

PhD thesis

**Admissibility of forensic experts and evidence in criminal cases in
England and Wales**
Deonaran, M.

Full bibliographic citation: Deonaran, M. 2025. Admissibility of forensic experts and evidence in criminal cases in England and Wales. PhD thesis Middlesex University

Year: 2025

Publisher: Middlesex University Research Repository

Available online: <https://repository.mdx.ac.uk/item/36qw25>

Middlesex University Research Repository makes the University's research available electronically.

Copyright and moral rights to this work are retained by the author and/or other copyright owners unless otherwise stated. The work is supplied on the understanding that any use for commercial gain is strictly forbidden. A copy may be downloaded for personal, non-commercial, research or study without prior permission and without charge.

Works, including theses and research projects, may not be reproduced in any format or medium, or extensive quotations taken from them, or their content changed in any way, without first obtaining permission in writing from the copyright holder(s). They may not be sold or exploited commercially in any format or medium without the prior written permission of the copyright holder(s).

Full bibliographic details must be given when referring to, or quoting from full items including the author's name, the title of the work, publication details where relevant

(place, publisher, date), pagination, and for theses or dissertations the awarding institution, the degree type awarded, and the date of the award.

If you believe that any material held in the repository infringes copyright law, please contact the Repository Team at Middlesex University via the following email address: repository@mdx.ac.uk

The item will be removed from the repository while any claim is being investigated.

See also repository copyright: re-use policy: <https://libguides.mdx.ac.uk/repository>

Admissibility of Forensic Experts and Evidence in Criminal Cases in England and Wales

A thesis submitted to Middlesex University in partial fulfilment of
the requirements for the degree of PhD

Mahensingh Deonaran
M00579055

School of Science and Technology
Middlesex University London

SEPTEMBER 2025

Admissibility of Forensic Experts and Evidence in Criminal Cases in England and Wales

Mahensingh Deonaran

Abstract

Jurisdictions such as England and Wales operate under an adversarial justice system that has long grappled with wrongful convictions and miscarriages of justice, raising concerns about the reliability and regulation of forensic science. In criminal trials, judges and jurors frequently depend on forensic experts to interpret and communicate complex scientific and technical evidence. Research indicates that when faced with such complexity, factfinders may rely on descriptive decision-making models—such as peripheral cues—rather than normative models grounded in substantive evaluation. This tendency may contribute to the admission of unreliable expert evidence. Compounding this issue is the absence of a codified framework for assessing the admissibility of forensic expert testimony in English law, thereby engendering inconsistency in judicial assessments and affording courts wide discretion in their determinations.

This thesis addressed the following questions: (1) To what extent do the Court of Appeal (Criminal Division) adhere to normative legal standards when evaluating forensic expert evidence? (2) How do legal professionals and laypeople conceptualise expert credibility? (3) What factors influence lay assessments of expert credibility in trial-like settings?

To answer these questions, three empirical studies were conducted. Study 1 employed a mixed-methods analysis of 305 appellate judgments from the England and Wales Court of Appeal (Criminal Division), revealing inconsistent application of general admissibility

criteria and limited engagement with scientific validity. Study 2 surveyed 231 legal professionals and UK-jury eligible laypeople, identifying divergence reasoning strategies: legal professionals relied on a context-driven but potentially misleading “intuitive checklist” while the lay participants drew on everyday heuristics. Study 3 adopted a between-subjects experimental design ($N = 376$) to examine how expert testimony communication (intuitive; quasirational; analytical) and domain expertise (DNA; Digital) influence lay credibility assessments. DNA experts were rated higher in substantive credibility, but communication style significantly shaped perceptions: intuitive delivery enhanced likeability, while analytical delivery increased perceived substantive credibility. Notably, analytical presentation reduced the credibility gap between DNA and digital experts, suggesting that delivery can outweigh disciplinary prestige.

Grounded in an integrative theoretical framework that synthesises cognitive continuum theory, bounded rationality, and evidentiary jurisprudence, this thesis offers a novel interdisciplinary contribution to the study of forensic science in legal contexts. It proposes an evaluative model that bridges psychological insights with legal standards to improve the assessment of expert evidence. The findings have implications for judicial training, expert witness guidelines, and policy reform aimed at enhancing the integrity of legal proceedings.

Acknowledgements

I am deeply grateful to my wife, Yarti, whose unwavering support and boundless encouragement have been the cornerstone of my journey through this doctoral research – you are my Shakti. Your resilience and belief in me have been the driving force behind every step I've taken. My daughter, Sonali-Veda, your love has provided me with solace and inspiration, reminding me of the importance of balance and family throughout this endeavour.

I extend my deepest appreciation to Dr. Yvan Russell – your guidance and insightful feedback have been instrumental in shaping the course of my work. Lastly, I reserve special thanks and gratitude to my Director of Studies, Professor Mandeep Dhimi. Thank you for your exceptional guidance, patience, and unwavering support throughout this research journey.

Table of Contents

Table of Contents	iv
List of Tables	viii
List of Figures.....	ix
1. Literature Review	10
1.1. Expert Forensic Evidence	10
1.2. The Criminal Courts in England and Wales.....	12
1.3. The Role of Forensic Expert Testimony in English Criminal Adjudication	13
1.4. Forensic Evidence	17
1.4.1. DNA Analysis	18
1.4.2. Fingerprint Analysis	22
1.4.3. Digital Forensics.....	24
1.5. The Evolution of Admissibility Standards in Adversarial Jurisdictions.....	27
1.5.1. United States Admissibility Rules for Forensic Evidence	27
1.5.2. The Admissibility Standards for Forensic Expert Evidence in England and Wales	32
1.5.3. Forensic Experts.....	35
1.5.4. Juror Assessment of Forensic Expert Credibility	37
1.5.5. Judicial Gatekeeping of Forensic Experts Evidence.....	40
1.6. Conceptual Link to Empirical Framework.....	43
1.7. Research Gaps and Questions	44
1.8. Contribution and Practical Implications.....	47
1.9. Structure of this Thesis.....	49
2. Legislative Frameworks on Expert Forensic Evidence: Appeal Court Analysis.....	52
2.1. Legal Procedures for Assessing the General Standards of Admissibility.....	53
2.1.1. Relevance of Expert Opinion Evidence.....	54
2.1.2. Necessity of Expert Opinion Evidence.....	54
2.1.3. Witness Competency to give an Opinion	54
2.1.4. Expert Evidence being Sufficiently Reliable.....	55
2.2. Issues with Applying the Criminal Procedure Rules and Practice Directions on Admissibility	55
2.2. Legal Procedures for Assessing Fresh Evidence on Appeal	59
2.3. Focus of the Present Study	61
2.3.1. Aims and Objectives for Study 1(a) General Standards of Admissibility	63
2.3.2. Hypotheses for General Standards of Admissibility.....	64
2.3.3. Aims for Study 1(b) Fresh Evidence on Appeal.....	65
2.3.4. Hypotheses for Fresh Evidence on Appeal.....	66
2.4. Method	70
2.4.1. Design.....	70

2.4.2.	Data Source	71
2.4.3.	Dataset	72
2.4.4.	Coding Scheme.....	74
2.4.5.	Reliability Assessment of the Coding Scheme	76
2.4.6.	Data Source and Ethical Considerations.....	76
2.4.7.	Data Analysis	77
2.4.8.	Mixed-Methods Document Analysis.....	77
2.4.9.	Case Selection and Descriptive Overview.....	78
2.4.10.	Quantitative Analysis	86
2.4.11.	Qualitative analysis	86
2.5.10.	Data Cleaning and Missing Value Analysis.....	88
2.6.	Findings.....	90
2.6.1.	General Standards of Admissibility.....	91
2.6.2.	Tests of General Admissibility	93
2.6.3.	Tests of Hypotheses – General Standards of Admissibility.....	97
2.6.4.	Qualitative Findings. General Standards of Admissibility	100
2.6.5.	Fresh Evidence on Appeal (Study 1b).....	112
2.6.6.	Test of Hypotheses—Tests of Fresh Evidence on Appeal	115
2.6.7.	Investigatory and Evidentiary factors and Fresh Evidence Admissibility	119
2.6.8.	Trial Evidence v Fresh Evidence on Appeal	122
2.6.9.	Qualitative Findings. Fresh Evidence on Appeal	124
2.7	Discussion	140
2.7.1.	Interpretation of the Findings in Relations to the Research Questions	140
2.7.2.	Limitations of the Current Discretionary Model	143
2.7.3.	Theoretical and Practical Implications	155
2.7.4.	Implications for Legal Practice and Policy.....	156
2.7.5.	Limitations	157
2.7.6.	Recommendations for Future Research Studies	158
2.7.7.	Conclusion.....	160
3.	Perceptions of Expertise: Legal and Lay Assessments of Forensic Expert Witness Credibility.....	162
3.1.	Legal criteria for Expert Witness Qualification	164
3.2.	Jurisdictional Frameworks and Evaluative Inconsistencies in Expert Qualification	166
3.3.	Miscarriages of Justice and the Risks of Flawed Expert Testimony	172
3.4.	Expertise from a Psychological Perspective.....	175
3.5.	Evaluating Expert Epistemic Status: Legal Professionals and Lay Jurors	178
3.6.	Evaluative Proxies of being a Genuine Expert: Legal and Lay perspectives in Forensic Contexts	181
3.7.	The Present Study.....	184
3.7.1.	Aims and Objectives	189
3.8	Method	191

3.7.1.	Participants	191
3.7.2.	Survey.....	192
3.7.3.	Procedure.....	194
3.7.4.	Data Cleaning	194
3.7.5.	Data Analysis	195
3.8.	Results.....	198
3.8.1.	Descriptive Statistics	198
3.8.2.	Inter-Item Correlations	202
3.8.3.	One-Sample <i>t</i> Tests	203
3.8.4.	Group Comparisons: Independent-Samples <i>t</i> Test	204
3.8.5.	Qualitative Findings	206
3.8.6.	Integrative insights	210
3.9.	Discussion	212
3.9.1.	Interpretation of the Findings in Relation to the Research Questions	212
3.9.2.	Implications.....	222
3.9.3.	Strengths and Limitations.....	224
3.9.4.	Recommendations for Future Research Studies	225
3.9.5.	Conclusion.....	227
4.	Effects of Communication Mode and Forensic Domain on Lay Assessments of Expert Witness Credibility.....	228
4.1.	Juror Comprehension of Expert Testimony.....	229
4.2.	Source Credibility	232
4.3.	Influence of Forensic Domain on Perceived Credibility	235
4.4.	Communication Modes of Testimony	239
4.5.	The Present Study	245
4.5.1.	Aims and Objectives	246
4.5.2.	Operationalising Expert Credibility.....	247
4.5.3.	Research Questions and Hypotheses	248
4.6.	Method	250
4.6.1.	Participants.....	250
4.6.2.	Design.....	251
4.6.3.	Materials and Stimuli	253
4.6.4.	Procedure.....	256
4.6.5.	Data Analysis	258
4.7.	Results.....	260
4.7.1.	Reliability and Inter-Item Correlations.....	260
4.7.2.	Descriptive Statistics	262
4.7.3.	Analysis of Variance	265
4.8.	Discussion	269
4.8.1.	Interpretation of the Findings in Relation to the Research Questions	269

4.8.2.	Practical Implications	274
4.8.3.	Limitations	276
4.8.4.	Recommendations for Future Research Studies	277
4.8.5.	Conclusion.....	278
5.	Recommendations.....	280
5.1.	Overview of Empirical Findings	281
5.2.	Recommendations for Lay Jurors	285
5.2.1.	Enhanced Jury Instructions for Forensic Evidence.....	285
5.2.2.	Pre-hearing Orientation Module on Forensic Evidence	287
5.3.	Judges.....	290
5.3.1.	Training on Cognitive Bias and Information Evaluation.....	290
5.3.2.	Improved Admissibility Guidelines.....	291
5.3.3.	Judicial Checklists for Admissibility Decisions	293
5.4.	Legal Professionals	294
5.4.1.	Ongoing Training in Basic Forensic Science for Barristers	294
5.4.2.	Use of Expert-Preparation Protocols	295
5.5.	Expert Testimony.....	297
5.6.	Policy Makers	299
5.6.1.	National Standardisation of Admissibility Criteria	299
5.6.2.	Funding for Psychological Research in Legal Decision-Making	302
5.6.3.	Creation of an Expert Evidence Oversight Body	304
5.7.	Artificial Intelligence for Commissioning and Assessing Forensic Experts	305
5.8.	Conclusion	306
	References.....	309
	Bibliography	359
	Appendices.....	399
	Appendix 1 List of Conferences Attended	399
	Appendix 2 Ethics Approval	401
	Appendix 3 Study 1. Coding Scheme	404
	Appendix 4 Study 2. Online Questionnaire.....	412
	Appendix 5 Study 3. Stimuli	413

List of Tables

Table 1.1	<i>Forensic Expert Core Functions</i>	37
Table 1.2	<i>Mapping of Identified Gaps, Research Questions, and Corresponding Study</i>	45
Table 2.1	<i>Annual Distribution of Cases in the General Standards of Admissibility Dataset</i>	79
Table 2.2	<i>Demographic and Socioeconomic Characteristics of Defendants</i>	80
Table 2.3	<i>Appeal Characteristics: Initiation, Applicant, and Appeals Against</i>	81
Table 2.4	<i>Original Case Trial Characteristics</i>	82
Table 2.5	<i>Appeal Case and Hearing factors relating to Forensic Evidence</i>	83
Table 2.6	<i>Investigative Stage: Collection of DNA, Fingerprint, and Digital Evidence in Appeal Hearings</i>	84
Table 2.7	<i>Investigative stage: Analysis of DNA, Fingerprint and Digital Evidence in Appeal Hearings</i>	85
Table 2.8	<i>Evidentiary stage data</i>	85
Table 2.9	<i>Annual Counts of Fresh Evidence Cases, 2010–2022</i>	113
Table 3.1	<i>Cues and Supporting Evidence for Assessing Forensic Expert Credibility</i>	182
Table 3.2	<i>Categorisation of Cues for Assessing Forensic Expert Credibility</i>	188
Table 3.3	<i>Overall Descriptive Statistics Legal Professionals and Lay Participant ratings combined.</i>	200
Table 3.4	<i>Correlation Matrix of Expert Credibility Cues</i>	202
Table 3.5	<i>One-Sample t Tests Comparing Item Ratings Against the Midpoint</i>	204
Table 3.6	<i>Independent-Samples t Tests of Expert Credibility Ratings by Legal and Lay Participants</i>	205
Table 4.1	<i>Sample Distribution by Gender, Education, and Ethnicity</i>	251
Table 4.2	<i>Communication Mode manipulations of expert testimony</i>	254
Table 4.3	<i>Accuracy of Responses Across Pilot Study Treatment Conditions</i>	258
Table 4.4	<i>Inter-Item Correlation among Expert Credibility Measures</i>	261
Table 4.5	<i>Mean Credibility Ratings by Dimensions for Digital and DNA Experts</i>	264
Table 4.6	<i>Mean Credibility Ratings of Likeability and Substantive Credibility for Digital and DNA Experts</i> ..	264
Table 4.7	<i>Multiple Comparisons of Cognitive Modes on Dependent Variable</i>	266
Table 4.8	<i>Multiple Comparisons for Cognitive Modes Across Dependent Variables</i>	268
Table 5.1	<i>Overview of Coding Scheme Development</i>	404
Table 5.2	<i>Adapted Coding Scheme</i>	405

List of Figures

Figure 1.1	<i>Hierarchical structure of Courts in England and Wales</i>	13
Figure 1.2	<i>Unambiguous and Ambiguous Electropherograms</i>	21
Figure 2.1	<i>Decision points for Judicial Assessment of Expert Evidence</i>	58
Figure 2.2	<i>Statutory Criteria for the Admissibility of Fresh Evidence on Appeal</i>	61
Figure 2.3	<i>Inclusion and exclusion criteria for case selection</i>	73
Figure 2.4	<i>Categories of Forensic Evidence presented at the Criminal Court of Appeal</i>	92
Figure 2.5	<i>Appeal Court Assessments of the Relevance of Expert Evidence across Forensic Categories</i>	93
Figure 2.6	<i>Appeal Court Assessments of the Necessity of Expert Evidence</i>	94
Figure 2.7	<i>Court Assessments of Expert Competency Across Evidence Categories</i>	96
Figure 2.8	<i>Appeal Court Assessments of the Reliability of Expert Evidence</i>	97
Figure 2.9	<i>Thematic Map for Appeal Court Assessment of Evidentiary relevancy</i>	101
Figure 2.10	<i>Thematic Map for Appeal Court Assessment of Evidentiary Necessity</i>	104
Figure 2.11	<i>Thematic Map for Appeal Court Assessment of Expert Competency</i>	107
Figure 2.12	<i>Thematic Map for Appeal Court Assessment of Evidentiary Relevance</i>	110
Figure 2.13	<i>Admissibility Decisions of the Court of Appeal Across Fresh Evidence Categories</i>	113
Figure 2.14	<i>Types of Fresh Evidence Considered in Appeal Cases</i>	114
Figure 2.15	<i>Fresh Evidence Introduced on Appeal by Trial Evidence Category</i>	114
Figure 2.16	<i>Court Decisions on Fresh Evidence by Investigatory and Evidentiary Factors</i>	121
Figure 2.17	<i>Forensic Evidence at Trial and Corresponding Fresh Evidence on Appeal</i>	123
Figure 2.18	<i>Thematic Map for Fresh Evidence being Capable of Belief</i>	125
Figure 2.19	<i>Thematic Map for Evidence having Grounds for Appeal</i>	129
Figure 2.20	<i>Thematic Map of Explanations for Non-Adduction of Evidence at the Original Hearing</i>	133
Figure 2.21	<i>Thematic Map of the Retrospective Admissibility of Evidence in the Original Hearing</i>	137
Figure 3.1	<i>Recruitment and Analytical Sample of Legal professionals and Laypeople</i>	193
Figure 3.2	<i>Mean Credibility Ratings of Forensic Expert Proxies by Laypeople and Legal Professionals</i>	201
Figure 3.3	<i>Thematic Map of Additional factors to qualify credible forensic expert</i>	208
Figure 4.1	<i>The Cognitive Continuum</i>	242
Figure 4.2	<i>Estimated Marginal Means of Likability by Cognitive Mode and Forensic Expertise</i>	266
Figure 4.3	<i>Estimated Marginal Means of Credibility by Cognitive Mode and Forensic Domain</i>	268

1. Literature Review

1.1. Expert Forensic Evidence

Within the criminal justice system of England and Wales, expert forensic evidence frequently assumes a critical role in shaping judicial outcomes. The evidentiary weight attributed to certain types of forensic expert evidence, such as Deoxyribonucleic acid (DNA) profiling, can potentially establish a link between an individual at the scene of a crime, or the criminal act itself. For instance, in the case of Damilola Taylor, a 10-year-old boy killed in a Peckham stairwell on November 27, 2000, the analysis of a single droplet of blood found on a shoe at the home of one of the defendants became decisive during the trials involving different defendants charged with the offense. Testimonies from blood pattern analysts were crucial for the jury to understand the nature of the prosecution's case, ultimately leading to the conviction of two defendants for manslaughter.

