniques. It is often ambivalent and ambiguous in its findings: simultaneously critical of scientific failures and oversights while recognizing the probative value of the scientifically deficient techniques. It sometimes engages in sweeping or vague exhortations, such as urging that forensic science should adopt "scientific culture," that all forensic techniques be standardized, practitioners, certified, and laboratories accredited. Furthermore, *Strengthening* does not provide guidance on whether specific techniques should continue to be used or how results should be expressed. Notwithstanding unprecedented criticisms, *Strengthening* does not purport to advise on admissibility. The report does not, for example, suggest that latent fingerprint or ballistics evidence should not be admitted. Rather, it places emphasis on the need for research, standardization, tempered expression and moderation. Though stridently critical of legal attempts to regulate forensic science evidence and undoubtedly relevant to a range of evidentiary procedures and decisions, *Strengthening* is not primarily oriented to the exigencies of legal practice. It does not, for example, advise how existing technologies should be used or restricted.

Strengthening can be distinguished from earlier NRC reports in both its breadth and implications. The earlier NRC reports provided recommendations that were more constrained.¹¹⁹ They could be more readily identified, understood and acted upon. Their recommendations applied to a small set of issues or cases, although DNA profiling was in the process of rapid expansion. Conversely, many of the concerns in *Strengthening* are diffuse: applicable to a very large number of current and legacy cases. In the absence of clear guidance and in the face of daunting logistical complexity, it is perhaps not surprising that courts have been cautious in their response to a report with incredibly disruptive potential. It is far from obvious that proposed reforms are affordable, or readily achievable, in the short term. In the absence of clear advice and viable alternatives courts have relied upon legal "solutions" such as opinionization and new forms of expression as judges sought to respond to apparent epistemic problems through trial mechanisms. American judges have invoked conventional legal rules and practices, valorized adversarialism, and insisted on the need to address problems on a case-by-case basis. The emphasis on individual cases helps to insulate earlier convictions that relied upon comparison evidence.

Another reason courts found it difficult to embrace the critique underpinning *Strengthening* is that in the vast majority of criminal cases (including pleas) it is not only forensic science evidence that supports the guilt of the accused. In many cases a mix of additional admissible and sometimes inadmissible evidence (such as character or tendency evidence, admissions or prior convictions) suggest

¹¹⁸ For a review of reports on forensic science, see Simon A. Cole, *National Academy of Sciences (NAS) in ENCYCLOPEDIA OF FORENSIC SCIENCES* 190 (Jay A. Siegel & Pekka J. Saukko eds., 2d ed. 2013).

¹¹⁹ NATIONAL RESEARCH COUNCIL, *THE EVALUATION OF FORENSIC DNA EVIDENCE* (1996) and NATIONAL RESEARCH COUNCIL, *DNA TECHNOLOGY IN FORENSIC SCIENCE* (1992).

that it is the accused who committed the crime or is implicated in the offence. Here, it may be that in many cases the opinions of forensic analysts using techniques that may not be as reliable as conventionally suggested, nevertheless underpin factually correct outcomes. There would seem to be pragmatic dimensions to the legal tolerance of forensic science evidence that is supported by a commitment to truth, a tradition of liberal admission, a belief in the effectiveness of trial safeguards and individual rights, along with the constitutionality of adversarial jury trials, which coincide with an underlying commitment to crime control. Many judges probably believe, perhaps correctly, that the exclusion of unvalidated forensic science techniques would make it harder to successfully prosecute guilty persons. These commitments might be particularly appealing when the alternative is recognition or adoption of a diffuse report that would disrupt criminal justice practice, place a question mark over many convictions, and unavoidably erode the legitimacy of American criminal courts. How the goal of not convicting the innocent corresponds with the proportion of innocent persons who plead or are found guilty on the basis of misleading or mistaken forensic techniques, remains unclear.¹²⁰

VI. CONCLUSIONS

In conclusion, it is useful to reflect on some of the different interpretations of *Strengthening*. It might be that the different groups embroiled in the contests around the forensic sciences have tended to produce particular kinds of (let's say biased) readings of *Strengthening* and its practical significance. Many forensic scientists, particularly those from practitioner backgrounds, tended to respond in a hostile manner, at least initially. Some of the initial responses to being labelled non-scientific seem to have been assuaged by continuing admission, along with realization that the report is a resource that can be mobilized to secure additional funding for forensic science research, training and equipment. Conversely, most scholarly commentators have tended to see *Strengthening* as vindication of (their) criticisms that were treated as marginal before the report was handed down. Among these "critics" there may be a tendency to over-read recommendations and to invoke idealized models of science and expertise when discussing forensic science evidence and legal implications. Into the contests over how to read the NRC report, prosecutors and judges have difficult professional obligations and institutional traditions to navigate. Realistically they cannot ignore the report and its implications, even if particular courts insist that some forms of legal action do not allow them to consider it overtly. Defense lawyers have struggled to translate general methodological concerns into forms of action or evidence that courts were willing to recognize and respond to. The NRC committee might have generated more controversy, even notoriety, and stimulated action if it had recommended that latent fingerprint examiners, ballistics analysts and so on, should not be allowed to match a trace to a source until their techniques are scientifi-

¹²⁰ Samuel R. Gross et al., *Rate of False Conviction of Criminal Defendants Who Are Sentenced to Death*, 111 PNAS 7230 (2014); D. Michael Risinger, *Innocents Convicted: An Empirically Justified Wrongful Conviction Rate*, 97 J. CRIM. L. & CRIMINOLOGY 761 (2007).

cally-supported through rigorous validation processes. Though, such a prescriptive approach to legal concepts like admissibility might have overplayed their position and epistemic capital.

Strengthening's breadth, potentially disruptive implications, along with the lack of clear prescription for legal practice, all made it difficult and unappealing for courts to defer, let alone recognize the depth of problems suggested by critics, notwithstanding apparent endorsement by the NRC committee. Our study reveals how, with very few exceptions, *Strengthening* is embraced by those being prosecuted or appealing convictions. In these endeavors *Strengthening* has become a rather blunt and impotent "weapon on the weak".¹²¹

Over time, some of *Strengthening's* more critical insights are likely to trickle down to forensic science communities, bar associations and courts, and occasionally flow to the extent that committees recently assembled by NIST and NIJ impose reforms, or declare some area of forensic science, or some technique or expression, unreliable (e.g. bite mark comparison evidence).¹²²

Perhaps the most unfortunate development in relation to forensic science evidence in recent years is not the reluctance to engage more directly with the *scientific advice* from *Strengthening*, but the apparent reluctance of trial and appellate judges to apply existing legal authority, particularly admissibility standards (e.g. the *Daubert* criteria), more aggressively.¹²³ *Frye* and, especially, *Daubert* seem to be conceived by lawyers and judges (operating in extremely hierarchical systems and traditions) as productive ways of engaging with scientific and technical forms of knowledge. Most lawyers and judges seem to believe that when it comes to the forensic sciences the current approach to admissibility standards—a relatively light touch in response to expert opinion evidence adduced by the state that effectively circumvents interest in validity and reliability—is sufficient, indeed appropriate. Demanding interpretations of *Daubert* are not applied to the state's forensic science evidence. For most prosecutors, judges, forensic analysts as well as the public at large, notwithstanding high profile wrongful convictions exposed through innocence projects, the overall rate of legal mistakes can be understood as miniscule, and used to valorize extant legal traditions and practice in support of a preference for gradual engagement and reform on a case by case basis.¹²⁴

As this overview confirms, legal responses are as diverse as the terms and situations in which legal institutions engage with forensic analysts and their opinions. Predictably, institutional concerns and legal framing tend to pre-dominate use and interpretations and, short of wholesale engagement by the most senior courts, make it unlikely that there will be a radical change to the way lawyers

¹²¹ JAMES C. SCOTT, *WEAPONS OF THE WEAK: EVERYDAY FORMS OF PEASANT RESISTANCE* (1985).

¹²² Erica Beecher-Monas, *Reality Bites: The Illusion of Science in Bite-Mark Evidence*, 30 CARDOZO L. REV. 1369 (2009).

¹²³ See, e.g., Jennifer L. Groscup et al., *The Effects of Daubert on the Admissibility of Expert Testimony in State and Federal Criminal Cases*, 8 PSYCHOL. PUB. POL'Y & L. 339 (2002); D. Michael Risinger, *Navigating Expert Reliability: Are Criminal Standards of Certainty Being Left on the Dock*, 64 ALB. L. REV. 99 (2002).

¹²⁴ See, e.g., Scalia J. in *Kansas v. Marsh*, 126 S. Ct. 2516 (2006).

and judges engage with forensic science evidence in criminal proceedings. The courts in our study rationalized their responses and evasions by reference to the specific case and the specific application of the technique, past practices in the jurisdiction, the responses of courts in other jurisdictions, the experience of the state's forensic scientists, the strength of the overall case (notwithstanding the treatment of the forensic science evidence at trial), and specifically enumerated rights such as the right to confront witnesses (in the Sixth Amendment). Simultaneously, they maintain a seemingly unshakeable confidence in adversarialism, trial safeguards, the party control of litigation, and the ability of lawyers, judges and juries to rationally evaluate scientific and technical evidence.¹²⁵ The limited resourcing available to most defendants, widespread dilatory performances by defense counsel, and research questioning the effectiveness of trial safeguards, seem to have done little to shake the criminal justice juggernaut.

In the end, there may be truth in the claim that: "there is a fundamental disconnect between the worlds of science and of law. Science is constantly evolving by testing and modifying its prior theories, knowledge, and 'truths.'"¹²⁶ It is our contention that attentive scientists have been more interested in subjecting forensic science and medicine to testing and refinement than lawyers and judges who have not only been remarkably insensitive to endemic problems across the forensic sciences, but simultaneously appear to be oblivious to the weakness of their own rules, practices and traditions, and their failure to provide more useful information to fact-finders about the actual value of forensic science evidence.

¹²⁵ We are not necessarily proponents of non-adversarial approaches but rather attempting to draw attention to the confidence invested in adversarial practices on the basis of tradition and the personal experience of lawyers. We might note that these are systems that do not usually provide feedback and so are less than ideal for promoting learning and understanding.

¹²⁶ *Robbins v. Texas*, 360 S.W.3d 446, 469 (2011).

FORENSIC EVIDENCE AND THE COURT OF APPEAL FOR ENGLAND AND WALES

Professor Lissa Griffin
Pace Law School, Pace University

ABSTRACT

The Criminal Division of the Court of Appeal has extensively analyzed the role of forensic evidence. In doing so, the court has grappled with the admissibility and reliability of a broad range of forensic evidence, from DNA and computer forensics to medical and psychological proof, to more outlying subjects like facial mapping, fiber analysis, or voice identification. The court has analyzed these subjects from two perspectives: the admissibility of such evidence in the lower courts and the admissibility of such evidence as fresh evidence on appeal. In both contexts, the court has taken a practical approach to admitting forensic proof that is deemed to be helpful and reliable. It has also given helpful guidance to practitioners dealing with these issues, and to judges who must instruct juries about how to evaluate forensic evidence. Compared to the approach of the United States courts, the Court of Appeal has indicated a greater willingness to keep pace with scientific developments and to admit forensic proof that contributes to the accuracy of criminal verdicts.

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I. INTRODUCTION

The Criminal Division of the Court of Appeal in England and Wales (“the court”) has had an extensive relationship with forensic evidence in criminal cases. Its history of grappling with many forms of forensic evidence is broad and detailed: throughout the years, the court has explored the admissibility and reliability of DNA evidence, medical evidence, and psychological evidence as well as computer forensic testimony, fingerprinting, facial mapping, and other types of forensic proof.¹

The court has addressed this kind of evidence through two vehicles: (1) by reviewing the treatment of those issues in trial courts;² and (2) by way of its power to receive fresh evidence – forensic or otherwise - on appeal.³ As to the first approach, the court has written extensively on the admissibility of forensic evidence at trial. Specifically, the court has analyzed the questions of when convictions based on forensic evidence are unsafe and what is required of the prosecution and defense when offering or contesting forensic proof at trial and on appeal. As to the second approach, the court has discussed when fresh forensic evidence should be received on appeal, and how to treat new scientific developments. In its analysis, the court has been assisted greatly by specific protocols established

*Professor of Law, Pace Law School. Contact: lgriffin@law.pace.edu

¹ See generally R. v. Coats, [2013] EWCA (Crim) 1472 (psychological); R. v. Hall, [2011] EWCA (Crim) 4 (fiber); R. v. Smith, [2011] EWCA (Crim) 1296, [2011] 2 Cr. App. R. 16 (fingerprint); R. v. Henderson, Butler and Oyediran, [2010] EWCA (Crim) 1269, [2010] 2 Cr. App. R. 24 (medical); R. v. Inglis, [2010] EWCA (Crim) 2637 (psychological); R. v. O’Shea, [2010] EWCA (Crim) 2879 (document and computer); R. v. Reed & Anor., [2009] EWCA (Crim) 2698, [2010] 1 Cr. App. R. 23 (DNA); R. v. Atkins & Anor., [2009] EWCA (Crim) 1876, [2010] 1 Cr. App. R. 8 (facial mapping); R. v. JRH, [2005] EWCA (Crim) 1828, [2006] 1 Cr. App. R. 10 (psychological); R. v. Kai-Whitewind, [2005] EWCA (Crim) 1092, [2005] 2 Cr. App. R. 31 (medical); R. v. Otoo, No. 9906358/Y3, ¶¶ 26, 39 (C.A. Jan. 31 2005) (on file with author) (DNA); R. v. Cannings, [2004] EWCA (Crim) 1, [2004] 2 Cr. App. R. 7 (medical); R. v. Shirley, [2003] EWCA (Crim) 1976 (DNA); R. v. O’Doherty, [2002] NICA (Crim) B51; [2002] N.I. 263 (voice identification).

² See discussion *infra* Parts II-III.

³ The court itself has referred to seminal cases in this context such as R. v. Jones, [1997] 1 Cr. App. R. 86; R. v. Kai-Whitewind, [2005] EWCA (Crim) 1092, [2005] 2 Cr. App. R. 31; R. v. Meachen, [2009] EWCA (Crim) 1701; and R. v. Henderson, Butler and Oyediran, [2010] EWCA (Crim) 1269, [2010] 2 Cr. App. R. 24. See discussion *infra* Parts II-III.

by the forensic science community, the Forensic Science Regulator,⁴ and by Parliament.⁵

Part II of this chapter addresses the general standards for admissibility of forensic evidence in the Court of Appeal. Part III analyzes how the general standards outlined in Part II have been applied to various types of forensic evidence, including DNA, medical evidence, psychological evidence, fingerprints, computer evidence, and other less conventional evidence such as fibers, voice, and facial mapping evidence. The chapter concludes with some general observations about the willingness to receive relevant forensic proof and the substantial guidance the court has given to practitioners seeking to introduce such proof in that court.

II. GENERAL STANDARDS

A. ADMISSIBILITY

Part 33 of the Criminal Procedure Rules provides the standard for admissibility of any kind of expert forensic evidence.⁶ The standard must be satisfied before expert testimony is received at trial or on appeal. In *R. v. Reed & Anor*,⁷ the court summarized the kinds of evidence that could be admissible under the rules as follows:

- a. Expert evidence of a scientific nature is not admissible where the scientific bases on which it is advanced is insufficiently reliable for it to be put before the jury.
- b. Even if the scientific basis is sufficiently reliable, the evidence is not admissible unless it is within the scope of evidence an expert can properly give.
- c. Unless the admissibility is challenged, the judge will receive that evidence. If objection is made, the party proffering the evidence must prove its admissibility.

Applying these standards, the court held that forensic trial proof should not have been received where its alleged scientific basis is not sufficiently reliable.⁸

⁴ The Forensic Science Regulator ensures that the United Kingdom's forensic science service providers comply with the appropriate scientific quality standards. The Forensic Science Regulator is responsible for establishing scientific quality standards and for guiding forensic science service providers to comply with those standards. *Forensic Service Regulator*, GOV.UK, <https://www.gov.uk/government/organisations/forensic-science-regulator/about> (last visited Aug. 16, 2014).

⁵ Specifically, Parliament addressed the use of forensic evidence in court through the presentment of expert witnesses. See Criminal Procedure Rules, 2013, Part 33, available at <https://www.justice.gov.uk/courts/procedure-rules/criminal/docs/2012/crim-proc-rules-2013-part-33.pdf>.

⁶ Criminal Procedure Rules, 2013, Part 33, available at <https://www.justice.gov.uk/courts/procedure-rules/criminal/docs/2012/crim-proc-rules-2013-part-33.pdf>.

⁷ [2009] EWCA (Crim) 2698, [2010] 1 Cr. App. R. 23 at ¶¶ 111-13.

⁸ *Id.* ¶114.

This can be a very multi-faceted and complex issue. In more controversial areas, the court's analysis might deal with whether the claimed scientific basis is recognized by experts in the field or whether there is even a scientific basis for the expert's conclusions (for example, shaken baby syndrome deaths,⁹ auditory analysis,¹⁰ and explosives testing.)¹¹ In more traditional forensic areas, such as DNA evidence, the court might address whether the statistical evidence is reliable; where there is no statistical evidence, the court will need to determine whether an expert's "evaluative" opinion, based on his or her experience and expertise, is sufficiently reliable to be admissible.¹²

B. FRESH EVIDENCE ON APPEAL

More often, the Court of Appeal addresses evidentiary issues that arise when fresh forensic evidence is offered on appeal.¹³ In addition to satisfying the standard for admissibility of expert forensic evidence, the fresh evidence offered on appeal must satisfy Section 23 of the Criminal Appeal Act 1968.¹⁴ That statute requires the Court of Appeal to receive fresh evidence where:

- (1) the "evidence appears to the Court to be capable of belief";
- (2) it appears to the Court that the evidence "may afford any ground for allowing the appeal";
- (3) "the evidence would have been admissible in the proceedings from which the appeal lies on an issue which is the subject of the appeal"; and
- (4) "there is a reasonable explanation for the failure to adduce the evidence in those proceedings."¹⁵

In addition to its mandatory receipt of fresh evidence, the court may use its discretion to receive new evidence when it is "expedient in the interests of justice" to do so.¹⁶ Under this standard, fresh evidence will be received when it is "new and compelling."¹⁷

⁹ R. v. Henderson, Butler and Oyediran, [2010] EWCA (Crim) 1269, [2010] 2 Cr. App. R. 24; R. v. Bacchus, [2004] EWCA (Crim) 1756.

¹⁰ R. v. O'Doherty, [2002] NICA (Crim) B51; [2002] N.I. 263.

¹¹ R. v. Assali, [2005] EWCA (Crim) 2031.

¹² See R. v. Dlugosz, [2013] EWCA (Crim) 2.

¹³ This procedural step is the equivalent of receiving newly discovered evidence in the United States courts. In the United States, however, appellate courts do not receive any evidence; if newly discovered evidence is to be considered, the proceeding must take place in the trial court in which a conviction was previously entered, and often before the same judge who presided at the earlier trial.

Criminal Appeal Act 1968, § 23, available at

<http://www.legislation.gov.uk/ukpga/1968/19/section/23#commentary-c1424586>.

¹⁵ *Id.* § 23 ¶ 2(a)-(d).

¹⁶ *Id.* § 23 ¶ 1. See, e.g., R. v. Hall, [2011] EWCA (Crim) 4; R. v. O'Shea, [2010] EWCA (Crim) 2879.

¹⁷ R. v. O'Shea, [2010] EWCA (Crim) 2879. Courts have admitted "new and compelling" evidence when the fresh evidence is sufficient to render the conviction unsafe. To determine the safety of a conviction, courts have looked at several factors, including the strength of the proof

Aside from the general questions of admissibility that arise from the Criminal Procedure Rules, Court of Appeal decisions involving fresh forensic evidence frequently examine two other questions: (1) if the issue is whether the evidence should be received, the court examines whether there is good reason why the evidence was not presented before; and (2) if the issue is whether the new evidence renders the conviction unsafe, the court examines whether the evidence is sufficiently significant to have had an impact on the verdict under the Court of Appeal's *Pendleton* standard. – i.e., whether new evidence “might reasonably have affected the decision of the trial jury to convict.”¹⁸ The first inquiry goes to the question of whether the evidence should be received, and the second question goes to whether, if it is received, the conviction should be quashed. In fact, as a practical matter, the two issues work together: the court is unlikely to find that proffered fresh evidence supports any ground for allowing the appeal if that evidence is not significant enough to render the verdict unsafe.¹⁹

In some cases, the court has directly addressed whether fresh forensic evidence should be received. Interestingly, however, these cases are the rarest. Instead, in many cases the court will receive fresh evidence *de bene esse* and proceed directly to the question of whether the evidence would render the conviction unsafe.²⁰ Accordingly, the issue of receipt is not initially addressed: if the court concludes the conviction is unsafe, it will then receive the fresh evidence.²¹ In some other cases, the issue of receipt is not addressed because the prosecution has conceded that the fresh evidence should be received and considered.²² The prosecution's argument in those cases is that the evidence, although admissible on appeal, is not significant enough to render the conviction unsafe.²³

It is clear that fresh forensic evidence will not be received if it was available at trial, regardless of whether it was used or not.²⁴ If it was used at trial and the

itself, the issues at trial, the existence or strength of other evidence supporting the verdict, and the accuracy and clarity of jury directions about how to evaluate the reliability of the evidence, whether to accept it, and how to use it. *See, e.g.*, *R. v. Henderson, Butler and Oyediran*, [2010] EWCA (Crim) 1269, [2010] 2 Cr. App. R. 24; *R. v. O'Shea*, [2010] EWCA (Crim) 2879; *R. v. Boreman & Ors.*, [2006] EWCA (Crim) 2265; *R. v. Reed & Anor.*, [2009] EWCA (Crim) 2698; *R. v. Clark*, [2000] EWCA (Crim) 54.

¹⁸ *R. v. Pendleton*, [2000] EWCA (Crim) 45, [19].

¹⁹ *See, e.g.*, *R. v. Kai-Whitewind*, [2005] EWCA (Crim) 1092, [2005] 2 Cr. App. R. 31. This conclusion is quite similar to the situation in the United States, where courts are generally unwilling to admit so-called “newly discovered evidence.” Unless it would have had a substantial likelihood of changing the verdict.

²⁰ The court will receive fresh evidence *de bene esse* even when the fresh evidence is witness testimony from witnesses in the same expertise as the witnesses previously available. *See R. v. Henderson, Butler and Oyediran*, [2010] EWCA (Crim) 1269, [2010] 2 Cr. App. R. 24.

²¹ *See, e.g.*, *R. v. Cannings*, [2004] EWCA (Crim) 1, [2004] 2 Cr. App. R. 7.

²² *See, e.g.*, *R. v. Pluck*, [2010] EWCA (Crim) 2936 (conceding that fresh DNA evidence ought to be received); *Hall v. R.*, [2011] EWCA (Crim) 4 (conceding that developments in fiber testing are not available).

²³ *Id.*

²⁴ *R. v. Reed & Anor.*, [2009] EWCA (Crim) 2698, [2010] 1 Cr. App. R. 23 (finding that Reed's decision not to present forensic evidence that was available at trial did not affect the question of

fresh evidence is offered later, simply to contradict the original evidence, that evidence will not be received.²⁵ Essentially, contradictory evidence offered to rebut and discredit the expert that testified at trial will not be received.²⁶ The same principle precludes relief where the defendant obtained expert reports but chose not to use them at trial.²⁷

A significant number of cases before the Court of Appeal concern the admission of fresh forensic evidence that was not available at the time of trial but that has subsequently become available due to scientific developments.²⁸ In some sense, these cases are easier for the court to resolve because they do not raise questions of whether the evidence was available at the time of trial or why the evidence was not prevented earlier. Since the Court of Appeal decides appeals under the law that exists at the time of the appeal, not the law at the time of trial,²⁹ it tends to take a relatively lenient approach to at least considering new scientific evidence even if it concludes that the conviction is not unsafe. Those cases are extremely interesting and represent the court's willingness to test old convictions by the standards of modern science.

Whether a conviction will be held to be unsafe based on a finding that trial evidence was inadmissible or based on the receipt of fresh evidence on appeal turns on several factors. The court has grappled on a case-by-case basis with the ultimate safety of a conviction and whether fresh evidence – considered *de bene esse* or received – is sufficient to render a conviction unsafe. In evaluating these cases, the court generally looks at the following factors: the experience and qualifications of the experts (i.e., the strength of the proof itself); the issues at trial, for example, whether the subject of scientific evidence was important; the existence or strength of other evidence supporting the verdict; and the accuracy and clarity of jury directions about how to evaluate the reliability of the evidence, whether to accept it, and how to use it.³⁰

admissibility). In essence, Reed waived receipt of fresh forensic evidence by choosing not to present it at trial when it was available.

²⁵ See, e.g., *R. v. Kai-Whitewind*, [2005] EWCA (Crim) 1092, [2005] 2 Cr. App. R. 31.

²⁶ As the court expressly noted, convictions will not be quashed in cases where a defendant is repeating “evidence of the same effect by some other expert.” *Id.* ¶ 97.

²⁷ *Id.*

²⁸ See, e.g., *R. v. Henderson, Butler and Oyediran*, [2010] EWCA (Crim) 1269, [2010] 2 Cr. App. R. 24 (finding a new possible cause for the symptoms that scientists believed could only be caused by shaken baby syndrome); *R. v. Reed & Anor.*, [2003] EWCA (Crim) 1976 (addressing the development of DNA evidence).

²⁹ *R. v. Shirley*, [2003] EWCA (Crim) 1976.

³⁰ See, e.g., *R. v. Henderson, Butler and Oyediran*, [2010] EWCA (Crim) 1269, [2010] 2 Cr. App. R. 24; *R. v. O’Shea*, [2010] EWCA (Crim) 2879; *R. v. Boreman & Ors.*, [2006] EWCA (Crim) 2265; *R. v. Reed & Anor.*, [2009] EWCA (Crim) 2698; *R. v. Clark*, [2000] EWCA (Crim) 54. Thus, for example, the court has held that clear and accurate jury directions are required when forensic evidence is presented. Clear and accurate jury directions include, if relevant, directing the jury that the science at issue is undeveloped. In addition, the jury should be told that the possibility that evidence exists which would assist the accused or exculpate him does not provide grounds for excluding relevant evidence. Rather the jury must evaluate the existing evidence properly. See *R. v. Bates*, [2006] EWCA (Crim) 1395 [¶30].