Whether it involves DNA recovered from a crime scene, fingerprint impressions on a weapon, or digital artefacts retrieved from electronic devices, forensic evidence collected during the investigative phase must be interpreted and presented *inter alia* by expert witnesses. At trial, the factfinder is tasked with evaluating the reliability, relevance, and probative value of the forensic evidence, often without having any specialist knowledge themselves. In this context, expert forensic testimony serves as a conduit through which complex scientific data is translated into legally actionable knowledge. This process enables the factfinder to engage with and evaluate the evidence in a manner conducive to informed and rational decision-making, despite their limited scientific literacy.

However, a series of high-profile miscarriages of justice, e.g., "Birmingham Six"¹ and the "Guildford Four"² have exposed systemic failures and deeply entrenched ideological conflicts surrounding the reliability of forensic evidence and the authority of expert witnesses in criminal trials. Such cases collectively challenge the longstanding presumption that forensic science offers neutral, objective, and authoritative evidence. Instead, they underscore the reality that forensic interpretation is frequently mediated by subjective judgment, institution norms, and systematic errors in thinking—biases—that the legal system has historically struggled to adequately recognise, let alone regulate.

This thesis critically examines the intersection of legal psychology and forensic practice, focusing on the evidentiary standards and admissibility thresholds that govern expert forensic evidence in criminal cases in England and Wales. It explores how factfinders—judges and lay-jurors—respond to such evidence and assesses how the current legal and procedural framework either supports or antagonises accurate and just decision-making. By situating forensic evidence within broader legal and psychological contexts, the research aims to illuminate systemic challenges and propose pathways toward more reliable adjudication.

Building on this foundation, the empirical investigation analyses how legal professionals and laypeople perceive and evaluate expert forensic testimony. It examines the credibility and competence attributed to forensic experts, the communicative strategies

¹ *R v. McKenny & Others* [1991] EWCA Crim 1

This is the landmark Court of Appeal decision where the convictions of the Birmingham Six were quashed on 14 March 1991.

² *R v Richardson & Others* (The Guildford Four) [1991] 2 All ER 557, [1991] Crim LR 365 (CA). The Court of Appeal (Lord Lane CJ presiding) quashed the convictions of the four defendants in 1989 after finding that the convictions were unsafe due to fabricated police evidence and suppression of material.

they employ to convey complex scientific information, and how these strategies shape the reception and interpretation of evidence. Through an interdisciplinary synthesis of legal doctrine, forensic epistemology, and cognitive psychological theory, this research seeks to develop a more empirically grounded framework for assessing forensic expertise and its impact on courtroom admissibility decision-making.

1.2. The Criminal Courts in England and Wales

The English legal system comprises of two principal domains: civil and criminal law. Within the criminal justice system, proceedings typically commence in the Magistrates' Courts, where preliminary hearings are conducted to assess the procedural viability of advancing cases to the higher courts (Figure 1.1). Due to their limited sentencing powers, magistrates rarely decide serious offences, which are escalated to the Crown Court for full trial under judges and juries (Wall, 2009).

The Criminal Courts of England and Wales play a fundamental role in upholding the rule of law by determining liability and imposing sanctions that safeguard fairness and public confidence (Moshin, 2024). Case volumes vary significantly, shaped by policy reforms and external events such as the COVID-19 pandemic. In 2023, Magistrates' Courts received 1.37 million cases, while Crown Courts received around 105,000. By 2024, this rose to 121,579, a 13% increase (House of Commons Library, n.d.; Ministry of Justice, 2025). While lower courts handle the bulk of cases, senior courts address the more complex matters, reflecting their distinct role within the hierarchy.

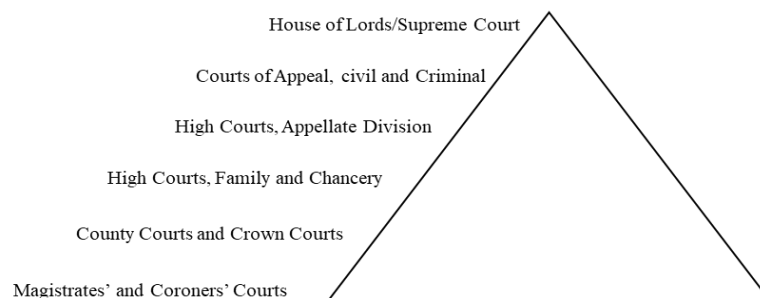
The Senior Courts of England and Wales consist of two principal judicial bodies namely, the Court of Appeal and the High Court. Within the context of criminal adjudication, defendants convicted in the Crown Court—particularly following jury

trials—retain procedural right to seek appellate review. Such appeals are directed to the England and Wales Court of Appeal (EWCA), which is institutionally divided into the Civil Division and Criminal Division.

The Criminal division of the EWCA (hereafter Crim EWCA) functions as the primary appellate forum for reviewing legal or procedural errors arising from Crown Court proceedings. It is bestowed with the authority to adjudicate appeals concerning both conviction and sentence. This division assumes a critical role in safeguarding the integrity of the criminal justice process by ensuring that lower court decisions conform to established legal standards and principles of due process (Wall, 2009).

Figure 1.1

Hierarchical structure of Courts in England and Wales



Note. This figure illustrates the hierarchical structure of the courts, showing both the relative authority of decisions and the courts at each level from highest to lowest. Adapted from Wall (2009, p. 26).

1.3. The Role of Forensic Expert Testimony in English Criminal Adjudication

The English criminal justice system is grounded in an adversarial model, wherein the trial is conceptualised as a structured contest between opposing parties—prosecution versus defence—designed to resolve legal disputes through rational contestation (Frankel,

1975). Within this framework, each party constructs and challenges competing narratives that incorporate and interpret evidence, with the ultimate aim of persuading a neutral factfinder (Carr, Piasecki, Tully & Wilson, 2016; Roberts & Zuckerman, 2010; Simon, 2019). Forensic evidence, typically introduced during the investigative phase, is formally presented at trial through expert witness testimony. During proceedings, both parties are entitled to summon witnesses—including experts—in support of their respective arguments and to cross-examine those presented by the opposing side. According to this doctrine, falsehoods will be exposed, and the truth will emerge through equitable competition (Findley, 2012). The factfinder is tasked with impartially evaluating the evidence presented and legal arguments advanced by both sides and rendering a verdict based on the legal and factual merits of the case (Simon, 2019).

In terms of evidentiary submissions, forensic evidence is widely recognised as one of the most influential forms of evidence in the adjudication of criminal cases (Koehler, 2013; Ling, Kaplan & Berryessa, 2021; Freeman & Punzo, 2001; Maeder, Ewanation & Monnink, 2017; Shermer, Rose & Hoffman, 2011; Pearson et al., 2018). Yet, despite its evidentiary weight, the adversarial system introduces structural and epistemic challenges that complicate its interpretation and use. A central conceptual contradiction lies in the system's reliance on competitive truth-finding while tolerating deep asymmetries in expertise, resources, and evidentiary access. While the model presupposes parity between prosecution and defence, empirical literature shows this is rarely achieved (Findley, 2012; Garg, 2024). Prosecutors retain privileged access to crime scene evidence and public forensic resources, while defence teams often struggle with limited funds and investigative

capacities. This imbalance not only skews the evaluative landscape but undermines the adversarial ideal of rational contestation (Chin, 2025).

Moreover, the adversarial structure promotes expert allegiances, wherein forensic experts are often retained for their alignment with the strategic narratives of the instructing party, rather than epistemic neutrality (Wall, 2009; Vidmar, 2005; Curley et al., 2022). These dynamics blurs the boundary between scientific objectivity and legal strategy, creating epistemic distortions in which jurors and judges must evaluate testimony that is as much rhetorical as it is factual. Rather than treating legal truth-finding as a pursuit of ‘ground truths’, it is more accurate to view it through the lens of epistemic advocacy, wherein each party constructs a plausible, compelling narrative bolstered by selectively curated expert evidence. This reframing bridges the divide between adversariality and scientific objectivity by recognising that both are goal-oriented but operate under different truth paradigms.

However, Tottenham (2021) contends that the obligation to tell the truth in court applies with equal force to expert witnesses as it does to any other category of witness. The integrity of adjudication depends upon the factfinder’s ability to rely upon the evidence presented. Yet, it is not uncommon for witnesses to exaggerate, or in some instances, deliberately misrepresent facts during testimony. In such circumstances, the court must revert to corroborative sources, e.g., photographic evidence or contemporaneous documentary records, to determine which witness of fact is most credible. Where no such corroboration exists, the tribunal is compelled to evaluate credibility holistically considering demeanour, consistency, and plausibility across the evidentiary corpus. A further complication arises from the structural reality that expert witnesses are retained and

renumerated by one of the litigating parties. This financial and professional association creates a latent risk that experts may consciously or unconsciously embellish aspects of their testimony in a manner favourable to the party retaining them. Tottenham (2021) furthers that the imperative of truthfulness within expert reports is seldom scrutinised by the arbiter of facts.

Nevertheless, Li (2024) contends that the adversarial system is widely regarded as the most effective institutional framework for discerning the truth in criminal proceedings, the increasing incidence of wrongful convictions in recent years has prompted growing scholarly scepticism. A substantial body of critical literature now contends that contemporary truth-finding systems require fundamental reform (Maculan & Gil Gil, 2020; Jackson, 2009; Jackson, 2016; McEwan, 2011; Roberts, 2013; Boudin & Fish, 2025; Chin, 2025). Numerous scholars (e.g., Hamer & Edmond, 2019; Broeders, 2006; Chin, 2025) have highlighted high-profile miscarriages of justice within adversarial jurisdictions, many of which have involved the misuse or misinterpretation of forensic evidence. In the context of the United Kingdom, recent legal history is marked by several such cases, where forensic error played a pivotal role in wrongful convictions.

Identifying this pattern reveals a conceptual gap in both forensic and legal theory—the absence of a critical framework for distinguishing between *legal reliability* (i.e., admissibility under evidentiary rules) and *scientific reliability* (i.e., validity grounded in empirical research and known error rates).

It underscores the urgent need for evidentiary reform grounded in scientific literacy, methodological transparency, and critical scrutiny of expert claims. Legal actors

must be equipped to assess not only the content of expert testimony but its underlying assumptions, limitations and evidentiary derivations.

1.4. Forensic Evidence

In contemporary criminal adjudication, forensic scientific evidence serves a multifaceted function. Beyond supplementing testimonial or circumstantial accounts, it provides a structured basis for inference grounded in empirical methodologies. It facilitates crime scene reconstructions, timeline establishment, suspect identification or exclusion, and the corroboration or refutation of witness statements (Campbell, Feeney, Goodman-Wilams, Sharma & Pierce, 2020; Deslauriers-Varin & Fortin, 2021; Wüllenweber & Giles, 2021). Forensic evidence informs the judiciary on matters that transcend common knowledge and assumes a critical role in post-conviction review, particularly in the exoneration of wrongfully convicted individuals, thereby reinforcing procedural integrity and the broader aims of justice (Koehler, 2013; Kaplan, Ling & Berryessa, 2021; Freeman & Punzo, 2001; Maeder, Ewanation & Monnink, 2017; Shermer, Rose & Hoffman, 2011; Pearson et al., 2018).

Forensic evidence typically comprises, *inter alia*, expert testimony, documentary records, and physical artifacts (Komar & Buikstra, 2008). It can also be categorised into: (i) observable and verifiable forms, e.g., blood spatter patterns (Dior, 2025; Osborne, 2025); (ii) interpretative forms requiring expert judgments, such as fingerprint comparisons or clinical diagnoses (Villavicencio-Queijeiro & Loyzance, 2022; Thompson & Tangen, 2014; Dror & Murrie, 2018; Chard, 2025); and (iii) physical trace evidence, e.g., footwear impressions, gunshot residues *in situ* at a crime scene (Holobinko, 2012).

While forensic science encompasses a broad array of subfields, this PhD thesis focuses on three domains—DNA analysis, digital forensics, and fingerprint analysis. These domains are of focus owing to their distinct epistemic status, historical significance, and contemporary relevance. DNA analysis is included due to its high scientific credibility and its *sui generis* impact on criminal investigations. It is widely regarded as the most accurate and reliable method of individual identification thus why it is considered the cornerstone of modern forensic practice (Moshin, 2024; Forensic Science on Trial Report, 2005). Fingerprint analysis, by contrast, is selected for its longstanding legacy and established position within institutional practices. As one of the oldest forensic techniques, it is supported by a substantial body of research and longstanding legal acceptance (Thompson, 2023; Asif, 2024). Finally, digital forensics is included due to its growing importance in an increasingly digitalised society. Originating in the 1970s alongside the advent of computerised law enforcement systems, the field has evolved into a critical discipline for investigating cybercrime and analysing digital evidence. The widespread integration of digital technology across personal, commercial, and governmental domains has driven the demand for specialised expertise in the identification, retrieval, preservation, and interpretation of digital data (Pollitt, 2010; Jones & Winster, 2022).

1.4.1. DNA Analysis

DNA profiling has transformed forensic science by enabling the individualisation of biological material, facilitating both suspect identification and post-conviction exonerations (Balhareth et al., 2024; Sharma & Mukherjee, 2023). It is widely regarded as the most reliable method of linking individuals to crime scenes. The process typically involves recovery and amplification of biological samples through Polymerase Chain

Reaction (PCR) targeting Short Tandem Repeat (STR) regions, followed by comparative analysis. Match strength is expressed using probabilities or likelihood ratios, embedding DNA within a quantitative framework designed to reduce subjectivity (Butler, 2011).

Yet challenges persist. Low-template or degraded samples may suffer stochastic effects such as allelic drop-out or drop-in, producing ambiguous profiles (Thompson, 2006; Alketbi, 2024). Mixtures amplify this difficulty, requiring interpretative judgment that undermines the perception of objectivity (Bright, Curran, & Buckleton, 2013). Empirical research demonstrates that analysts may be influenced by contextual cues, creating risks of confirmation bias (Dror & Hampikian, 2021). Divergent interpretations of identical electropherograms are not uncommon, particularly in complex mixtures (Dror & Hampikian, 2011) (See Figure 1.2). Even probabilistic reports are vulnerable to misinterpretation, with jurors often overvaluing matches without appreciating statistical nuance (Garrett et al., 2020). The problem is compounded in database “cold hits,” where population-level statistics increase the likelihood of coincidental matches (Roth, 2010). Crucially, presence of DNA does not necessarily equate to evidential relevance; mode and timing of deposition remain decisive contextual factors (Gill, 2018).

Judicial responses in the UK illustrate these concerns. In *R v Doheny & Adams* [1996] EWCA Crim 10; 222, the Court of Appeal warned against the “prosecutor’s fallacy,” directing that likelihood ratios must not be conflated with probability of guilt. *R v Reed, Reed & Garmson* [2009] EWCA Crim 2698 restricted extrapolation from low copy number (LCN) DNA, while *R v Dlugosz & others* [2013] EWCA Crim 2 condemned qualitative descriptors such as “rare” without statistical support. These rulings underscore

the risks of misapplication, where DNA's scientific credibility can be overstated, potentially distorting the fact-finding process.

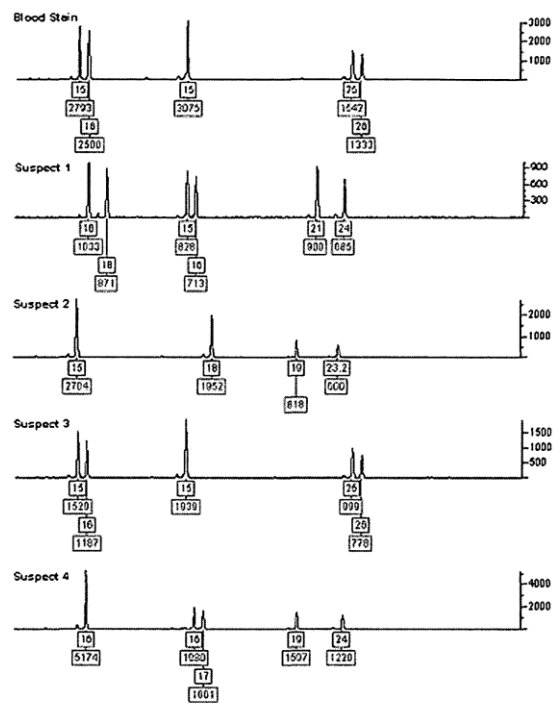
Collectively, these findings reveal that DNA's probative power is shaped not only by molecular specificity but *ipso facto* by socio-cognitive and procedural frameworks. Reliability is co-constructed through protocols, human cognition, institutional practice, and legal norms. Thus, DNA profiling should not be understood as infallible per se, but as an interpretive process requiring vigilance, reflexivity, and transparency.