Significantly, the Court of Appeal has made very clear what it expects from counsel presenting or challenging expert evidence at trial: strict compliance with Criminal Procedure Rules Part 33.³¹ The court did so in the context of expert DNA evidence.³² In *Henderson, Butler and Oyediran v. R.*,³³ the court also set out the duties of appellate counsel in presenting new evidence.³⁴ There, it praised the efforts of counsel as follows:

All counsel we heard in these cases were able to assist due to their experience in cases such as these and to the skill with which they deployed that experience. It is no criticism of other counsel if we highlight the manner in which counsel for the prosecution, Joanna Glynn QC and Sarah Campbell, and for the defense, Mr[.] Topolski QC and Andrew Scott, in *Henderson*, prepared their appeal. The skeleton arguments were focused upon the particular medical evidence. Different features of that evidence were clearly identified and when any medical proposition was advanced, it was explained and its source clearly identified. A number of different disciplines were involved, all of which were clearly distinguished by separate files, separately colored and with the underlying evidence and literature upon which that evidence was based, identified and collated. A core literature file, prepared by Mr[.] Topolski, enabled the court to find and weigh the underlying literature upon which controversial evidence was based. The Vice-President conducted a detailed case management hearing providing timetables and giving directions as to how the evidence was to be prepared. Importantly, meetings were held between the experts so as to identify clearly those issues upon which agreement had been reached and those issues which remained a matter of debate. Without such preparation and obedience to the directions given by the Vice-President it would have been difficult properly to resolve the appeal. The example of the preparation in that case should, we suggest, be followed in future appeals.³⁵

³¹ Criminal Procedure Rules, 2013, Part 33, *available at* <https://www.justice.gov.uk/courts/procedure-rules/criminal/docs/2012/crim-proc-rules-2013-part-33.pdf>.

³² “Part 33 of the Criminal Procedure Rules ...set[s] out the procedure through which the court controls expert evidence in the developing science of DNA....Rule 33.3(1) [provides] a very important safeguard. This requires at sub-paragraphs (f) and (g) each expert to identify where there is a range of opinion on the matters dealt with in his report. In such a case, the expert must summarise the scope of opinion and give reasons for his own opinion. If the expert cannot give his opinion without qualification, he must state the qualification. Compliance with this obligation will identify for the other party an area where there is a range of opinion; it is particularly important that this rule is followed in the expert report obtained by the Crown.” *R. v. Reed & Anor.*, [2009] EWCA (Crim) 2698 [¶ 129], [2010] 1 Cr. App. R. 23 [¶ 129].

³³ [2010] EWCA (Crim) 1269, [2010] 2 Cr. App. R. 24.

³⁴ *Id.* ¶ 5 (noting, “Since the appeal depends upon an assessment of the expert evidence, just as at trial, the preparation and marshalling of that expert evidence is of the utmost importance in achieving just resolution. The appeal requires presentation by counsel experienced and expert in the field of what is contended to be the unexplained death of or injury to a child. Such counsel need to be able to identify focussed issues upon which this court can concentrate and to identify the evidence, whether it be evidence at trial or which it is sought to call, on which resolution of those issues will depend.”).

³⁵ *Id.*

Finally, as in all of its cases, the question of remedy in forensic evidence cases is an independent issue for the Court of Appeal. Where fresh evidence renders a conviction unsafe, should there be a retrial or should the conviction simply be quashed? As in other cases, the default remedy is to quash the conviction.³⁶ However, the court also may order a retrial.³⁷

III. TYPES OF FORENSIC PROOF

A discussion of how these general principles are applied in cases addressing various types of evidence best demonstrates the court's treatment of forensic evidence. Accordingly, this chapter analyzes the Court of Appeal's approach to DNA, medical, psychological, fingerprint, and computer evidence, as well as less traditional forms of forensic evidence such as fiber, voice and facial mapping proof.

A. DNA

DNA presents the prototypical case in which the court has been asked to receive fresh evidence that was unavailable at trial because the science had not developed sufficiently at the time. In the 1980s, when DNA evidence was entirely new, the court addressed the testing process, the interpretation of testing results, the role of experts, and the directions given to juries.³⁸ Analysis continued as the science developed.³⁹ Once DNA testing became an accepted area of forensic science, new issues arose. In a case where DNA results were received in evidence at trial, samples that had not been subject to testing were later proved to be testable. Similarly, more discerning tests have been developed that contradict or add to the evidence at trial. Thus, for example, in *Shirley v. R.*,⁴⁰ the results of DNA testing on a very small piece of material, which results had not been available at trial due to the primitive development of DNA testing, were received in evidence to show that the defendant could not have committed the rape for which he had been convicted.⁴¹ Additionally, in *R. v. Otoo*,⁴² DNA evidence from a pair of trainers that could not earlier have been successfully tested proved that the defendant had not committed the charged robbery and corroborated the defendant's claim that he had been forced to trade trainers with the actual robber.

³⁶ See, e.g., *R. v. Shirley*, [2003] EWCA (Crim) 1976. See also *R. v. Henderson, Butler and Oyediran*, [2010] EWCA (Crim) 1269, [2010] 2 Cr. App. R. 24.

³⁷ See, e.g., *R. v. Inglis*, [2010] EWCA (Crim) 2269; *R. v. Friend*, [2004] EWCA (Crim) 2661.

³⁸ See *R. v. Doheny*, [1997] 1 Cr. App. R. 369.

³⁹ *R. v. Bates*, [2006] EWCA (Crim) 1395. For a primer on the basic science of DNA testing and the history of the Court of Appeal's treatment, see *R. v. Reed & Anor.*, [2009] EWCA (Crim) 2698 [¶¶ 28-61], [2010] 1 Cr. App. R. 23 [¶¶ 28-61].

⁴⁰ [2003] EWCA (Crim) 1976.

⁴¹ *Id.* ¶ 6 ("At the time of the offence and its investigation, the state of relevant scientific knowledge and expertise did not allow effective DNA profiling from samples bearing such little material as was to hand in this case; all that could sensibly be done was to test the recovered semen for blood grouping....").

⁴² No. 9906358/Y3, ¶¶ 26, 39 (C.A. Jan. 31 2005) (on file with author).

One issue addressed by the court concerns the reliability of the various types of DNA testing. In *R. v. Reed & Anor.*,⁴³ the court summarized the history of its treatment of DNA evidence based on low template DNA testing, (LCN DNA) an older method, and received, *de bene esse*, fresh scientific evidence challenging the reliability and evidential value of such test results.⁴⁴ In that case, a challenge to the reliability of that evidence was abandoned on appeal after a more sophisticated test revealed the same results.⁴⁵ Nevertheless, the court took the opportunity to analyze the reliability of low template DNA evidence for future cases.⁴⁶ Thus, the court explained that the amount of DNA available for testing must be quantified before testing and that such evidence would henceforth be considered as reliable if 100-200 picograms of genetic material were available for testing.⁴⁷ In cases where there is a dispute about the size of the sample, the parties should present expert evidence on the subject of whether a reliable interpretation can be made “by persons who are expert in the science of DNA and supported by the latest research on the subject.”⁴⁸

The court has prescribed the jury directions that should be given where the jury is required to evaluate DNA proof.⁴⁹ In brief, where evidence of a probable match is presented and contested, the judge must explain the relevance of the alleged probability and the other evidence that gives the probability its probative value and must “draw attention to any evidence which might exculpate the defendant.”⁵⁰

A significant issue is the admissibility and treatment of expert forensic testimony about DNA where the expert’s opinion is not based on statistics but rather on experience and expertise. This situation arises, for example, where there is insufficient material for reliable testing or where the issue is not identification but method of transfer, discussed below. As discussed earlier in Part II, such “evaluative” expert evidence generally will be admissible if the court concludes the experience and expertise upon which it is based is sufficient. Given the risk that the jury will overestimate the strength of this evidence, however, the court must be careful to instruct clearly about how to evaluate the reliability of such proof.⁵¹

⁴³ [2009] EWCA (Crim) 2698, [2010] 1 Cr. App. R. 23.

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ *Id.*

⁴⁷ *Id.* Based on Prof. Caddy’s study and recommendations, which were accepted by the Forensic Science Regulator, the jury should be informed of any Low Template DNA profile regardless of the quantity of DNA. However, in such cases, the jury should be cautioned that the quantity of DNA is unknown, the time of DNA transfer is unknown, and that the possibility of secondary transfer here is more likely than in standard DNA profiling. Dr. Caddy further contends that DNA profile matches due to LCN DNA profiling should be reported to the jury as a match only. The source of DNA material or the activity through which it was transferred should not be mentioned. *Id.* ¶¶ 115-16.

⁴⁸ *Id.* ¶ 74(v).

⁴⁹ *Id.* ¶¶ 54-55.

⁵⁰ *Id.* ¶ 55.

⁵¹ See *supra* Part II, discussing *R. v. Dlugosz* [2013] EWCA (Crim) 2.

A related issue, therefore, addressed by the court is the reliability of expert testimony – often, again, based not on statistics here but on experience and expertise – as to the manner and time of DNA transfer – how and when did the DNA get to be where it was found? This can be a critical issue at trial. In fact, this was the main issue in *R. v. Reed & Anor.*,⁵² where the defendants, whose DNA was found in the victim’s home, had claimed they had never been there.⁵³ At trial, the prosecution’s expert testified that the most likely explanation for the defendants’ DNA on the handles broken off of two knives that were found in the house was that the defendants brought the knives there and were handling them when they broke.⁵⁴ The prosecution’s expert did not address other potential explanations for the DNA on the knife handles such as an innocent primary touching of the knives or possible secondary touching, whereby the defendants touched the hands of someone who then touched the knives. The defendants argued that the expert testimony introduced by the prosecution went well beyond that which was scientifically possible to explain, that it was not possible to scientifically opine about how the cellular material got on the knife handles, and that the expert’s testimony constituted “a direction from an expert to convict.”⁵⁵ The defense further argued that the expert’s testimony regarding secondary transfer was “unrealistic.”⁵⁶ The defense presented its own experts. One defense expert testified that “no firm view could be expressed as to the time for which an object had to be held for primary transfer to take place or the period of time that could elapse between primary and secondary transfer.”⁵⁷ Accordingly, a scientific opinion could not be made as to the method of transfer.⁵⁸ The second defense expert’s supporting testimony was dismissed since his expertise in the interpretation of DNA results was limited: “His expertise did not extend to examining the scene of a crime and relating that examination to the evaluation of the circumstances of transfer of unidentified cellular material.”⁵⁹

The court concluded, first, that an opinion as to how the DNA was placed on the material from which the DNA cellular material was taken is admissible where the quantity of DNA is above 200 picograms.⁶⁰ Second, the court explained that, although the science on transferability was incomplete and thus arguably failed to satisfy the second prong of the Criminal Procedure Rules’ test, which requires that the conclusion is within the expert’s competence, the underlying science was sufficiently reliable for a range of possibilities to be enumerated.⁶¹ However, the court noted that a range of possibilities could only be enumerated if the limitations are made clear to the jury.⁶² The expert also can give

⁵² [2009] EWCA (Crim) 2698, [2010] 1 Cr. App. R. 23.

⁵³ *Id.* ¶ 147.

⁵⁴ *Id.* ¶¶ 87-90.

⁵⁵ *Id.* ¶ 91.

⁵⁶ *Id.* ¶ 92.

⁵⁷ *Id.* ¶ 100(ii).

⁵⁸ *Id.*

⁵⁹ *Id.* ¶ 103.

⁶⁰ *Id.* ¶ 118-19.

⁶¹ *Id.* ¶ 119.

⁶² *Id.*

an evaluation of those possibilities. The known mechanisms of primary and secondary transfer, the observations at the scene, and any other facts upon which the opinion is based should be enumerated.⁶³ The court warned, however, that “care must be taken to guard against the dangers of that evaluation being tainted with the verisimilitude of scientific certainty....”⁶⁴ That was the case in *Reed*, and the expert’s opinion that it came from knives brought in by the defendants was admissible.⁶⁵ However, the court explained that the expert’s testimony that the defendants were handling the knives when the knives broke was improper because there was no reliable scientific basis to support it.⁶⁶ However, since it was not objected to and since the court concluded that it did not affect the jury’s conclusion, the appeals were dismissed.⁶⁷

The decision in *R. v. Reed & Anor.*, concluded with an outline of the appropriate pre-trial procedures to be undertaken in a case involving DNA evidence. That procedure focuses primarily on Part 33 of the Criminal Procedure Rules.⁶⁸ Rule 33.3(1) provides, in relevant part, the following:

- (1) An expert’s report must—
 - ...(f) where there is a range of opinion on the matters dealt with in the report—
 - (i) summarize the range of opinion, and
 - (ii) give reasons for his own opinion;
 - (g) if the expert is not able to give his opinion without qualification, state the qualification...⁶⁹

The court explained that Rule 33.3(1) provides an important safeguard for expert testimony involving DNA evidence,⁷⁰ particularly subparagraphs (f) and (g).⁷¹ According to the court, these subparagraphs require an expert to qualify any opinion by providing a precise explanation of the opinion, a summary of the scope of the opinion, and the reasons for the opinion.⁷²

If parties have served expert reports on one another, each expert report must be analyzed by each party.⁷³ Any disagreements with the expert report must be brought to the court’s attention.⁷⁴ If the parties have not served expert reports,

⁶³ *Id.* ¶ 120.

⁶⁴ *Id.* ¶ 121.

⁶⁵ *Id.* ¶ 122.

⁶⁶ *Id.* ¶ 127.

⁶⁷ *Id.* ¶ 123.

⁶⁸ *Id.* ¶ 129.

⁶⁹ Criminal Procedure Rules, 2013, Part 33, *available at* <https://www.justice.gov.uk/courts/procedure-rules/criminal/docs/2012/crim-proc-rules-2013-part-33.pdf>.

⁷⁰ [2009] EWCA (Crim) 2698 [¶ 129].

⁷¹ *Id.*

⁷² *Id.* ¶ 131.

⁷³ *Id.* ¶ 131(i).

⁷⁴ *Id.* ¶ 131(ii).

the prosecution and defense must take necessary steps to ensure that any disagreements with the expert report are brought to the court's attention.⁷⁵

In addition, the court referred to Rule 33.6(2), which gives the court the "power to direct experts to discuss expert issues in the proceedings and prepare a statement for the court of the matters on which they agree and disagree giving their reasons."⁷⁶ If the court does so, the experts should put forth a statement that outlines the basic science that is agreed upon and that identifies precisely what is in dispute.⁷⁷ If the expert does not meet with the court or produce this statement, the court will exercise discretion and may potentially decide to prevent the party, whose expert was supposed to produce this statement, from calling that expert to give evidence.⁷⁸ Failure to meet with the court or produce a report because the expert does not have time does not provide good cause to excuse the Rule 33.6(2) requirement.⁷⁹

B. MEDICAL EVIDENCE

The court also has frequently addressed questions of the admissibility and weight of expert medical testimony. Most often, the cases involve medical evidence offered by the prosecution to establish cause of death or to support an allegation of sexual abuse that otherwise is based only on a complainant's allegations. In such cases, the court generally focuses on the experience and special training (clinical or academic) of the witness; the materials available to the witness and on which the witness bases his or her opinion (actual samples or not); evidence - expert or otherwise - that confirms or supports that opinion; and the clarity and accuracy of the directions of the judge concerning the jury's evaluation of that evidence. The two most frequently addressed issues are cause of death in homicide cases and corroboration of allegations of sexual abuse.

i. Cause of Death

Several important aspects of the court's handling of medical evidence derive from cases involving the unexpected death of an infant, i.e., Sudden Infant Death Syndrome (SIDS) and shaken baby syndrome cases.

The first case, *R. v. Cannings*,⁸⁰ involved a battle between forensic experts who disagreed about whether the infant's death was from natural causes or from trauma.⁸¹ The Court of Appeal quashed a conviction not, as it later explained, because there was no way for the jury to reject or accept either position, but

⁷⁵ *Id.* ¶ 131(iii).

⁷⁶ *Id.* ¶ 130.

⁷⁷ *Id.* ¶ 131(v).

⁷⁸ *Id.* ¶ 131(vi).

⁷⁹ *Id.* The court notes that this procedure will "identify whether the issue in dispute raises a question of admissibility to be determined by the judge or whether the issue is one where the dispute is simply one for determination by the jury." *Id.* ¶ 132.

⁸⁰ [2004] EWCA (Crim) 1, [2004] 2 Cr. App. R. 7.

⁸¹ *Id.*

because the only support for the allegation that the mother killed the child was the coincidence of multiple, unexplained infant deaths in one family.⁸²

In *R. v. Kai-Whitewind*,⁸³ which built on language in the *Cannings* decision, the defendant argued the conviction was unsafe for three reasons: (1) there was a serious disagreement among experts about the cause of death; (2) experts had concluded that natural causes cannot be excluded as a possible cause of death; and (3) there was no additional evidence that supported the conclusion that the child was harmed.⁸⁴ The court rejected the contention that, in a case involving a single death, a disagreement among experts is sufficient to render the conviction unsafe.⁸⁵

In *Kai-Whitewind*, the court also was asked to receive extensive allegedly fresh evidence in support of the conclusion that the infant had died of natural causes. The court received this evidence *de bene esse*, but then rejected it because there was no explanation for why it had not been produced a trial⁸⁶ and because it did not add anything to the appellant's argument.⁸⁷

A major decision involving forensic medical evidence is that in *Henderson, Butler and Oyediran v. R.*,⁸⁸ the most recent set of shaken baby syndrome cases. Each case involved an infant homicide based on allegations that an unexpected infant death was caused by shaking.

⁸² *Id.* ¶ 175-79.

⁸³ [2005] EWCA (Crim) 1092, [2005] 2 Cr. App. R. 31.

⁸⁴ *Id.* ¶ 74.

⁸⁵ *Id.* ¶ 89. The *Kai-Whitewind* court's reliance on *Cannings* is misplaced. The *Cannings* court explained that where the only support for a conclusion of unaccidental death is the coincidence of other unexplained infant deaths in the family, the prosecution normally should not be brought. The basis for the ruling in *Cannings* was not that there was a disagreement among experts that the jury could not resolve, but that the only basis for the charge was coincidence. As in *Kai-Whitewind*, where only one infant death is involved, a disagreement among experts does not render the conviction unsafe.

⁸⁶ The defense sought to call five expert medical witnesses whom were not produced at trial. *Id.* ¶ 94. The court dismissed defense's request for two reasons. First, the defense was able to call these five experts at trial and no explanation was provided for why these five experts were not produced. *Id.* ¶ 95. Second, the evidence they would have produced was produced at trial by another expert. *Id.* Accordingly, the witness would not add any "fresh" evidence. *Id.* Just because an expert chosen by the defense did not give evidence during trial in a form agreeable to the defense does not allow the defense to produce additional experts after trial. *Id.* ¶ 97.

⁸⁷ During appeal, the defense sought to rely on three experts: Prof. Andrew Nicholson, Dr. Mark Rosenthal, and Dr. Brendan MacDonald. Prof. Nicholson sought to provide evidence of a single cluster of cells found on the slides containing sections of Bidzill's lungs. *Id.* ¶ 98. Prof. Nicholson's evidence was no clinical significance, did not advance appellant's case, and would afford no ground for allowing the appeal. *Id.* Dr. Rosenthal sought to consider the fact that appellant was diabetic and suffered from related health issues as a result. *Id.* ¶ 98. The court found that Dr. Rosenthal provided no relevant evidence. *Id.* Dr. Rosenthal also sought to produce evidence that the green vomit presented an unusual symptom. *Id.* ¶ 100. The court held that this evidence would afford no ground for allowing the appeal. *Id.* ¶ 102. Dr. MacDonald sought to present evidence that doubted Dr. Bonshek's diagnosis of gliosis. *Id.* ¶ 103. Again, the court found that Dr. MacDonald's evidence would not afford a ground for allowing the appeal. *Id.* ¶ 105.

⁸⁸ [2010] EWCA (Crim) 1269, [2010] 2 Cr. App. R. 24.

In the first case, *Henderson*, the prosecution's trial expert testified that the only possible cause of the infant's death was trauma by shaking.⁸⁹ The defense presented expert evidence at trial to rebut that proof.⁹⁰ After trial, a new possible cause for retinal folds and axonal damage was discovered.⁹¹ The defense expert testified that, while he could not exclude trauma as the cause of death, the retinal folds could have resulted instead from hemorrhage and edema.⁹² Accordingly, the appellant claimed that the prosecution expert's testimony was no longer reliable and that the conviction was unsafe.⁹³

The court held that this evidence did not make the conviction unsafe.⁹⁴ While the expert on appeal urged caution in diagnosis, the evidence that retinal folds are generally associated with trauma and that the prosecution expert had never seen them in the absence of trauma was sufficient to support the conviction.⁹⁵ As to the second symptom – axonal damage – the court rejected the challenge by the defense expert, who had himself modified his own views after he had learned more about the case and whose experience with the phenomenon was largely in the past.⁹⁶

A few interesting facts bear mention: the court commented that the defense expert, as a pathologist and not a clinician, could not and did not dispute the expert clinician's conclusion as to cause.⁹⁷ In addition, the defense expert – a pathologist – was from the same specialty as a defense expert consulted at trial but not called to testify.⁹⁸ Accordingly, the relative expertise of the experts and the fact that the defense had not called a pathologist initially was relevant to the court's determination of whether the conviction was unsafe. Finally, the court pointed to the trial court's correct and detailed directions on how the jury should evaluate the expert testimony as having ensured that the issue was fairly and accurately presented to the jury.⁹⁹

In the second case, *Butler*, the court was not asked to receive fresh evidence but simply to evaluate the sufficiency of the evidence at trial.¹⁰⁰ The court quashed the conviction based on evidence that the retinal hemorrhaging supporting the trial expert's diagnosis of shaking had completely resolved itself after the prosecution experts' examination and report.¹⁰¹ The court concluded that in light of that recovery, there could not have been any rational basis on which the jury

⁸⁹ *Id.* ¶ 27.

⁹⁰ *Id.* ¶ 28.

⁹¹ *Id.* ¶ 39.

⁹² *Id.* ¶¶ 29-31.

⁹³ *Id.* ¶ 11.

⁹⁴ *Id.* ¶ 83.

⁹⁵ *Id.* ¶ 42.

⁹⁶ *Id.* ¶ 63.

⁹⁷ *Id.* ¶ 42.

⁹⁸ *Id.* ¶ 29.

⁹⁹ *Id.* ¶¶ 76-79.

¹⁰⁰ *Id.* ¶ 102.

¹⁰¹ *Id.* ¶ 104, 110.

could have rejected an unknown cause.¹⁰² Here, the judge's relevant misdirections were noted.¹⁰³

The third case in *Henderson, Butler and Oyediran v. R.*, the *Oyediran* case, relied on fresh evidence that the court considered *de bene esse*.¹⁰⁴ The fresh evidence was from a biomechanical engineer in support of the defense's contention that the child had been injured in an earlier fall rather than by shaking.¹⁰⁵ The court noted that this defense had been rejected by the jury on substantial evidence and that the defense expert on appeal had conceded the uncertainty of determining causation.¹⁰⁶

Another leading and prominent case is *R. v. Clark*,¹⁰⁷ a homicide prosecution against a mother for the separate deaths of her two children.¹⁰⁸ The defendant claimed at trial that her two children died of sudden infant death syndrome (SIDS).¹⁰⁹ The prosecution's expert, Professor Sir Roy Meadows, testified that the statistical probability of one SIDS death in a family was one in 8,543; the statistical probability for two children dying of SIDS in one family, according to Professor Meadow, was one in 73 million.¹¹⁰ The jury found the mother guilty.¹¹¹

After the initial appeal, a hospital record containing one of the infant's blood tests came to light - a record the prosecution failed to disclose at trial - which established that the child had died of natural causes.¹¹² The court would have quashed the conviction on that basis alone.¹¹³ However, it took the opportunity to state that the statistical evidence should not have been received.¹¹⁴ Such evidence was grossly misleading in that it allowed the jury "without consideration of the rest of the evidence [to] be just about sure that this was a case of murder." and "grossly overstate[d] the chance of two sudden deaths within the same family from unexplained but natural causes."¹¹⁵ The court held that had the expert's testimony been the focus on the first appeal, it would have provided a distinct basis upon which to quash the conviction.¹¹⁶

Another case in which the Court of Appeal received and considered a new medical report that conflicted with the proof at trial was *R. v. Boreman & Ors*.¹¹⁷ In that case, the issue at trial had been whether the deceased died from injuries inflicted by the defendants or by a subsequent fire for which the defendants were

¹⁰² *Id.* ¶ 110.

¹⁰³ *Id.* ¶¶ 112-14.

¹⁰⁴ *Id.* ¶ 125.

¹⁰⁵ *Id.* ¶ 179.

¹⁰⁶ *Id.* ¶¶ 183-85.

¹⁰⁷ [2003] EWCA Crim 1020.

¹⁰⁸ *Id.* ¶ 1.

¹⁰⁹ *Id.* ¶ 8.

¹¹⁰ *Id.* ¶ 94-110.

¹¹¹ *Id.* ¶ 1.

¹¹² *Id.* ¶¶ 2, 111-132.

¹¹³ *Id.* ¶¶ 134-137.

¹¹⁴ *Id.* ¶ 177.

¹¹⁵ *Id.* ¶ 178.

¹¹⁶ *Id.* ¶ 179.