Although DNA remains among the most persuasive forms of forensic evidence, its epistemic authority must be critically appraised. Procedural complexity, cognitive vulnerability, and statistical opacity expose it to misinterpretation and misuse. Future progress depends not only on technical refinement but also on recognition of the interpretive labour involved. This is evident in studies such as Dror and Hampikian (2011), where 17 analysts interpreting the same electropherogram reached inconsistent conclusions—highlighting how context and cognition undermine objectivity. Such systemic vulnerabilities underscore the need for procedural reform and reconceptualisation of forensic evaluation as a cognitively mediated rather than mechanistic process.

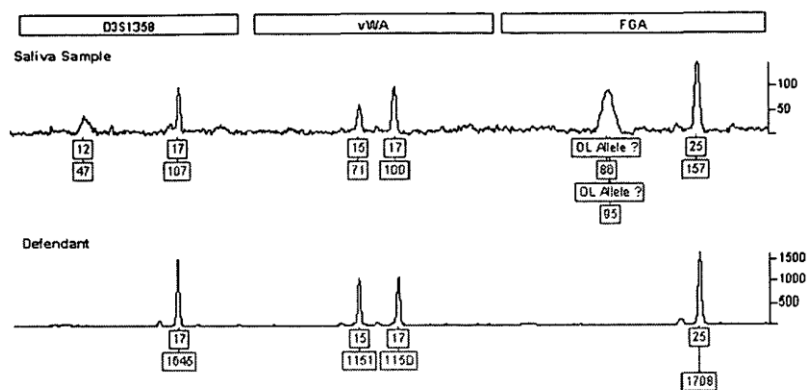
This challenge contrasts with fingerprint analysis, where the relative stability of dermal ridge patterns offers a more direct and perceptually resilient basis for identification. Unlike DNA, which requires inferential and statistical interpretation, fingerprint evidence can, in some contexts, provide a more immediate and stable epistemological anchor.

Figure 1.2

Unambiguous and Ambiguous Electropherograms



(a) Unambiguous electropherogram (Above)



b) Ambiguous electropherogram (Above)

Note. Panel (a) shows an unambiguous electropherogram with distinct allele peaks that permit straightforward DNA profile interpretation. Panel (b) shows an ambiguous electropherogram in which

degraded samples, low-template DNA, or mixtures produce overlapping alleles, allelic drop-out or drop-in, stochastic variation, or skewed peak heights. These conditions require evaluative thresholds and expert judgment to assess evidentiary reliability. Adapted from *Forensic DNA Evidence: The Basics* (Whitman & Koppl, 2010).

1.4.2. Fingerprint Analysis

Fingerprint analysis has long dominated forensic identification, premised on the belief that unique ridge configurations serve as reliable personal markers (Cole, 2009; de Villers, 2014). Before the rise of DNA profiling, it was the central tool of forensic individualisation (Wise, 2004), its perceived reliability reinforced by both manual techniques and algorithmic aids such as Automated Fingerprint Identification System (AFIS) (Dror & Mnookin, 2010).

However, its scientific status remains contested. The discipline simultaneously claims objectivity while depending heavily on subjective expert judgment. Numeric thresholds for minutiae vary internationally—from 7 to 17 points (Meuwly, 2009, as cited in Champod et al., 2004)—undermining uniformity and highlighting that identification practices are legally and culturally constructed. In England and Wales, *R v Buckley* [1999] EWCA Crim 1194 dismantled the long-standing 16-point rule, shifting towards a multifactorial framework based on print clarity, examiner expertise, and dissimilarities (Edmond et al., 2013). This reform enhanced flexibility but entrenched reliance on expert interpretation.

The ACE-V protocol (Analysis—Comparison—Evaluation—Verification) exemplifies this tension. Although framed as procedural rigour, each stage remains subjective, and the final verification step lacks blind testing, leaving it vulnerable to confirmation bias (Spinney, 2010; Dror et al., 2011). Empirical work confirms fallibility:

both false positives and false negatives have been recorded (Ulery et al., 2011; Stevenage & Bennett, 2017), refuting claims of a “zero error rate” (Giannelli & Friedman, 2010). Cognitive research further shows examiners’ judgments are shaped by contextual cues such as confessions (Dror & Rosenthal, 2008) and by task difficulties including distortion or poor surface quality (Searston et al., 2025). Inter- and intra-examiner variability remains high even among experts (Ulery et al., 2011; Dror et al., 2011).

Theoretical critiques emphasise that fingerprinting operates inductively and cannot yield categorical certainty without exhaustive population data (Broeders, 2006). Without probabilistic framing or error quantification, claims of individualisation lack epistemic justification (Kadane & Koehler, 2018). DNA analysis, by contrast, embraces probabilistic reporting, highlighting the relative epistemic humility absent in fingerprint practice.

The U.S. National Research Council’s 2009 report crystallised these concerns, declaring that—aside from nuclear DNA—no forensic technique had been scientifically validated for individualisation. Specifically, it condemned ACE-V for lacking specificity, blinding, and reproducibility, portraying fingerprinting as a craft rather than a science (NRC, 2009; Edmond, Thompson & Tangen, 2014).

Courts, however, often accept fingerprint evidence as conclusive, rarely issuing jury cautions (Edmond et al., 2013). This reflects cultural deference to expert authority, producing evidentiary weight disproportionate to probative value (Ulery et al., 2014; Edmond, 2022; Smalarz et al., 2016; Smith & Miller, 2021). Empirical studies show even seasoned examiners remain susceptible to expectancy effects, contextual bias, and task-irrelevant information (Dror et al., 2011; Vogelsang et al., 2017; Grows et al., 2022; Pena

et al., 2024). Rather than neutral conduits of science, examiners emerge as interpretive agents operating under uncertainty.

The dangers of overconfidence were starkly revealed in *HMA v McKie* (1999). A disputed thumbprint wrongly implicated police officer Shirley McKie, leading to her prosecution for perjury. A later inquiry (2011) exposed systemic failures and criticised the misuse of fingerprint evidence as determinative proof. The case demonstrated how subjective expert judgment can have catastrophic consequences for justice and public trust.

In summary, fingerprint analysis is potentially compromised by subjectivity, inconsistent standards, cognitive vulnerabilities, and the absence of error metrics. While courtroom rhetoric often casts it as definitive, contemporary scholarship and inquiry reveal its fragility. This underscores the need for probabilistic reasoning, enhanced safeguards, and greater transparency. Against this backdrop, digital forensics is emerging as a more methodologically robust and conceptually coherent alternative.

1.4.3. Digital Forensics

In response to the rapid proliferation of digital technologies, digital forensics has emerged as a critical component of modern criminal investigations. Digital evidence—defined as data establishing connections between crimes and their actors—plays an increasingly pivotal evidentiary role (Perumal, 2009). As a specialised subdiscipline, digital forensics employs advanced tools to extract and interpret artifacts from computers, mobile devices, storage systems, and social media platforms, thereby supporting investigations with scientific rigour (Alenezi, 2023; Raghavan, 2013; Casino et al., 2022, as cited in Teing et al., 2017).

This discipline operates within a structured procedural framework. Its core tasks include preserving evidence integrity, conducting rigorous analyses, and synthesising findings in line with evidentiary standards (Casino et al., 2022; Horsman, 2023). Specialists apply targeted techniques to recover erased data, examine metadata, triangulate device use, and uncover concealed information through steganographic analysis (Reedy, 2023; Selim & Ali, 2024). The evidentiary scope spans electronic communications, multimedia, encrypted data, and social media interactions, enabling the investigation of cybercrime, fraud, terrorism, data breaches, intellectual property theft, and falsified records (Son, Kim, Oh & Kim, 2022; Neha, Gupta, Khan & Alam, 2023).

Initially emerging in the late 1980s, digital forensics lacked established scientific foundations, and digital evidence was often treated as inherently objective (Casey, 2011). By the 1990s, however, methodological refinement and theoretical development consolidated its status as a recognised forensic science, distinguished by systematic frameworks and rigorous evidentiary standards.

Despite its utility, digital forensics faces persistent challenges. The sheer volume, heterogeneity, and complexity of digital data complicate efficient identification and extraction (Quick & Choo, 2018). Rapid technological innovation frequently outpaces forensic methodologies, demanding continual adaptation (Zareen et al., 2024; Cho & Montasari, 2024). Volatility and susceptibility to alteration or loss further threaten evidentiary integrity (Fakhouri et al., 2024). Chain-of-custody breaches, tool inconsistencies, lack of standardised protocols, and human error amplify these difficulties (Elgohary, Darwish & Elkaffas, 2022; Hughes & Karabiyik, 2020; Skipanes et al., 2025). In parallel, courts and legal professionals often struggle with the interpretative complexity

of digital traces, raising concerns regarding evidentiary validity and privacy (Wilson-Kovacs, Helm, Grown & Redfern, 2023).

These vulnerabilities underscore the fragility of digital evidence and the need for stringent documentation, preservation, and analysis protocols (Carrier, 2003). They also highlight a broader issue common across forensic domains: while DNA is regarded as the “gold standard,” it raises probabilistic interpretation and contamination issues; fingerprint analysis lacks validated error rates and is prone to cognitive bias (Dror et al., 2006). Digital forensics, though increasingly indispensable, remains comparatively nascent and technologically volatile, creating gaps between perceived objectivity and actual reliability.

The misuse of forensic evidence has contributed to miscarriages of justice across domains. In digital forensics, the Post Office Horizon scandal revealed how unreliable accounting data and disclosure failures led to wrongful prosecutions. At appellate level, *Rana v R*. [2018] EWCA Crim 725 exposed flawed cell-site analysis, while *Kay v R*. [2017] EWCA Crim 2214 illustrated the dangers of incomplete digital records. These cases demonstrate how methodological weaknesses, and expert overreach can materially undermine justice.

Across forensic sciences, recurring challenges include variability in scientific validity, interpretative complexity, expert disagreement, and the difficulty for lay factfinders to evaluate probabilistic or technical evidence. Ultimately, courts must navigate the tension between scientific progress and legal admissibility, ensuring expert testimony is both methodologically sound and presented by qualified experts. As emphasised in recent scholarship, admissibility hinges on a dual requirement: robust, validated methods and competent, impartial experts (Moshin, 2024). This dual threshold safeguards fairness by

ensuring that both the reliability of the evidence and the credibility of the expert withstand scrutiny.

1.5. The Evolution of Admissibility Standards in Adversarial Jurisdictions

1.5.1. United States Admissibility Rules for Forensic Evidence

Until the late 20th century, expert witnesses in the United States were permitted to testify with minimal judicial oversight, provided their opinions were relevant to their field of expertise (Kim, 2016; Bernstein, 2013). This permissive approach, often lacking methodological scrutiny, enabled litigants to introduce testimony without demonstrating its scientific validity. The rise of toxic tort litigation, frequently reliant on partisan experts advancing tenuous causation theories, magnified concerns about adversarial bias and the unreliability of expert evidence (Kim, 2016; Bernstein, 2007).

By the mid-1980s, courts increasingly recognised that many expert opinions lacked empirical grounding, particularly in complex causation disputes, prompting judicial efforts to exclude speculative or unverified testimony. This culminated in the Supreme Court’s landmark trilogy—*Daubert v. Merrell Dow Pharmaceuticals, Inc.*, *General Electric Co. v. Joiner*, and *Kumho Tire Co. v. Carmichael*—which collectively redefined admissibility standards (Kim, 2016). Central to *Daubert* was the requirement that judges act as “gatekeepers,” ensuring expert testimony rests on scientifically valid methods reliably applied to case facts (Billauer, 2015; Schauer & Spellman, 2013).

The gatekeeping role was codified in the 2000 amendment to Federal Rule of Evidence 702, which permits expert testimony only if it is based on sufficient data, derives from reliable principles and methods, and is properly applied (Edmond, Cole, Cunliffe, & Roberts, 2013). In many, but not all states, this replaced the earlier *Frye v. United States*

(1923) standard of “general acceptance,” which deferred to disciplinary consensus but lacked the analytical rigour introduced by *Daubert* (Hargis & Patranella, 2010). Under *Daubert*, reliability is assessed through five non-exhaustive factors: (1) testability, (2) peer review and publication, (3) known or potential error rates, (4) general acceptance within the scientific community, and (5) Standards controlling the technique operation. These factors guide judicial discretion rather than impose rigid rules, but empirical research suggests judges often rely on proxies such as academic credentials or precedent due to limited scientific literacy (Edmond et al., 2013).

Despite codification, judicial application remains inconsistent. Appellate courts typically review Rule 702 decisions under an “abuse of discretion” standard, affording trial judges broad latitude (McClellan, 1997). Moreover, Rule 403, which allows exclusion of prejudicial or confusing evidence, is rarely invoked once Rule 702 is satisfied, meaning questionable evidence often enters trials (Edmond et al., 2013). Nevertheless, *Daubert* has served as a critical filter against “junk science,”³ particularly by emphasising testability and error rates as diagnostically superior indicators of reliability (Gatowski et al., 2001; Maixner & Diamond, 2014).

The framework has also prompted scrutiny of long-accepted forensic practices. Fingerprint comparison and handwriting analysis, once readily admitted, have faced exclusion where scientific validation was insufficient (*United States v. Lewis; Ragland v. Commonwealth; State v. Rose*, cited in Iannece, 2015, p. 198; Giannelli, 2010, p. 62).

While courts occasionally admit testimony grounded in professional experience, *Daubert*

³ The term “Junk science” was largely popularised in law and public debate by Peter W. Huber see Huber, P. W. (1993). *Galileo's revenge: Junk science in the courtroom*.

prioritises empirical validation, thereby creating tensions in domains where experiential expertise, such as social work or policing, may be highly valuable but not readily testable (Faigman, Kaye, Saks, & Sanders, 2000). Furthermore, a growing body of empirical studies accentuate the limitations of *Daubert* criteria in practice, highlighting recurrent problems of misapplications, doctrinal misunderstanding and mere superficial adherence to what may become overly formulaic set of admissibility criteria.

Criticism of *Daubert* persists with scholars highlighting its philosophical ambiguities (Caudill & Redding, 2000), poor fit across diverse expert domains (Schauer & Spellman, 2013), and disproportionate burden on plaintiffs in mass tort and discrimination cases, where non-traditional expertise is often central (Scheider, 2009). Others caution against overreliance on scientific authorities, whose epistemic standards differ from legal ones (Friedman, 2002). Cicchini (2021a; 2021b) argues that the *Daubert* standards have been framed as a reliability safeguard, yet it functions as a discretionary and asymmetrical device that overwhelmingly favours the prosecution. In Cicchini's (2021a) study of Wisconsin appellate litigation, prosecutors achieved a perfect 134–0 record on *Daubert* issues, with defence challenges never succeeding—a pattern Cicchini interprets as incompatible with *Daubert*'s stated purpose, particularly given that this state calls the most expert witnesses. This asymmetry is operationalised through recurring doctrinal strategies. Courts: (i) reclassify police testimony as “lay opinion” despite its reliance on specialised training; (ii) impose stringent evidentiary demands on defence experts while tolerating vague, unquantified claims from prosecution witnesses; (iii) dilute reliability analysis by invoking domain standing, or pre-*Daubert* precedent as proxies for admissibility; and (iv) apply the “application” requirement inconsistently, permitting prosecution exposition

testimony detached from case facts while demanding case-specific conclusions from defence experts. These practices collectively undermine *Daubert*'s gatekeeping function by privileging state expertise and constraining defence testimony.

Cicchini also acknowledges methodological and institutional limitations. While the appellate dataset excludes potential trial-level defence victories, the absence of appellate precedents admitting defence experts or excluding State experts entrenches path dependence, discouraging trial courts from deviating. More broadly, *Daubert*'s multi-pronged structure grants judges' substantial flexibility to reach predetermined outcomes, typically favouring prosecution evidence. Herein, the courts routinely admit forensic and pattern-matching testimony despite reliability concerns, while excluding defence testimony—even when supported by robust empirical findings—suggesting that “reliability” is applied selectively.

Finally, Cicchini highlights doctrinal inconsistency in the “application” prong. Defence experts may be excluded for failing to draw case-specific conclusions that are legally or methodologically improper, while some jurisdictions permit exposition testimony that bypasses application altogether. This inconsistency, coupled with the admission of generalised “commonality” or syndrome evidence, enables prosecution narratives to acquire a veneer of scientific legitimacy without rigorous testing against case facts. Arguably, these dynamics render *Daubert* an unreliable and outcome-contingent framework in criminal litigation, undermining its promise of neutral gatekeeping.

Additionally, numerous empirical studies have also highlighted significant gaps between the *Daubert* framework's aspirations and its practical application in U.S. courts. Gatowski et al. (2001) found that although judges demonstrate a stronger grasp of peer

review and general acceptance, they often lack the capacity to operationalise key scientific concepts such as falsifiability and error rates raising concerns about inconsistent application across contested domains. Indeed, Dror (2020) and Martire et al. (2019) emphasise the conceptual and practical difficulties of error-rate estimation, noting challenges in defining “error,” constructing representative test materials, and communicating results meaningfully to courts and jurors. These limitations risk misleading decision-makers and reducing the utility of error-rate evidence.

Conversely, Kovera and McAuliff (2000) argue that peer review and publication function as heuristic cues rather than substantive indicators of validity, with judges often failing to detect methodological flaws despite the presence of peer-reviewed work.

Moreover, Williams and Saks (2015) identify a broader inconsistency between *Daubert* doctrine and practice, observing that courts frequently dilute or evade scrutiny by reframing methodological critiques as issues of weight, invoking flexibility without clear criteria, or admitting established forensic techniques based on historical use rather than scientific validation. They attribute this to structural and cognitive limitations, including judges’ lack of scientific training, institutional inertia, and reliance on adversarial processes that may not adequately correct flawed evidence.