¹¹⁷ [2006] EWCA (Crim) 2265.

not responsible.¹¹⁸ At trial, an expert pathologist testified that the deceased's death resulted from the injuries inflicted by the defendants.¹¹⁹ On referral from the Criminal Cases Review Commission (CCRC),¹²⁰ the court received a new forensic report to the contrary.¹²¹ In addition, the expert's reputation had been discredited in other cases.¹²² Accordingly, the Court of Appeal quashed the conviction—because it found that the expert's testimony may have "tipped the balance" in favor of conviction.¹²³

ii. Corroboration of Sexual Abuse

The court has addressed issues concerning medical proof in several cases involving convictions for sex crimes.¹²⁴ In those cases, the allegation of abuse frequently rests entirely on the complainant and is denied by the defendant.¹²⁵ Medical evidence that is claimed to support the complainant's allegations becomes extremely important and the issue is whether such proof does or does not help to establish that the abuse occurred. Two such cases are *R. v. S & Ors.*¹²⁶ and *R v. Colin John C.*¹²⁷

In *R. v. S & Ors.*, the court addressed four joined cases involving convictions of child sexual abuse under then-current diagnostic criteria, which were different from the diagnostic criteria that existed at the time of trial.¹²⁸ The court relied on current standards contained in "An Evidence Based Review of the literature on Physical Signs of Child Sexual Abuse," which was published in 2008 by the Royal College of Paediatrics and Child Health.¹²⁹ The Crown did not oppose the receipt of this fresh evidence and offered fresh evidence of its own.¹³⁰

In *R. v. B*, the first case of the group of four, the defendant was charged with indecency with a child and appealed his conviction on the basis of fresh evidence. Part of the defendant's fresh evidence was a retraction of the prosecution's trial expert's findings that the physical examination of the child victim conclusively indicated "chronic anal abuse."¹³¹ Under the old standards, that would have been accurate. However, by the time of the appeal, the physical symptoms

¹¹⁸ *Id.* ¶¶ 2, 4.

¹¹⁹ *Id.* ¶ 7.

¹²⁰ The Criminal Cases Review Commission is, of course, the executive, non-departmental public body whose mandate is to review the applications of convicted defendants and to refer cases to the court of appeal for review where there is a "real possibility that the conviction, verdict, finding or sentence would not be upheld were the reference to be made." Criminal Appeal Act, 1995, c. 16 section 13(1)(a).

¹²¹ *Id.* ¶¶ 13-14.

¹²² *Id.* ¶ 9.

¹²³ *Id.* ¶¶ 34- 35.

¹²⁴ See discussion *infra*.

¹²⁵ *Id.*

¹²⁶ [2012] EWCA (Crim) 1433.

¹²⁷ [2010] EWCA Crim 1379.

¹²⁸ [2012] EWCA (Crim) 1433 [¶ 1].

¹²⁹ *Id.* ¶ 5.

¹³⁰ *Id.* ¶ 8.

¹³¹ *Id.* ¶¶ 12, 16.

noted would not have been proven “chronic anal abuse,” but only would have “supported” the diagnosis of “anal penetration.”¹³² The court found the convictions unsafe, even though other expert witness testimony was presented at trial, because of the powerful effect of the prosecution’s initial expert testimony. The prosecution’s initial expert witness provided a graphic description at trial (“I remember this child’s bottom but I cannot remember her face.”) and later rescinded it.¹³³ The court noted how persuasive this evidence would have been on the jury, but that this evidence was now invalid.¹³⁴

The second case in the group of four, *R. v. C.*, was a rape and indecent assault case – a he said/she said credibility contest that turned on whether there was physical evidence to establish the crime. At trial, the prosecution’s examining physician testified to and relied on evidence of “attenuation” of the hymen or “rubbing/tearing away” as evidence of repeated penetration and abuse.¹³⁵ As in *R v. B*, diagnostic standards changed after the conviction: by the time of this appeal, attenuation could only be used for diagnostic purposes where there was some record of the condition of the hymen pre-abuse allegation, which was not available in this case. Moreover, the updated diagnostic protocol described “attenuation” and “rubbing/tearing away” as “not helpful” terms¹³⁶ and did not consider the symptoms found by the prosecution’s expert to be a possible result of non-traumatic causes.¹³⁷ Significantly, the crown conceded that their trial expert’s testimony was no longer correct.¹³⁸ The fact that the expert evidence at trial was the only independent evidence supporting the claim led the conviction to be quashed.¹³⁹ Interestingly, unlike the situation in *R v. S*, the physical examination of the victim had been recorded, so the experts offering fresh evidence in the Court of Appeal were able to see the condition themselves.¹⁴⁰ This clearly added credibility to the fresh evidence offered.¹⁴¹

Similarly, as in *S* above, in *R v. Colin John C.*,¹⁴² the court considered an allegation of anal rape that had been supported at trial by medical evidence concerning, *inter alia*, the condition of the victim’s anus.¹⁴³ In its summing up, the court had characterized this medical evidence as “conclusive” of sexual abuse. When fresh evidence established, as in *S*, that the physical findings had subsequently been considered by the profession to be non-specific,¹⁴⁴ the court received

¹³² *Id.* ¶ 18.

¹³³ *Id.* ¶¶ 13, 28.

¹³⁴ *Id.* ¶ 28.

¹³⁵ *Id.* ¶ 35. Interestingly, other doctors found that the hymen was normal. It is not clear why appellant did not challenge this trial proof. *Id.* ¶ 38.

¹³⁶ *Id.* ¶ 38.

¹³⁷ *Id.* ¶¶ 39-40.

¹³⁸ *Id.* ¶¶ 44-45.

¹³⁹ *Id.* ¶ 48.

¹⁴⁰ *Id.* ¶ 35.

¹⁴¹ *Id.* ¶ 38.

¹⁴² [2010] EWCA (Crim) 1379.

¹⁴³ *Id.* ¶ 7.

¹⁴⁴ *Id.* ¶ 15.

the fresh evidence and quashed the conviction.¹⁴⁵ It noted that “the complainant and the appellant were both seemingly honest young people.¹⁴⁶ When the court’s summing up made the medical evidence “for practical purposes decisive,” and fresh evidence made that “anything but plain,” the convictions were quashed.¹⁴⁷

C. PSYCHOLOGICAL EVIDENCE

The cases the court has heard involving psychological evidence fall into two categories: (1) psychological evidence involving mental capacity; and (2) psychological evidence bearing on the reliability of a defendant’s confession or of a witness’ testimony. In many cases, the nature of the psychological testimony has been controversial.¹⁴⁸

i. Mental Capacity or Loss of Self-Control

The cases involving forensic proof of mental capacity are more straightforward than the cases involving expert testimony about the reliability of another person’s statement or testimony. In several of the mental-capacity cases, despite the defense’s failure to present a diminished capacity defense at trial, the court has willingly received fresh psychiatric evidence and quashed the conviction.¹⁴⁹

For example, *Inglis v. R.*,¹⁵⁰ was one of the last cases to address the issue of provocation before that defense was abandoned in favor of the “loss of self-control,” defense.¹⁵¹ In *Inglis*, the Court of Appeal found the conviction unsafe after it received fresh psychiatric evidence that the defendant had suffered from bipolar affective disorder when he killed his wife.¹⁵² The main issue presented to the court was whether the fresh psychiatric evidence could have been presented at trial but was not.¹⁵³

Prior to trial, the defense had instructed two forensic psychiatrists.¹⁵⁴ One forensic psychiatrist opined that the defendant was not suffering from any personality disorder at the time of the killing; the other concluded that evidence of

¹⁴⁵ *Id.* ¶ 23.

¹⁴⁶ *Id.* ¶ 21.

¹⁴⁷ *Id.*

¹⁴⁸ See, e.g., *R. v. Coats*, [2013] EWCA (Crim) 1472; *R. v. JH*, [2005] EWCA (Crim) 1828, [2006] 1 Cr. App. R. 10.

¹⁴⁹ See, e.g., *R. v. Inglis*, [2010] EWCA (Crim) 2269.

¹⁵⁰ [2010] EWCA (Crim) 2269.

¹⁵¹ The provocation defense was replaced by sections 54 and 55 of the Coroners and Justice Act 2009 (the 2009 Act), which created a new partial defense to murder of “loss of control.” See also Attorney General’s Reference No 29 of 2014 [2014] EWCA (Crim) 1314.

¹⁵² The court ordered a retrial. *Id.* ¶ 4.

¹⁵³ *R. v. Inglis*, [2010] EWCA (Crim) 2269.

¹⁵⁴ *Id.* ¶ 6.

a personality disorder was equivocal.¹⁵⁵ As a result, there was no basis for a diminished responsibility defense.¹⁵⁶ Rather, the defense was provocation.¹⁵⁷ Accordingly, the court held that this was not a case “where a deliberate decision” was made not to raise the diminished responsibility issue.¹⁵⁸ Since there was “no realistic forensic basis to advance diminished responsibility,” the prosecution agreed the defendant suffered from bipolar disorder before the crime, at the time of the crime, and after the crime.¹⁵⁹ The prosecution witness, however, contended he had been in remission at the time of the crime.¹⁶⁰ In opposition, the defense produced the testimony of “one of this country’s leading experts on the disorder,”¹⁶¹ who identified specific evidence demonstrating that the defendant had been in a depressive state at the time of the crime.¹⁶² The defense also proffered evidence from a lay witness who provided a detailed account of the defendant’s condition at the time of the killing.¹⁶³ The court found the “fresh evidence is of a sufficient weight and credibility that a jury should consider it on a retrial.”¹⁶⁴

*R. v. Coats*¹⁶⁵ presented the Court of Appeal with a request to receive fresh expert testimony that the defendant had suffered from Battered Woman’s Syndrome when she imported narcotics in suitcases from Jamaica to Heathrow Airport in London.¹⁶⁶ The defendant alleged that she imported the narcotics under duress from her lover, Walters, who met her at the airport in London.¹⁶⁷ At trial, the defense had claimed that she did not know anyone was waiting for her at Heathrow, but she was convicted.¹⁶⁸ She did not appeal her conviction and attempted unsuccessfully to get leave to appeal her sentence.¹⁶⁹

Sometime later, after Walters was convicted and sentenced to life imprisonment for an unrelated murder, a relative consulted the CCRC on her behalf.¹⁷⁰ The CCRC consulted an experienced psychiatrist who concluded that the defendant had suffered from Battered Woman’s Syndrome as a result of her relationship with Walters.¹⁷¹ On appeal, the defendant claimed that her conviction was unsafe on the basis of this fresh psychological evidence because the evidence supported a defense of duress.¹⁷² The new evidence also allegedly provided a reasonable

¹⁵⁵ *Id.*

¹⁵⁶ *Id.*

¹⁵⁷ *Id.*

¹⁵⁸ *Id.* ¶ 7.

¹⁵⁹ *Id.*

¹⁶⁰ *Id.* ¶ 9.

¹⁶¹ *Id.* ¶ 10.

¹⁶² *Id.*

¹⁶³ *Id.* ¶ 11.

¹⁶⁴ *Id.* ¶ 13.

¹⁶⁵ [2013] EWCA (Crim) 1472.

¹⁶⁶ *Id.* ¶¶ 1-2.

¹⁶⁷ *Id.* ¶¶ 2, 9.

¹⁶⁸ *Id.* ¶¶ 5-6.

¹⁶⁹ *Id.* ¶¶ 6, 8.

¹⁷⁰ *Id.* ¶ 8.

¹⁷¹ *Id.*

¹⁷² *Id.* ¶ 9.

explanation for the failure to present the defense at trial.¹⁷³ The court rejected her claims and did not receive the evidence.¹⁷⁴

ii. Reliability of Witnesses

This category consists of cases in which expert testimony is offered to challenge the reliability of a statement or of testimony by someone other than the expert, e.g., a witness or a defendant who has allegedly confessed.

For example, in *R. v. Evans*,¹⁷⁵ the court accepted fresh evidence that the defendant, who had previously been unable to remember anything about the killing of his wife, remembered post-conviction what had occurred.¹⁷⁶ Significantly, the circumstances as he now was able to remember them would have supported a defense of provocation.¹⁷⁷ The Court of Appeal accepted forensic psychiatric evidence which proved that, after genuine cases of amnesia, there can be accurate and complete recovered memory.¹⁷⁸ However, the court found that the defendant's recovered memory was not genuine in the case at bar.¹⁷⁹ Accordingly, there was no support for a defense of provocation.¹⁸⁰ As to a claim of diminished responsibility, the court rejected the evidence offered by psychiatrists that would have supported a defense of diminished responsibility because that issue had been carefully examined at least twice before and a contrary conclusion was reached.¹⁸¹

A similar result was reached in *Jackson v. R.*¹⁸² There, the defendant recalled post-conviction that he had been the victim of sexual abuse as a student and adduced fresh psychiatric evidence that he had killed the victim – a pedophile – based on Post Traumatic Stress Disorder (PTSD).¹⁸³ The court expressed doubts about the claimed sexual abuse, but accepted that it had occurred for the purposes of the appeal.¹⁸⁴ It also accepted that the psychiatric understanding of PTSD had developed in the twenty years since the conviction and that the defendant may have suffered from PTSD at the time of the killing.¹⁸⁵ However, the court held it was “wholly satisfied that the fresh evidence...provides no reason for doubting the jury's conclusion that his mental responsibility for this killing was not substantially impaired.”¹⁸⁶

Another aspect of forensic psychological evidence that the court has addressed involves the ability of a child victim-witness to recall historical child

¹⁷³ *Id.*

¹⁷⁴ *Id.* ¶ 62.

¹⁷⁵ [2009] EWCA (Crim) 2243.

¹⁷⁶ *Id.*

¹⁷⁷ *Id.* ¶ 28.

¹⁷⁸ *Id.* ¶ 57.

¹⁷⁹ *Id.* ¶ 60.

¹⁸⁰ *Id.* ¶ 61.

¹⁸¹ *Id.* ¶¶ 69-71.

¹⁸² [2013] EWCA (Crim) 163.

¹⁸³ *Id.* ¶¶ 10-11.

¹⁸⁴ *Id.* ¶ 13.

¹⁸⁵ *Id.* ¶ 18.

¹⁸⁶ *Id.* ¶ 21.

abuse. In *R. v. JH*¹⁸⁷ the adult complainant alleged that she had been sexually abused by the defendant as a three year old.¹⁸⁸ On appeal, the defense produced expert evidence concerning the unreliability of such an early childhood memory based on the development of the brain and other cognitive science.¹⁸⁹ The prosecution conceded that, while this sort of expert testimony had been available at the time of trial, it certainly was not well known.¹⁹⁰ The court admitted the evidence, rejecting the claim that it usurped the jury's function in determining credibility.¹⁹¹ However, the court did "sound a note of caution," about the kind of expert evidence in the case, stating that "it will only be in the most unusual of circumstances" that such evidence will be admissible and relevant, i.e., "only in those rare cases in which the complainant provides a description of very early events which appears to contain an unrealistic amount of detail."¹⁹²

Also, in *R. v. Friend*,¹⁹³ the court relied on recent developments in the recognition and understanding of Attention Deficit and Hyperactivity Disorder (ADHD) to quash a conviction that was primarily based on the ADHD-afflicted defendant's confession.¹⁹⁴ In *R. v. Pinfold*,¹⁹⁵ the court relied on expert psychiatric evidence to conclude that the main witness against the defendants suffered from a personality disorder that made his testimony unreliable.¹⁹⁶

The court also has received expert psychological evidence on the question of the reliability of a defendant's confession. In several cases, the court has reviewed the evidence of Dr. Gisli Gudjonsson to assist it with this issue.¹⁹⁷ Dr. Gudjonsson developed a scale for measuring the suggestibility of a subject. Dr. Gudjonsson's suggestibility scale is used to determine whether a confession allegedly true and voluntarily given to police was actually a false confession given in submission to police pressure.¹⁹⁸ Dr. Gudjonsson's suggestibility scale indicates how likely a subject may be to give in to pressure to conform or to please or otherwise to submit to authority. Accordingly, Dr. Gudjonsson's testimony is often offered by the defense to show that a confession relied on as proof of guilt is false.¹⁹⁹

¹⁸⁷ [2005] EWCA (Crim) 1828, [2006] 1 Cr. App. R. 10.

¹⁸⁸ *Id.* ¶¶ 7-18.

¹⁸⁹ *Id.* ¶¶ 25-36.

¹⁹⁰ *Id.* ¶ 28.

¹⁹¹ *Id.* ¶ 26.

¹⁹² *Id.* ¶ 47.

¹⁹³ [2004] EWCA (Crim) 2661.

¹⁹⁴ *Id.*

¹⁹⁵ [2003] EWCA (Crim) 3643.

¹⁹⁶ *Id.*

¹⁹⁷ *See, e.g.*, *R. v. Brown*, [2011] EWCA (Crim) 1606; *R. v. Miah & Anor.*, [2011] EWCA (Crim) 945; *R. v. Kenyon*, [2010] EWCA (Crim) 914; *R. v. Mansha*, [2006] EWCA (Crim) 2051; *R. v. Henry*, [2005] EWCA (Crim) 1681; *R. v. Friend*, [2004] EWCA (Crim) 2661; *R. v. Foster*, [2003] EWCA (Crim) 178; *R. v. Fell*, [2001] EWCA (Crim) 696; *R. v. Pendleton*, [2000] EWCA (Crim) 45; *R. v. Friend*, [1997] EWCA (Crim) 816.

¹⁹⁸ *See, e.g.*, *R. v. Antar*, [2004] EWCA (Crim) 2708; *R. v. Steel*, [2003] EWCA (Crim) 1640.

¹⁹⁹ *See cases cited supra* note 197.

D. FINGERPRINT EVIDENCE

The court wrote extensively about the standards for presentation, admission, and sufficiency of fingerprint evidence in *R. v. Smith*.²⁰⁰ In the same case, it also described the historical evolution of current standards for fingerprint identification.²⁰¹

In *Smith*, the defendant was convicted of murdering an elderly neighbor ostensibly for financial gain.²⁰² The neighbor had been brutally murdered in her home.²⁰³ Fingerprints were found at the premises,²⁰⁴ but when the fingerprints were initially examined, the prosecution expert, Gore, determined there was “insufficient detail to be able to make a meaningful comparison.”²⁰⁵ Later, Gore identified these same fingerprints as belonging to the defendant,²⁰⁶ but he had made no notes or any explanation of either of his findings.²⁰⁷ As was required by the standards of the time, he testified to his conclusions at trial with the support of two confirming witnesses.²⁰⁸ A defense expert had been hired to testify at trial, but the defense expert was not called because her training had been in the United States rather than in England, and the court determined she would be too vulnerable.²⁰⁹ Thus, a single confirming defense witness, Bunter, testified that there was insufficient detail for identification.²¹⁰

At trial, and on appeal, the issue was whether the print was clear and detailed enough to identify it as the defendant’s print.²¹¹ The prosecution conceded that the fresh expert defense evidence, which established the prints could not be identified as the defendant’s prints because of insufficient similarities, was admissible on appeal.²¹² Gore met this evidence by claiming, for the first time, that the lack of clarity resulted from a double touch – the defendant had touched the door handle twice.²¹³

The court’s lengthy exegesis on the training of fingerprint experts, the substance of their testimony, and the manner of its presentation is what is most important about the decision because these topics go well beyond the facts of the actual case. First, the court noted with concern the fact that there is no opportunity to become fully qualified as a fingerprint expert in England and Wales except by participation in the police force training.²¹⁴ As a result, there are no

²⁰⁰ [2011] EWCA (Crim) 1296, [2011] 2 Cr. App. R. 16.

²⁰¹ *Id.*

²⁰² [2011] EWCA (Crim) 1296 [¶¶ 1-3], [2011] 2 Cr. App. R. 16 [¶¶ 1-3].

²⁰³ *Id.* ¶ 1.

²⁰⁴ *Id.* ¶ 3.

²⁰⁵ *Id.* ¶ 14.

²⁰⁶ *Id.* ¶ 15.

²⁰⁷ *Id.* ¶ 16.

²⁰⁸ *Id.* ¶ 17.

²⁰⁹ *Id.* ¶¶ 22-24, 29-32, 57-60.

²¹⁰ *Id.* ¶¶ 27, 31.

²¹¹ *Id.* ¶ 9.

²¹² *Id.* ¶¶ 6, 60.

²¹³ *Id.* ¶¶ 35, 47.

²¹⁴ *Id.* ¶ 11(iii).

truly independent experts in fingerprint examination because most experts in fingerprint examination are retired police officers: “The position is in marked contrast to other forensic science disciplines.”²¹⁵ The court’s emphasis on the absence of independent fingerprint examiner experts suggests that this might be a factor the court will consider in future fingerprint evidence cases. Second, the court noted the lack of procedure followed by the fingerprint evidence expert in this case and called for a procedure in conformity with contemporary forensic science. The court noted that “[n]o competent forensic scientist...would conduct an examination without keeping detailed notes of his examination and the reasons for his conclusion. That universal practice of other forensic scientists was not followed by the Nottinghamshire Fingerprint Bureau....The quality of the reports...provided for the trial [do not meet] the vastly improves standards expected in contemporary forensic science.”²¹⁶ The court’s consideration of the technical aspects of fingerprint evidence analysis, such as reporting one’s examinations, suggests that the court is trying to move expert witness testimony into the modern scientific world.

Moreover, the court was critical of the courtroom proceedings as neither the presentation to the jury nor that to the Court of Appeal used “modern methods of presentation.”²¹⁷ Specifically, no digital images were provided.²¹⁸ Noting that “[t]his is one of the very few cases where fingerprint evidence has been challenged at a trial since 1999, and, as far as we are aware, the first since then to come before this court on an appeal where this court has had to hear fresh evidence,”²¹⁹ the court called for action. The forensic science practices in England and Wales lag behind other forensic science areas.²²⁰ Clearly, there is “...a need for the points that have arisen...to be the subject to wider examination.”²²¹

The court held the conviction unsafe.²²² While there was circumstantial evidence pointing to the defendant’s guilt, there were substantial weaknesses in it.²²³ One weakness was that whoever killed the deceased would have been covered in blood and no blood was found at the defendant’s house or his car.²²⁴ Moreover, the timing the prosecution put forward for the defendant to have killed the deceased and cleaned himself up was unrealistically short.²²⁵ In addition, the court recognized that: (1) through no fault of the defendant, his principal fingerprint expert had not been called; (2) that the expert the defendant was able to call was not verified by another examiner; (3) the police report did not properly identify the issues for determination; and (4) the expert evidence was not prepared in a

²¹⁵ *Id.* ¶ 61(iv).

²¹⁶ *Id.* ¶ 61(v), 61(vii).

²¹⁷ *Id.* ¶ 61(iii).

²¹⁸ *Id.* ¶¶ 43, 61(viii).

²¹⁹ *Id.* ¶ 61(viii).

²²⁰ *Id.*

²²¹ *Id.* ¶ 62.

²²² *Id.* ¶ 90.

²²³ *Id.* ¶ 87.

²²⁴ *Id.* ¶ 87(ii).

²²⁵ *Id.* ¶ 87(iii).

way that the jury could have realistically attempted to determine the dispute between the experts.²²⁶

E. DOCUMENT AND COMPUTER ANALYSIS

The question of the admissibility of forensic computer analysis has also arisen in the Court of Appeal. For example, in computer crimes concerning child pornography, examination of computer records has been required to establish whether possession of child pornography was “knowing” and to trace its source. In a more traditional context, expert evidence has been received to show that police records have been falsified.

For example, in *O’Shea v. R.*,²²⁷ the defendant was convicted of incitement to distribute an indecent photograph of a child based on possession of child pornography on his computer. The conviction arose out of Operation Ore, a government operation in which several individuals in the United Kingdom were accused of accessing and downloading child pornography through a United States website called Landslide.²²⁸ When Landslide was shut down, the credit card information of these individuals was found on the Landslide computer.²²⁹ Among other things, the court was asked to receive fresh expert evidence to support the defendant’s claims that the post-trial examination of Landslide’s computer records showed he had been the victim of identity theft, that the computer records were “rife with fraud,” and that the subscriptions said to have been taken out by him were contaminated by fraud.²³⁰ According to the defendant, he had never visited the website, but the webmasters at the site had stolen his credit card details and identity to benefit from bogus credit card payments.²³¹

Interestingly, the evidence that the court received *de bene esse* was not strictly fresh. The expert had been instructed by the defense in 2005, before the trial, and he had been present at the trial.²³² For this reason, the evidence would only be accepted “in the interests of justice.”²³³ That is, the evidence would only be accepted if it truly rendered the conviction unsafe.

Given that heightened standard, the court refused to accept the evidence.²³⁴ In part, it did so based on the personal lack of credibility of the expert, who had been convicted of perjury for misrepresenting his qualifications in another matter and who falsely denied having signed a document until he was shown his signature on the document.²³⁵ More generally, however, the court held the evidence

²²⁶ *Id.* ¶ 89.

²²⁷ [2010] EWCA (Crim) 2879.

²²⁸ *Id.* ¶¶ 4-5.

²²⁹ *Id.*

²³⁰ *Id.* ¶ 6.

²³¹ *Id.* ¶ 30.

²³² *Id.* ¶ 12.

²³³ *Id.* ¶ 9.

²³⁴ *Id.* ¶ 70.

²³⁵ *Id.* ¶ 46.

did not afford any ground for allowing the appeal because the claim that the webmaster had access to appellant's data was not supported by any evidence.²³⁶

The Court of Appeal has received fresh evidence on appeal to establish that police notes have been altered.²³⁷ In most of these cases, police notes were received at trial to show that the defendant had confessed and that the confession had been entirely voluntary.²³⁸ Similarly, the court relied on forensic linguistics evidence to show that the defendant's statements allegedly made as a narrative were in fact the product of police questioning and manipulation and not a simple, voluntary narrative.²³⁹ Because the jury did not have this evidence to impeach the police testimony and because the fresh evidence might have affected the verdict, the court quashed those convictions.²⁴⁰

F. THE OUTLIERS: FACIAL MAPPING, FIBERS, AND VOICE IDENTIFICATION

One thing fiber, facial mapping, and voice identification procedures have in common is that there is no statistical basis for a finding of a match as proof of identity.²⁴¹ Instead, the conclusion of a match is based solely on the experience of the examiner. Thus, the first question for the court in these types of cases is whether such evidence is sufficiently scientific to be admissible. The second question is whether the fresh evidence, if it is received, is sufficiently powerful to render a conviction unsafe. This second question necessarily involves the court in a very detailed analysis of the qualifications of the opposing experts, their credibility, the bases for their conclusions, and any corroboration for those conclusions.

i. Fiber Evidence

The probative value of recovered fibers is a controversial subject. A good example is *Hall v. R.*,²⁴² a murder prosecution. There, the court received fiber analysis evidence.²⁴³ The prosecution presented evidence by an FSS expert that fibers found in the defendant's home and cars matched fibers found on the body and clothing of the deceased.²⁴⁴ According to the expert, the number of fibers found was unprecedented and the chance of finding a number of fibers of a particular color and type at random was extremely small.²⁴⁵ In her opinion there was "extremely strong scientific evidence" of an association between the fibers and

²³⁶ *Id.* ¶¶ 50-51.

²³⁷ *See, e.g., R. v. Bamber*, [2002] EWCA (Crim) 2912.

²³⁸ *See, e.g., R. v. Bentley*, [1998] EWCA (Crim) 2516, [2001] 1 Cr. App. R. 21; *R. v. Blackburn*, [2005] EWCA (Crim) 1349.

²³⁹ *See, e.g., R. v. Bentley*, [1998] EWCA (Crim) 2516, [2001] 1 Cr. App. R. 21.

²⁴⁰ *Id.* ¶ 81.

²⁴¹ *See generally R. v. Atkins & Anor.*, [2009] EWCA (Crim) 1876 [¶¶ 23, 29], [2010] 1 Cr. App. R. 8 [¶¶ 23, 29].

²⁴² [2011] EWCA (Crim) 4.

²⁴³ *Id.* ¶ 54.

²⁴⁴ *Id.* ¶¶ 6-9.

²⁴⁵ *Id.* ¶ 9.

the scene and the fibers found at locations associated with the defendant.²⁴⁶ The defendant did not challenge the expert's conclusions, but sought to demonstrate an innocent, secondary transfer of the fibers to his clothing.²⁴⁷ The jury found him guilty.²⁴⁸

The appellant applied to the CCRC, which contacted a fiber specialist at Contact Traces Limited.²⁴⁹ The fiber specialist reviewed the work done by the FSS expert.²⁵⁰ He concluded that a scientific technique – the production and analysis of a computer algorithm that analyzes the results of microspectrophotometry, i.e., the “first derivative of the spectral data” – should have been used and that application of that technique would have revealed subtle differences in the samples.²⁵¹ That technique was not used by the FSS expert.²⁵² The prosecution conceded that the application of the first derivative was not reasonably available at the time of trial and that the application would have been relevant and admissible at trial. Accordingly, the prosecution-retained two experts to evaluate the defense expert's work.²⁵³ The prosecution experts also conceded that there were variations in the samples, but they concluded that these variations did not make the samples distinguishable.²⁵⁴ In addition, they were of the opinion that the differences had been “exacerbated” by the first derivative.²⁵⁵ A third expert, hired to review the work of both experts, agreed that there were differences, but disagreed that they were “sufficient on their own to exclude an association.”²⁵⁶ The third expert concluded that the scientific evidence “provided ‘moderately strong support’ for [a finding of association].”²⁵⁷ According to the third expert, the different opinions of the two experts were based on the differences in their approaches.²⁵⁸

²⁴⁶ *Id.*

²⁴⁷ *Id.* ¶ 11.

²⁴⁸ *Id.* ¶ 1.

²⁴⁹ *Id.* ¶ 12.

²⁵⁰ *Id.*

²⁵¹ *Id.* “Both in his witness statements and in his evidence Mr Coyle has expressed his opinion based upon the conventional analysis of fibers recovered. In this respect his evidence does not qualify for admission under section 23(2) of the 1968 Act since it was available at the time of trial. It is arguable that it is not now open to the appellant to seek to improve upon the expert evidence available to him at trial simply by relying upon evidence which treads old ground. Mr Mansfield accepts this. Nevertheless, the description by each of the witnesses of his microscopic examination of fibers has been a necessary prelude to the application of the first derivative to the analysis of fibers and we have received that evidence. Furthermore, submits Mr Mansfield, if the fresh evidence does provide a ground of appeal we are entitled to and should have regard to all the circumstances when considering whether the verdict returned was safe. We shall return to this subject later in our judgment.” *Id.* ¶ 14.

²⁵² *Id.* ¶ 12.

²⁵³ *Id.* ¶¶ 13, 21, 26.

²⁵⁴ *Id.* ¶¶ 28, 30.

²⁵⁵ *Id.* ¶ 30.

²⁵⁶ *Id.* ¶ 39.

²⁵⁷ *Id.*

²⁵⁸ *Id.* ¶ 40. Both previous experts, Coyle and Palmer, conducted tests to determine whether the two separate fiber populations – one from Boydlands and one from Snowcroft – had a common

The court found the evidence offered by all of the new experts capable of belief.²⁵⁹ However, based on its own viewing of the raw data and first derivative data, it accepted the third expert's conclusion that the first derivative had exacerbated differences that were not sufficient to distinguish the two samples.²⁶⁰ Nevertheless, it observed that the evidence before the jury had been much stronger than would now be given, and that the FSS expert gave "an incomplete picture of the variety of fibers to be seen in each population."²⁶¹ The court held it was in the interests of justice to receive the fresh evidence even though "the conventional examination of fibers could have been but was not challenged at trial."²⁶² The court concluded that, even though the fiber evidence was incomplete and identification of green polyester fibers was wrong, "the scientific support for the assertion that the appellant was the source of the fibers found at the crime scene [was] compelling"²⁶³ and upheld the conviction as safe.²⁶⁴

ii. Facial Mapping Evidence

Facial mapping is one of those less respected forensic subjects that relies on an expert's experience rather than on statistics. A good example of the problems surrounding such proof is *Atkins & Anor. v. R.*²⁶⁵ There, the court considered the admissibility of a facial mapping expert's opinion that there was a match

source. *Id.* ¶ 20. Each obtained different microscopic results because of their different approaches. *Id.* ¶ 40. Coyle reexamined selected fibers from Mrs. Albert's body and clothing. *Id.* ¶ 21. Based on his visual observations of the fibers, Coyle determined that there were many black flock fibers that differed in thickness and in their levels of delustrant particles. *Id.* Coyle then selected additional fibers for microscopic analysis. *Id.* Coyle made microscopic comparisons of fibers located at Boydlands and Snowcroft under white, blue, and UV light conditions. *Id.* ¶ 23. Under the white light, Coyle saw subtle differences in the fibers morphology. *Id.* Under the blue light, Coyle observed differences in "shading": the Boydlands fibers exhibited a red tint while the Snowcroft fibers exhibited a blue tint. *Id.* In total, Mr. Coyle produced 106 MSP spectra – 78 from Boydlands and 28 from Snowcroft. *Id.* ¶ 24. Ultimately, the MSP and first derivative spectra analysis resulted in subtle differences. *Id.* Accordingly, Coyle concluded that the fibers did not have a common source. *Id.* Palmer, on the other hand, examined not only the range of absorbance values between the fibers, but also the range of variation in absorbance values along the length of each fiber in each population. *Id.* ¶ 27. Palmer tested a total of 60 fibers from Boydlands and 30 from Snowcroft. *Id.* ¶ 27. Palmer viewed each fiber with and without magnification. *Id.* ¶ 28. This examination led Palmer to conclude that, while there was a variation in the color, morphology, and delustrant concentration in each fiber population, "the range and degree of this variation is congruent between each population." *Id.* Additionally, when Palmer examined the fibers through MSP, he found the fibers varied in length. *Id.* ¶ 30. However, Palmer also found that fibers in the Boydlands population fell within the range of intra-fiber variation as those fibers in the Snowcroft population. *Id.* ¶¶ 30-31.

²⁵⁹ *Id.* ¶ 54.

²⁶⁰ *Id.* ¶ 50.

²⁶¹ *Id.* ¶ 53.

²⁶² *Id.* ¶ 54.

²⁶³ *Id.* ¶ 67.

²⁶⁴ *Id.*

²⁶⁵ [2009] EWCA (Crim) 1876, [2010] 1 Cr. App. R. 8.

between a photograph and the defendant's face.²⁶⁶ As with fiber analysis, this forensic method does not rely on a statistical basis for comparison, but is based simply on that expert's experience.²⁶⁷ The court upheld the admissibility of the facial mapping evidence.²⁶⁸ Without receiving such testimony, observed the court, the jury would have no means of evaluating the raw materials presented to it.²⁶⁹ But the court also emphasized that the jury must be told that the opinion is not based on statistics.²⁷⁰

The court reached a different conclusion in *R v. Bacchus*,²⁷¹ although the decision had little to do with the scientific basis for facial mapping comparisons.²⁷² There, the prosecution had attempted to rely at trial on the comparison of CCTV footage of a robbery with CCTV footage of other robberies at which, it was accepted, the defendant had been present.²⁷³ Subsequent to the trial, however, the prosecution concluded that its witness was unreliable and ceased to instruct the witness.²⁷⁴ Accordingly, the prosecution conceded the conviction was no longer safe, and it was quashed.²⁷⁵

iii. Voice Identification Evidence

The court has also addressed the admissibility of voice identification evidence. Again, this evidence is not statistically based, but relies on the experience and expertise of the comparing expert.

In *R. v. O'Doherty*,²⁷⁶ the court set forth the requirements for admissibility of voice identification evidence. In that case, which arose in Northern Ireland, the defendant had been convicted in 1997 of burglary and causing grievous bodily harm with intent, based, in part, on the identification of his voice as the male caller to ambulance control.²⁷⁷ At trial, *inter alia*, an expert testified that it was "highly probable that the applicant was the male caller to ambulance control."²⁷⁸ The expert's conclusion had been based solely on auditory phonetic analysis and did not include a more detailed acoustic analysis of the tapes.²⁷⁹

On appeal, the court accepted fresh evidence from two new experts who used both auditory phonetic analysis and quantitative acoustic analysis of the tapes.²⁸⁰ The trial expert also testified.²⁸¹ The defense expert compared the voices

²⁶⁶ *Id.*

²⁶⁷ *Id.*

²⁶⁸ *Id.* ¶¶ 23, 31.

²⁶⁹ *Id.* ¶ 23.

²⁷⁰ *Id.* ¶¶ 23, 29.

²⁷¹ [2004] EWCA (Crim) 1756.

²⁷² *Id.*

²⁷³ *Id.* ¶ 3.

²⁷⁴ *Id.* ¶ 5.

²⁷⁵ *Id.* ¶ 6.

²⁷⁶ [2002] NICA (Crim) B51; [2002] N.I. 263.

²⁷⁷ *Id.* at 1.

²⁷⁸ *Id.* at 2.

²⁷⁹ *Id.* at 12-13.

²⁸⁰ *Id.* at 3-4, 11.

²⁸¹ *Id.* at 11.

on a 999 tape to the defendant's voice and concluded that the defendant's voice was incompatible with the voice on the tape.²⁸² Fresh evidence from the prosecution's expert concluded that it was "rather more likely than not" (on a scale from 0 to -5 and 0 to +5) but not as high as "probable," that it was the defendant's voice.²⁸³ As the court explained, "the difference between him and [the defense expert] was one of interpretation rather than fact. There were no population statistics against which auditory or acoustic analysis can be tested."²⁸⁴

The court received the fresh evidence and quashed the conviction.²⁸⁵ In doing so, it held that evidence of voice identification, based on the testimony of a phonetician who carried out auditory analysis only, would no longer be admissible.²⁸⁶ The court also held that voice identification would not be admissible absent auditory analysis and quantitative acoustical analysis.²⁸⁷ Both experts acknowledged that the necessity of both tests had become, over time, the majority view among experts.²⁸⁸ According to the court, "Time has moved on."²⁸⁹ The court quashed the conviction because it concluded that, in light of that testimony, it could not conclude that the conviction was safe.

The court did carve out three exceptions to the requirement of both auditory and acoustic analysis: (1) where the issue is which voices of a known group of voices spoke which words; (2) where there are rare characteristics that render a speaker identifiable; or (3) the issue is the accent or dialect of the speaker.²⁹⁰

The court also held that the jury could be allowed to listen to the voice identification tapes in a case in which they heard the defendant testify, but that they should be specifically directed concerning the dangers of relying on their own "untrained ears" and the differences in conditions between the tape they are listening to and the defendant's in-court testimony.²⁹¹

IV. CONCLUSION

The Court of Appeal has grappled extensively with the role of forensic evidence in the criminal process. It has repeatedly, and in great detail, analyzed the reliability of many forms of forensic evidence and the impact of forensic evidence on a criminal jury. At the same time, it has been most willing, at least conditionally, to receive fresh evidence on appeal at least for the purpose of evaluating newly available forensic evidence and accounting for legitimate advances in the sciences. The Court has given substantial guidance to practitioners seeking to admit or contest forensic evidence and has made a real attempt to ensure that forensic evidence that enters the justice system is reliable.

²⁸² *Id.* at 3.

²⁸³ *Id.* at 11.

²⁸⁴ *Id.* at 12.

²⁸⁵ *Id.* at 28.

²⁸⁶ *Id.* at 17.

²⁸⁷ *Id.*

²⁸⁸ *Id.* at 17-18.

²⁸⁹ *Id.* at 17.

²⁹⁰ *Id.* at 18.

²⁹¹ *Id.* at 27.

JUDICIAL RESPONSES TO SHIFTING SCIENTIFIC OPINION IN
FORENSIC IDENTIFICATION EVIDENCE AND NEWLY
DISCOVERED EVIDENCE CLAIMS IN THE UNITED STATES:
THE INFLUENCE OF FINALITY AND LEGAL PROCESS THEORY

Sarah Lucy Cooper*
Birmingham City University, School of Law

ABSTRACT

There has been a historical availability of new trials based on newly discovered evidence in the United States. At present, the standards for granting relief based upon newly discovered evidence typically involve some combination of showings that (1) the new evidence could not have been discovered prior to trial; (2) the petitioner has exercised reasonable diligence in raising the new evidence; (3) the new evidence is relevant and beyond mere impeachment; and (4) the new evidence has verdict changing capacity. In 2009, the National Academy of Sciences officially criticized the accuracy of many forensic identification methods. Subsequently, petitioners have argued this criticism is newly discovered evidence. Appellate courts, however, routinely reject such claims. In doing so, the courts show fidelity to procedural fairness, finality and predictability, and consequently sideline competing ideals of substantive accuracy. By signalling that procedural regularity legitimizes decisions, the courts are applying classic tenets of legal process theory. This paper critically explores the institutional competence of appellate courts to address the legal questions that flow from the scientific uncertainty documented by the Academy. It concludes that courts are neither giving sufficient deference to shifting scientific opinion nor fully acknowledging their own constitutional position for addressing scientific uncertainty.

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I. INTRODUCTION

In *Herrera v. Collins*¹ the United States Supreme Court noted that although the United States Constitution was silent on the subject of new trials, there had been a “historical availability of new trials based on newly discovered evidence in the United States.”² This availability can be traced back to 17th Century England³ and up to the current Era of Innocence in America. Now, the precise standards for granting relief based upon newly discovered evidence varies from state-to-state (and federally), but usually involves “some combination of showings that the new evidence could not have been discovered prior to trial with the exercise of reasonable diligence; that the evidence is relevant and not cumulative or merely impeaching; and that the new evidence creates a sufficient probability of a different result at a new trial.”⁴ Newly discovered evidence claims arise in a “melange of direct and collateral remedies,” including motions for a new trial, statutory procedures, court rules, applications for common law *coram nobis* relief, and habeas corpus petitions.⁵

According to the Innocence Project, as of August, 2015, 330 people had been exonerated by post-conviction DNA evidence in America.⁶ All of these individuals were – eventually – able to present “new” DNA evidence to a court in order to secure post-conviction relief. Consequently, an inmate’s ability to apply for a new trial (or evidentiary hearing) on the grounds of “newly discovered evidence” has become a crucial feature of his post-conviction arsenal. Professor Daniel Medwed considers that “more than ever... rules concerning newly discovered evidence, have the potential to operate as the principal engine driving [wrongful conviction] cases toward fair resolutions.”⁷

*Senior Lecturer in Law, Birmingham City University. Many thanks to Dr. Haydn Davies for his helpful peer review and Amna Nazir and Alice Storey for their excellent editorial assistance.

¹ 506 U.S. 390 (1993).

² *Id.*

³ Daniel S. Medwed, *Up the River Without a Procedure: Innocent Prisoners and Newly Discovered Non-DNA Evidence in State Courts*, 47 ARIZ. L. REV. 655, 666 (2005).

⁴ Keith Findley, *Defining Innocence*, 74 ALB. L. REV. 1157, 1197 (2011).

⁵ Medwed, *supra* note 3, at 675.

⁶ See *The Cases: DNA Exoneree Profiles*, INNOCENCE PROJECT, <http://www.innocenceproject.org/cases-false-imprisonment> (last visited Aug. 15, 2015).

⁷ Medwed, *supra* note 3, at 718.

Nearly fifty-percent of the 330 DNA exonerations to date are attributable to invalidated and/or unreliable forensic evidence.⁸ This is unsurprising. Recently, a number of popular forensic identification methods – including those involving the analysis of tool-marks, fingerprints, shoeprints, hairs and blood stain analysis – have been significantly criticized for engaging in “individualization,” that is, the practice of connecting a suspect uniquely with inculpatory evidence.⁹ In particular, the National Academy of Sciences (NAS) concluded in its landmark 2009 report – *Strengthening Forensic Science in the United States: A Path Forward* (NAS Report) – that “with the exception of DNA 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.”¹⁰ Soon after the report was published, the U.S. Supreme Court acknowledged that many forensic sciences are subject to “serious deficiencies.”¹¹

Medwed considers that the “same problems that led to the wrongful convictions of those innocent prisoners later freed through DNA” – such as invalidated and/or improper forensic evidence – “presumably appear in the scores of convictions procured without biological evidence.”¹² This is supported by the fact that the National Registry of Exonerations presents a higher number of wrongful conviction cases impacted by faulty or misleading forensic evidence.¹³ In such – non-DNA – cases inmates can present arguments that the forensic identification evidence that contributed to their wrongful conviction was unreliable and/or improper using newly discovered evidence procedures. Inmates can do this by arguing that the criticism (generally couched as shifting scientific opinion or contro-

⁸ See *Unvalidated or Improper Forensic Science*, INNOCENCE PROJECT, <http://www.innocenceproject.org/understand/Unreliable-Limited-Science.php> (last visited Aug. 15, 2015).

⁹ Michael J. Saks, *Merlin and Solomon: Lessons from the Law's Encounters with Forensic Identification Science*, 49 HASTINGS L.J. 1069, 1082, 1119 (1998) (quoting another source).

¹⁰ THE COMM. ON IDENTIFYING THE NEEDS OF THE FORENSIC SCI. CMTY., NAT'L RESEARCH COUNCIL OF THE NAT'L ACADS., *STRENGTHENING THE FORENSIC SCIENCES IN THE UNITED STATES: A PATH FORWARD* 7 (2009) [hereinafter NAS REPORT]. Although note that DNA evidence is not infallible. See Donald E. Shelton, *Twenty-First Century Forensic Science Challenges for Trial Judges in Criminal Cases: Where the “Polybutadiene” Meets the “Bitumen”*, 18 WIDENER L.J. 309, 320 (2009), at 323-24. Although DNA profiling is clearly scientifically superior to other forensic identification evidence, it is not— contrary to earlier pronouncements— infallible. DNA evidence and its underlying methodology are, of course, subject to human error. False positive DNA results have occurred and will undoubtedly continue to be part of the DNA testing landscape. Proffered evidence may still, as with other forensic science evidence, be the result of mistakes or contamination in its collection, testing, or interpretation. As the technology and methodology of DNA testing has progressed, it is the human errors that may present the biggest evidentiary challenges for trial judges.

¹¹ *Melendez-Diaz v. Massachusetts*, 129 S. Ct. 2527, 2537 (2009).

¹² Medwed, *supra* note 3, at 657.

¹³ See A Project of the University of Michigan Law School, *About the Registry*, THE NATIONAL REGISTRY OF EXONERATIONS, <http://www.law.umich.edu/special/exoneration/Pages/about.aspx> (last visited Aug. 16th, 2015).

versy) levelled at these forensic identification methods is newly discovered evidence. Consequently, the ability of states' newly discovered evidence rules to effectively cater for such claims is crucial. At present, however, courts routinely reject that "shifting scientific opinion or the existence of new scientific controversy" is newly discovered evidence.¹⁴ In particular, the shift contained in the NAS Report, in relation to a variety of forensic identification disciplines, seems to have made little impact on appellate courts. In fact, Professors Simon Cole and Gary Edmond in this Special Issue consider the NAS Report to be "a rather blunt and impotent "weapon of the weak.""¹⁵

This article presents this pattern in judicial decision-making within two theoretical frameworks: the theory of finality and legal process theory. Part II considers the interpretation and application of newly discovered evidence rules as vehicles for post-conviction relief in the United States. Part III outlines the role of forensic identification evidence both in the American criminal process generally, and, as more recently discovered, the conviction of the innocent. It then considers the impact of the 2009 NAS Report, as the most recent and quasi-official recognition of the fallibility of forensic identification evidence. Part IV summarizes the NAS Report's findings in relation to the forensic disciplines associated with toolmarks, fingerprints, shoe-prints, hairs and blood spatter and then explores the courts' routine rejection of newly discovered evidence claims based on arguments that these forensic identification methods are subject to shifting scientific opinion and/or controversy. The resulting doctrine demonstrates that appellate courts show a strong desire to follow precedent that largely rejects shifting scientific opinion as newly discovered evidence. By signalling that procedural regularity legitimizes court decisions, as opposed to substantive accuracy, the courts are applying classic tenets of legal process theory. Part V, therefore, critically considers how this pattern in judicial decision-making fits within legal process theory's central concept: the principle of institutional competence, by assessing the institutional strength of appellate courts to accurately assess indeterminacy. Part VI concludes that the current judicial approach is problematic given the documented role of unreliable and/or improper forensic evidence in convicting the innocent. The courts should no longer hide behind procedural regularity to the detriment of substantive accuracy, fill policy gaps with generalized finality interests, and neglect their own institutional competence for providing the most accurate assessment possible of newly discovered evidence claims based on shifting scientific opinion.

¹⁴ See Part II and Part III of this article.

¹⁵ Simon A. Cole & Gary Edmond, *Science Without Precedent: The Impact of the National Research Council Report on the Admissibility and Use of Forensic Science Evidence in the United States*, 4 BRIT. J. AM. LEGAL STUD. 585, 616 (2015); J.C. SCOTT, WEAPONS OF THE WEAK: EVERYDAY FORMS OF PEASANT RESISTANCE (1985).

II. THE INTERPRETATION AND APPLICATION OF NEWLY DISCOVERED EVIDENCE RULES IN THE UNITED STATES

Post-conviction newly-discovered-evidence claims “surface in a melange of direct and collateral remedies.”¹⁶ These remedies include motions for a new trial, statutory procedures, court rules and common law rules with *coram nobis* characteristics, and habeas corpus petitions.¹⁷ The notion that a petitioner should be able to obtain a new trial post-conviction can be traced back to late seventeenth century England, and, later, to the First United States Congress, which permitted new trials for “reasons for which new trials have usually been granted in courts of law.”¹⁸ The states soon followed this trend, leading to the current state of affairs whereby newly discovered evidence frameworks are considered “an integral part of the state court landscape for criminal defendants.”¹⁹ Through these procedures, petitioners may present a wrongful conviction claim based on newly-discovered non-DNA evidence, such as a claim based on shifting scientific opinion or controversy.

At present, every state provides for a motion for a new trial based on newly discovered evidence (largely viewed as direct remedies), and a number of states also allow newly discovered evidence as a ground for triggering collateral, post-conviction relief procedures.²⁰ Unlike traditional post-conviction remedies these collateral procedures are primarily “fact based,”²¹ as opposed to being aimed at remedying egregious legal errors of either “jurisdictional or constitutional dimensions.”²² The standards for granting relief based on newly discovered evidence differs from state-to-state (and federally), but Professor Keith Findley summarizes that such standards usually,

... involve some combination of showings that the new evidence could not have been discovered prior to trial with the exercise of reasonable diligence; that the evidence is relevant and not cumulative or merely impeaching; and that the new evidence creates a sufficient probability of a different result at a new trial.²³

Newly discovered evidence standards impose onerous burdens on those seeking relief. This is particularly problematic for petitioners convicted in part or whole on the basis of erroneous forensic identification evidence. A basic deconstruction of Findley’s generic formula of newly discovered evidence rules provides a good example of why this is commonly the case. First, the petitioner must present evidence that actually qualifies as newly discovered evidence, and ‘shifting scientific opinion and controversy’ tends not to qualify.²⁴ A specific example of

¹⁶ Medwed, *supra* note 3, at 675.

¹⁷ *Id.*

¹⁸ *Id.* at 666.

¹⁹ *Id.* at 665.

²⁰ *Id.*

²¹ *Id.* at 664.

²² *Id.*

²³ Keith Findley, *Defining Innocence*, 74 ALB. L. REV. 1157 (2011).

²⁴ See Daniel G. Orenstein, *Shaken to the Core: Emerging Scientific Opinion and Post-Conviction Relief in Cases of Shaken Baby Syndrome*, 42 ARIZ. ST. L.J. 1305 (2010-11).

this is Shaken Baby Syndrome (SBS). The diagnostic triad used historically to diagnose SBS has, in recent years, been significantly criticized.²⁵ However, as one commentator reports, "...federal courts reviewing SBS-based convictions have been reticent to accept the argument that new scientific evidence meets the standard for federal habeas relief..."²⁶ noting this is attributable, in some way, to the "high bar" petitioners must 'jump' to trigger post-conviction relief.²⁷ The story is largely the same in state courts too, with many not inclined "to open the door to post-conviction relief on the basis of shifting scientific opinion or the existence of new scientific controversy."²⁸ Second, the petitioner must bring the new fact to the court within a reasonable time-frame after his conviction. However, shifts in scientific opinion or the rise of controversy in a scientific discipline can take decades to crystallize, as shown by the recent publication of the NAS Report in 2009, which criticized disciplines that have been employed in the criminal justice system for decades. The shifts in medical opinion with regards to SBS also demonstrate this slow burn effect.²⁹ Moreover, science is widely understood to be a methodology. The scientific method involves making observations, devising and empirically testing hypotheses to explain those observations, and revising or abandoning those hypotheses in a continual process. Consequently, a particular school of thought may never objectively constitute a 'scientific truth,' since it is always prone to replacement as the dominant theory following a shift in scientific opinion. In other words, the crystallization of a 'new' scientific opinion – which newly discovered evidence rules demand – is arguably a fiction. Third, the petitioner must prove that the shifting scientific opinion and/or controversy is relevant to his conviction in such a way that – if the jury had known about it – they would have changed their verdict. Although it's almost impossible to be certain about what would have materially impacted a jury's verdict, research shows that scientific evidence – and in particular evidence of individualization – has a highly persuasive impact on jurors.³⁰ However, despite this, appellate courts routinely find that the presentation of individualization evidence by forensic experts – although arguably inaccurate and misleading – is harmless error and would not have changed the jury's verdict.³¹ Consequently, petitioners making such claims have a very steep mountain to climb.