Similar concerns arise in psychological assessment evidence. Neal et al. (2019) report that *Daubert* challenges are rare and weakly related to psychometric quality, with courts often defaulting to general acceptance despite limited empirical support. They highlight epistemic gaps among lawyers and judges that undermine the doctrine’s reliability filter. Kaye (2018) further critiques *Daubert*’s application in criminalistics, showing how courts reduce its factors to superficial checklists and substitute practitioner

acceptance for scientific validation, thereby admitting evidence without rigorous empirical foundations.

Collectively, these findings demonstrate that Daubert's promise of scientific gatekeeping is undermined by conceptual ambiguities, methodological challenges, and institutional dynamics, often rendering the framework more rhetorical than substantive and leaving courts vulnerable to admitting evidence lacking robust scientific validation.

Although *Daubert* has reshaped admissibility by embedding methodological rigor into judicial assessment, its inconsistent application, difficulties in operationalising scientific validity, and reliance on judicial discretion raise doubts about its effectiveness as a safeguard against unreliable forensic testimony. Strengthening judicial education and clarifying evidentiary standards are therefore essential to ensure that admissibility decisions genuinely reflect scientific reliability. Against this backdrop, the proceeding section focuses on England and Wales, where admissibility standards have evolved under distinct legal traditions and institutional pressures, offering a valuable comparative perspective on how courts manage the reliability, scope, and integrity of expert testimony.

1.5.2. The Admissibility Standards for Forensic Expert Evidence in England and Wales

Compared with the United States, the legal framework governing expert evidence in England and Wales remains relatively underdeveloped. While the Criminal Procedure Rules (CrimPR)—first introduced in 2005 and consolidated in 2015 under Part 19—now provide procedural guidance, admissibility continues to evolve primarily through common law precedents and incremental reforms. Prior to 2005, admissibility rested largely on case

law, most notably *R v Turner* [1975] QB 834 and *R v Bonython* [1984] 38 SASR 45, supplemented by scattered statutory provisions. No unified statutory framework existed.

The foundational test in *R v Turner* restricted expert opinion to matters beyond the ordinary knowledge of judge or jury. This “common knowledge” rule has been applied flexibly (Edmond et al., 2013), producing a permissive culture in which reliability is treated as a matter of evidential weight for the jury rather than a threshold for admissibility.

Tottenham (2021) argues that expert evidence must be presented without presuming prior subject knowledge, ensuring that factfinders are equipped to evaluate its significance. Two limiting doctrines shape this requirement. The *common knowledge rule* excludes expert opinion where the tribunal can reason unaided, while the *ultimate issue rule* prevents experts from usurping the factfinder’s evaluative role—for instance, by converting a fingerprint correspondence into a definitive claim of presence at the crime scene. Although *R v Bonython* established that expert testimony should derive from a “recognised and reliable body of knowledge,” enforcement of this standard has been inconsistent, leaving admissibility vulnerable to uneven application. Section 78 of the Police and Criminal Evidence Act 1984 empowers courts to exclude evidence prejudicial to fairness, yet this discretion is rarely exercised in relation to expert testimony. Appellate rulings such as *R v Dallagher* [2002] EWCA Crim 1903 (earprint evidence) and *R v Luttrell* [2004] EWCA Crim 1344 (lip-reading with a 50% error rate) illustrate judicial willingness to admit evidence of doubtful validity, relying instead on jury assessment and judicial directions.

The CrimPR and accompanying Criminal Practice Directions (CrimPD) function in tandem. The CrimPR, as statutory instruments, impose binding duties on experts—such as

the overriding duty to the court (Rule 19.2), procedural requirements for adducing expert evidence (Rule 19.3), and mandatory report content (Rule 19.4) (Davies & Piasecki, 2016; Stockdale & Jackson, 2016). The CrimPD, issued under the authority of the Lord Chief Justice, supplement these rules with interpretive guidance, notably Section 7 on expert evidence. However, as non-legislative instruments, they lack enforceability. Collectively, the CrimPR and CrimPD provide structure but stop short of establishing a binding reliability test, leaving admissibility *de jure* procedural but *de facto* discretionary.

Concerns about reliability surfaced in the 2005 House of Commons Science and Technology Select Committee (HCSTSC) report *Forensic Science on Trial*, which highlighted systemic failures and miscarriages of justice (e.g., Sally Clark, Angela Cannings). The Committee recommended a statutory reliability threshold and an independent advisory council modelled on the *Daubert* framework. The Law Commission's 2011 report echoed this call, proposing an eight-criterion reliability test encompassing data quality, methodological validity, error rates, peer review, domain expertise, completeness, consistency, and adherence to established practice (Edmond et al., 2013). Yet, in 2013, the Ministry of Justice rejected the proposal, citing cost and insufficient evidence of systemic failure. Judicial attitudes reinforced this permissiveness: in *R v Reed & Anors*, the Court of Appeal reaffirmed that reliability was primarily for the jury to assess.

While case law such as *R v Dlugosz*; *R v Pickering*; *R v MDS* [2013] EWCA Crim 2 and *R v Reed* refined expectations for DNA evidence, and *R v Bonython* continues to be cited as an evaluative anchor, the overall framework remains fragmented and discretionary. Scholars have criticised this reliance on judicial discretion for fostering inconsistency and

epistemic uncertainty (Edmond & Roberts, 2008; Allen & Meintjes-van der Walt, 2020). English courts, it is argued, continue to privilege expert status over methodological validity (Ormerod, 2002; Gold, 2003; Grant, 2002). Reform proposals stress the need for mandatory disclosure of error rates, enhanced judicial training, and greater transparency in expert reporting.

Institutional oversight has similarly proved limited. The Forensic Science Regulator (FSR), established in 2007 to promote quality standards, lacks statutory enforcement powers. Scholars note its limited ability to compel compliance, exacerbated by a fragmented forensic services market, resource constraints, and misalignment between police procurement priorities and evidentiary needs (Amoako & McCartney, 2021). While the FSR advances quality assurance and accreditation, its restricted remit undermines consistency and reliability in forensic provision.

Thus, despite procedural codification under the CrimPR and interpretive support from the CrimPD, admissibility decisions in England and Wales remain governed by a permissive, case law–driven culture. The absence of a statutory reliability threshold perpetuates doctrinal ambiguity and inconsistency, particularly in cases involving novel or contested forensic science. This stands in sharp contrast to the United States’ *Daubert*-based approach, where methodological scrutiny forms a central admissibility standard.

1.5.3. Forensic Experts

Expert witnesses span diverse disciplines, each providing specialised knowledge to assist judicial decision-making. In the English criminal justice system, forensic experts occupy a distinct category, applying scientific methods to interpret evidence beyond the

comprehension of laypersons. Their role is to bridge science and law, translating technical findings into legally admissible conclusions.

While DNA analysts, fingerprint examiners, and digital forensic specialists are most frequently cited, many other disciplines contribute substantively to adjudication. These include forensic pathologists, biologists, ballistics experts, trace evidence analysts, odontologists, psychologists, psychiatrists, document examiners, and forensic accountants. Each domain contributes unique expertise essential for assessing evidentiary relevance, reliability, and probative value in scientifically complex cases. Table 1.1 outlines the core functions of the principal categories of forensic experts.

Having examined the strategic deployment of forensic experts by legal advocates and the principal types of expertise presented in court, the analysis now turns to jurors—the lay factfinders who are tasked with evaluating such testimony within the constraints of legal instruction and typically with limited scientific literacy.

Table 1.1*Forensic Expert Core Functions*

Discipline	Core Function
Forensic Pathologist	Investigates cause and manner of death through autopsy, toxicology, histology, and scene analysis. Findings support determinations in cases of suspicious, sudden, or violent deaths (Folkerth et al., 2025; Ely & Gill, 2023).
Forensic Biologist	Examines biological materials (e.g., blood, saliva, semen, hair) through DNA extraction, STR profiling, and next-generation sequencing to support human identification, kinship analysis, and event reconstruction (Butler, 2023).
Ballistics and Firearms analyst	Analyses bullets, cartridge cases, and firearms to match projectiles to weapons and reconstruct shootings (Guarnera et al., 2023).
Trace Evidence Analyst	Identifies and compares microscopic materials (e.g., fibres, glass, paint, soil, gunshot residue) to reconstruct events, link suspects, and identify serial patterns (Roux et al., 2015).
Forensic Odontologist	Identifies individuals through dental records, radiographs, and 3D imaging. Also assesses bite marks, though reliability remains contested (Forrest, 2019; Reesu & Brown, 2016).
Forensic Psychologist	Assesses psychological and behavioural factors, provides risk assessments, and develops evidence-based interventions in legal and correctional contexts (British Psychological Society, n.d.).
Forensic Psychiatrist	Evaluates mental fitness to stand trial, criminal responsibility, psychiatric injury, and risk of reoffending, often within secure hospitals or custodial settings (Douglas & Skeem, 2005; Fazel & Baillargeon, 2011; Grisso, 2003; Heilbrun et al., 2002).
Document and Handwriting Analyst	Examines questioned documents for authenticity, authorship, or alteration, using handwriting comparison and ink/paper analysis (Bird & Yang, 2024; Expert Working Group, 2020).
Forensic Accountant	Investigates financial irregularities, fraud, and white-collar crime, providing litigation support and compliance audits. Increasingly incorporates digital forensic methods to trace misconduct (Alshurafat, 2024).

1.5.4. Juror Assessment of Forensic Expert Credibility

A fundamental responsibility of jurors is to evaluate the credibility of forensic expert testimony. This task imposes a significant epistemic burden, as jurors must assess the validity and reliability of technical claims without specialised training (Curley, Munro, & Dror, 2022; Simon, 2019). The burden is compounded by procedural constraints that

limit jurors to passive reception of evidence, restricting opportunities for clarification or critical interrogation (Angell, 1998; Vidmar & Diamond, 2000).

Research consistently demonstrates that jurors struggle to comprehend judicial instructions, particularly when phrased in complex or ambiguous language (Elwork, Sales, & Alfini, 1977; Cooper et al., 1996). The adversarial presentation of conflicting expert opinions further complicates assessments, often obscuring rather than clarifying evidentiary issues (Simon, 2019). Faced with such complexity, jurors may resort to heuristic processing, relying on peripheral cues such as expert demeanour, credentials, or communication style instead of engaging with substantive scientific content (Eldridge, 2019; Devine et al., 2001).

Juror credibility judgments are shaped by both extrinsic and intrinsic factors. Extrinsic influences include an expert's gender, appearance, remuneration, and courtroom familiarity, which can affect perceived impartiality (Cooper & Neuhaus, 2000; Ivković & Hans, 2003). Intrinsic factors concern the evidence itself, such as its complexity and perceived scientific reliability (Smith, Bull, & Holliday, 2011; Thompson & Newman, 2015). DNA evidence is generally afforded greater probative weight and *ipso facto* reflects cultural assumptions about its accuracy and objectivity (Thompson & Newman, 2015).

Two theoretical models explain how jurors process expert testimony. The heuristic model, grounded in dual-process theories of cognition, suggests that jurors frequently rely on superficial indicators of credibility when presented with complex or unfamiliar information (Petty & Cacioppo, 1986; Brekke & Borgida, 1988). By contrast, the story model conceptualises juror reasoning as a narrative process, with testimony integrated into

broader schemas consistent with jurors' prior beliefs and expectations (Hastie et al., 1983; Krauss & Sales, 2001).

Despite cognitive challenges, jurors are not wholly passive *in toto*. Qualitative research shows that jurors actively engage with expert testimony, assessing clarity, consistency, and completeness (Ivković & Hans, 2003; Vidmar, 1995). They are capable of identifying substantive disagreements between experts, scrutinising potential bias, and recognising gaps in evidence (Shuman, Whitaker, & Champagne, 1993). These findings challenge the assumption of “white coat syndrome” in which jurors mechanistically defer to certain experts because of their field of expertise (Shuman & Champagne, 1997, p. 242) and highlight jurors' potential for critical evaluation under certain conditions.

Nevertheless, the technical complexity of forensic testimony—often expressed in esoteric or statistical terms—remains a substantial barrier to comprehension (LaBat et al., 2023). This has prompted calls for standardisation in forensic reporting, such as the U.S. Department of Justice's Uniform Language for Testimony and Reports (ULTR) initiative, which seeks to enhance clarity and reduce ambiguity (Garrett & Neufeld, 2009; National Research Council, 2009). In adversarial contexts, however, the presentation of conflicting expert views risks “mutual neutralisation,” where testimony cancels itself out, leaving jurors uncertain (Goodman-Delahunty & Wakabayashi, 2012).

Three key gaps emerge from the literature. First, findings on juror competence are inconsistent, with some studies emphasising jurors' critical capacities and others highlighting their cognitive limitations (Curley et al., 2022; Saks & Spellman, 2016). Second, relatively little is known about the cognitive strategies jurors employ when weighing contested or technically complex forensic evidence (Goodman-Delahunty &

Wakabayashi, 2012). Third, the absence of structured guidance or training leaves jurors ill-prepared to evaluate expert reliability (McQuiston-Surrett & Saks, 2009). Moreover, there is no cohesive framework to explain how jurors integrate extra-legal cues—such as judicial instructions, expert credentials, and communication style—with evidentiary content (Brodsky, Griffin, & Cramer, 2010).

In essence, while jurors are routinely tasked with evaluating expert credibility, their interpretations are shaped by the clarity of expert communication, the epistemic quality of the evidence, cognitive limitations inherent to lay reasoning, and adversarial constraints. These complexities underscore the importance of judicial gatekeeping as a safeguard ensuring that only methodologically sound and legally admissible expert testimony reaches the jury. The interplay between juror interpretation and judicial oversight is therefore central to preserving the epistemic integrity and reliability of forensic evidence in criminal adjudication.

1.5.5. Judicial Gatekeeping of Forensic Expert Evidence

Judges play a central gatekeeping role in criminal proceedings, responsible for ensuring that expert testimony is both relevant and scientifically reliable (Criminal Justice Act 2003, Part 11; Holobinko, 2012). Tottenham (2021) conceptualises the evidentiary foundation of expert testimony as comprising three interrelated elements: the case-specific facts, the specialised disciplinary knowledge, and the opinion formed by applying that knowledge to the facts. This framework underscores the dual responsibility of the court: to evaluate complex scientific evidence and to determine whether the expert possesses the requisite qualifications to assist in resolving the issues at hand. However, a persistent constraint lies in the judiciary's limited scientific literacy, which restricts their capacity to

critically appraise methodological rigour (Cheng, 2006; Young & Goodman-Delahunty, 2021). Although judges are not expected to hold domain-specific expertise, they must nonetheless adjudicate on matters that often exceed conventional legal reasoning (Bystranowski, Janik, & Próchnicki, 2022; Redmayne, 2001).

This epistemic asymmetry creates a paradox: judges depend on experts to interpret science, while simultaneously tasked with evaluating its admissibility. Even judges with scientific backgrounds face challenges given the breadth and rapid evolution of forensic disciplines. Precedents established in this context may shape admissibility for decades, even when initial rulings lack robust scientific justification. Survey research illustrates this variability. Cheng (2006), for example, found appellate judges divided over whether it was appropriate to consult peer-reviewed literature, while most rejected informal consultations with medical professionals, reflecting concerns about *ex parte* communications.

Empirical studies consistently show that judges often rely on heuristics or intuitive reasoning rather than applying rigorous admissibility standards. Findings reveal frequent misinterpretation of technical explanations (Green, Yacoby, Griffin, & Doshi-Velez, 2022), reliance on simplified decision rules over validated tools (Jung, Concannon, & Shroff, 2017), and admissions based on narrative coherence or “common sense” rather than scientific validity (Visser & Kruger, 2018; Ward, 2020; Kotsoglou & Biedermann, 2022). Judges have been shown to struggle with core scientific concepts such as falsifiability and error rates, often favouring “general acceptance” as a more intuitive criterion (Beecher-Monas, 1998; Gatowski et al., 2001). Even under *Daubert*, courts have hesitated to exclude methods lacking empirical validation (Saks & Faigman, 2008).

Judicial reliance on extra-legal cues further complicates admissibility. Assessments are frequently influenced by an expert's presentation, demeanour, or perceived trustworthiness (Brodsky, Griffin, & Cramer, 2010). Interviews with judges in Frye jurisdictions similarly revealed that they often prioritise the perceived weight of evidence—particularly in domains like DNA—over the robustness of the underlying methodology (Nir & Liu, 2021).

In practice, exclusions remain rare. Judges often prefer to admit forensic evidence, leaving challenges to cross-examination and jury deliberation (Edmond, Cole, Cunliffe, & Roberts, 2013). In England and Wales, courts typically issue cautionary instructions rather than exclude evidence, reflecting confidence in trial safeguards but risking overestimation of jurors' evaluative abilities (Hans & Saks, 2018; Cornett & Knowlton, 2020). Defence lawyers frequently lack the expertise or resources to contest flawed forensic methods, further limiting the adversarial check on expert claims (Edmond & Roque, 2012; Saks & Faigman, 2008).

From the perspective of procedural justice, fair decision-making requires consistency, impartiality, accuracy, and transparency (Cropanzano, Bowen, & Gilliland, 2007; Leventhal, 1980). Indeed, Tottenham (2021) refers to a number of cases where expert witnesses have violated their duty of independence, with courts relying on compromised testimony to secure wrongful convictions. Therefore, upholding these standards remains problematic in English criminal courts, since the absence of a codified admissibility framework fosters discretionary and ad hoc reasoning (Martire et al., 2025). This indeterminacy undermines coherence and legitimacy in judicial rulings, leaving

forensic evidence vulnerable to misapplication and weakening the reliability of criminal adjudication.

A further limitation is the paucity of empirical insight into how judges engage with scientific evidence in practice, particularly outside the United States. Existing studies often adopt narrow, quantitative approaches that overlook the interpretive and context-sensitive nature of judicial reasoning. Judges may inadvertently overestimate the probative value of forensic evidence, especially in the absence of clear epistemic standards. This evidentiary gap underscores the need for longitudinal and qualitative research, alongside theoretical models capable of guiding evidence-based judicial engagement with forensic science.

1.6. Conceptual Link to Empirical Framework

This chapter has examined the position of forensic evidence within the English criminal justice system, identifying both its strengths and vulnerabilities. Across domains such as DNA, fingerprints, and digital forensics, a recurring tension emerges between claims of scientific certainty and the interpretive, often subjective practices that underpin forensic analysis. Miscarriages of justice (Refer to the cases of Shirley McKie, Sally Clark, and Mark Dallagher) highlight the risks of over-reliance on contested or methodologically weak expertise.

Admissibility standards further complicate these challenges. In the United States, the *Daubert* framework obliges judges to assess reliability through empirical and methodological criteria. By contrast, in England and Wales, admissibility remains discretionary, shaped by case law and procedural guidance. This permissive framework privileges expert authority over scientific validation, contributing to inconsistency and unpredictability in evidentiary rulings.

Forensic experts, drawn from multiple disciplines, are indispensable to criminal proceedings. Yet their testimony raises persistent concerns of qualification, reliability, and communication. Jurors, responsible for evaluating such testimony, frequently default to heuristic cues—*inter alia* credentials, confidence, or presentation style—rather than scrutinising methodological rigour, underscoring their epistemic limitations.

Taken together, these insights reveal conceptual contradictions at the intersection of science, law, and psychology. Courts demand certainty, yet forensic sciences operate within probabilistic frameworks; experts interpret data but may overstate reliability; and jurors, lacking scientific literacy, must reconcile competing claims under adversarial conditions. These contradictions provide the foundation for the present research, which seeks to explore how forensic evidence is assessed, how expert credibility is determined, and how communication strategies influence perceptions of reliability in criminal adjudication.

1.7. Research Gaps and Questions

The literature review has highlighted significant conceptual, procedural, and empirical gaps concerning the use of forensic expert evidence in the English criminal justice system. These gaps span, *inter alia*, legal doctrine, forensic methodology, cognitive psychology, and courtroom communication. Despite the centrality of expert testimony to criminal adjudication, persistent uncertainties compromise epistemic integrity, fairness, and the prevention of miscarriages of justice.

This thesis focuses particularly on DNA, fingerprint, and digital forensic evidence. Each exemplifies distinct intersections of scientific technique and legal scrutiny, collectively illustrating the broader challenges of integrating specialist knowledge into

adversarial proceedings. In response, the research identifies targeted gaps and formulates corresponding research questions, as summarised in Table 1.2.

Table 1.2

Mapping of Identified Gaps, Research Questions, and Corresponding Study

Identified Gap	Research Question	Study
Structural and Procedural Gaps in Admissibility Standards	1. To what extent do the criminal appeal courts in England and Wales apply admissibility criteria consistently when evaluating forensic evidence?	1
	2. What are the limitations of the current discretionary model of admissibility in ensuring reliability?	1
	3. How might a codified reliability-based admissibility framework improve the consistency and scientific integrity of expert evidence evaluation in criminal proceedings?	1
Cognitive and Psychological Gaps in Judicial Reasoning	4. How do judges gatekeep the admissibility of forensic evidence given their limited scientific literacy?	1
Lack of Empirical Standards in Legal Commissioning of Forensic Experts	5. What evaluative criteria do legal professionals prioritise when commissioning forensic experts for courtroom testimony?	2
Fragmentation in juror evaluation of expert credibility.	6. What factors do laypeople consider the most important in determining the credibility of forensic expert witnesses?	2
Empirical and Theoretical gap in the criteria for qualifying forensic witnesses as credible experts	7. To what extent do the criteria used by legal professionals differ from those used by laypeople in assessing the credibility of forensic expert witnesses?	2
Theoretical Gap: The influence of epistemic standing on lay credibility assessments	8. To what extent does the perceived level of establishment of a forensic discipline influence the credibility that jurors assign to expert testimony?	3
Communication and Interpretation Gaps in Expert Testimony	9. How does communication mode of testimony affect juror perceptions of expert credibility.	3

Structural and Procedural Gaps in Admissibility Standards

The absence of codified reliability criteria in England and Wales has resulted in inconsistent admissibility rulings. Courts often admit evidence based on discretionary reasoning rather than systematic evaluation, permitting the entry of contested methodologies and undermining transparency. This gap necessitates investigation into whether a structured admissibility framework could enhance fairness, consistency, and evidentiary rigour (Research Questions 1–3).

Cognitive and Psychological Gaps in Judicial Reasoning

Judges, despite their gatekeeping role, frequently lack the scientific literacy to evaluate forensic methodologies. They may rely on credentials or precedent rather than engaging with methodological validity. This cognitive limitation calls for closer examination of how admissibility decisions are actually made (Research Question 4).

Empirical Standards in Commissioning Experts

Limited empirical research has examined how legal professionals select forensic experts. Decisions often appear guided by adversarial strategy or persuasive impact rather than scientific robustness, raising concerns about the epistemic quality of admitted testimony (Research Question 5).

Juror Evaluation of Expert Credibility

Research on juror assessments remains fragmented. Jurors may rely on heuristic cues, yet under certain conditions they demonstrate critical engagement. A systematic framework capturing the cues jurors prioritise—and whether these overlap with those used by legal professionals—remains absent (Research Questions 6–7).

Influence of Epistemic Standing

Little is known about how jurors account for the scientific status of a forensic discipline. While DNA enjoys strong credibility due to extensive validation, newer fields such as digital forensics lack comparable recognition. Jurors' sensitivity to disciplinary status remains under-theorised and under-examined (Research Question 8).

Communication and Interpretation Gaps

Jurors' difficulties in interpreting expert testimony are well established, yet few studies isolate the role of communication style in shaping credibility assessments. How delivery interacts with the epistemic status of a discipline remains a critical but unexplored area (Research Question 9).

Empirical and Methodological Gaps

Finally, limited empirical research has examined judicial reasoning in forensic contexts outside the United States. Existing studies rely heavily on short-term quantitative designs, failing to capture the interpretive and evolving nature of judicial decision-making. Addressing this requires a multi-method approach that integrates document analysis, surveys, and experiments to develop a more comprehensive understanding of how forensic evidence is evaluated.

1.8. Contribution and Practical Implications

1. Judicial application of admissibility standards

The research systematically analyses how courts interpret and apply statutory and case law governing expert evidence. It evaluates whether appellate decisions reflect the principled aims of legislation—reliability, relevance, and fairness—or whether they are shaped by heuristics, conservatism, or deference to expertise. By interrogating judicial reasoning and interpretive practices, the study highlights the potential disjunction between normative

admissibility frameworks and judicial behaviour. This contributes to a clearer understanding of how admissibility standards are operationalised in practice and informs reforms to ensure that only scientifically valid evidence reaches the courtroom.

2. Evaluation of expert credibility by legal professionals and laypeople

The study examines the cues employed by both legal professionals and jurors in determining expert credibility. It considers whether assessments are grounded in epistemic merit or influenced by extraneous factors such as demeanour, confidence, or reputation. This inquiry contributes to debates about fairness, evidentiary integrity, and the epistemic foundations of expert qualification.

3. Influence of forensic discipline and communication style on credibility assessments

The research investigates how the scientific status of forensic evidence (e.g., DNA versus digital forensics) and the communicative mode of testimony affect juror perceptions of credibility. Findings illuminate potential sources of bias, showing that certain disciplines or presentation styles may be perceived as more persuasive regardless of scientific robustness. These insights intersect with psychological theories of persuasion and information processing and highlight the need to optimise expert communication for clarity and fairness.

4. Theoretical Contributions

From a psychological perspective, the research advances understanding of the cognitive mechanisms that shape legal decision-making, identifying systematic deviations from normative reasoning and potential interventions to mitigate bias. From a forensic science standpoint, it refines admissibility standards and expert qualification criteria, supporting clearer evidentiary frameworks and improved communication strategies.

Practical Implications

- a. Judicial training and guidance.** Empirical insights can inform judicial education, fostering consistency and rigour in admissibility decisions. Findings support evidence-based protocols for expert evaluation and the development of clearer jury instructions to enhance comprehension and reduce bias.
- b. Forensic practice.** Results highlight how presentation style can influence credibility, offering guidance for forensic professionals on tailoring communication strategies to maximise transparency without undue persuasion.
- c. Legal practice.** Insights into how lawyers commission and evaluate experts may inform the development of vetting procedures and procedural safeguards that align expert commissioning with scientific reliability rather than adversarial strategy.
- d. Policy reform.** Findings support broader reforms aimed at refining admissibility standards and operationalising clearer definitions of expertise, ensuring that forensic science contributes to justice rather than perpetuating systemic errors or inequities.

1.9. Structure of this Thesis

This thesis addresses the deficiencies identified in the literature through three interrelated empirical studies that together provide an *in toto* examination of how forensic expert evidence is admitted, evaluated, and operationalised in English criminal courts. Each chapter builds progressively from the conceptual foundations established in the introductory discussion, developing a coherent line of inquiry that integrates legal analysis, psychological theory, and empirical investigation.

Chapter Two offers a systematic and critical analysis of the legal framework that governs the admissibility of forensic evidence in the Court of Appeal. It considers the statutory

provisions, procedural rules, and case law that shape evidentiary standards, before presenting the first empirical study. This study employs a mixed-methods design, combining structured document analysis and thematic examination of appellate judgments, in order to investigate the extent to which judicial reasoning aligns with normative models of decision-making. Divided into two parts, the study first examines the general standards of admissibility with reference to the reliability of forensic methods, the scope of expert competence, and the benchmark of Part 19 of the Criminal Procedure Rules. It then shifts to the jurisprudential standards governing fresh evidence on appeal, evaluating judicial approaches to reliability, the influence of trial-level deficiencies, and the relationship between the types of evidence presented at trial and those adduced on appeal.

Chapter Three turns to the qualification of expert witnesses as credible authorities in court. It begins with a review of statutory frameworks, case law, and professional guidelines, before integrating insights from psychological theories of expertise. Building on this foundation, the second empirical study explores how both legal professionals and laypeople evaluate expert credibility. Using a survey methodology, the study examines the criteria prioritised by lawyers and laypeople to qualify credible expert witnesses, and the degree of convergence or divergence between these two cohorts. The findings are assessed against the normative standards of admissibility, thereby providing a more empirically grounded understanding of credibility assessments in legal practice.

Chapter Four examines the influence of testimony delivery and scientific standing of forensic domain on lay perceptions of credibility. Drawing on Cognitive Continuum Theory, it conceptualises reasoning as spanning intuitive, analytical, and quasi-rational modes of processing. The third empirical study presented in this chapter adopts an experimental design to

test how communication style—whether intuitive, quasi-rational or analytical—and the scientific standing of the forensic discipline—whether established or emerging—affect juror evaluations. This dual-focus approach offers granular insights into how both the structural and contextual features of testimony shape credibility judgments in adversarial trials.

Chapter Five synthesises the findings from the preceding studies and situates them within the broader literature. It demonstrates that the current handling of forensic evidence in England and Wales is marked by structural, procedural, and epistemological limitations that compromise evidentiary integrity and fairness. To address these shortcomings, the chapter proposes a number of evidence-based prescriptive tool for improving admissibility assessments. The recommendations, directed at judges, jurors, legal practitioners, forensic experts, and policymakers, emphasise the need for structured training, clearer communication strategies, and decision-making tools designed to mitigate cognitive bias and strengthen the transparency and reliability of expert testimony.

2. Legislative Frameworks on Expert Forensic Evidence: Appeal Court

Analysis

The preceding chapter identified a number of interrelated deficiencies within the legal framework governing the assessment of forensic evidence in the English and Welsh justice system. These deficiencies include structural and procedural inconsistencies in admissibility standards, as well as limitations in judicial reasoning concerning expert testimony.

More broadly, enduring challenges persist in the deployment of forensic expert evidence across multiple domains—*inter alia*, legal doctrine, forensic science, cognitive psychology, and courtroom communication. These challenges reveal persistent gaps in the evaluation and interpretation of expert evidence, suggesting that the current approach to admissibility lacks both conceptual coherence and methodological rigour. Such shortcomings do not merely affect technical aspects of evidentiary practice but also undermine the reliability of judicial reasoning. *Prima facie*, this raises fundamental concerns regarding fairness, consistency, and the potential for miscarriages of justice. Ultimately, these deficiencies risk compromising public trust in the English judicial system, reinforcing the need for a more transparent and scientifically informed framework for the assessment of expert evidence.

Building on these assertions, this chapter undertakes a focused analysis of the legal framework underpinning the admissibility of forensic evidence. It examines statutory provisions, procedural rules, and case laws that establish evidentiary thresholds. Central to this analysis is the inherent conflict between legal reliability—anchored by procedural admissibility—and scientific validity—rooted in empirical rigour. This dichotomy reveals fundamental inconsistencies in how courts reconcile legal and scientific standards.

To address these contradictions, this chapter draws on decision science to evaluate judicial reasoning particularly at the appellate level. It investigates whether judges employ normative models—characterised by principled adherence to legal standards—or descriptive models shaped by heuristic reasoning and contextual constraints. This theoretical inquiry aims to clarify and resolve conceptual ambiguities within the admissibility regime, thereby contributing to a more coherent and empirically informed framework for forensic adjudication.

This chapter then transitions to a procedural and empirical investigation of how expert evidence is assessed at the court of appeal. This forms the basis for the first empirical study, which examines the judiciary’s application of two legislative instruments: (1) the general standards of admissibility, and (2) the admission of fresh evidence on appeal. The study critically evaluates the consistency of judicial application of these provisions, identifying patterns in admissibility decisions and the reasoning processes that underpin them. In doing so, it tests the conceptual claims advanced in the preceding analysis by assessing the extent to which judicial practices align with established legal principles and scientific standards.

2.1. Legal Procedures for Assessing the General Standards of Admissibility

As stated earlier, the CrimPR (Part 19) and CrimPD (s.7) operate in a complementary manner within the criminal justice system, jointly shaping the procedural and interpretive framework governing expert evidence. The CrimPR, being statutory, are legally binding on all participants in criminal proceedings, including judges, legal practitioners, and expert witnesses. Of particular relevance is Part 19, which delineates ten specific rules regulating the introduction, disclosure, and evaluation of expert evidence. Essentially, rule 19.1 defines the scope and applicability of Part 19, governing the use of expert evidence in various procedural contexts, such as determining a defendant’s fitness to plead or informing sentencing decisions.

CrimPD (s.7) provides guidance to the courts on the assessment of general admissibility. In particular, CrimPD 7.1.1 supplements this framework by advancing four admissibility criteria for expert evidence, in regard to its: (1) relevance to the matter in dispute, (2) necessity for informing the court on issues beyond its ordinary knowledge and experience, (3) competence of the witness to provide such an opinion, and (4) sufficiently reliable to justify admission. These criteria constitute the current procedural and interpretative threshold that seeks to ensure that expert evidence admitted in criminal proceedings meets legal standards. The preceding sub-sections outlines each criterion in its formal legal context. This is preceded by a critical evaluation of the provisions of the CrimPR (Part 19) and CrimPD (s.7).

2.1.1. Relevance of Expert Opinion Evidence

CrimPD 7.2.1 supports the relevance criterion under CrimPD 7.1.1(a) by requiring a declaration of truth. This obliges experts to affirm the objectivity and evidential grounding of their opinions, thereby aligning their contributions with the factual and legal issues in dispute.

2.1.2. Necessity of Expert Opinion Evidence

CrimPR 19.2 enforces necessity by permitting expert evidence only when it covers matters beyond ordinary judicial competence. Rule 19.2(1)(a)(ii) confines testimony to recognised areas of expertise, while Rule 19.2(3) (a–b) requires experts to delineate their competence and alert the court when an issue exceeds it. These safeguards prevent epistemic overreach and reinforce impartiality by distinguishing expert from lay knowledge.

2.1.3. Witness Competency to give an Opinion

Competence is operationalised through CrimPR 19.2 and 19.4. Experts must disclose qualifications, methodology, and limitations, alongside a declaration of compliance with their duty to the court. CrimPD 7.1.4 requires disclosure of credibility-affecting factors (e.g., conflicts

of interest or disciplinary findings), while CrimPD 7.2.1 reinforces competence through the truth declaration, affirming impartiality and methodological integrity.

2.1.4. Expert Evidence being Sufficiently Reliable

The requirement of “sufficient reliability” is supported by CrimPR 19.2–19.4, which impose safeguards on impartiality, disclosure, and methodological rigour. Rule 19.3 mandates full disclosure of reports, results, and potential biases, while Rule 19.4 specifies report content, including methodology and the range of professional opinion. CrimPD 7.1.2–7.1.3 further direct courts to assess data quality, peer review, and logical coherence, and to identify flaws such as unsupported assumptions or misapplied methods.

While these criteria provide a structured framework, their application remains challenging. Judges must interpret not only the formal rules but also the broader epistemic context of the evidence, underscoring the complex balance between legal standards and scientific reliability (Adam, 2016).

2.2. Issues with Applying the Criminal Procedure Rules and Practice Directions on Admissibility

Gilson (2010), responding to the Law Commission’s Consultation Paper No. 190, questioned the need for a statutory reliability test. He argued that despite miscarriages of justice, judicial discretion remains effective for evaluating expert evidence, warning that rigid frameworks like *Daubert* may undermine flexibility. Instead, he recommended clearer ethical duties for experts, potential civil liability for negligent testimony, and enhanced judicial training in science. While insightful, his critique lacked empirical grounding or comparative analysis and overlooked the operational challenges judges face when assessing complex forensic science

without structured criteria. Broader scholarship, by contrast, emphasises recurring evidentiary failures and the growing complexity of forensic science, reinforcing calls for reform.