²⁵ See generally Deborah Tuerkheimer, *The Next Innocence Project: Shaken Baby Syndrome and the Criminal Courts*, 87 WASH. U. L. REV. 1 (2009).

²⁶ Orenstein, *supra* note 24, at 1316.

²⁷ *Id.*

²⁸ *Id.*

²⁹ Tuerkheimer, *supra* note 25.

³⁰ See J. Koehler & Michael J. Saks, *Individualization Claims in Forensic Science: Still Unwarranted*, 75 BROOK. L. REV. 1187, 1206 (2010); D. McQuiston-Surrett & M. Saks, *Communicating Opinion Evidence in the Forensic Identification Sciences: Accuracy and Impact*, 59 HASTINGS L.J. 1159 (2008); and Sarah Lucy Cooper, *Judicial Responses to Challenges to Firearms Identification Evidence: A Need for New Perspectives on Finality*, 31 T.M. COOLEY L. REV. 457 (2014).

³¹ See Cooper, *supra* note 30; Sarah Lucy Cooper, *Challenges to Fingerprint Identification Evidence: Why the Courts Need a New Approach to Finality*, (forthcoming in WM. MITCHELL L. REV.) (copy on file with author).

High standards for relief are “hallmarks” of the doctrine of finality.³² Newly discovered evidence standards are neither easy to satisfy nor broadly interpreted by the courts. As Medwed considers, “state courts have traditionally viewed newly discovered evidence claims with disdain, fearing the impact of such claims on the finality of judgments and the historic role of the jury as the true arbiter of fact, and harboring doubts about the underlying validity of new evidence.”³³ The imposition of legal frameworks requiring such extraordinary showings has led to an “inappropriately restrictive limitation on the criminal justices system's “ability to correct injustices.”³⁴ This is troublesome given that “More than ever...state post-conviction procedures comprise the most appropriate vehicle to rectify wrongful convictions and a subset of those procedures, the rules concerning newly discovered evidence, have the potential to operate as the principal engine driving cases toward fair resolutions.”³⁵

The restrictive interpretation of newly discovered evidence rules is particularly notable where petitioners argue that a shifting scientific opinion and/or controversy within a forensic identification discipline qualifies as newly discovered evidence. Part III, therefore, explores the historic role of forensic identification evidence in the criminal justice process, before highlighting how the weaknesses of such evidence have been exposed by recent DNA exonerations and the 2009 NAS Report, both of which petitioners have used to support newly discovered claims based on shifting scientific opinion.

III. THE ROLE OF FORENSIC IDENTIFICATION EVIDENCE IN THE CRIMINAL JUSTICE PROCESS, DNA EXONERATIONS AND THE 2009 NAS REPORT.

Forensic identification evidence is a mainstay of the American criminal justice system;³⁶ however it is also linked to nearly fifty percent of the known post-conviction DNA testing exonerations to date.³⁷ The fallibility of various forensic science disciplines was most recently catalogued, by the National Academy of Sciences in its 2009 report: *Strengthening Forensic Science in the United States: A Path Forward*. This section considers the role of forensic identification evidence in the criminal justice process and in convicting the innocent, and the impact of the NAS Report.

³² Sarah Lucy Cooper, *The State Clemency Power and Innocence Claims: The Influence of Finality and Its Implications for Innocents*, CHARLOTTE L. REV. (forthcoming 2016) (Copy on file with Author).

³³ Medwed, *supra* note 3.

³⁴ *Id.*

³⁵ Findley, *supra* note 23, at 1198.

³⁶ See Sarah Lucy Cooper, *The Collision of Law and Science: American Court Responses to Developments in Forensic Science*, 33 PACE L. REV. 234 (2013).

³⁷ See *Unvalidated or Improper Forensic Science*, *supra* note 8.

A. THE ROLE OF FORENSIC IDENTIFICATION EVIDENCE IN THE CRIMINAL JUSTICE PROCESS AND IN CONVICTING THE INNOCENT

Forensic identification evidence has long played a role in the American criminal justice process. Throughout the 20th and 21st centuries, American courts have embraced the notion that a plethora of forensic identification disciplines (known as the soft sciences) can engage in individualization, i.e., identify a perpetrator to the “exclusion of all others.” For instance, courts have routinely accepted that fingerprints can uniquely identify the perpetrator of a crime, suspect notes can be “matched” to a suspect’s handwriting, bite-marks on a victim can be “matched” to a suspect’s teeth, bullets from a suspect’s gun can be “matched” to suspect ammunition, and a suspect’s vehicle tyres, shoes and hairs can be “matched” to prints and hairs left at a crime scene respectively. At the close of the 20th Century, forensic identification evidence became even more pivotal, as the power of DNA³⁸ evidence to both ‘catch’ the guilty and exonerate the innocent was discovered.³⁹

With the discovery of the power of DNA, came the birth of the American Innocence Movement. In 1992, Barry C. Scheck and Peter J. Neufeld formed The Innocence Project “to assist prisoners who could be proven innocent through DNA testing.”⁴⁰ By the end of 1993, 135 people had been exonerated,⁴¹ including 14 whose innocence had been conclusively proven by post-conviction DNA evidence. Over the last two decades, the number of DNA exonerations has continued to grow, along with an increased understanding of the propensity of the criminal justice system to generate factual errors. The concept of “innocence” is now a burgeoning feature of legal, social and political discourse,⁴² with the Innocence Movement described as “the most dramatic development in the criminal justice world since the Warren Court’s Due Process Revolution of the 1960s.”⁴³

As of August, 2015, 330 people had been exonerated by post-conviction DNA testing in America, and the capacity of DNA evidence to identify specific sources consistently, and with a high degree of certainty, has been rigorously tested.⁴⁴ DNA evidence has become a gold-standard, raising the bar for what is

³⁸ Shelton, *supra* note 10, at 309: “DNA is the molecular structure in all living things that contains genetic information. DNA evidence is very durable and can be extracted from the smallest of remains many years after a crime. Equally significant is its “polymorphism,” meaning that, depending on the method used for its extraction, it is unique among humans and can identify the donor of the specimen with overwhelming accuracy. DNA testing can be extremely precise and can often demonstrate that only one person in billions could have been the source of the specimen evidence.”

³⁹ Cooper, *supra* note 36.

⁴⁰ *About Us*, INNOCENCE PROJECT, <http://www.innocenceproject.org/about-innocence-project> (last visited Aug. 16, 2015).

⁴¹ A Project of the University of Michigan Law School, *Browse the National Registry of Exonerations*, THE NAT’L REGISTRY OF EXONERATIONS, <http://www.law.umich.edu/special/exoneration/Pages/browse.aspx> (last visited Aug. 24, 2015).

⁴² See generally CONTROVERSIES IN INNOCENCE CASES IN AMERICA (Sarah Lucy Cooper ed., 2014).

⁴³ Keith A. Findley, *Innocence Found: Thee New Revolution in American Criminal Justice in CONTROVERSIES IN INNOCENCE CASES IN AMERICA 1* (Sarah Lucy Cooper ed., 2014).

⁴⁴ NAS REPORT, *supra* note 10, at 7.

scientifically acceptable for identifying a source to the exclusion of all others.⁴⁵ DNA technology has exposed the fallibility of numerous forensic disciplines, with forty-seven percent of the wrongful convictions that led to the known 330 DNA exonerations being attributed, in some way, to unreliable and/or improper forensic evidence.⁴⁶ Naturally, this has provoked significant concern about the ability of the soft sciences to engage in individualization. This concern was both solidified and stoked by the 2009 NAS Report.

B. STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD

In 2005, recognizing the existence of concern about the reliability of forensic science and that significant improvements were required across the discipline, Congress commissioned the National Academy of Sciences— one of the world’s premier sources of independent, expert advice on scientific issues – to report on the past, present, and future use of forensic science in America.⁴⁷ The Academy spent two years collaborating with legal and scientific scholars, practitioners and other professionals.⁴⁸ It heard over eighty witnesses during sixteen days of testimony,⁴⁹ and issued its final report in February, 2009. The report was billed as a “blockbuster” that would overhaul the legal landscape relating to forensic evidence.⁵⁰ The report addressed a wide range of relevant topics including an overview of the forensic community and need for integrated governance, the methods and veracity of various forensic disciplines (including tool-marks, fingerprints, shoeprints, hair analysis and blood stain pattern analysis), the admission and interpretation of scientific data, methods for improvement, and education and training.⁵¹

The report made some important observations and impacts. First, the report concluded that the forensic science system had “serious problems,”⁵² faced many

⁴⁵ *Id.* at 8.

⁴⁶ See *Unvalidated or Improper Forensic Science*, *supra* note 8.

⁴⁷ NAS REPORT, *supra* note 10, at xix (preface).

⁴⁸ *Id.* at xix – xx (preface).

⁴⁹ *Id.* at 2.

⁵⁰ Jacqueline McMurtrie, *Swirls and Whorls: Litigating Post-Conviction Claims of Fingerprint Misidentification after the NAS Report*, 2010 UTAH L. REV. 267, 267 (2010).

⁵¹ See generally NAS REPORT, *supra* note 10.

⁵² NAS REPORT, *supra* note 10 at xx (preface). (“In considering the testimony and evidence that was presented to the committee, what surprised us the most was the consistency of the message that we heard: The forensic science system, encompassing both research and practice, has serious problems that can only be addressed by a national commitment to overhaul the current structure that supports the forensic science community in this country. This can only be done with effective leadership at the highest levels of both federal and state governments, pursuant to national standards, and with a significant infusion of federal funds.”).

challenges,⁵³ and was accountable for multiple, wrongful convictions.⁵⁴ On the basis of the evidence before it, the NAS concluded, *inter alia*, that (1) “with the exception of DNA 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;”⁵⁵ and (2) the existing legal framework governing the admissibility of forensic evidence in the United States was inadequate for resolving the problems identified.⁵⁶ The bottom line was 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.”⁵⁷

Second, the report drew an unprecedented conclusion, namely that DNA was the only forensic method that had been rigorously shown to have the capacity to consistently, and with a high degree of certainty, engage in individualization; thereby casting a new and officially-stamped critical light onto the soft sciences.⁵⁸ Third, the report provided a level of repose for exonerees convicted in whole or part by erroneous forensic evidence. It did this by acknowledging the deficiencies that had led to their wrongful convictions. For instance, exonerees like Kennedy Brewer and Dwayne Allen Dail (as well as relatives of victims who had suffered through the conviction of the wrong assailant) welcomed the report’s findings and recommendations.⁵⁹ Fourth, for those engaging in innocence work, it was apparent the report could serve as a valuable resource for future, credible innocence claims based on erroneous forensic identification evidence. For instance, a press statement released by the Innocence Project stated “In a watershed development that could transform forensic science nationwide, the National Academy of Sciences today released a comprehensive report finding that

⁵³*Id.* at 4-5 (summary). These challenges range from the lack of mandatory standardization, certification, and accreditation to problems associated with the interpretation of forensic evidence, to the need for research to establish limits and measures of performance.

⁵⁴*Id.* at 4 (summary). (“Those advances [DNA evidence testing], however, also have revealed that, in some cases, substantive information and testimony based on faulty forensic science analyses may have contributed to wrongful convictions of innocent people. This fact has demonstrated the potential danger of giving undue weight to evidence and testimony derived from imperfect testing and analysis. Moreover, imprecise or exaggerated expert testimony has sometimes contributed to the admission of erroneous or misleading evidence.”).

⁵⁵*Id.* at 7 (summary).

⁵⁶*Id.* at 85. (“The report finds that the existing legal regime—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 judges and lawyers who often lack the scientific expertise necessary to comprehend and evaluate forensic evidence—is inadequate to the task of curing the documented ills of the forensic science disciplines.”).

⁵⁷ *Id.* at 53.

⁵⁸ *Id.* at 7.

⁵⁹*Reactions to Groundbreaking National Academy of Sciences Report Urging Reform in U.S. Forensic Sciences*, INNOCENCE PROJECT, (Feb. 18, 2009, 12:00 AM), http://www.innocenceproject.org/Content/Reactions_to_Groundbreaking_National_Academy_of_Sciences_Report_Urging_Reform_in_US_Forensic_Sciences.php.

the forensic sciences need significantly strengthened oversight, research and support in order to play a more reliable role in identifying perpetrators of crime, protecting the wrongly accused and ensuring public safety.”⁶⁰ Peter Neufeld, co-director of the Innocence Project commented “... forensic science professionals have not had the support or management needed to identify the real strengths and weaknesses of different assays and techniques... This report provides the roadmap for rectifying that problem, and we look forward to working with Congress and other key stakeholders to implement the report’s recommendations.”⁶¹

However, generally, the NAS Report (and other catalogued criticism of forensic identification evidence) has had limited impact. First, it has failed to turn the heads of the judiciary when it comes to the admissibility of forensic identification evidence. Despite the NAS Report’s findings, trial judges continue to admit, often unreservedly, forensic identification evidence that engages with individualization.⁶² Moreover, appellate judges continue to defer to such trial court decisions, and/ or find the admission of such forensic identification evidence was a “harmless error” or lawful due to the fact defense counsel had the opportunity to challenge it (whether or not they did so effectively).⁶³ Furthermore, the Report’s findings and other such criticism has, on the whole, failed to persuade appellate judges that there has been a shift in scientific opinion or generation of controversy, within relevant forensic identification disciplines, which qualifies as “newly discovered evidence.” Part III presents this pattern in judicial decision-making, and offers the findings of NAS Report, in relation to the forensic disciplines associated with tool-marks, fingerprints, hairs, shoe-prints and blood spatter, to provide a flavour of the basis upon which petitioners have made newly discovered evidence arguments that there has been a shift in scientific opinion.

IV. THE FINDINGS OF THE 2009 NAS REPORT AND JUDICIAL RESPONSES TO NEWLY DISCOVERED EVIDENCE CLAIMS BASED ON SHIFTING SCIENTIFIC OPINION AND/OR CONTROVERSY IN FORENSIC DISCIPLINES

The 2009 NAS Report was a watershed publication, subjecting both the previously known and unknown deficiencies of a variety of popular forensic identification methods to the condemnation of America’s premier scientific organization. Moreover, for the first time, following an assessment of forensic science as a whole the NAS found “with the exception of DNA 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.”⁶⁴ In other words, it cast, new significant doubt, on the

⁶⁰*National Academy of Sciences Urges Comprehensive Reform of U.S. Forensic Sciences*, INNOCENCE PROJECT (Feb. 18, 2009 12:00 AM), http://www.innocenceproject.org/Content/National_Academy_of_Sciences_Urges_Comprehensive_Reform_of_US_Forensic_Sciences.php.

⁶¹ *Id.*

⁶² See generally Cooper, *supra* note 36.

⁶³ See Cooper, *supra* note 30; Cooper, *supra* note 31.

⁶⁴ NAS REPORT, *supra* note 10, at 7.

ability of many popular forensics identification methods to engage in individualization. Subsequently, the NAS Report has served as a basis for post-conviction newly discovered evidence claims, with defendants arguing that it represents shifting scientific opinion and/or controversy in a forensic discipline associated with their conviction.

This section explores judicial responses to such newly discovered evidence claims. My dataset comprises ten cases. I identified my dataset via a Westlaw search using the terms (and synonymous terms) “National Academy of Sciences,” “newly discovered evidence,” and “individualization” in a variety of combinations. The dates of my searches were restricted to cases occurring between 2009 and 2014 to coincide with the publication of the NAS Report. The ten cases have been divided into two categories: Category One comprises tool-mark (firearms) cases. This category includes standard tool-mark identification cases and Comparative Bullet Lead Analysis (CBLA) cases. Category Two comprises other forensic identification methods cases. This category includes cases involving newly discovered evidence claims based on criticisms of the methods involved in fingerprint analysis, hair analysis, shoe-print analysis and blood stain pattern analysis. Before exploring judicial responses in each category, sub-section (i) sets out some of the specific findings of the NAS Report in relation to each of these forensic disciplines, in order to provide a sense of a petitioner’s perspective on the alleged “scientific shift and/or controversy” in each discipline.

A. THE 2009 NAS REPORT’S FINDINGS: TOOL-MARKS, FINGER-PRINTS, MICROSCOPIC HAIR ANALYSIS, SHOE-PRINTS, AND BLOOD STAIN PATTERNS.

i. Firearms Identification – Tool-mark Analysis

The NAS Report found that class characteristics “can be useful in narrowing the pool of tools that may have left a distinctive mark,”⁶⁵ and that individual characteristics “might, in some cases, be distinctive enough to suggest one particular source.”⁶⁶ However, overall, the report concluded that the “scientific knowledge base for tool mark and firearms analysis is fairly limited.”⁶⁷ In order to make the process of individualization more precise and repeatable, the report concluded “additional studies should be performed.”⁶⁸ It further concluded that the AFTE Protocol was not defined in a sufficiently precise way for examiners to follow, particularly in relation to when an examiner can “match” two samples.⁶⁹

⁶⁵*Id.* at 154.

⁶⁶*Id.*

⁶⁷*Id.* at 155.

⁶⁸*Id.* at 154. Some studies have been performed to consider the degree of similarity that can be found between marks made by different tools and the variability in marks made by individual tool.

⁶⁹*Id.* at 155. (“... AFTE has adopted a theory of identification, but it does not provide a specific protocol. It says that an examiner may offer an opinion that a specific tool or firearm was the source of a specific set of tool-marks...“sufficient agreement” exists in the pattern of two sets of marks. It defines agreement as significant “when it exceeds the best agreement demonstrated between tool marks known to have been produced by different tools and is consistent with the

The report berated the protocol, stating “This AFTE document, which is the best guidance available for the field of tool mark identification, does not even consider, let alone address, questions regarding variability, reliability, repeatability, or the number of correlations needed to achieve a given degree of confidence.”⁷⁰

ii. Fingerprint Identification - Friction Ridge Analysis

The NAS Report acknowledged that friction ridge analysis had long “served as a valuable tool, both to identify the guilty and exclude the innocent,”⁷¹ and gave some support to the discipline’s ability to engage in individualization. Due to the amount of detail available in friction ridges, the NAS opined that “it seems plausible that a careful comparison of two impressions can accurately discern whether or not they had a common source.”⁷² The report agreed that some scientific evidence supports the presumption that friction ridge patterns are unique and remain unchanged throughout a lifetime.⁷³

However, the report also found that the discipline was not “properly” underpinned.⁷⁴ The NAS Report’s criticism spanned four areas. First, the ‘Analysis, Comparison, Evaluation and Verification’ method (ACE-V) is not “specific” enough to qualify as a validated method because it “does not guard against bias; is too broad to ensure repeatability and transparency; and does not guarantee that two analysts following it will obtain the same results.”⁷⁵ Thus, following ACE-V did not mean that one was “proceeding in a scientific manner or producing reliable results.”⁷⁶ Second, examiners need to better document their analysis.⁷⁷ Third, claims of a zero error-rate are clearly “unrealistic.”⁷⁸ Fourth, more research is needed into ridge patterns and distribution, discriminating values and items that affect the quality of latent prints.⁷⁹

iii. Microscopic Hair Analysis

The NAS Report acknowledged that because human and animal hairs are routinely shed, it makes it possible for hairs to be transferred from an individual

agreement demonstrated by tool marks known to have been produced by the same tool.” The meaning of “exceeds the best agreement” and “consistent with” are not specified, and the examiner is expected to draw on his or her own experience.”).

⁷⁰*Id.*

⁷¹*Id.* at 142.

⁷²*Id.*

⁷³*Id.* at 143-44.

⁷⁴*Id.* at 144.

⁷⁵*Id.* at 142.

⁷⁶*Id.*

⁷⁷*Id.* at 143. (“Better documentation is needed of each step in the ACE-V process or its equivalent. At the very least, sufficient documentation is needed to reconstruct the analysis, if necessary.”)

⁷⁸*Id.*

⁷⁹*Id.* at 144-45. (The NAS Report acknowledged that “Some research has recently begun to into ridge flow and crease pattern distribution on the hands and feet and research into the discriminating value of the various ridge formations and clusters of ridge formations.”).

to a crime scene.⁸⁰ The report noted that examiners can generally recognize various physical characteristics of hairs, which are sufficiently different among individuals, to allow people to be included or excluded from having donated them.⁸¹ However, the NAS Report concluded that no scientifically accepted statistics exist about the frequency with which particular characteristics of hair are distributed in the population.⁸² Moreover, the report found that there are seemingly no uniform standards on the number of features on which hairs must agree before an examiner may declare a “match” between a suspect hair and a suspect; finding that the categorization of hair features depends heavily on an examiner’s proficiency and practical experience.⁸³ Ultimately, the NAS Report concluded that there was “no scientific support for the use of hair comparisons for individualization in the absence of nuclear DNA.”⁸⁴

iv. Impression Evidence – Shoeprints

The NAS Report noted that the scientific basis for the evaluation of impression evidence is that mass-produced items (such as shoes and tyres) pick up features of wear that, over time, individualize them.⁸⁵ However, because these features continue to change as the items are used, elapsed time after a crime can undercut a forensic scientist’s certainty.⁸⁶ Class characteristics (amongst a particular batch of shoes, for example) can be identified, but there is no consensus about how many individual characteristics are required to make a “match” between a batch item and a suspect one. The NAS Report found that necessary research into validity, reliability, variables, and population studies was absent, and that even the most experienced examiners should avoid biases in experience-based judgments, especially in the absence of a feedback mechanism to correct an erroneous judgment.⁸⁷

v. Blood Stain Pattern Analysis

The NAS Report found that some scientific studies “support some aspects of bloodstain pattern analysis.”⁸⁸ For instance, the report accepted that it can be known whether blood was spattered quickly or slowly.⁸⁹ However, the report also stated that some experts “extrapolate far beyond what can be supported.”⁹⁰ The NAS concluded that given the complexity of assessments involved in such analysis, great care must be taken about how such expert testimony is presented

⁸⁰ *Id.* at 155.

⁸¹ *Id.* at 156.

⁸² *Id.* at 160.

⁸³ *Id.*

⁸⁴ *Id.*

⁸⁵ *Id.* at 149.

⁸⁶ *Id.*

⁸⁷ *Id.*

⁸⁸ *Id.* at 178.

⁸⁹ *Id.*

⁹⁰ *Id.*

in court.⁹¹ The report concluded, however, that at present “The uncertainties associated with blood stain pattern analysis are enormous.”⁹²

*B. JUDICIAL RESPONSES TO NEWLY DISCOVERED EVIDENCE CLAIMS
BASED ON SHIFTING SCIENTIFIC OPINION AND/OR CONTROVERSY
IN FORENSIC IDENTIFICATION DISCIPLINES*

i. Category One: Firearms Identification Cases

It is unsurprising that the majority of the cases identified involve newly discovered claims related to the veracity of firearms identification evidence. This is because firearms identification evidence has been the subject of the most notable shift in judicial opinion. Since 2005 there has been a trend, by some courts, to direct expert testimony away from claims of individualization i.e., away from allowing experts to testify to a “match” between a specific firearm and suspect ammunition.⁹³ These courts have, overall, taken such an approach because of concerns about the subjectivity of firearms identification and its lack of empirical underpinnings for claims of individualization.⁹⁴ The cases in this category can be divided into two sub-categories: (1) standard tool-mark cases; and (2) CBLA cases.

a. Standard Tool-mark Cases

The courts have been generally reluctant to accept that shifting scientific opinion and/or controversy in the field of firearms identification qualifies as newly discovered evidence. For instance, in the 2011 case of *Rues v Denney*,⁹⁵ Denney argued that the NAS Report constituted newly discovered evidence, which would extend his limitations period. Denney argued, *inter alia*, that the NAS Report called into question the processes for comparing bunter marks from firearm shells to other, unfired shells: a method of analysis that had led to evidence contributing to his conviction. The Eighth Circuit Court of Appeals affirmed the U.S. District Court’s finding that the report was not “new evidence,” accepting the lower court’s reasoning that the criticism contained in the NAS Report was not “new.” This was because the criticisms had been raised previously in academic journals. As such, the criticisms were discoverable prior to 2009. As such, the appellate court found that the NAS Report did not “constitute a new fact,” because it did not “raise any new issues.”⁹⁶

⁹¹ *Id.* at 179.

⁹² *Id.*

⁹³ See *United States v. Green*, 405 F. Supp. 2d 104 (D. Mass. 2005); *United States v. Monteiro*, 407 F. Supp. 2d 351 (D. Mass. 2006); *United States v. Glynn*, 578 F. Supp. 2d 567 (S.D.N.Y. 2008).

⁹⁴ Cooper, *supra* note 36.

⁹⁵ 643 F.3d 618 (8th Cir. 2011).

⁹⁶ *Id.* at 622.