Judicial clarification has emerged in cases such as *R v. Reed & Anor*, which stressed that unreliable expert evidence should be excluded and that competence must be demonstrated within an expert's domain. When admissibility is disputed, the opposing party bears the burden of proof. These rulings highlight the judiciary's gatekeeping role, but practical application remains uneven. Courts face epistemic challenges, particularly with novel techniques such as voice analysis or shaken baby syndrome, where consensus is lacking. In contrast, well-established domains like DNA profiling offer statistical benchmarks for reliability (Griffin, 2015). Without such data, courts often rely heavily on expert opinion, increasing the risk of deference to authority rather than methodological scrutiny. Tottenham (2021) contends that courts must not defer uncritically to expert witnesses on contentious matters, but instead scrutinise the reasoning underpinning their conclusions. Correspondingly, experts bear a duty to avoid presenting unsubstantiated or categorical assertions; rather, they are obligated to articulate their reasoning in a manner accessible to the court, thereby enabling meaningful evaluation of its validity and significance.

Morrison (2018) identifies two key reliability indicators: whether expert opinions account for statistical uncertainty and whether methods have undergone empirical testing. These are essential in fields reliant on probabilistic reasoning. Yet judicial expectations that judges possess adequate scientific literacy are problematic in domains such as LCN DNA, obscure psychiatric diagnoses, or specialised digital forensics. In these areas, courts depend almost entirely on experts, heightening the risk of uncritical acceptance.

Ward (2020) highlights inconsistency in applying the “sufficiently reliable” standard. He identifies three problem case types: *Tsekiri*-type cases, where uncorroborated expert opinion risks shifting the burden of proof; *Reed*-type cases, where evaluative inferences may usurp the jury’s role; and *Dlugosz*-type cases, where weak evidence gains probative weight when coupled with other material. To address these issues, Ward advocates a contextual approach, treating reliability as “potentially safely reliable” in light of the case as a whole. He recommends ensuring methods are valid for their specific purpose, distinguishing foundational from evaluative validity, and controlling how evidence is presented to reduce undue jury deference.

Concerns about competence are also evident. Rix (2015) discusses cases involving Sir Roy Meadows and Dr Richard Pool, which spurred reforms to Part 19 and emphasised the need for rigorous evaluation of expert qualifications. He notes the lack of consistent standards across courts and regulators, arguing experts must clearly define their expertise, substantiate opinions, and demonstrate legal awareness. Similarly, Hirst (2015) critiques historical deficiencies in vetting experts, noting courts have become more willing to exclude testimony lacking sound methodology or straying into credibility assessments, as seen in *R v Stephen and Pora v The Queen* [2015] UKPC 9. However, both Rix and Hirst rely heavily on selective cases and focus narrowly on psychiatric and psychological evidence, limiting the generalisability of their conclusions.

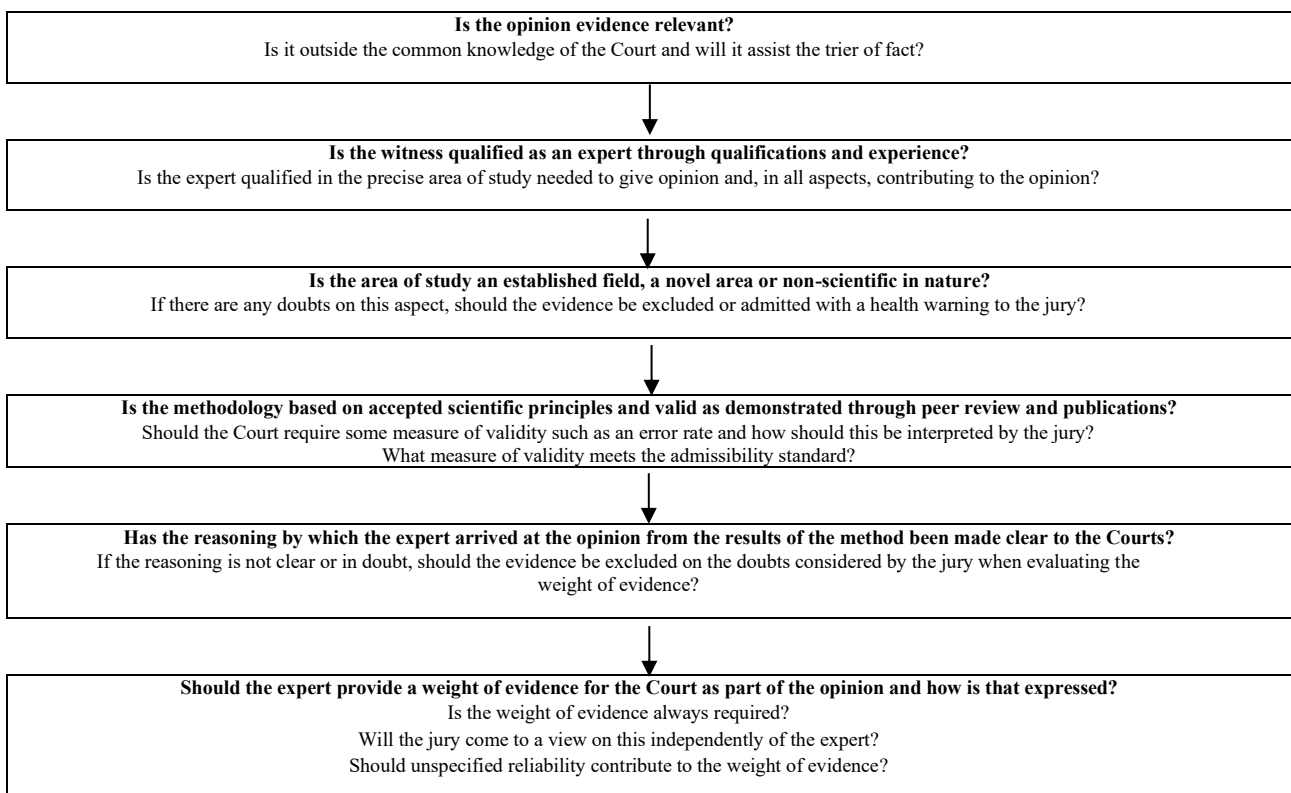
Addressing this gap, Smit, Morgan, and Lagnado (2017) conducted a systematic study of misleading evidence in 218 successful appeals (2010–2016). They found 76% of appeals were overturned on the same evidence presented at trial, most commonly due to witness (39%) and forensic (32%) errors. Two-thirds of misleading evidence concerned activity-level inferences (e.g., what the suspect did), rather than source-level attribution. The authors argue that many

unsafe convictions could have been avoided with clearer articulation of evidential uncertainty, better training for judges and jurors, and wider use of probabilistic reasoning tools such as Bayesian networks.

Adam (2016) underscores persistent inconsistency across cases such as *R v Turner*, *R v Gilfoyle* [2001] 2 Cr App R 5, and *R v Luttrell*. He proposes structured admissibility criteria, including the relevance of evidence, qualifications of the expert, credibility of the domain, methodological robustness, transparency of reasoning, and provision of a justifiable weight of evidence. These considerations (Figure 2.1) aim to guide judicial reasoning and mitigate risks associated with epistemic uncertainty.

Figure 2.1

Decision points for Judicial Assessment of Expert Evidence



Note. This figure illustrates a proposed framework for judicial evaluation of expert opinion admissibility based on six criteria: (a) the evidence is relevant and beyond the court’s common knowledge, (b) the witness is demonstrably qualified, (c) the field of study is established and scientifically credible, (d) the methodology is valid and peer-reviewed, (e) the reasoning is transparent, and (f) the expert provides a justifiable weight of evidence to aid deliberation. Collectively, these criteria emphasise the judiciary’s role in balancing evidentiary reliability with accessibility for the trier of fact. Adapted from Adam (2016).

2.2. Legal Procedures for Assessing Fresh Evidence on Appeal

The admission of fresh evidence on appeal in England and Wales is primarily governed by the Criminal Appeal Act 1968. Section 23(1) empowers the Court of Appeal to admit new evidence where “necessary or expedient in the interests of justice.” This provides appellants with a mechanism to challenge convictions or sentences on the basis of evidence unavailable at trial, though admission ultimately rests on judicial discretion, particularly in cases involving novel scientific techniques.

Section 23(2) sets out four cumulative criteria for admission: (a) credibility—the evidence must be capable of belief; (b) relevance—it must affect the outcome or undermine the conviction; (c) admissibility—it must have been admissible at trial; and (d) timeliness—there must be a reasonable explanation for its absence and it must not have been discoverable through due diligence (See Figure 2.2). Failure to meet any single criterion may result in exclusion. Of these, timeliness is often the most problematic. Courts routinely reject evidence available at trial unless its admission would render the conviction unsafe, in which case the broader “interests of justice” provision under s.23(1) may override strict compliance.

Despite this framework, literature remains largely doctrinal with little empirical analysis. Roberts (2017) criticises courts for applying s.23(2) too rigidly, undermining the remedial purpose of s.23(1). He highlights *R v Calvert* [2016] and *R v Pratt* [2016], where new expert

evidence on CCTV was rejected because it could have been introduced at trial. This tension reflects the difficulty of balancing procedural regularity with correcting miscarriages of justice.

Ambiguity also surrounds the “jury impact” test. In *R v Pendleton* [2001], the House of Lords left unresolved whether appellate courts should ask if fresh evidence “might reasonably have affected the jury’s decision.” This lack of clarity has led to inconsistent rulings, with outcomes dependent on subjective assessments of the original case strength, raising concerns about finality versus fairness.

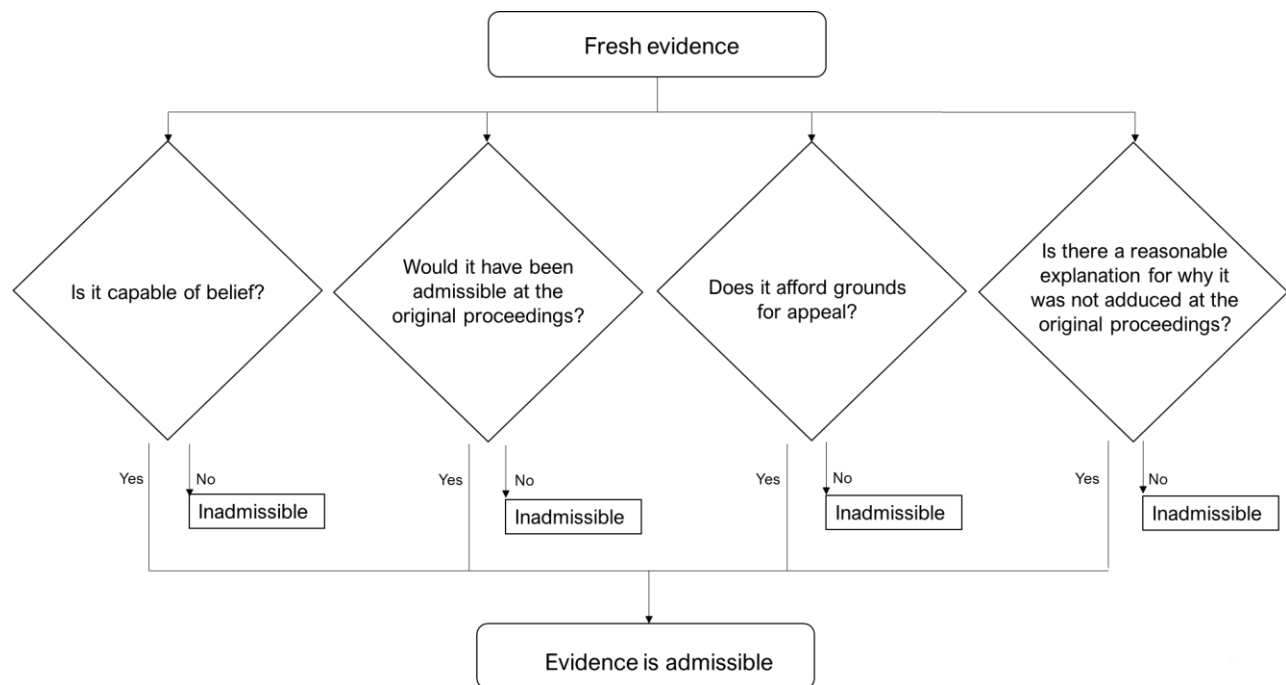
Courts also weigh whether evidence is “new and compelling,” especially where scientific or technological advances could reasonably alter a verdict. Evaluations often consider the expert’s credentials, the strength of trial evidence, and jury instructions. Griffin (2015) notes that courts frequently admit fresh evidence *de bene esse*—provisionally—before deciding if it renders the conviction unsafe. While this promotes substantive justice, it may also privilege continuity with trial evidence and discourage reassessment of contested expertise.

Courts have shown reluctance to admit evidence solely discrediting trial experts or reintroducing material previously considered, unless it introduces genuinely novel insights. This protects the integrity of proceedings while recognising the evolving nature of forensic science. Notably, many appeals involve new scientific developments—such as advances in DNA profiling, digital forensics, or psychiatric diagnoses—that were unavailable at trial, where courts have demonstrated greater willingness to revisit convictions.

Empirical research remains limited. Dargue (2019) found appeals based on fresh evidence succeed less often than those citing procedural irregularities, particularly where factual disputes rather than legal errors are central. While his conclusions suggest a restrictive approach, the study’s methodology was limited, calling for cautious interpretation.

Figure 2.2

Statutory Criteria for the Admissibility of Fresh Evidence on Appeal



Note. This figure illustrates the sequential statutory tests applied under section 23 of the Criminal Appeal Act 1968 for determining the admissibility of fresh evidence. Courts assess whether the evidence (a) is capable of belief, (b) would have been admissible at the original proceedings, (c) affords grounds for appeal, and (d) has a reasonable explanation for its earlier non-production. Failure at any stage renders the evidence inadmissible; only when all four criteria are satisfied may the evidence be admitted.

2.3. Focus of the Present Study

Despite the framework of the Criminal Procedure Rules (Part 19) and CrimPD s.7, inconsistencies persist in judicial reasoning and the application of admissibility standards. The absence of empirically grounded criteria, such as those found in *Daubert*, results in fragmented and subjective assessments of expert reliability and competence. Scholars such as Gilson and Rix

have highlighted the tension between broad judicial discretion and the need for structured evaluation, though their analyses are limited by narrow disciplinary focus and lack of empirical data. Concerns also arise from limited judicial scientific literacy, particularly in fast-evolving forensic domains, which risks overreliance on expert authority. Empirical studies, for instance Smit et al. (2017), reveal that misleading evidence often stems from misinterpretation or miscommunication rather than flawed science. Appellate procedures for admitting fresh evidence add further uncertainty, with conceptual ambiguities surrounding the “jury impact” test and the balance between s.23(1)’s discretionary remit and s.23(2)’s rigid criteria. These divergences between procedural admissibility and substantive justice underscore the need for a more coherent, empirically informed, and context-sensitive framework for forensic adjudication.

The statutory criteria under s.23(2) illustrate these challenges. The first requires courts to assess whether evidence is “capable of belief.” Yet as forensic science grows more technical, doubts arise about judicial proficiency in evaluating plausibility without deeper expertise. The second criterion asks whether the evidence justifies appeal, but here too courts risk adopting the role of “amateur scientists,”⁴ with only a superficial grasp of complex material. The third criterion—admissibility in the original trial—links back to the general standards under CrimPR Part 19 and CrimPD s.7, neither of which provide a codified, binding framework. The fourth, requiring a reasonable explanation for failing to present the evidence at trial, is comparatively less demanding, as it does not hinge on scientific interpretation.

Although courts apply a non-compensatory approach to s.23(2)—all four criteria must be satisfied—research into its practical application remains sparse. It is therefore unclear how courts weigh each element, particularly in cases involving novel or complex forensic evidence.

⁴ The phrase “amateur scientists” is most commonly attributed to Chief Justice William H. Rehnquist in his partial dissent in *Daubert v. Merrell Dow Pharmaceuticals*, 509 U.S. 579 (1993).

The overarching research questions for the first empirical study in this PhD research project are:

1. To what extent do the criminal appeal courts in England and Wales apply admissibility criteria consistently when evaluating forensic evidence?
2. What are the limitations of the current discretionary model of admissibility in ensuring reliability?
3. How might a codified reliability-based admissibility framework improve the consistency and scientific integrity of expert evidence evaluation in criminal proceedings?
4. How do judges gatekeep the admissibility of forensic evidence given their limited scientific literacy?

To answer these questions, this first study is divided into two parts. Study 1(a) concerns general standards of admissibility, and study 1(b) fresh evidence on appeal.

2.3.1. Aims and Objectives for Study 1(a) General Standards of Admissibility

The present study seeks to investigate how the Crim EWCA assesses the general admissibility of expert evidence—particularly DNA, digital forensics, and fingerprinting—and the extent to which the court adheres to the provisions of the CrimPR (Part 19) in conjunction with Crim PD (s.7). Study 1a is guided by the following research objectives, each designed to systematically investigate the court’s application of the admissibility standards in appellate proceedings:

1. To examine the judicial criteria and reasoning employed in determining the relevance of expert evidence, with a focus on how courts align expert testimony with actual and legal issues in dispute.

2. To analyse the procedural and epistemic considerations used by the appellate court to establish the necessity of expert evidence, particularly in relation to the boundaries of lay and specialised knowledge.
3. To evaluate how courts assess the competence of expert witnesses, including the extent to which demonstrable expertise, methodological transparency, and ethical compliance inform admissibility decisions.
4. To investigate the judicial mechanisms for determining the reliability of expert evidence with emphasis on the use of methodological scrutiny, peer review, and evidentiary coherence in establishing admissibility.

2.3.2. Hypotheses for General Standards of Admissibility

Drawing upon the normative framework established by the CrimPR (Part 7) and CrimPD s.7, study 1(a) advances four hypotheses to evaluate whether judicial decisions conform to prescribed legal standards. Specifically, these hypotheses test the expectation that when the court assesses expert evidence as relevant, necessary, reliable, or presented by a suitably qualified and competent expert, they are more likely to admit the evidence. Accordingly, the following hypotheses are designed to empirically examine the relationship between the admissibility guidelines and the court's decision to admit or exclude forensic expert evidence:

Hypothesis 1. There will be a statistically significant association between the courts assessment of the relevance of expert evidence and the decision to admit the evidence. This hypothesis denotes the expectation that the court will admit evidence that demonstrably pertains to the factual matters in dispute.

Hypothesis 2. There will be a statistically significant association between the court's determination that expert evidence is necessary and its admissibility decision. This hypothesis is grounded in the procedural requirement that expert testimony must address issues beyond the ordinary competence of the court.

Hypothesis 3. There will be a statistically significant association between the court's evaluation of the expert's qualifications and competence and the decision to admit the evidence. This reflects the legal obligation to ensure that expert witnesses possess demonstrable expertise in the relevant domain.

Hypothesis 4. There will be a statistically significant association between the court's assessment of the reliability of the forensic evidence and its decision to admit the evidence. This hypothesis tests the extent to which the court adheres to the requirement that expert evidence must be grounded in methodologically sound and empirically validated principles.

2.3.3. Aims for Study 1(b) Fresh Evidence on Appeal

The principal aim of study 1(b) is to critically examine how the Crim EWCA evaluates applications for the admission of fresh evidence on appeal, with particular reference to the statutory criteria outlined in s.23(2) of the Criminal Appeal Act (1968). This investigation seeks to assess the extent to which judicial determinations align with the procedural and evidentiary benchmarks established by the legislation, and to identify any patterns or deviations in judicial reasoning across forensic domains, particularly DNA analysis, digital forensics and fingerprint analysis.

To achieve this aim, study 1(b) is guided by the following specific objectives:

1. To analyse the appeal court's application of the s23 criteria which is used to determine whether fresh evidence is "capable of belief"
2. To evaluate how the appeal court establishes that fresh evidence provides grounds for appeal (relevance), particularly in relation to its potential to undermine the safety of the original conviction.
3. To investigate the extent to which the appeal court assesses the admissibility of fresh evidence based on its hypothetical admissibility in the original trial proceedings, thereby examining the retrospective application of evidentiary standards.
4. To examine how the appeal court determines whether there is a reasonable explanation for the evidence not being presented at trial, including considerations of investigatory diligence and procedural fairness.
5. To explore whether appeal court decisions to admit fresh evidence are influenced by factors arising during the investigatory or evidentiary stages of legal proceedings.
6. To determine whether there is a relationship between the type of forensic evidence presented at trial (e.g. DNA, fingerprint or Digital) and the type of fresh evidence submitted on appeal, thereby identifying potential domain-specific patterns in appellate adjudication.

2.3.4. Hypotheses for Fresh Evidence on Appeal

The following hypotheses are formulated to isolate the predictive utility of each criterion of s23(2) of the Criminal Appeal Act:

Hypothesis 5. There will be a statistically significant association between the court's decision that fresh evidence is "capable of belief" and the subsequent decision to admit the evidence.

Hypothesis 6. There will be a statistically significant relationship between the courts assessment that the fresh evidence “affords grounds for allowing the appeal” and their decision to admit the evidence.

Hypothesis 7. There will be a statistically significant association between the court’s assessment that the fresh evidence “would have been admissible at the original hearing” and their decision to admit the evidence.

Hypothesis 8. There will be a statistically significant relationship between the court’s assessment that there was a “reasonable explanation” for the failure to adduce fresh evidence at the original trial and their subsequent decision to admit the evidence.

In line with the exploratory nature of this investigation, the following hypotheses are advanced:

Hypothesis 9. There will be a statistically significant association between the court’s decision to admit fresh evidence and the presence of other factors arising during the investigatory or evidentiary stages, such as the presentation of an alibi, the existence of circumstantial evidence, the defendant being treated as a suspect, or the defendant’s plea or conviction status.

Although Section 23(2) of the Criminal Appeal Act 1968 outlines formal criteria for admitting fresh evidence, the literature indicates that judicial decision-making often incorporates broader contextual factors. Roberts (2017) critiques the rigid application of these criteria, noting that courts may exclude evidence available at trial even when it could affect the outcome. Griffin (2015) contend that courts sometimes admit fresh evidence provisionally, prioritising substantive justice over procedural formality. These practices suggest that factors arising during the investigatory or evidentiary stages—such as the presence of an alibi, circumstantial evidence,

suspect status, or the defendant's plea status—may influence judicial assessments of fairness and reliability, thereby shaping decisions to admit fresh evidence.

Hypothesis 10. It is hypothesised that there will be a statistically significant relationship between the type of forensic evidence presented at the original trial (i.e., DNA, fingerprint or digital evidence) and the type of fresh evidence submitted on appeal.

The literature highlights that appeal courts face distinct challenges when evaluating forensic evidence, particularly in cases involving scientific or technological advancements. Griffin (2015) and Morrison (2018) note that courts are more likely to reassess convictions when fresh evidence introduces novel methodologies or addresses epistemic limitations inherent in the original forensic analysis. This is especially true in domains such as DNA profiling, digital forensics, and psychiatric diagnoses, where evidentiary landscape may evolve significantly post-conviction.

Moreover, the review indicates that courts are reluctant to admit fresh evidence that merely reiterates previously presented material unless it offers substantially new insights. This suggests that the type of forensic evidence originally presented may influence decisions concerning the admissibility of fresh evidence, particularly when the latter provides a more robust or updated interpretation. The empirical findings of Smit et al. (2017) demonstrated that misleading evidence often stems from misinterpretation rather than flawed science. This lends further support to the hypothesis that forensic domain-specific factors are critical in shaping appellate outcomes. Based on these premises, there is an expectation that the forensic context of the original trial influences nature and admissibility of fresh evidence on appeal.

In response to gaps identified in the literature—dominated by legal commentary and short-term case analyses—this study adopts a mixed-methods approach to examine appeal court

judgments involving forensic expert evidence over an extended period. A sample of appeal judgments will be subjected to both qualitative and quantitative analyses, enabling a rigorous exploration of how courts assess forensic evidence and operationalise admissibility standards.

The methodological framework is particularly well suited to the study's aims. By applying psychological theories of decision-making, the research transcends descriptive legal analysis to interrogate cognitive and contextual factors affecting judicial reasoning. The use of a comprehensive coding scheme will facilitate the systemic mapping of reasoning patterns, while the longitudinal scope captures evolving trends in admissibility decisions. The present study also introduces underutilised decision science frameworks into the legal context, offering fresh empirical insights at the intersection of psychology, law, and forensic science.

2.4. Method

2.4.1. Design

This study employed a convergent mixed methods design to examine judicial reasoning in the England and Wales Court of Appeal (Criminal Division) between 2010 and 2022. The primary objective was to investigate how appellate courts assess the admissibility of forensic evidence under two distinct legal frameworks: the General Standards of Admissibility (Study 1a) and Fresh Evidence on Appeal (Study 1b). The integration of both quantitative and qualitative methods was necessary to capture the complexity of judicial decision-making and to generate a comprehensive understanding of how admissibility criteria are applied in practice.

To address the research aims, two separate datasets were constructed, each corresponding to each of the legal frameworks. Study 1a employed Document analysis—subsuming quantitative and qualitative Analysis, to identify patterns in how courts evaluated whether forensic evidence met the admissibility criteria as stipulated in the CrimPD s7, specifically 7.1.1. Study 1b used the same mixed-methodological approach to analysis to explore how appellate courts applied the four statutory criteria outlined in Section 23(2) of the Criminal Appeal Act 1968 when evaluating fresh forensic evidence.

Document analysis, as defined by Bowen (2009), is a systematic method for reviewing and interpreting textual data. In Study 1b, this method was applied quantitatively using a structured coding scheme to analyse a cross-section of appellate judgments. The selection of Document analysis was guided by several methodological advantages: (1) it involved data selection rather than primary data collection, reducing time demands; (2) the judgments were publicly accessible; (3) they were non-reactive and unobtrusive; (4) the researcher's presence did

not influence the data; (5) the judgments provided detailed procedural and evidentiary information; and (6) the method was well-suited to the longitudinal scope of the study.

Given the non-experimental nature of the research, which relied on the observation and analysis of existing legal documents, this approach aligned with the study's exploratory objectives (Jhangiani et al., 2019). The independent variables—judicial reasoning and admissibility outcomes—were not subject to manipulation. Quantitative data were coded and subjected to statistical analysis, while qualitative data underwent thematic and document-based interpretation. This dual approach enabled triangulation of findings and facilitated the identification of convergences and divergences across cases.

According to Creswell and Creswell (2017), a convergent mixed-methods design allows for the simultaneous collection and integration of quantitative and qualitative data to provide a more nuanced understanding of complex research problems. In this study, the design enabled the exploration of contradictory findings and enhanced the interpretive depth of the analysis. The use of a coding scheme was particularly advantageous given the complexity of appellate judgments, offering a cost-effective and time-efficient alternative to more resource-intensive methods such as courtroom observation or judicial interview.

2.4.2. Data Source

Appeal court judgments were selected as the primary data source due to their unobtrusive and non-reactive nature, making them well-suited for examining judicial decision-making. The British and Irish Legal Information Institute (BAILII) database was used to access these judgments, as it serves as a comprehensive online repository for legal decisions issued by the England and Wales Court of Appeal (Criminal Division). The BAILII platform

(<https://www.bailii.org/ew/cases/EWCA/Crim/>) enables efficient retrieval of relevant cases through keyword, name, date, and other search parameters.

The decision to limit the search to BAILII was pragmatic, reflecting resource constraints and the platform's accessibility. While this approach excluded cases not recorded during the search period or published through alternative reporting channels, BAILII remains a robust source for appellate case law, offering access to judgments and law reports dating back to 2000 (Leith & Fellows, 2010). Hosted by the Institute of Advanced Legal Studies (IALS), University of London, and the Law Faculty at University College Cork, BAILII aggregates legal materials from multiple jurisdictions, including the UK Parliament, Northern Ireland Assembly, Scottish Parliament, Welsh Assembly, and Irish legislative bodies (Fellows, Leith & Ury, 2012).

Importantly, BAILII includes both full-text judgments and law reports. The latter are third-party legal analyses authored by practitioners not directly involved in the case, offering interpretive summaries alongside judicial reasoning (Leith & Fellows, 2010). This dual format enhances the richness of the data and supports a more nuanced understanding of appellate court reasoning.

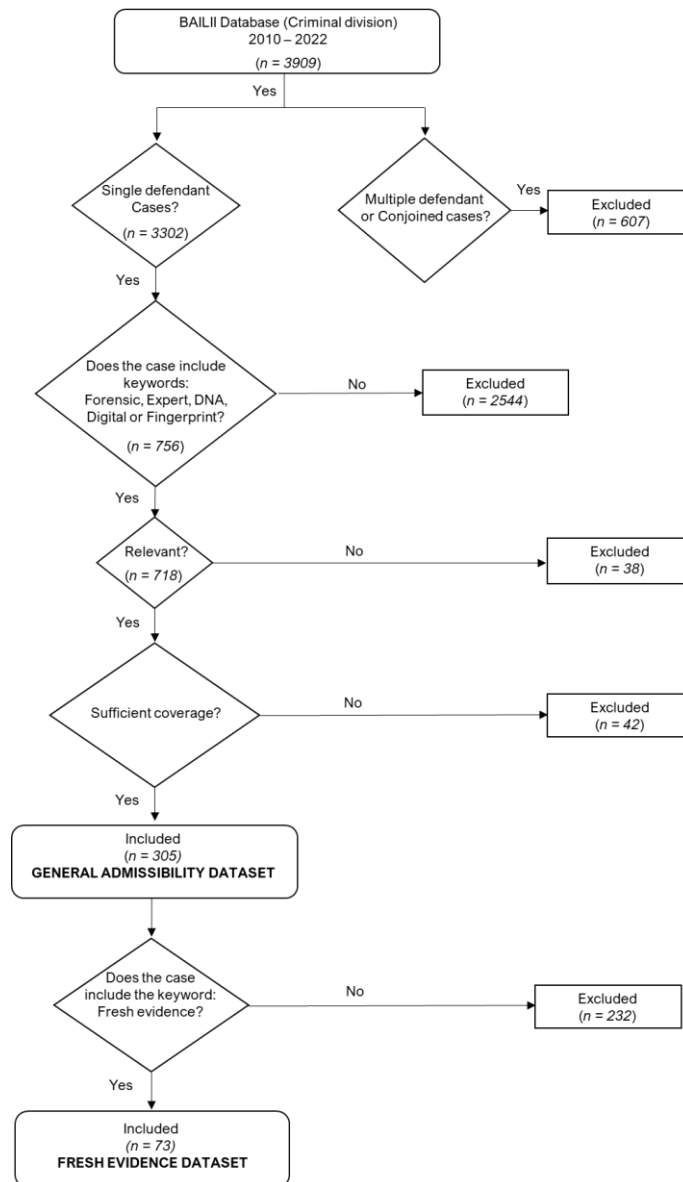
2.4.3. Dataset

Two distinct datasets were constructed: (1) General Standards of Admissibility and (2) Fresh Evidence on Appeal. The first dataset was compiled by systematically reviewing criminal appeal judgments from 2010 to 2022. Using the BAILII database, cases were identified through keyword searches including “forensic,” “expert,” “DNA,” “fingerprint,” and “digital.” Each returned case was opened and read in full to determine the contextual relevance of the keywords to the study's focus on forensic evidence admissibility. Judgments deemed relevant were extracted and stored in a Microsoft Access database, while irrelevant cases were excluded.

To ensure consistency and analytical clarity, the dataset was limited to single-defendant appeals. Cases involving multiple co-defendants or conjoined appeals—where separate

Figure 2.3

Inclusion and exclusion criteria for case selection



Note. This flow diagram depicts the stepwise inclusion and exclusion of criminal cases across two datasets: one addressing general admissibility criteria and the other focusing on fresh evidence introduced at the appellate stage.

applications were heard together—were excluded. This refined dataset formed the basis for Study 1a, which examined the application of the General Standards of Admissibility (see Figure 2.3).

The second dataset, used in Study 1b, was derived from the first by conducting an additional keyword search for “fresh evidence.” Each case was re-examined to identify references to Section 23(2) of the Criminal Appeal Act 1968, which governs the admissibility of fresh evidence on appeal. All judgments included in both datasets were subsequently analysed using a structured coding scheme to extract and code variables of interest.

2.4.4. Coding Scheme

Each judgment included in the dataset was systematically reviewed using a structured coding scheme designed to extract variables of interest. A coding scheme refers to a predefined set of procedures for categorising qualitative or quantitative data in a consistent and replicable manner. In this study, the coding scheme enhanced objectivity and transparency by clearly documenting classification criteria, thereby supporting methodological rigour and facilitating replication. This approach contributes to the overall reliability and validity of the findings.

The coding framework also enabled efficient management of a large volume of case data by providing a structured method for organising and analysing judicial reasoning. Through this process, recurring patterns and themes in appellate assessments of forensic evidence admissibility were identified.

2.4.4.1. *Development and Refinement of the Coding Scheme*

Initial Development. The original coding scheme, developed by Dhimi (2019), comprised 101 items grouped into six thematic sections: (1) Sample description (6 items), (2) Defendant

demographics (8 items), (3) Appeal Case/Hearing Factors (30 items), (4) Original Case/Trial characteristics (13 items), (5) Investigative stages—collection and analysis (22 items), and (6) Evidentiary stage (22 items). This scheme was previously applied to appellate judgments involving DNA and fingerprint evidence from 2011 to 2018. Data types included categorical, binary (e.g., Yes = 1; No = 0), and qualitative text responses. Annotations were added where necessary to clarify interpretive inferences, and missing data were coded as “99” to denote absence of information.

Refinement and Adaptation. To align with the objectives of the present study, Dhami’s (2019) scheme was expanded to accommodate a broader range of forensic domains and procedural variables. The final version consisted of 126 items comprising of 172 codes, retaining the original six-section structure with modifications to enhance specificity and relevance. The revised sections comprised: (1) Sample description (6 items), (2) Defendant demographics (8 items), (3) Appeal Case/Hearing factors (31 items), (4) Original case/Trial characteristics (13 items), (5) Investigative stages (36 items), and (6) Evidentiary stage (28 items). A detailed list of modifications is provided in Table 1A (Appendix 3), alongside the final coding scheme presented in Table 1B.

The original coding scheme was applied to DNA and fingerprint cases from 2011–2018, whereas the revised version was used to analyse a broader dataset, including digital forensic evidence cases from 2010–2022, and DNA/fingerprint cases from 2010 and 2018–2022. This adaptation ensured consistency in coding across forensic domains while incorporating emerging evidentiary practices.

2.4.5. Reliability Assessment of the Coding Scheme

To ensure the consistency and accuracy of data derived from the coding scheme, both inter-rater and intra-rater reliability checks were conducted using a match/mismatch reliability approach. This method statistically evaluates the degree of agreement between coding interpretations, thereby validating the robustness of the coding process.

2.4.5.1. *Inter-Rater Reliability*

Inter-rater reliability was assessed by comparing the coding decisions of multiple independent coders across a sample of 20 cases. The resulting Cronbach's alpha coefficient ($\alpha = 0.726$) indicated an acceptable level of agreement for research purposes, suggesting that the coding scheme was sufficiently clear and interpretable across coders.

2.4.5.2. *Intra-Rater Reliability*

To evaluate the consistency of coding by a single researcher over time, a test-retest reliability check was performed. The same researcher re-coded a subset of 16 cases after a six-month interval. The intra-rater reliability yielded a Cronbach's alpha of $\alpha = .865$, indicating a high level of stability and reliability in coding practices over time.

2.4.6. Data Source and Ethical Considerations

All data utilised in this study were obtained from publicly accessible legal records hosted on the BAILII database, specifically from the Court of Appeal (Criminal Division):

<https://www.bailii.org/ew/cases/EWCA/Crim/> In accordance with BAILII's reproduction and copyright policy, users are permitted to copy, print, and distribute legal materials published on the site without prior authorisation, provided that BAILII is cited as the source (see BAILII Copyright Policy, Paragraph 5: <https://www.bailii.org/bailii/copyright.html>).

Appeal judgments accessed often included explicit identifying information such as the names, roles, and affiliations of appellants, complainants, witnesses, and legal professionals. In a limited number of cases, reporting restrictions were imposed by the courts, resulting in the anonymisation of sensitive personal details to protect the identities of those involved.