In *Foster v Florida*,⁹⁷ the Supreme Court of Florida also rejected the argument that the findings contained in the NAS Report were newly discovered evidence. The court found that Foster had failed to meet the required standards for newly discovered evidence, namely that he needed to “allege sufficient facts showing that the evidence was unknown by the trial court, the party, or his counsel, and that his counsel could not have known of it by use of due diligence”,⁹⁸ and “if the evidence is newly discovered, it must be such that on retrial the defendant would probably be acquitted.”⁹⁹ The court applied precedent (*Johnston v State* discussed *infra*) where it had rejected a similar claim on the basis that (1) the NAS Report cited to existing publications before the crime was committed and others that were published during the time that the petitioner was seeking post-conviction relief; and (2) the report lacked specificity “that would justify a conclusion that it provides a basis to find the forensic evidence admitted at trial to be infirm or faulty.... Nothing in the report renders the forensic techniques used in this case unreliable...”¹⁰⁰ The Florida Supreme Court found the same reasoning applied to Foster, citing additional precedents where research studies had failed to qualify as sources of newly discovered evidence,¹⁰¹ and noting that Foster had failed to identify how the relevant research “would demonstrate, in any specific way, that the testing methods or opinions in his case were deficient.”¹⁰²

Similarly, in the 2011 case of *Arizona v Rodriguez*¹⁰³ the petitioner argued, *inter alia*, that the NAS Report constituted newly discovered evidence that would have challenged the testimony of the state's ballistics expert, and changed the outcome of his trial. In a memorandum opinion, the Arizona Court of Appeals (Division 2) rejected Rodriguez's claim, finding the trial court did not abuse its discretion in denying post-conviction relief. The court described the trial court's decision as “thorough”¹⁰⁴ and offered no further reasoning for the rejection of the claim. Notably, however, the same Arizona court did provide a form of relief in the 2014 case of *Arizona v Celaya*.¹⁰⁵ In that case, Celaya argued that his trial court erred when it denied him an evidentiary hearing on his claim that the NAS Report's findings “debunking the certainty of firearms comparison analysis”¹⁰⁶ constituted newly discovered evidence. At Celaya's trial, two state experts had testified that there was “no doubt”¹⁰⁷ that a bullet found in Celaya's truck was fired by the same gun that killed the victims. In other words, the experts had claimed individualization. The appellate court determined that the trial court abused its discretion by failing to have an evidentiary hearing, but refused to

⁹⁷ 132 So.3d 40 (Fla. 2013).

⁹⁸ *Id.* at 71.

⁹⁹ *Id.* at 72.

¹⁰⁰ *Id.*

¹⁰¹ *Id.*

¹⁰² *Id.*

¹⁰³ Not Reported in P.3d, 2011 WL 6916543 (Ariz. App. Div. 2).

¹⁰⁴ *Id.* at 2.

¹⁰⁵ Not Reported in P.3d, 2014 WL 4244049 (Ariz. App. Div. 2).

¹⁰⁶ *Id.* at 5.

¹⁰⁷ *Id.*

comment of whether the NAS report was in fact newly discovered evidence (without such a hearing). The court remanded for an evidentiary hearing, rejecting the state's claim that one was unnecessary.¹⁰⁸

Despite signalling that the review of such issues must occur, the decision in *Celeya* fed into the conservative trend by appellate courts to (1) defer to lower court decisions regarding the qualification of newly discovered evidence; and (2) not label the findings of the NAS Report (including the unprecedented finding that individualization was not proper in forensic disciplines such as firearms identification) as newly discovered evidence. As it stands, the cases in this sub-section show that the shift in scientific opinion contained in the NAS, with regards to firearms identification evidence, fails to qualify as newly discovered evidence. This is largely because courts take the view it presents no “new” facts given that it cites to older research and lacks specificity to individual cases. With regard to specificity, Cole and Edmond have noted how the judiciary’s “intense focus on the case, the particular witness, their opinion and its relation to facts in issue...”¹⁰⁹ has made it difficult for petitioners to apply general concerns from the NAS Report to “...specific case-based evidence relevant to prosecutions and appeals.”¹¹⁰ As Cole and Edmond point out, “Courts are interested in relevant—that is, probative—evidence bearing on facts in issue in the *specific* proceedings.”¹¹¹ This view is palpable in the cases explored in this sub-section (and throughout Part III). As it stands, petitioners are failing to bridge the gap between the NAS Report’s findings and the impact they have on the evidence in their cases. This failure tends to be fatal for the “verdict changing capacity” requirement of newly discovered evidence rules.

b. CBLA Cases

The use of CBLA evidence was discontinued in 2004, after a report questioning its validity was published by the National Academy of Sciences (CBLA NAS Report).¹¹² Historically, CBLA evidence had been used to show that “bullets came from the same box, the same manufacturer, were related in time or geography, or generally linked the defendant to the crime in some unspecified manner.”¹¹³ Since 2004, some defendants have used this shift in scientific opinion as

¹⁰⁸ *Id.* at 6.

¹⁰⁹ Cole & Edmond, *supra* note 15 at 595.

¹¹⁰ *Id.*

¹¹¹ *Id.* at 597

¹¹² NAT'L RESEARCH COUNCIL OF THE NAT'L ACADEMIES, REPORT IN BRIEF, FORENSIC ANALYSIS: WEIGHING BULLET LEAD EVIDENCE 1 (2004).

¹¹³ *Id.* (“The FBI commissioned the National Research Council (“NRC”) to evaluate its use of CBLA and, following the Council’s 2004 report, discontinued its use of CBLA at trials. The NRC report demonstrates that the problem with CBLA is not that the *method* used to *compare* the contents of two bullets is unreliable in some abstract sense, but that it is unreliable to conclude that a CBLA “match” supports *further specific factual assertions put forth at trial*. Most often, these assertions are that matching bullets came from the same box, the same manufacturer, were related in time or geography, or generally linked the defendant to the crime in some unspecified manner. Crucially, these conclusions rested on assumptions unsupported by scientific and statistical testing of the general bullet *manufacturing* process. See Nat'l Res. Council at 112–13.

a basis for newly discovered evidence claims. Unlike the claims identified in subsection (a) above, however, these claims have generally triggered judicial intervention in favor of the petitioner.

For example, in *Zamarippa v Florida*,¹¹⁴ Zamarippa based his newly discovered evidence claim on a 2007 Washington Post article that detailed the controversy surrounding CBLA, including a reference to the CBLA NAS Report.¹¹⁵ Applying the earlier decision of *Murphy v State*,¹¹⁶ in which the same court had held that the CBLA NAS Report might qualify as newly discovered evidence, the court held that the petitioner was entitled to an evidentiary hearing to determine, *inter alia*, whether newly discovered evidence on CBLA would probably produce acquittal on retrial. The ruling overturned that of the lower court, and continued the idea that there was some judicial acceptance that the shift in scientific opinion with regards to CBLA evidence qualified as newly discovered evidence.

In the 2010 case of *Smith v Florida*,¹¹⁷ a Florida court labelled the shift in scientific opinion with regards to CBLA evidence as newly discovered evidence. In that case, Smith alleged that the CBLA method, which had been used by an FBI analyst who testified at his murder trials in 1989 and 1990, had been subsequently discredited by scientific research and abandoned by the FBI as unreliable. Smith cited the November 2007 joint-investigation by *The Washington Post* and CBS News in its “60 Minutes” feature and the CBLA NAS Report, which concluded that CBLA could not reliably support testimony that a bullet came from a particular box of ammunition.¹¹⁸ The District Court of Appeal held that Smith had sufficiently alleged that evidence that CBLA had been discredited and abandoned was unknown at the time of his trials, and could not have been discovered by the use of due diligence and provided relief. In so holding, the court cited precedents that CBLA had been held inadmissible on the basis that they were scientifically unreliable.¹¹⁹

However, firing a shot across the bows of lawyers who were minded to interpret the *Smith* decision as a liberal shift in judicial thought on newly discovered

First, the NRC found that a CBLA match supports the inference that two bullets came from the same “source” when taken to mean a compositionally indistinguishable volume of lead (“CIVL”). But there was no generally reliable evidence that a CBLA match corresponded to a match among any other type of “source,” such as a specific manufacturer, box, time, location, etc. *See id.* at 106–07. Thus, it remained in many cases a distinct possibility that while bullets from the same “source” match each other, they also match bullets from any number of “sources.” Second, there was no general knowledge of the probability that manufacturing variations would result in two different lead sources randomly producing matching bullets, producing what is known as a “false positive.” *Id.* at 107 (“Although it has been demonstrated that there are a large number of different [CIVL’s], there is evidence that bullets from different CIVL[’]s can sometimes coincidentally be analytically indistinguishable.”) (quoting: *Kulbicki v. State of Maryland*, 207 Md. App. 412, 53 A.3d 361 at 439-40).

¹¹⁴ 100 So.3d 746 (Fla. App. 2 Dist., 2012).

¹¹⁵ *Id.* at 747.

¹¹⁶ 24 So.3d 1220 (Fla. App. 2 Dist., 2009).

¹¹⁷ 23 So.3d 1277 (Fla. App. 2 Dist., 2010).

¹¹⁸ *Id.* at 1278.

¹¹⁹ *Id.*

claims involving a shift in scientific opinion, in a special concurring judgment, Judge Altenbernd stated that,

...a change in scientific opinion within a relevant scientific community—a change that occurred almost twenty years after the trial in this case—may require a different postconviction analysis than the typical claim of newly discovered evidence.¹²⁰

The judge went on to explain his view that when a defendant is arguing that evidence properly admitted would no longer be admissible due to advances in scientific knowledge or theory, he “should have a heavy burden to establish that the admitted evidence was critical to the conviction.”¹²¹ This was largely because such advancements in ‘soft science’ forensic disciplines, like CBLA, were not comparable to those in DNA testing. The judge explained,

CBLA normally allowed for testimony that a bullet involved in a crime was consistent with other bullets in the possession of the defendant, but those bullets may have come from a manufacturing batch that may have contained thousands of additional comparable bullets. In other words, CBLA allowed for circumstantial evidence suggesting a connection between the defendant and the bullet involved in the crime. Thus, the recent shift in scientific thought may reduce the amount of circumstantial evidence connecting the defendant to the offense, but it should not result in any affirmative evidence exonerating the convicted defendant.¹²²

As such, Judge Altenbernd was not “completely convinced” that the normal test used for newly discovered evidence, i.e. that it would probably change the result, should be the test controlling this post-conviction issue.¹²³ When the change in scientific thought occurs many years after the conviction, the judge was inclined to “believe that the defendant should be required to establish a higher degree of certainty that the change in evidence would have altered the jury's verdict.”¹²⁴

The cases in sub-section (b) suggest that courts have treated shifts in scientific opinion about CBLA evidence more favourably, allowing such claims to qualify as newly discovered evidence. Concerns about the ‘newness’ of the criticism aimed at CBLA evidence and how probative that criticism is to a particular case (given it comes from sources detached from the specific case at hand) have seemingly been side-lined. The difference between how courts have treated newly discovered evidence claims related to standard tool-mark analysis and those involving CBLA evidence raises a question about how the 2009 NAS Report differs from the CBLA NAS Report. Cole and Edmond point out that,

Strengthening can be distinguished from earlier NRC reports in both its breadth and implications. The earlier NRC reports provided recommendations that were more constrained. They could be more readily identified, understood

¹²⁰ *Id.* at 1279 (Altenbernd, J., concurring).

¹²¹ *Id.* at 1280.

¹²² *Id.*

¹²³ *Id.*

¹²⁴ *Id.*

and acted upon. Their recommendations applied to a small set of issues or cases, although DNA profiling was in the process of rapid expansion. Conversely, many of the concerns in *Strengthening* are diffuse: applicable to a very large number of current and legacy cases. In the absence of clear guidance and in the face of daunting logistical complexity, it is perhaps not surprising that courts have been cautious in their response to a report with incredibly disruptive potential.¹²⁵

In addition, the changes promulgated by the 2004 CBLA NAS Report also had the rubber stamp of the FBI. The FBI forced the discontinuance of CBLA evidence in 2004, whereas the forensic disciplines criticized for making claims of individualization by the NAS Report 2009 have continued routinely to make such claims post-2009.¹²⁶ This difference might be related to the different roles (and perhaps perceived importance by the judiciary) of the FBI and NAS. The FBI is the premier criminal investigation and law enforcement agency in America, and therefore has a great deal of weight when it comes to changing practices that effect criminal investigations. By contrast, the NAS is a self-described “non-profit society of distinguished scholars.”¹²⁷ The NAS simply doesn’t undertake the same practically potent role as the FBI. Unlike the FBI, the NAS has considerable distance from the routine grind of criminal investigations, including the application of the forensic identification methods such investigations involve.

ii. Category Two: Other Forensic Identification Methods Cases

This category includes newly discovered evidence claims based on shifting scientific opinion with regards to the methods involved in fingerprint analysis, microscopic hair analysis, shoe-print analysis and blood stain pattern analysis. Overall, the courts have been reluctant to find that any of the conclusions of the NAS Report (relevant to these disciplines) are a scientific shift and/or controversy that qualifies as newly discovered evidence.

In the 2010 case of *Johnston v State*,¹²⁸ the petitioner argued that the NAS Report constituted newly discovered evidence that proved he was convicted on “infirm forensic evidence.”¹²⁹ The forensic evidence in his case involved fingerprints, shoeprints and blood stain patterns. The appellate court rejected his claim, affirming the lower court’s decision. The appellate court’s decision that the NAS Report did not qualify as newly discovered evidence was two-fold. First, the court found, the NAS Report cited to existing publications, which negated any argument that its findings were “new.”¹³⁰ Second, the report lacked the specificity

¹²⁵ Cole & Edmond, *supra* note 15 at 614.

¹²⁶ See generally Cooper, *supra* note 36.

¹²⁷ NAS Mission, THE NATIONAL ACADEMY OF SCIENCES, <http://www.nasonline.org/about-nas/mission/> (last visited Aug. 25, 2015).

¹²⁸ 27 So.3d 11 (Fla. 2010).

¹²⁹ *Id.* at 16.

¹³⁰ *Id.* at 21.

that would justify a conclusion that it provides a basis to find the forensic evidence admitted at trial to be infirm or faulty.¹³¹ In so holding, the court found that one statement in the NAS Report was “particularly telling,”¹³² namely that:

The committee decided early in its work that it would not be feasible to develop a detailed evaluation of each discipline in terms of its scientific underpinning, level of development, and ability to provide evidence to address the major types of questions raised in criminal prosecutions and civil litigation.¹³³

One of these “major types” of questions clearly related to the admissibility of forensic identification evidence in criminal proceedings. As Judge Harry Edwards, the Co-Chair of the NAS Report Committee, stated to a Congressional committee: “whether forensic evidence in a particular case is admissible under applicable law is not coterminous with the question whether there are studies confirming the scientific validity and reliability of a forensic science discipline.”¹³⁴ This particular statement has been used to support claims that the NAS Report’s findings should neither render inadmissible the forensic identification methods criticized in the NAS Report, nor should the criticism represent a shift in scientific opinion that undermines all convictions these disciplines have contributed to securing. Judge Edwards has since rejected such conclusions.¹³⁵ Cole and Edmond agree that the NAS Report did not advise on admissibility specifically, but suggest it would “...be misleading to suggest that it is not relevant to admissibility determinations.”¹³⁶

Nonetheless, the *Johnston* court persisted with the idea that the NAS Report did not “establish that any particular test, test result, or specific testimony presented at Mr. Johnston's trial was faulty or otherwise subject to challenge”¹³⁷ and was merely “a new or updated discussion of issues regarding developments in forensic testing.”¹³⁸ As such, it did not constitute evidence that was not known at trial and could not have been ascertained through due diligence. Moreover, Johnston had not demonstrated how, in any specific way, the testing methods or opinions in his case were deficient.

In the 2014 case of *Enderle v Iowa*,¹³⁹ the petitioner claimed that the NAS Report constituted newly discovered evidence that undermined his conviction on the basis that it challenged the validity of fingerprint evidence against him. The Iowa court questioned whether the report was “evidence” within the meaning of the state’s newly discovered evidence rule. However, even if it was, because

¹³¹ *Id.*

¹³² *Id.*

¹³³ *Id.* at 21.

¹³⁴ Statement of Judge Harry T. Edwards, Co-Chair, Committee on Identifying the Needs of the Forensic Science Community, before the United States Senate Committee on the Judiciary, March 18, 2009. Statement can be accessed at:

<http://www.latent-prints.com/images/NAS%20Congressional%20Testimony%20Mar09.pdf>.

¹³⁵ Cole & Edmond, *supra* note 15 at 591-92.

¹³⁶ *Id.* at 592

¹³⁷ Johnston, *supra* note 128, at 20.

¹³⁸ *Id.* at 21.

¹³⁹ 847 N.W.2d 235 (Table), 2014 WL 956018 (Iowa App.).

Enderle admitted similar articles (containing such criticism about fingerprint evidence) appeared before his trial, his concession was “dispositive of the issue.”¹⁴⁰ Without further exploration, the court found the NAS Report was not newly discovered evidence.

Similarly, in the 2013 case of *Pennsylvania v Edmiston*,¹⁴¹ hairs in Edmiston’s truck had been “matched” to a murder victim. The court found that the NAS Report’s findings about the imprecision of microscopic hair analysis did not provide a basis for applying a newly discovered facts exception to timeliness requirements for filing a petition for post-conviction relief. In so holding, the appellate court ruled that the analysis of the scientific principles supporting hair comparison analysis and the facts compiled in the NAS Report were not new, but existed in various sources prior to the publication of the NAS Report. The lower court had found that “to the extent the NAS Report contained a specific examination of the scientific support for various methodologies of hair analysis, it qualified as new information.”¹⁴² However, the lower court also observed that the deficiencies of forensic science were “nothing new, and commonly form the basis for attacks on expert testimony in the court room.”¹⁴³ What was new, in the lower court’s view, however, was that these deficiencies had been “collected, investigated, and studied in a report bearing the imprimatur of the NAS.”¹⁴⁴ The lower court rejected Edmiston’s claim on the merits, however. This was on the basis that the expert testimony in his case did not individualize the hair found in his truck to the victim, and, therefore, was not inconsistent with the NAS Report.¹⁴⁵ It further commented that the newly discovered information in the NAS Report would be useful only for impeachment and, moreover, would not have changed the outcome of the trial.¹⁴⁶ The appellate court did not interfere with this finding.

The appellate court did, however, expand on the issue of what constituted a newly discovered fact, finding that the claim was untimely. The court stated that,

to constitute facts which were unknown to a petitioner and could not have been ascertained by the exercise of due diligence, the information must not be of public record and must not be facts that were previously known but are now presented through a newly discovered source. The “fact” Appellant relies upon as newly discovered is not the publication of the NAS Report, but the analysis of the scientific principles supporting hair comparison analysis. His argument is that the Commonwealth’s evidence, specifically the testimony of Mr. Tackett, is unreliable based on the information recited in the NAS Report. It is when the underlying information was available to Appellant in the public domain that we must examine.

¹⁴⁰ *Id.* at 9.

¹⁴¹ 619 Pa. 549, 65 A.3d 339 (Pa. 2013).

¹⁴² *Id.* at 569.

¹⁴³ *Id.*

¹⁴⁴ *Id.*

¹⁴⁵ *Id.*

¹⁴⁶ *Id.*

In this case, the Commonwealth is correct that the facts compiled in the NAS Report were not new, and existed in various sources prior to the publication of that report. Specifically, the NAS Report refers to various studies and reports published in the public domain as early as 1974 and as recently as 2007.¹⁴⁷

Justice Todd disagreed with this finding in a separate concurring opinion. He believed the claim was timely. Justice Todd thought that because the NAS was “unlike other scientific bodies”¹⁴⁸ and arguably the nation’s “most prestigious scientific organization,”¹⁴⁹ the NAS Report was significant. Moreover, NAS had compiled the report at the request of Congress and “heard testimony from experts in government, law enforcement, law, academia, and elsewhere; reviewed published materials, studies, and reports related to forensic science; and conducted independent research.”¹⁵⁰ Justice Todd found that, in particular, the NAS Report’s conclusion that there is “no scientific support for the use of hair comparisons for individualization in the absence of nuclear DNA”¹⁵¹ was new. Justice Todd thought it significant that, in relation to that specific conclusion “the Report cites no [earlier or other] sources.”¹⁵² As such, he reasoned, “these are not merely the regurgitated conclusions from previously published studies, or from a prior Academy report, which Appellant could have uncovered previously with some diligence.”¹⁵³ Justice Todd found that these were,

novel conclusions concerning the deficiencies in the analysis of hair evidence from the leading science advisory body in the Nation, after being charged under federal law to make these very assessments, and following its own investigation and research. No amount of prior diligence by Appellant, no amount of combing through the *Journal of Forensic Sciences*, *Forensic Science Review*, *Forensic Science Communications*, or any of the other studies or publications the Academy reviewed from the last 40 years, could have produced such findings. Such findings bear the unique imprimatur of the Academy.¹⁵⁴

Again, cases like *Johnston*, *Tucker*, *Enderle*, *Edmiston* demonstrate that, generally, there is a judicial resistance towards allowing claims that shifting scientific opinion about various forensic identification methods (contained in the NAS Report) qualify as newly discovered evidence. These rulings reflect the trend identified in the category one, subsection (a) cases. In so holding, the courts (1) defer to lower court decisions regarding the qualification of newly discovered evidence; and (2) do not label the findings of the NAS Report – including the unprecedented finding that individualization was not proper in any other discipline other than DNA analysis – as newly discovered evidence. As it stands, the cases in category two show that the shift in scientific opinions contained in the NAS Report fail to qualify as newly discovered evidence. This is largely because

¹⁴⁷ *Id.* at 570-71.

¹⁴⁸ *Id.* at 583. (Todd, J., concurring).

¹⁴⁹ *Id.* (Todd, J., concurring).

¹⁵⁰ *Id.* (Todd, J., concurring).

¹⁵¹ *Id.* at 584. (Todd, J., concurring).

¹⁵² *Id.* (Todd, J., concurring).

¹⁵³ *Id.* (Todd, J., concurring).

¹⁵⁴ *Id.* (Todd, J., concurring).

courts take the view that the NAS Report presents no “new” facts given that it cites to older research and lacks specificity to individual cases, albeit there is at least one recorded negative judicial reaction to this assessment in *Edmiston*. Again, the courts’ demand for probative evidence that bears on the specific facts at issue in the single case before them is fatal for newly discovered evidence claims. In other words, the *sui generis* nature of adversarial legal proceedings has been used to limit the use of the NAS Report to support newly discovered evidence claims based on shifting scientific opinion and/or controversy in various forensic identification disciplines.¹⁵⁵

A crucial question, therefore, is *why* are appellate courts so reluctant to accept that even the unprecedented findings of the NAS Report qualify as newly discovered evidence? Further *why* are they so keen to defer to both precedent and lower court findings, but unwilling to defer to the expert findings of the NAS in relation to forensic science? These questions require an exposition of two theoretical frameworks: the theory of finality and legal process theory. The courts’ restriction of post-conviction review by narrowly interpreting the high thresholds for relief contained in newly discovered evidence rules, is symptomatic of an institution that favours finality over substantive accuracy. Moreover, the appellate courts’ routine deference to precedent and lower court findings is indicative of an institution that supports the notion that procedural regularity legitimizes outcomes, as opposed to substantive accuracy. As such, this pattern in judicial decision-making raises important questions about the courts’ institutional competence to address indeterminacy when shifting scientific opinion raises “new” legal questions. Institutional competence is, of course, a classic tenet of legal process theory. Part V, therefore, further explores the influence of the doctrine of finality and legal process theory in this context.

V. THE INFLUENCE OF THE DOCTRINE OF FINALITY AND THE APPELLATE COURTS’ INSTITUTIONAL COMPETENCE FOR ASSESSING INDETERMINACY

The foreclosing of post-conviction relief claims, judicial deference to procedural regularity and institutional competence are concepts related to the theory of finality and legal process theory. This section explores these two theoretical frameworks, and how they relate to the examples of judicial decision-making presented in Part IV.

A. FINALITY, POST-CONVICTION RELIEF AND NEWLY DISCOVERED EVIDENCE RULES

The obvious theoretical reason for why courts reject any post-conviction challenges is finality. The doctrine of finality developed out of a taxonomy de-

¹⁵⁵ This point goes beyond claims associated with forensic identification methods.

tailed by Professor Paul M. Bator in his landmark 1963 article, *Finality in Criminal Law and Federal Habeas Corpus for State Prisoners*.¹⁵⁶ Bator's article "... laid the intellectual groundwork for the Supreme Court's post-trial review jurisprudence and has been cited in hundreds of law review articles and court opinions."¹⁵⁷ Bator argued that the finality of criminal judgments serves important interests that are harmed by expansions of post-conviction rights,¹⁵⁸ and proposed that because we can never be 100% certain that no error of law or fact was made during trial (or appellate) proceedings, "we must impose an end to litigation at some point or else the case could conceivably go on *ad infinitum*."¹⁵⁹

Bator argued that endless litigation led to numerous, negative consequences. These included undermining public confidence in the criminal justice system, allowing prisoners to escape corrective sanctions, and negative impacts on the effective enforcement of the law. Finality, Bator argued, was needed to prevent and/or minimize these consequences.¹⁶⁰ Fifty years later, the criminal justice system is very familiar with the notion that finality is not a singular "consequence" but rather "shorthand for a collection of interests scholars assume are furthered by any restrictions on review."¹⁶¹ These interests include ensuring respect for criminal judgments and victims' rights, conserving state resources, furthering the efficiency and deterrent and educational functions of the criminal law, satisfying the human need for closure, incentivizing defense counsel to "get it right first time" and preventing a flood of non-controversial claims from masking the fewer, credible ones.¹⁶² Proponents of finality consider that providing defendants with broader post-conviction rights harms these –society desired– interests.¹⁶³ Consequently, when considering appeals, judges must balance society's interests in finality against the constitutional rights of defendants.¹⁶⁴ Of course, finality does serve the interests of defendants too, including their interests not to be subject to repetitive trials, to be able to move on in their lives, and not to be 'caught' by repetitive state attempts at trying a case (and its luck) that wear down the resources and stamina of the defendant.¹⁶⁵ At present, however, the scales are not commonly tipped in favour of defendants, with finality often being used as a

¹⁵⁶ Paul M. Bator, *Finality in Criminal Law and Federal Habeas Corpus for State Prisoners*, 76 HARV. L. REV. 441 (1963).

¹⁵⁷ Andrew Chongseh Kim, *Beyond Finality: How Making Criminal Judgements Less Final Can Further the "Interests of Finality"* 2013 UTAH L. REV. 561, 563 (2013).

¹⁵⁸ Bator, *supra* note 156.

¹⁵⁹ Sigmund G. Popko, *Putting Finality in Perspective: Collateral Review of Criminal Judgments in the DNA Era*, 1 L.J. SOC. JUST. 75, 76 (2011).

¹⁶⁰ *Id.* at 78.

¹⁶¹ Kim, *supra* note 157, at 568.

¹⁶² See generally Kim, *supra* note 157; Bator, *supra* note 156; Henry J. Friendly, *Is Innocence Irrelevant? Collateral Attack on Criminal Judgments*, 38 U. CHI. L. REV. 142 (1970); Carrie Sperling, *When Finality and Innocence Collide in CONTROVERSIES IN INNOCENCE CASES IN AMERICA* 139 (Sarah Lucy Cooper ed., 2014).

¹⁶³ Kim, *supra* note 157, at 573.

¹⁶⁴ *Id.* at 566.

¹⁶⁵ Laurie L. Levenson, *Searching for Injustice: The Challenge of PostConviction Discovery, Investigation, and Litigation*, 87 S. CAL. L. REV. 545, 552-53 (2014).

“trump card that presumptively outranks defendants’ interests...”¹⁶⁶As Professor Laurie Levenson states “The criminal justice system is obsessed with finality. While it professes to focus on obtaining fair and accurate results, the goal of finality is never far away.”¹⁶⁷

The criminal justice system’s obsession with finality is visible in the vast majority of post-conviction relief frameworks because these procedures “...grow out of a strong tradition that values the finality of criminal convictions.”¹⁶⁸ These procedures, Professor Carrie Sperling states, form a “shockingly confusing web...” for petitioners.¹⁶⁹ Newly discovered evidence rules form part of this web. This is because – as explained in Part II – newly discovered evidence proceedings typically employ high thresholds for relief, such as requiring petitioners to prove that: the new fact was undiscoverable before trial; is beyond mere impeachment and cumulative evidence; has been raised with reasonable diligence; and has verdict-changing capacity.¹⁷⁰ Such thresholds are a hallmark of finality. It is widely accepted that high thresholds for relief work to alleviate judicial concerns about finality.¹⁷¹ As one commentator notes, “Naturally, a state has an interest in maintaining the finality of its judgments. Thus, respect for the finality of judgments is a concern in any habeas analysis. A legal standard that provides a realistic opportunity for state prisoners to obtain habeas relief is arguably harmful to the state’s interest in finality because it increases the likelihood that some judgments will be overturned.”¹⁷²

Newly discovered evidence rules reflect the criminal justice system’s general allegiance to finality. For instance, they can even work to foreclose relief by way of DNA testing, which is a common component of newly discovered evidence claims. The onerous standards involved in post-conviction statutes, like newly discovered evidence rules, allow courts to deny access to DNA testing that could providing compelling evidence of innocence. Those statutes, Professor Brandon Garrett argues, “appear to provide mere window-dressing for post-conviction

¹⁶⁶ Kim, *supra* note 157, at 563. (referencing Erwin Chemerinsky, *Thinking about Habeas Corpus*, 37 CASE W. RES. L. REV. 748, 772–75 (1987); Popko, *supra* note 159, at 75).

¹⁶⁷ Levenson, *supra* note 165, at 551.

¹⁶⁸ Sperling, *supra* note 162.

¹⁶⁹ Sperling, *supra* note 162; Barry Friedman, *A Tale of Two Habeas*, 73 MINN. L. REV. 247, 253 (1988) (“[T]he rules governing access to habeas review have become hopelessly confusing and confused.”); Stephanie Roberts Hartung, *Missing the Forest for the Trees: Federal Habeas Corpus and the Piecemeal Problem in Actual Innocence Cases*, 10 STAN. J. CIV. RTS. & CIV. LIBERTIES 101 (2013) (discussing the confusing procedures an innocent inmate faces when asserting a post-conviction challenge and suggesting reforms).

¹⁷⁰ Findley, *supra* note 4, at 1161.

¹⁷¹ Kathleen Callahan, *In Limbo: In Re Davis and the Future of Herrera Innocence Claims in Federal Habeas Proceedings*, 53 ARIZ. L. REV. 629, 655 (2011) (“Furthermore, steps can be taken to minimize the detrimental impact on comity and federalism. For example, requiring a high requisite evidentiary showing and a standard of review deferential to state court findings would help to ensure that federal habeas review of Herrera claims does not trample states’ rights. These procedural standards would also help to alleviate concerns regarding finality, judicial efficiency, and frivolous claims.”).

¹⁷² Theresa Hsu Schriever, *In Our Own Backyard: Why California Should Care About Habeas Corpus*, 45 MCGEORGE L. REV. 763, 790 (2014).

systems determined to deny access to proof of innocence and to deny relief to meritorious claims of innocence.”¹⁷³ Notably, concerns about finality have led to the United States Supreme Court denying relief in this context. In the case of *District Attorney's Office for the Third Judicial District v. Osborne*,¹⁷⁴ the U.S. Supreme Court determined that due process does not entitle a prisoner to access evidence in order to run additional tests (in this case more sophisticated DNA testing) that were not available at the time of trial. Finality concerns underpinned the U.S. Supreme Court’s decision in *Osborne*. As Professor Kim explains, in *Osborne*, the Court denied relief “based in part on fears that allowing the test would do unspecified damage to the “traditional [interest in] finality.”¹⁷⁵ In his dissent, Justice Stevens conceded that allowing the test would harm finality, but such interests must take a back-seat in light of the power of DNA evidence to prove innocence.¹⁷⁶ However, although it was generally agreed amongst the Justices that granting relief would harm the interests of finality, no attempt was made to explain how those interests would be harmed by allowing the defendant to pay to test the DNA evidence in his case.¹⁷⁷

Professor Daniel Medwed confirms newly discovered evidence rules are protective of finality interests in non-DNA cases too, such as where a petitioner claims that there has been a shift in scientific opinion and/or the development of scientific controversy in relation to the forensic evidence used against him. Medwed argues that the inherent difficulty in litigating claims predicated on newly discovered non-DNA evidence is “exacerbated by the structural design of most state post-conviction regimes: in effect, the path to proving one's innocence through new evidence has become virtually impassable due to procedural roadblocks.”¹⁷⁸ In addition, state courts have traditionally viewed newly discovered evidence claims with “disdain, fearing the impact of such claims on the finality of judgments...”¹⁷⁹

Finality has come to have a significant influence on legal discourse, with judges (and scholars) routinely asserting that restricting defendants’ post-conviction arsenal benefits society. Scholars have criticized the courts for not expanding on *how* finality benefits society, with some even arguing that such restrictions can even “harm the very interests increased finality is presumed to protect.”¹⁸⁰

¹⁷³ Brandon L. Garrett, *Claiming Innocence*, 92 MINN. L. REV. 1629, 1684 (2008).

¹⁷⁴ 557 U.S. 52 (2009).

¹⁷⁵ Kim, *supra* note 157 at 574.

¹⁷⁶ *Osborne*, 557 U.S. at 99 (Stevens, J dissenting).

¹⁷⁷ Kim, *supra* note 157 at 574.

¹⁷⁸ Medwed, *supra* note 3, at 658.

¹⁷⁹ *Id.* at 664.

¹⁸⁰ Kim, *supra* note 157, at 620, 621. (“This Article argues, however, that restrictions on defendants’ rights in posttrial review can often harm the very interests increased finality is presumed to protect. Limiting defendants’ rights to obtain relief from improper convictions or excessively lengthy sentences also limits the state’s ability to identify and remedy wrongful incarceration. Although restrictions on posttrial review invariably help conserve judicial and prosecutorial time, they often impose net costs on the state as a whole. Arguments that restrictions on relief from errors after trial encourage defense counsel to take greater care in representation are theoretically appealing, but falsely assume that trial attorneys have the capability to provide

Judges are supposed to weigh these interests singularly and not view finality as a “monolithic interest of presumptive importance.”¹⁸¹ Often this is not the case, however, with many courts supporting their judgments with a simple reference to a general societal interest in finality, and some courts making no mention of the concept at all.

This latter judicial practice is evident in cases presented in Part IV. The courts routinely reject newly discovered evidence claims that argue the findings of the 2009 NAS Report (and other critical sources), with regard to the fallibility of various forensic identification methods, represent a shift in scientific opinion or the existence of scientific controversy. The courts do not mention finality, but interpret the high thresholds comprised in newly discovered evidence rules narrowly to reject these claims. For instance, courts reason that such criticism was discoverable prior to the publication of the report, and that the NAS Report has no bearing on the case at hand and therefore does not have verdict changing capacity. As such, the judiciary apply the law in a way that silently favours finality interests over substantive accuracy.

Applying the law is a fundamental, institutional function of the courts. The cases in Part IV show the courts to be carrying out this function (in the context of this article) in an arguably consistent manner, which is “rationally adapted to the task.”¹⁸² Accordingly, it would be Bator’s view that “in the absence of institutional or functional reasons to the contrary we should accept a presumption against mere repetition of the process on the alleged ground that, after all, error could have occurred.”¹⁸³ This view embodies the principle of institutional settlement, a classic tenet of legal process theory. How this principle relates to the pattern presented in Part IV is explored next.

a higher quality of representation with the same limited resources. The traditional arguments that limiting defendants’ rights to appeal increases the deterrent value of criminal law are unpersuasive in light of modern research on rehabilitation and the miniscule effect posttrial review has on the punishment criminals can expect to receive. On the other hand, providing defendants with fair opportunities to seek relief from claimed errors can increase the subjective legitimacy of the system, thereby encouraging defendants to obey the law in the future. Conversely, restricting posttrial relief in ways that defendants see as arbitrary or unfair may well increase recidivism. Courts and scholars treat finality as either a thumb on the scale or a hefty interest that weighs in the favor of restrictions on posttrial review. A close analysis reveals, however, that it is often neither. Rather, restrictions on posttrial review that make criminal judgments more “final” often harm the very interests finality presumes to protect. Moving beyond the language of finality and towards a more critical analysis of the costs and benefits of posttrial review may allow society to craft more efficient and equitable systems of criminal justice.”)

¹⁸¹ *Id.* at 578.

¹⁸² Bator, *supra* note 156, at 454.

¹⁸³ *Id.*

B. LEGAL PROCESS THEORY: THE PRINCIPLE OF INSTITUTIONAL SETTLEMENT AND THE COMPETENCE OF APPELLATE COURTS TO ADDRESS INDETERMINACY WHEN SHIFTING SCIENTIFIC OPINION RAISES NEW LEGAL QUESTIONS

This sub-section first explains how the principle of institutional settlement relates to the pattern of judicial decision-making presented in Part IV. It then critically explores the institutional competence of the appellate courts to address indeterminacy when shifting scientific opinion raises new legal questions.

i. The Principle of Institutional Settlement

Hart and Saks – the fathers of Legal Process Theory – conceived the principle of institutional settlement.¹⁸⁴ The principle of institutional settlement expresses the view that when competent institutions produce decisions that have been arrived at as a result of “duly established procedures”, those decisions “ought to be accepted as binding upon the whole society unless and until they [the procedures] are duly changed.”¹⁸⁵ In other words, the principle theorizes that it is procedural regularity in the decision-making process of a competent institution that legitimizes the institution’s decisions, not whether its decisions are substantively accurate. Procedure is “critically important”¹⁸⁶ because it, *inter alia*, provides important practical benefits. Procedure provides an effective way of obtaining “good” decisions, facilitating the collaboration of institutions in an interconnected institutional system (like the criminal justice system), and enhances the legitimacy of the law by generating consistency.¹⁸⁷ In the context of this article, the legal process vision suggests that the judicial decision-making pattern identified in Part IV is good, institutionally appropriate, and legitimate.

However, the competence of appellate courts to address indeterminacy when shifting scientific opinion raises new legal questions is open to critical analysis. The following sub-section critically considers the preparedness of the appellate courts to rationally and accurately assess scientific uncertainty, like that presented by newly discovered evidence claims grounded on the alleged indeterminacy present across various forensic identification disciplines. It is presently undeniable that (despite the use of rational procedures and decision-making) the criminal justice system makes factual errors. As Professor David Wolitz points out, the power of new evidence like DNA to cast legitimate doubt on a trial verdict quite apart from procedural defect is something “Professor Bator failed to acknowledge or foresee in his argument.”¹⁸⁸ While procedural regularity may provide levels of consistency and certainty, it “also raises the possibility that the

¹⁸⁴ Henry M. Hart, Jr. & Albert M. Sacks, *THE LEGAL PROCESS: BASIC PROBLEMS IN THE MAKING AND APPLICATION OF LAW* (William N. Eskridge, Jr. & Philip P. Frickey eds., 4th ed. 1994).

¹⁸⁵ *Id.*

¹⁸⁶ William N. Eskridge, Jr. & Gary Peller, *The New Public Law Movement: Moderation as a Postmodern Cultural Form*, 89 MICH. L. REV. 707, 721 (1991).

¹⁸⁷ *Id.*

¹⁸⁸ David Wolitz, *Innocence Commissions and the Future of Post-Conviction Review*, 52 ARIZ. L. REV. 1027, 1060 (2010).

importance people attach to procedural justice may distract them from the failure of the legal system to provide substantively accurate outcomes.”¹⁸⁹ In the Era of Innocence judges must have a closer eye on substance; concerns about accuracy must take on a more prominent role in their decision-making.

ii. The Competence of Appellate Courts to Address Indeterminacy When Shifting Scientific Opinion Raises New Legal Questions

The NAS Report presents the criminal justice system – and in particular appellate judges – with scientific uncertainty. As D. Michael Risinger explains,

Much of the NAS/NRC Report concentrates on what might be described as the problem children of forensic science. These are, in general, forensic techniques that were developed more or less at the dawn of forensic science, such as fingerprint identification, handwriting identification, firearms and toolmark identification, etc. They mostly deal with “source attributions,” that is, determining the source item that left a trace in some relevant place, such as a crime scene. The principles relied upon by such techniques are not the products of science, as that term is currently understood, but rather the product of a kind of commonsense generalization derived from experience with the subject matter under examination. Neither the generalizations so derived nor the accuracy of the results arrived at by practitioners of these disciplines have ever been subject to the kind of systematic testing that has come to be expected as a part of anything calling itself “science.” This does not mean that the results arrived at are necessarily always in error, but simply that we have no very good evidence about when they are likely to be in error and when they are likely to be accurate.¹⁹⁰

This catalogue, coupled with the NAS Report’s unprecedented conclusions about the consistency and certainty of DNA analysis, the fact it was commissioned by Congress and authored by a distinguished committee that was not a “hotbed of card-carrying forensic science skeptics,”¹⁹¹ cast a new, quasi-official,¹⁹² critical light on a plethora of forensic identification disciplines. As Risinger puts it, “As a well-documented catalogue of the problems of forensic science by a highly credentialed body, this report is hugely important.”¹⁹³

The NAS Report made it “untenable to treat criticisms [of forensic science] as simply the cavils of uninformed academics with nothing better to do.”¹⁹⁴ For instance, the report posed many new legal questions about admissibility: Does forensic identification evidence post the findings of the NAS Report satisfy *Daubert*? Should forensic examiners curtail their testimony? If so, what should that testimony be? In the context of newly discovered evidence rules, the NAS Report has driven questions such as: are the findings of the NAS Report new? And, if so,

¹⁸⁹ Jenny S. Martinez, *Process and Substance in the “War on Terror”*, 108 COLUM. L. REV. 1013, 1027 (2008).

¹⁹⁰ D. Michael Risinger, *The NAS/NRC Report on Forensic Science: A Path Forward Fraught with Pitfalls*, 2010 UTAH L. REV. 225, 230-231 (2010).

¹⁹¹ *Id.* at 229.

¹⁹² Cole & Edmond, *supra* note 15 at 588.

¹⁹³ Risinger, *supra* note 190, at 226.

¹⁹⁴ *Id.*

do those findings have verdict changing capacity? These questions are problematic for appellate courts because they stem from, and encompass, scientific uncertainty. As Professor Emily Hammond Meazell explains, “unresolved (and perhaps unresolvable) scientific uncertainty places scientific and legal-system values in greatest tension.”¹⁹⁵ This is because science and law embody different cultures: “[s]cience progresses while law builds slowly on precedent. Science assumes that humankind is determined by some combination of nature and nurture, while law assumes that humankind can transcend these influences and exercise free will. Science is a cooperative endeavor, while most legal institutions operate on an adversary model.”¹⁹⁶

These tensions have led appellate courts largely to avoid a detailed examination of the questions raised in the context of newly discovered evidence claims when a petitioner argues, with regards to forensic identification evidence, that there has been a shift in scientific opinion post the NAS Report. This is demonstrated by the vast majority of judicial decision-making presented in Part IV. In rejecting claims, the courts have sided with ideals such as procedural fairness, finality and predictability (i.e., precedent) over substantive accuracy. This is unsurprising, as the “The law is rarely concerned solely with factual truth in the scientific sense because that is rarely society's sole concern.”¹⁹⁷ In addition, appellate courts suffer from a number of institutional deficiencies when it comes to accurately assessing newly discovered claims based upon uncertainty created by shifting scientific opinion. These include the appellate courts’ discomfort with fact-based assessments and non-binary questions, the shortcomings of the adversarial system, and judges’ lack of scientific expertise. Each of these issues are considered below, along with suggestions for what institutional strengths appellate courts have when it comes to making assessments concerning scientific uncertainty.

a. Problems with Factual Assessments

Appellate courts are used to (and therefore generally good at) assessing legal error, as opposed to factual error. Most post-conviction relief procedures are law based; aimed at remedying egregious legal errors related to jurisdiction or constitutionality.¹⁹⁸ By contrast, newly discovered evidence procedures are primarily “fact based”¹⁹⁹ and require a factual assessment of the qualification, timing, quality, relevance and impact of new facts. Consequently, they require courts to step outside of their comfort zone, particularly in the context of assessments relating to scientific uncertainty. This is because there is “a natural judicial tendency to avoid any deep confrontations with science.”²⁰⁰

¹⁹⁵ Emily Hammond Meazell, *Scientific Avoidance: Toward More Principled Judicial Review of Legislative Science*, 84 IND. L.J. 239, 244 (2009).

¹⁹⁶ DAVID L. FAIGMAN, *LEGAL ALCHEMY: THE USE AND MISUSE OF SCIENCE IN THE LAW* 26, 56 (1999).

¹⁹⁷ Meazell, *supra* note 195, at 250.

¹⁹⁸ Medwed, *supra* note 3, at 664.

¹⁹⁹ *Id.*

²⁰⁰ Emily Hammond Meazell, *Super Deference, the Science Obsession, and Judicial Review as Translation of Agency Science*, 109 MICH. L. REV. 733, 734 (2011).

The fact-based assessments associated with newly discovered evidence can be onerous and ill-suited for comity and efficiency based institutional agendas, and, indeed, the expertise of judges. The onerous nature of the assessment stems, in part, from the fact newly discovered evidence rules comprise multiple elements.

Generally newly discovered evidence rules “involve some combination of showings that the new evidence could not have been discovered prior to trial with the exercise of reasonable diligence; that the evidence is relevant and not cumulative or merely impeaching; and that the new evidence creates a sufficient probability of a different result at a new trial.”²⁰¹ Using this definition as a benchmark, it can be said newly discovered evidence rules typically require at least five factual assessments: Is the evidence a new fact? Was the new fact discoverable before trial? Did the petitioner exercise reasonable diligence in discovering and presenting the new fact? Is the new fact relevant and probative? And, does the new fact have verdict changing capacity? Each element comprises a challenging fact-based assessment that will often (especially in non-DNA cases) be (1) different in each case; (2) without a clear answer; and (3) outside the expertise of the judge. For instance, diligence must be measured along a continuum. Diligence might be satisfied if a new witness is found within ten weeks of becoming known to the petitioner, but diligence in discovering (or, indeed, waiting for) the crystallization of a new scientific theory might reasonably take ten years or an infinite amount of time. Moreover, when can a scientific theory be said to have crystallized, if ever? And, how is it determined if the new scientific theory would have been understood by and therefore persuaded a jury to deliver a different verdict? The non-binary nature of these questions presents further problems for the courts, as explored in the next section. Moreover, there is evidence of inconsistent interpretations of these elements, which limits the courts’ ability to correct error.²⁰²

Concepts associated with newly discovered evidence rules also have problematic definitions. For instance, the concept of “innocence,” which petitioners commonly attempt to prove through newly discovered evidence procedures, “has no real legal meaning in most jurisdictions.”²⁰³ As Findley describes “In a legal system that presumes innocence unless and until guilt is established beyond a reasonable doubt, and generally permits or requires no corresponding finding or judgment of “innocent,” it can be a vexing problem to determine when a person previously found “guilty” is entitled to relief from an unsound conviction as opposed to when a person may justifiably claim to be “innocent” and to have been “exonerated.””²⁰⁴ Even in DNA cases, there is “no such thing as absolute proof of guilt.”²⁰⁵ This problem is compounded in non-DNA cases, like those where petitioners are attempting to show a shift in scientific opinion in relation to the forensic identification evidence used against them. This is because there is an “inherent difficulty and ambiguity in trying to prove a negative.”²⁰⁶ For instance,

²⁰¹ Findley, *supra* note 4, at 1161.

²⁰² *Id.*

²⁰³ *Id.* at 1160.

²⁰⁴ *Id.* at 1161.

²⁰⁵ *Id.*

²⁰⁶ *Id.*

Alex is convicted of a homicide offence largely on the basis that a firearms examiner testified that his gun shot the fatal bullets “to the exclusion of all other guns in the world.” Alex is subsequently able to use the findings of the NAS Report regarding tool-mark evidence to significantly undermine the prosecution’s case and obtain relief via a newly discovered evidence procedure. In that instance, can Alex claim to be innocent? As Findley puts it in relation to a similar hypothetical, “...while the new evidence may provide new grounds for challenging the prosecution's proof of guilt, it does not necessarily conclusively prove the opposite: that the defendant did not commit the crime charged.”²⁰⁷

Collectively, these issues make the assessment of newly discovered evidence claims, based upon uncertainty created by shifting scientific opinion, difficult for the appellate courts to accurately resolve. This is exacerbated by the non-binary nature of the questions presented by newly discovered evidence claims.

b. The Non-Binary Nature of Questions Stemming from Newly Discovered Evidence Rules and Scientific Uncertainty

The NAS Report presents appellate courts with scientific uncertainty. Amongst other things, the report identified vacuums in scientific knowledge with regards to various forensic disciplines. For instance it found there was a lack of research about the variability, reliability, and repeatability of tool-marks; that there was a dearth of scientific underpinning for individualization based on hair comparisons; and there was a need to conduct research into validity, reliability, variables, and population studies in the field of shoe print analysis. These vacuums pose (currently) unresolvable questions, such as: can a firearms examiner ever scientifically conclude there is a “match” between a suspect weapon and suspect bullets? Will any (soft science) forensic method ever be as reliable as DNA evidence? These gaps are either due to a lack of appropriate research, evolving research and/or under-developed research. Some forensic science communities have made significant strides post-NAS,²⁰⁸ but many questions remain unanswered. Moreover, due to the evolutive nature of scientific enquiry, any answers will likely be a moving target. After all, scientific truth is something of a fiction: “Although [science's] goal is to approach true explanations as closely as possible, its investigators claim no final or permanent explanatory truths. Science changes. It evolves...”²⁰⁹

²⁰⁷ *Id.* at 1162.

²⁰⁸ *See, e.g.*, United States v. Love, No. 10-cr-2418 (MMM), 2011 WL 2173644 (S.D. Cal. June 1, 2011). In this case a United States District Court in California recognized that there was evidence that the forensic science community has generally started to take appropriate steps to respond to criticism aimed at its methodologies. *See also* Sarah Lucy Cooper, *Challenges to Fingerprint Identification Evidence: Why the Courts Need a New Approach to Finality* (forthcoming in WM. MITCHELL L. REV.) (copy on file with author).

²⁰⁹ *See generally* ALFRED NORTH WHITEHEAD, SCIENCE AND THE MODERN WORLD (1925); *see also* Panel on Scientific Responsibility and the Conduct of Research: Committee on Science, Engineering, and Public Policy, 1 RESPONSIBLE SCIENCE: ENSURING THE INTEGRITY OF THE RESEARCH PROCESS 38 (1992) (“Although its goal is to approach true explanations as closely as possible, science's investigators claim no final or permanent explanatory truths. Science changes. It evolves.”).

Meazell labels the questions in the paragraph above as “qualitative or non-binary”²¹⁰, and suggests courts are institutionally weak to handle the scientific uncertainty to which these questions relate. This is because “When a court is asked to resolve a question science itself has not resolved, it is simply unequipped to do so because legal values--and more particularly, the judicial process--do not employ the scientific method.”²¹¹ Conversely, courts have “significant institutional strength”²¹² in answering binary questions. Binary questions, Meazell explains, are when “the scientific issue relates to “certain,” or positive science--such as a judicially noticeable scientific fact--no additional scientific methodology needs to be employed. Instead, usual legal-system values easily discern a binary answer in a way indistinct from courts' other fact-finding methods.”²¹³ Examples of such binary questions, in the context of forensic science would be: has there been criticism of the ability of tool-mark, fingerprint and hair examiners to engage in individualization? Has the NAS recommended reforms in the area of forensic science? As Meazell explains, “Courts are very good at reaching binary decisions relatively quickly.”²¹⁴

Newly discovered evidence rules demand that appellate courts answer questions such as: Is the evidence a new fact? Was the new fact discoverable before trial? Did the petitioner exercise reasonable diligence in discovering and presenting the new fact? Is the new fact relevant and probative? And, does the new fact have verdict changing capacity? In some cases these questions might be binary in nature. For example, it would be simple for a court to qualify DNA evidence (related to a 1974 case) extracted by modern testing methods only available from 2014, as “new” without the need for further exploration. However, more often, the questions posed to courts are non-binary in nature, especially in non-DNA cases involving a shift in scientific opinion. Consider the following example:

Jack is charged with murder in 1990. At his trial in 1991, the prosecution allege Jack set fire to a liquor store, killing three people inside. A state fire analyst testifies that the crime scene presented numerous “hallmarks of arson”, including brown stains on the floors, “V” shaped soot marks and spider-webbed glass. The state also presents evidence that, when stopped for jay walking near to the liquor store, Jack was found in possession of an accelerant. In 2015, the State Justice Project (on behalf of Jack) files a newly discovered evidence claim based on the “new” fact that the hallmarks of arson have been discredited i.e., there has been a shift in scientific opinion that undermines the conviction. In fact, the project alleges the new evidence – in the form of an expert affidavit -- proves there was no arson at all, and the fire was an accident. The project’s interest in Jack’s case was triggered in 2009 by the NAS Report, which found that conclusions by fire investigators that a particular fire was arson, on the basis of rules of thumb, are not well founded.²¹⁵ Judge Wilson assesses Jack’s claim in appellate court.

²¹⁰ See generally Meazell, *supra* note 195.

²¹¹ *Id.* at 256.

²¹² *Id.*

²¹³ *Id.*

²¹⁴ *Id.*

²¹⁵ NAS REPORT, *supra* note 10, at 173.

In assessing the claim, Judge Wilson must determine whether the criticism of arson hallmarks is new; whether that criticism was discoverable before trial; whether Jack has exercised reasonable diligence in presenting it to court; whether the criticism is relevant and probative; and whether the criticism has verdict changing capacity? These questions are non-binary in nature and, therefore, difficult for the judge to address. This is partly because some of the questions relate to scientific uncertainty. For instance, whether the criticism of arson indicators qualifies as new and was not discoverable before trial requires an exploration of when the hallmarks were first criticized, and whether scientific uncertainty remains in the field. The answer to the first question may be found in 1990 when the Lime Street Fire Experiment was conducted,²¹⁶ although the NAS Report lent support to the argument in 2009.²¹⁷ Given Jack was tried in 1991, evidence of this experiment was arguably discoverable before trial, but given the trial was so soon after the experiment it is questionable whether the findings of the experiment were available to Jack's lawyer and of sufficient weight to challenge the prosecution's case at that time. Moreover, the NAS Report cites to research related to the experiment, reducing its weight as "new" in the eyes of the court, as per the rationales employed in cases like *Foster* and *Johnson infra*. In addition, given hallmarks of arson continue to be used as indicators of arson,²¹⁸ scientific uncertainty remains in the discipline. In the end, to make an accurate assessment of whether Jack has brought a "new" fact to the court that was not discoverable before his trial, the judge must engage in the near impossible task of resolving the remaining scientific uncertainty himself.

The judge's task would be much easier if he tasked with accurately determining binary questions, such as: Has there been criticism of the hallmarks of arson? Or is evidence that non-arson fires present evidence such as spider-web glass and brown stains? Faced with these binary questions, the judge could no doubt make an accurate determination without great difficulty.

As it stands, however, Judge Wilson's task is fraught with difficulty, right from the first factual assessment he faces. The main problem is that there is scientific uncertainty in relation to the veracity of arson indicators and the assessment of arson fires, and the judge must attempt to resolve that uncertainty when determining the newly discovered evidence claim. This is a near impossible challenge for the judge, not in the sense that he can't make the relevant decision fairly and rationally – but in the sense that he will struggle to make it accurately. Arguably, given the fidelity that post-conviction procedures and judicial decision-making in this domain confer on the legal process vision, the judge's inability to make accurate assessments is somewhat irrelevant. However, in the Era of Innocence, hiding behind process – particularly as a default position – is concerning.

The judge's struggle is not only attributable to the framing of the questions he is required to answer, but other institutional weaknesses too. For instance, it is also likely that Judge Wilson would lack scientific expertise, and be presented with a trial record that presents a "battle of the experts." These two issues relate

²¹⁶ John J. Lentini, *The Lime Street Fire: Another Perspective*, 43 FIRE & ARSON INVESTIGATOR 52, 52 (1992).

²¹⁷ NAS REPORT, *supra* note 10, at 172- 73.

²¹⁸ *Id.*

to the dearth of scientific expertise amongst legal professionals, including judges, and the limitations of the adversarial model respectively. These issues are considered next.

c. The Shortcomings of the Adversarial System and a Lack of Scientific Expertise amongst Judges

The adversarial model generally prevents a full consideration of scientific issues, because it encourages parties to “produce evidence favorable to their respective sides, regardless of the quality of that science.”²¹⁹ This leads to a “battle of the experts.”²²⁰ Judges (and jurors at trial level) are not presented with the full picture. Instead, they “hear highly practiced alternative stories that only roughly approximate what might be termed reality.”²²¹ In terms of expert testimony, because of the adversarial model, “information that reaches the legal system...does not represent the scientific field more generally.”²²² Very often, courts are presented with experts at the “margins of their disciplines”²²³ who are “chosen...because they are willing to be more certain in their conclusions.”²²⁴ Consequently, “the adversarial process will not necessarily produce a full spectrum of scientific research on a particular topic, making it very different from the formal and informal consensus-building methods that science itself uses.”²²⁵ The nature of the adversarial process therefore makes it difficult for judges to resolve scientific uncertainty accurately, which, as explored above, judges already have difficulty doing because of the non-binary nature of the questions asked of them and the vacuums in, and evolving nature of, relevant scientific knowledge.

On top of this, judges generally lack scientific expertise and technical training.²²⁶ Some scholars argue that judges “do not think like scientists”²²⁷ and therefore do not have the capacity to make accurate assessments about science. As Professor Michael J. Saks notes, “Just as legal training teaches one the intellectual skills to analyze legal problems, scientific training teaches one how to analyze empirical questions and proposed answers. This places judges in a weak position to know what questions need to be asked in order to test an empirical claim or how to evaluate the data offered in answer.”²²⁸ Professor Frederic I. Lederer further notes that lawyers’ educational deficiency (when it comes to scientific knowledge) “... often places lawyers at a disadvantage when confronted with scientific evidence...lawyers often fail to ask the right questions and uncritically

²¹⁹ Meazell, *supra* note 195, at 255.

²²⁰ *Id.*

²²¹ Faigman, *supra* note 196, at 65.

²²² *Id.*

²²³ *Id.* at 54.

²²⁴ *Id.*

²²⁵ Meazell, *supra* note 195, at 255.

²²⁶ Faigman, *supra* note 196.

²²⁷ Saks, *supra* note 9, at 1136.

²²⁸ *Id.*

accept scientific assertions.”²²⁹ The NAS Report recognized this was a significant issue too, stating, eleven times, that “lawyers and judges often have insufficient training and background in scientific methodology, and they often fail to fully comprehend the approaches employed by different forensic science disciplines and the reliability of forensic science evidence...”²³⁰ This deficiency is often attributed to a science and math “black hole” in legal education – “a black hole that becomes harder to close the more removed it is from law school.”²³¹ Consequently, as Professor Jessica D. Gabel states, “As lawyers, we are ill-equipped to speak the language of science.”²³²

Collectively, these institutional weaknesses engender an appellate court system that has great difficulty in accurately assessing newly discovered evidence claims based on indeterminacy. This is because these claims require judges to conduct a fact-based assessment to resolve scientific uncertainty, which is presented to them largely in the form of non-binary questions, and conducted within an adversarial model that limits the quality of evidence before them, and which they do not commonly have the expertise to accurately assess. These issues, Meazell argues, “speak to the courts’ limited ability to deal with scientific uncertainty.”²³³

d. Institutional Strengths

Despite the deficiencies detailed above, the appellate courts do have some institutional strengths when it comes to accurately engaging in assessments concerning indeterminacy. First, appellate courts have the competence to address these science-related factual questions,²³⁴ as it is their constitutional role to review the law. Moreover, addressing indeterminacy is “mostly an issue for appellate courts.”²³⁵ Addressing uncertainty is a crucial part of the appellate judiciary’s day job. Appellate courts, therefore, have the institutional power to develop and engage in appropriate decision-making procedures to suit the task at hand. In other words, they have the strength to evolve towards decision-making that is more sensitive to notions of accuracy. As per the legal process vision, a “distinctive comparative advantage of the judiciary”²³⁶ is its ability to use “the defining tools of legal craft--to render decisions according to principle rather than discretion or subjective policy judgment.”²³⁷ The judiciary can, as part of their craft, strive for decision-making that accords with principles of accuracy. Moreover, they courts can do this and be loyal to notions of procedural regularity. An important facet

²²⁹ Frederic I. Lederer, *Scientific Evidence--An Introduction*, 25 WM. & MARY L. REV. 517, 519-20 (1984).

²³⁰ See Jessica D. Gabel, *Forensiphilia: Is Public Fascination with Forensic Science a Love Affair or a Fatal Attraction?*, 36 NEW ENG. J ON. CRIM. & CIV. CONFINEMENT 233, 258 (2010).

²³¹ *Id.* at 257-58.

²³² *Id.* at 258.

²³³ Meazell, *supra* note 195, at 252.

²³⁴ *Id.* at 283.

²³⁵ Michael C. Dorf, *Legal Indeterminacy and Institutional Design*, 78 N.Y.U. L. REV. 875, 940 (2003).

²³⁶ *Id.* at 920.

²³⁷ *Id.*

of process thinking is the ability of an institution to provide "mechanisms for systemic self-correction, an important virtue under the relativist theory of democracy."²³⁸ In other words, institutional procedure has an inbuilt corrective function. To bolster this strength, the courts can utilize a variety of pre-existing institutional mechanisms. For example, judges can use procedures to narrow the disputed scientific issues; conduct hearings where the court can examine potential experts; and appoint independent experts, special masters, and specially trained law clerks.²³⁹ Courts also have a convening power, namely the ability to bring together the various actors needed to craft effective solutions to multi-dimensional problems,²⁴⁰ like, for example, scientific uncertainty.

Second, with the emergence of the Innocence Movement in particular, appellate courts have also been thrust into conducting more newly discovered evidence based fact assessments. As Findley recalls, "The innocence movement got its initial momentum from using new evidence--primarily DNA evidence--to prove factual, as opposed to "legal," innocence."²⁴¹ With the ever-increasing rhetoric of innocence across the criminal justice system,²⁴² and the role scientific evidence plays in that movement, judges should become more familiar with science orientated fact assessments. This increased familiarity should serve to improve their fact based assessments and engagement with non-binary questions in the domain of newly discovered evidence. As aforementioned, courts also have great institutional strength in making binary decisions, of which some newly discovered evidence claims will encompass. The courts should apply this skill in favour of accuracy-focused assessments when it is appropriate to do so.

Third, judges can engage in further scientific and technical training. After all, given judges are prime consumers of scientific evidence, they should "learn to evaluate what they are getting for their dollar."²⁴³ Moreover, judges are intelligent people with the capacity to engage accurately with technical issues. The courts' institutional strength is also furthered by the judiciary's (at least perceived) neutral position and prestige.²⁴⁴ The courts' lack of a direct stake in the outcome of a case and the respect they command, should enable them to engage in objective, accurate and thorough fact-finding, unburdened by "subjective policy judgment."²⁴⁵

In light of these institutional strengths, there is reason to be optimistic about the courts' ability to engage accurately in the indeterminacy raised in newly discovered evidence claims based on shifting scientific opinion. Moreover, they can do this and remain true to key tenets of the legal process vision.

²³⁸ Eskridge & Peller, *supra* note 186, at 721.

²³⁹ *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 149-50 (1997). *See also* Cooper, *supra* note 36, at 243.

²⁴⁰ Dorf, *supra* note 235, at 945.

²⁴¹ Findley, *supra* note 4, at 1160.

²⁴² *See generally* CONTROVERSIES, *supra* note 42.

²⁴³ Faigman, *supra* note 196, at 64.

²⁴⁴ Dorf, *supra* note 235, at 945.

²⁴⁵ *Id.* at 920.

VI. CONCLUSION

Newly discovered evidence rules are an important feature of a defendant's post-conviction arsenal. In particular, the ability of these rules to effectively handle claims based on shifting scientific opinion in relation to forensic identification evidence is crucial. This is because, in recent years, the ability of various, popular forensic disciplines to engage in source attribution (especially individualization) – a function the criminal justice system has (almost) unreservedly relied on these disciplines to undertake for decades – has been significantly criticized. The 2009 NAS Report was a landmark event in this context, rubber stamping such criticism with the imprimatur of the National Academies.

Since 2009, petitioners have argued that the criticism levelled at these forensic identification methods is newly discovered evidence; contending that the criticism represents a shift in the scientific opinion that was used to convict them. The appellate courts, however, routinely reject these claims. In doing so, the courts (1) defer to lower court decisions regarding the qualification of newly discovered evidence; and (2) do not label the findings of the NAS Report – including the unprecedented finding that individualization was not proper in any other discipline other than DNA analysis – as newly discovered evidence. Appellate courts tend to take the view that the NAS Report presents no “new” facts given that it cites to older research, and lacks verdict changing capacity because its findings are not specific to individual cases.

This pattern in judicial decision-making shows the courts to be favoring finality interests and procedural regularity over substantive accuracy. The obvious theoretical reason for why courts foreclose post-conviction review is finality, as concerns about comity, resource and preventing a flood of trivial claims are crucial facets of the appellate courts' institutional agendas. The relevant case law also presents the courts as an institution that is loyal to notions of procedure and predictability, and therefore faithful to the legal process vision. At the heart of that vision is the principle of institutional settlement, which theorizes that it is procedural regularity in the decision-making process of a competent institution that legitimizes the institution's decisions, not whether its decisions are substantively accurate.

The side-lining of substantive accuracy is problematic for newly discovered evidence claims because they are fact-based remedies. Furthermore, when it comes to scientific uncertainty, such as that present within many forensic identification disciplines at present, the appellate courts are institutionally weak to make accurate determinations. This is because appellate courts tend to avoid confrontations with science, are generally uncomfortable (and inexperienced) with fact-based assessments and non-binary questions (like those presented by newly discovered evidence rules), and must confront the challenges presented by the adversarial model and their own lack of scientific expertise. These deficiencies combine to make it very difficult for appellate courts to address scientific uncertainty accurately.

However, there is reason to be optimistic. The appellate courts do have competence to address factual questions and indeterminacy. In fact, it a crucial function of their docket. As such, they have the institutional strength to evolve towards decision-making that is more sensitive to notions of accuracy. In addition,

appellate courts are engaging with fact-assessments related to scientific evidence more frequently, can address binary questions with skill and speed, and have the neutrality and professional ‘clout’ to engage in accurate fact-finding. Judges also can avail themselves of further technical training and assistance. These institutional strengths should be harnessed.

In light of the fact that nearly 50% of DNA exonerations to date are attributable, in some way, to unreliable and/or improper forensic evidence, the appellate courts must have a closer eye on accuracy with regards to relevant forensic disciplines. The problem of wrongful conviction on the basis of erroneous science is unlikely to go away soon. The courts must begin to remedy their institutional weaknesses, and seek to harness and apply their institutional strengths in favour of accurate assessments when faced with newly discovered evidence claims concerning scientific uncertainty.

Judges should take a more proactive role in remedying factual error caused by erroneous science. Science will always “encompass some quantum of uncertainty, there will always be a policy gap for our legal institutions to fill.”²⁴⁶ Courts cannot – and should not – be expected to conclusively resolve scientific uncertainty; however they should no longer – as a default position – hide behind procedural regularity to the detriment of substantive accuracy. Courts should not fill policy gaps with generalized finality interests, and neglect their own institutional competence for providing the most accurate possible assessment of newly discovered evidence claims raising questions related to scientific uncertainty.

²⁴⁶ Meazell, *supra* note 195, at 250.

IN THE EYE OF THE BEHOLDER

Afterword by Michael Mansfield Q.C

This observation applies to both beauty and forensic science!

That's how I have always viewed science. It removes the mystique, the impenetrability, and the apparent unassailability. Bottom line, nothing is written in tablets of stone, nothing is infallible and everything is subject to the frailty of the human hand. The knack is discerning the point of interaction where error, misjudgement, and subjectivity arise.

Such points are manifold once the principle is grasped. They may occur at each stage of the process from the development of hypothesis, through theory, to implementation in the field. The smallest detail is as important as the biggest. Such an approach was cultivated in real life and in fiction by Sir Arthur Conan Doyle. Both the perpetrator of crime and the forensic investigator make mistakes and overlook the risks of momentary inattention. The inadvertent trace which adventitiously gets transferred from one surface to another. The failure to protect, the failure to clean, the failure to seal. Protocols help but cannot exclude.

Above all this, is the critical process of analysis assessment and interpretation. Even if mechanical or electronic devices are involved, the results may be distorted, or the assessment observed differently through different eyes. It is the failure to recognize and remember this continual risk of subjectivity which has allowed forensic science to be misunderstood and to be accorded a status of reliability which is not merited.

None of these reservations detract from the fundamental need for science as an essential tool in the search for truth. What has to be guarded against is when the former becomes the substitute for the latter.

This Special Issue of the British Journal of American Legal Studies provides a timely insight into these issues. It is written in both an authoritative and accessible manner, for the benefit of practitioner and public alike.

My own experience spans nigh on 50 years at the English Bar, and I have been fortunate enough to be involved in ground breaking cases which have impacted on the practice of forensic science. Unhappily some of the lessons still need to be heeded and still result in miscarriages both in the United Kingdom and elsewhere.

This is especially poignant in the United Kingdom because once the evidential canker of 'false and/or unreliable confessions' had been rooted out by new legislative measures in the 1980s, the spotlight turned to the role of scientific investigation regarded by many as a much better bet.

Not necessarily so.

It soon became apparent that presumptive field tests could produce spurious positive results (The Birmingham Six¹) and that fingerprint analysis could produce as many views as the prints themselves (Danny McNamee²). It has also been shown that Firearms Discharge Residue may derive from common airborne sources (Barry George³), and even DNA is liable to degradation and contamination.⁴

The problem is not the science itself but often the scientist. Recent cases in both the United States and the United Kingdom clearly demonstrate how much work is still to be done to overcome lack of circumspection and unconscious predisposition.

In April, 2015 the Federal Bureau of Investigation in the United States (in conjunction with The Innocence Project, National Association of Defense Lawyers, and Department of Justice) announced that it would review several thousand cases where the FBI had conducted microscopic hair analysis of crime scene evidence.⁵ This initiative followed the exoneration of Donald Gates, who was wrongly convicted of murder and rape.⁶ Scientific evidence relating to subjective hair comparison and statistical rarity was destroyed by subsequent DNA analysis, which showed that the suspect hairs were not Mr Gates's. The FBI's initial review has revealed 96% of the 268 review cases that went to trial involved examiners making erroneous statements. Moreover, defendants in at least 35 of these cases were sentenced to death and errors were identified in 94% of those cases. Nine of these defendants have already been executed and five died of other causes while on death row.⁷

In the same year that Gates was exonerated, the National Academy of Sciences in the United States observed that "testimony based on faulty forensic science analyses may have contributed to wrongful convictions of innocent people"⁸ and that in a number of disciplines "forensic science professionals have yet to

¹ ASPECTS OF EXPLOSIVES DETECTION 48-49 (Maurice Marshall & Jimmy Oxley eds., 2009).

² R. v. McNamee (Gilbert Thomas Patrick), (unreported) 1998 WL 1751094, Court of Appeal (Crim. Div.) (1998).

³ R. v. George (Barry) [2007] EWCA Crim 2722.

⁴ See generally Peter Alldridge, *Recognising Novel Scientific Techniques: DNA as a Test Case*, CRIM. L.R. 687 (1992).

⁵ See *Innocence Project and NACDL Announce Historic Partnership with the FBI and Department of Justice on Microscopic Hair Analysis Cases*, INNOCENCE PROJECT (July 18, 2013, 12:00 PM), <http://www.innocenceproject.org/news-events-exonerations/press-releases/innocence-project-and-nacdl-announce-historic-partnership-with-the-fbi-and-department-of-justice-on-microscopic-hair-analysis-cases>.

⁶ Maurice Possley, *David Eugene Gates*, INNOCENCE PROJECT, <http://www.innocenceproject.org/cases-false-imprisonment/donald-eugene-gates> (last visited Nov. 2, 2015).

⁷ See *FBI Testimony on Microscopic Hair Analysis Contained Errors in at Least 90 Percent of Cases in Ongoing Review*, FBI.GOV (Apr. 20, 2015), available at <https://www.fbi.gov/news/pressrel/press-releases/fbi-testimony-on-microscopic-hair-analysis-contained-errors-in-at-least-90-percent-of-cases-in-ongoing-review>.

⁸ THE COMM. ON IDENTIFYING THE NEEDS OF THE FORENSIC SCI. CMTY., NAT'L RESEARCH COUNCIL OF THE NAT'L ACADS., *STRENGTHENING THE FORENSIC SCIENCES IN THE UNITED STATES: A PATH FORWARD* 4 (2009).

establish either the validity of their approach or the accuracy of their conclusions.”⁹ This excellent exposé also tackled the risks attached to DNA evidence, acknowledging that errors can also occur in the examination of DNA evidence, including misinterpretation.¹⁰

I have encountered such problems in relation to fingerprint evidence. The analysis of fingerprint evidence requires a comparison – between a profile and a crime scene sample - to be made by a human agency. Such an undertaking necessarily involves very fine degrees of separation and discernment. I highlighted this in my Memoirs¹¹ having had the opportunity to liaise with Dr. Itiel Dror (whose work is also included in this Special Issue).

Dr. Dror asked me to participate in a very simple but salutary test. I was to watch a short film. I would see two teams playing basketball. One dressed in black and the other in white. My task was to count how many times the white team passed the ball successfully with a bounce in between. When asked for my assessment I said 12. I was pressed on this. I repeated the same figure but perhaps with a little less conviction. This went on for a few more times until Dr. Dror stopped. He paused. He looked straight at me and said “what about the gorilla?” I thought I was hearing things so I asked him to repeat his comment. “Look again,” he urged. Second time around I could hardly believe my eyes. The figure of a gorilla walked straight through the middle of the teams and I had not noticed.

The lesson was that you see what you want or need to see, or at least think you do. Scientists unconsciously are capable of doing exactly the same. Influenced by what they may be told, or by previous experience, or by what is expected.

At the beginning of my career at the Bar, I represented a defendant in a high profile political case. The core evidence concerned handwriting comparison. It seemed to me that the established procedure of requesting the handful of known experts to examine the known against the suspect document was plainly a self-fulfilling prophesy, depending on which party engaged the expert. All sorts of spoken and unspoken assumptions were made. To overcome this approach and infuse a modicum of objectivity I insisted, against considerable consternation and opposition, that three experts be given ten documents to examine, in order to assess whether any of them were written by the same person. They were not told which was suspect nor which was known. Some experts refused to participate. The results were startling and did not reveal a consensus.

The current situation in the United Kingdom is not dissimilar to experiences in the United States. It has been exacerbated by government cuts to funding (£20

⁹ *Id.* at 53.

¹⁰ *Id.* at 132.

¹¹ MICHAEL MANSFIELD, MEMOIRS OF A RADICAL LAWYER (2009).

million in two years) in the field of criminal justice,¹² and the closure of the Forensic Science Service in December, 2012.¹³ Now police laboratories do the work in-house and the rest of the service has been privatized and is dominated by a few firms. This fragmentation has led to serious deficiencies and mistakes. The United Kingdom is now the only major nation without a national forensic science facility.

The House of Commons Science and Technology Select Committee issued a damning report in 2013 highlighting the potential for more miscarriages of justice.¹⁴ Professor Peter Gill, the pioneer of mass genetic profiling, added fuel to the fire by pointing out that in-house DNA testing would be disastrous with scientists under pressure to come up with results to secure convictions.¹⁵ He himself had resigned from the Forensic Science Service because of increasing commercialization. It hardly needs saying that truth is not a marketable commodity.

Examples of shortcomings cited recently within the private sector include contamination of samples, the creation of a non-existent suspect, and the false link of an innocent man to a crime scene.¹⁶ A good example of these sorts of problems is the case of Adam Scott. Scott was arrested in October, 2011 on an allegation of rape and held in custody for five months. His DNA from an incident in Exeter had become mixed up with genetic material from the victim in Manchester. During analysis the tray used for the Scott examination was wrongly reused for the victim's swab.¹⁷

In light of these observations, ultimately, certain basic principles have to be reiterated. There has to be:

1. A national not for profit public forensic science service.
2. A national code of standards and protocols for the public and the private sector.
3. Enforcement by a regulatory body.
4. Regular review of methods, techniques, and equipment.

¹² Paul Peachey, *Privatisation of Forensic Services 'Threat to Justice' and Putting the Work in Police Hands Would Be 'Disastrous,' Warn Experts*, THE INDEPENDENT, Jan. 21, 2015, <http://www.independent.co.uk/news/uk/crime/privatisation-of-forensic-services-a-threat-to-justice-and-putting-the-work-in-police-hands-would-be-9991356.html>.

¹³ Paul Rincon, *'Higher Cost' of Forensic Science Service Closure*, BBC NEWS, Jan. 30, 2013, <http://www.bbc.co.uk/news/science-environment-21251162>.

¹⁴ HOUSE OF COMMONS SCIENCE AND TECHNOLOGY COMMITTEE, FORENSIC SCIENCE (2013-14), available at

<http://www.publications.parliament.uk/pa/cm201314/cmselect/cmsctech/610/610.pdf>.

¹⁵ See Peachey, *supra* note 12.

¹⁶ *Id.*

¹⁷ *Id.*

In the Eye of the Beholder

5. Obligatory disclosure of data to interested parties.
6. A national registration scheme for all practitioners.
7. A codified system of training and qualification at colleges of forensic science.
8. Oversight and quality control by the courts in the form of pre-trial hearings that are aimed to ensure only reliable scientific evidence is admitted.

This Special Issue makes a significant contribution towards highlighting current issues with forensic science evidence, and furthering international conversations about the intersection of forensic science and criminal justice.

Michael Mansfield Q.C

Professor of Law at the City University, London
Visiting Professor of Law at Birkbeck School of Law, London
Fellow, University of Kent, Canterbury
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