Ethical approval for the study was granted by the Middlesex University Psychology Research Ethics Committee (Application Number: 4780). Documentation of the ethical approval process is provided in Appendix 2.

2.4.7. Data Analysis

All statistical analyses were conducted using IBM SPSS Statistics (Version 28). A significance threshold of $\alpha = .01$ was adopted for all inferential tests to reduce the likelihood of Type I errors. Effect sizes were reported alongside p-values to provide a more comprehensive interpretation of the practical significance of the findings. Descriptive statistics were used to summarise the characteristics of the appeal judgments. These included sample demographics, defendant profiles, appeal case and hearing factors, original trial characteristics, and variables related to the investigative and evidentiary stages of the appeal process.

For hypothesis testing, Pearson's chi-square test of independence and Fisher's exact test were employed to examine associations between categorical variables. These tests were selected based on the distributional properties of the data and the expected cell frequencies.

2.4.8. Mixed-Methods Document Analysis

To investigate how the courts assess the admissibility of forensic evidence, this study employed a mixed-methods approach to document analysis. The quantitative component consisted of the systematic coding of legal judgments, followed by statistical analysis, as

described earlier. Complementing this, qualitative strategies were applied to capture the interpretive dimensions of judicial reasoning.

In Study 1a, Content Thematic Analysis (CTA) was used to examine how the Court applied the General Standards of Admissibility in evaluating relevancy, necessity, expert competency, and evidential reliability. In Study 1b, CTA was also applied to analyse the Court's use of Section 23(2) of the Criminal Appeal Act (1968) in determining the admissibility of fresh forensic evidence. These qualitative analyses provided a richer understanding of the evidentiary thresholds employed and the reasoning patterns underlying judicial determinations.

Document analysis was selected for its capacity to facilitate both methodological and data triangulation (Bowen, 2009). By integrating quantitative and qualitative evidence, this design mitigated the limitations of each approach and strengthened the robustness of the findings. As Creswell and Creswell (2017) emphasise, triangulation enhances validity by drawing on multiple sources of evidence, echoing Eisner's (1991, p. 110) assertion that such convergence creates "a confluence of evidence that breeds credibility."

2.4.9. Case Selection and Descriptive Overview

Between 2010 and 2022, 3,533 criminal appeal cases were retrieved from the BAILII database. From this corpus, a purposive sampling strategy was applied, yielding 305 cases (8.6%) that met the inclusion criteria. These criteria required the presence of specific keywords—*forensic*, *expert*, *DNA*, *fingerprint*, or *digital*—and a level of judicial analysis sufficient to permit systematic coding and interpretation. Including reasoned discussion by the court on admissibility rather than mere mention and/or reference to established legal principles, statutory provisions or appeal guidelines. See Table 2.1. for the annual frequency of cases.

Table 2.1*Annual Distribution of Cases in the General Standards of Admissibility Dataset*

	Year											
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Number of cases	37	22	11	11	9	16	12	14	41	28	49	55

Note. General Standards of Admissibility Dataset between 2010 and 2022. The distribution provides the temporal scope of the dataset and establishes the empirical basis for subsequent analyses.

Among the 305 included cases, 193 (63%) involved one or more forms of forensic evidence, specifically DNA, digital, and/or fingerprint evidence. This subset formed the basis for subsequent analyses concerning evidentiary admissibility and judicial reasoning.

Case outcomes analysis revealed that 205 appeals (62.5%) were dismissed, 86 (26.2%) were granted, and 11 (3.4%) resulted in mixed outcomes (e.g., appeal against conviction dismissed while appeal against sentence allowed). In two cases (0.6%), the outcome was not disclosed in the judgment text.

Descriptive statistics pertaining to defendant demographics, appeal case or hearing factors, and original trial characteristics are presented in Tables 2.2. to 2.5. Additional data concerning appeal case/hearing factors, as well as variables from the investigative and evidentiary stages, are provided in Tables 2.6 to 2.8.

Table 2.2*Demographic and Socioeconomic Characteristics of Defendants*

Measure	<i>M</i>	<i>n</i>	%
Age (years) at time of offence			
13-80	29.6	146	47.9
Not specified	-	159	52.1
Gender			
Male	-	284	86.6
Female	-	17	5.2
Not specified	-	4	1.2
Nationality			
British	-	7	2.1
Other	-	25	7.6
Not specified		273	83.2
Employment status			
Employed		40	12.2
Unemployed		11	3.4
Student		14	4.3
Other		14	4.3
Not specified		224	68.3
Education			
University		13	4
Below university		20	6.1
Other education		9	2.7
Not specified		263	80.2
Relationship			
Married		23	7
Single		15	4.6
In a relationship		62	18.9
Undisclosed		205	62.5
Parental status			
Dependents		48	14.6
No dependents		6	1.8
Undisclosed		251	76.5
Housing status			
Accommodation		167	50.9
Homeless		10	3
Not specified		128	39

Note. This table summarises the demographic and socioeconomic characteristics of defendants included in the sample ($N = 305$). Variables reported include age at the time of offence, gender, nationality, employment status, educational attainment, relationship status, parental status, and housing status. Where information was unavailable, cases were recorded as not specified or undisclosed. Percentages reflect the proportion of the total sample within each category.

Table 2.3

Appeal Characteristics: Initiation, Applicant, and Appeals Against

Measure	n	%
Appeal initiated		
Post-trial	12	3.7
Post-conviction	105	32
Post-sentence	176	53.7
Other	10	3
Unspecified	2	.6
Appeal applicant		
Defence	284	86.6
Prosecution	11	3.4
Other	10	3
Appeals against		
Conviction	178	54.3
Sentence	70	21.3
Conviction and sentence	37	11.3
Other	20	6.1

Note. Distribution of appeal characteristics within the dataset. Appeals were most frequently initiated post-sentence, followed by post-conviction and, less commonly, post-trial. The majority of applications originated from the defence, with only a small proportion submitted by the prosecution or by other sources (e.g., the Criminal Cases Review Tribunal). Regarding “appeals against,” the category other refers to challenges that did not concern conviction or sentence alone but encompassed alternative or combined grounds. Percentages represent proportions of the total sample.

Table 2.4*Original Case Trial Characteristics*

Measure	<i>n</i>	%
Defendant		
Treated as suspect	158	48.2
Not treated as suspect	103	31.4
Not disclosed	44	13.4
Single defendant	272	82.9
Co-defendant	32	9.8
Hearings		
First trial	195	59.5
>1 hearing	75	22.9
Unspecified	34	10.4
Previous hearing prior to appeal		
Crown Court	289	88.1
Magistrates Court	8	2.4
Not specified	8	2.4

Note. ‘co-defendant’ denotes more than one defendant being involved in offence. >1 hearing is used to denote cases where there were additional hearings other than the first trial.

Table 2.5*Appeal Case and Hearing factors relating to Forensic Evidence*

	Yes		No		Not specified	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Concerns expressed at original trial or appeal about there being a chance of contamination of Fingerprint/DNA evidence prior to sample collection from the crime scene	10	3.3	57	18.7	238	78.0
Did new defence Fingerprint/DNA/Digital experts present evidence at appeal hearing	17	5.6	288	94.4	-	-
Concern expressed at appeal hearing about qualifications, knowledge, skills or experience of any new prosecution Fingerprint/DNA/Digital expert(s)	1	0.3	304	99.7	-	-
Was any concern expressed at appeal hearing about qualifications, knowledge, skills or experience of any new defence Fingerprint/DNA/Digital expert(s)?	2	0.7	303	99.3	-	-
Concern expressed at original trial or appeal about where the DNA came from	34	11.1	40	13.1	231	75.7
Concern expressed at original trial or appeal about there being potential for evidence tampering/planting	7	2.3	51	16.7	247	81.0
Over a week's delay between crime being committed and collection of Fingerprint/DNA or Digital evidence from crime scene	16	5.2	62	20.3	227	74.4
Concern expressed at original trial or appeal about the method(s) used to collect the sample	6	2.0	44	14.4	255	83.6
Concern expressed at original trial or appeal about broken chain of custody i.e., who was looking after the Fingerprint/DNA sample(s) or Digital evidence after they were collected	7	2.3	162	53.1	136	44.6
For Digital evidence, were any technical problems	7	2.3	17	5.6	281	92.1
Concern expressed at original trial about problems securing Digital evidence data	7	2.3	119	39.0	179	58.7
Concerns about digital evidence data being missed during investigation	8	2.6	126	38.1	181	59.3
Digital evidence data hidden over the network	1	0.3	110	36.1	194	63.6
Digital evidence data hidden inside storage areas to make them invisible to the system commands and programs	1	0.3	104	34.1	200	65.6
Digital evidence data corrupted	1	0.3	110	36.1	194	63.6
Digital evidence residual data wiping	1	0.3	109	35.7	193	63.6
Concern expressed at the original trial or appeal about Digital evidence data sources being damaged	1	0.3	110	36.1	191	62.6
Concern about digital data sources being damaged	1	0.3	113	37.1	191	62.6
Digital evidence was any data encrypted?	4	1.3	101	33.1	195	65.5
Digital evidence was any data hidden in a carrier file without modifying its outward appearance	0	0.0	104	34.1	201	65.9
Digital evidence, was any techniques used to obfuscate the source of the attack?	1	0.3	103	33.8	201	65.9
Digital evidence, did the investigator have to analyse high volumes of data?	4	1.3	102	33.4	199	65.2
Digital evidence, were the investigators restricted to analysing only recent data stored on volatile memory?	0	0.0	108	35.4	197	64.6

Table 2.6*Investigative Stage: Collection of DNA, Fingerprint, and Digital Evidence in Appeal Hearings*

	Yes		No		Not specified	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
New techniques used to re-examine old evidence at appeal	19	6.2	286	93.8	0	0.0
Fingerprint/DNA/Digital expert expressed confidence in conclusion at appeal hearing	1	0.3	304	99.7	0	0.0
New probabilities of Fingerprint/DNA match mentioned at appeal hearing	19	6.2	286	93.8	-	-
For DNA evidence new contamination/error rates were presented at appeal hearing	6	2.0	299	98.0	-	-
For Fingerprint evidence new points of dissimilarity between sample and print presented at appeal hearing	1	0.3	304	99.7	-	-
Appeal Court raised concerns about prosecution or defence team misunderstanding fingerprint/DNA/Digital evidence	14	4.6	291	95.4	-	-
Appeal Court raised concerns about jury at original trial misunderstanding or having difficulty understanding fingerprint/DNA/Digital evidence	2.3	7.0	298	97.7	-	-
Appeal Court raised concerns about judge at original trial misunderstanding fingerprint/DNA/Digital evidence	8	2.6	297	97.4	-	-
Appeal Court raised concerns about how fingerprint/DNA/Digital evidence was presented at original trial	15	4.9	290	95.1	-	-
Appeal Court raised concerns that weight of fingerprint/DNA/Digital evidence was overstated in Court by either prosecution/defence/judge at original trial	13	4.3	292	95.7	-	-
Appeal Court raise concerns about inadmissible evidence being presented at original trial	57	18.7	248	81.3	-	-

Table 2.7*Investigative stage: Analysis of DNA, Fingerprint and Digital Evidence in Appeal Hearings*

	Yes		No		Not specified	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Concern expressed at original trial or appeal about the methods of Fingerprint/DNA/Digital analysis used	8	2.6	57	18.7	240	78.7
Concern expressed at original trial or appeal about there being a chance of the Fingerprint/DNA samples being degraded	7	2.3	51	16.7	247	81.0
Concern expressed at original trial or appeal about the quality of notes taken/report of the Fingerprint/DNA/Digital examiner	9	3.0	296	97.0	-	-

Table 2.8*Evidentiary stage data*

	Yes		No		Not specified	
	<i>n</i>	%	<i>n</i>	%	%	<i>n</i>
Concern expressed at original trial or appeal about quality of prosecution expert reports	15	4.9	290	95.1	-	-
Concern expressed at original trial or appeal about quality of defence expert reports	12	3.9	293	96.1	-	-

2.4.10. Quantitative Analysis

To examine potential associations between categorical variables, the coded data were analysed using chi-square (χ^2) tests of independence. This non-parametric test evaluates whether the observed frequency in a contingency table significantly deviates from expected frequency under the null hypothesis of no association.

The validity of the χ^2 test depends on several assumptions: (1) data must consist of raw frequencies rather than percentages or transformed values; (2) categories must be mutually exclusive; (3) each observation must contribute to only one cell; (4) groups must be independent; (5) both variables must be categorical, typically at the nominal level; and (6) at least 80% of the expected cell frequencies should be five or more, with no cell having an expected frequency below one (McHugh, 2013).

In instances where these assumptions were violated—particularly when expected cell counts were low—Fisher’s exact test was employed. Unlike the χ^2 test, Fisher’s exact test calculates the exact probability of the observed distribution by evaluating all possible permutations that preserve marginal totals (Mehta & Patel, 1983). This approach ensures statistical validity and reliability in analyses involving sparse data or small sample sizes, thereby mitigating the limitations of the χ^2 approximation (Field, 2009; Elliott & Woodward, 2007).

2.4.11. Qualitative analysis

To explore judicial reasoning in the assessment of expert evidence, Content Thematic Analysis (CTA) was applied to the General Standards of Admissibility dataset. CTA was selected for its theoretical flexibility and capacity to generate nuanced insights into legal decision-making. The analysis followed Braun and Clarke’s (2006) six-phase framework:

familiarisation with the data, generation of initial codes, theme development, theme review, theme definition and naming, and final reporting. These phases provided a systematic and iterative process for identifying, analysing, and reporting patterns, thereby enhancing analytical rigour and transparency. To preserve fidelity to the courts stated reasons and enhance replicability, interpretation proceeded at the semantic level, focusing on explicit references rather than inferred meanings (Braun & Clarke, 2006).

In the first phase, familiarisation involved immersion in the dataset through repeated reading and annotation of preliminary observations. In the second phase, initial codes were generated by identifying and labelling meaningful segments of text relevant to the research questions, ensuring comprehensive coverage. The third phase grouped related codes into candidate themes, while the fourth involved refining these themes by assessing their internal coherence and broader validity across the dataset. In the fifth phase, themes were clearly defined, boundaries delineated, and labels assigned to capture their conceptual essence. A thematic map was developed to illustrate the relationships between themes, sub-themes, and codes. Finally, the sixth phase entailed reporting, where themes were integrated into a coherent narrative supported by illustrative extracts and linked to the research questions and theoretical context.

The analysis was conducted from a realist/essentialist epistemological stance, assuming a direct relationship between language and meaning. Themes were identified deductively, guided by the study's focus on judicial assessments of the four statutory tests of General Admissibility: relevance, reliability, expert competency, and necessity. Coding was undertaken at the semantic level, with emphasis on explicit references to these criteria. Analytical consistency was supported by operationalising prevalence as the frequency with which courts explicitly addressed each of the four tests, alongside their ultimate decision on admissibility. This approach enabled

the identification of dominant reasoning patterns and advanced the study's objective of clarifying how admissibility standards are applied in practice.

CTA was also conducted on cases involving fresh evidence on appeal, focusing on judicial application of the four statutory tests under Section 23(2) of the Criminal Appeal Act (1968): grounds for appeal, reasonable explanation for non-adduction at trial, admissibility, and capability of belief. Keyword searches facilitated targeted coding, and each instance was analysed in relation to the type of forensic evidence presented, the statutory test applied, and the court's determination. Thematic patterns were subsequently quantified to capture the relative emphasis placed on each statutory criterion. This structured yet interpretive approach provided a comprehensive understanding of appellate reasoning and helped resolve conceptual ambiguities surrounding the application of evidentiary standards.

2.5.10. Data Cleaning and Missing Value Analysis

Standardisation, documentation, and transparency in data handling have increased attention to missing data, one of the most persistent challenges in quantitative research (Tabachnick & Fidell, 2014). Yet procedures such as screening for outliers, handling missing values, and testing distributional normality remain underreported (Osborne, 2010; Van den Broeck et al., 2005). The purpose of data cleaning is to identify and correct errors or, at minimum, reduce their influence on results.

Van den Broeck et al. (2005) describe data cleaning as an iterative process of screening, diagnosing, and editing anomalies, and emphasise transparency through reporting procedures, error types, and their impact on findings.

In this study, an initial screening evaluated the frequency and distribution of missing data across all coded variables. SPSS (Version 28) was used to analyse the extent and pattern of

missing numerical data. Given the structured format of BAILII judgments, this screening was sufficient to ensure integrity. Where missing values stemmed from uncoded items, original judgments were re-examined and updated. Consequently, no cases or variables were excluded, and the final dataset was deemed complete for analysis.

2.6. Findings

The findings are presented in two parts, corresponding to Study 1a and Study 1b. Study 1a examined the Appeal Court's application of General Standards of Admissibility, while Study 1b examined the treatment of fresh evidence on appeal.

General Standards of Admissibility (Study 1a)

This section begins with a presentation of descriptive statistics. An analysis of appeal court decisions concerning the admissibility of forensic evidence, specifically DNA, digital and fingerprint evidence is presented. The primary objective was to identify patterns and associations in the courts assessment of the general standards of admissibility. To test the study's hypotheses, chi-square analyses were conducted to determine whether there were statistical associations between the four Criminal Practice Direction s.7.1.1. criteria and the court's admissibility decisions.

To complement the quantitative analysis, content thematic analysis was employed to explore how the courts interpret and apply the four limbs of the CrimPD s.7. This qualitative approach provided deeper insight into judicial reasoning and the operationalisation of general admissibility standards.

Study 1b. Fresh Evidence on Appeal

The second part of the findings focused on fresh evidence. Descriptive statistics are first presented to outline the nature and distribution of the evidence. To test the study's hypotheses, chi-square analysis was conducted to determine whether there were statistical associations between the court application of the s23(2) tests and the court's decision to admit fresh evidence. Additionally, two exploratory hypotheses were tested: (1) whether admissibility decisions were associated with factors from the investigatory and evidentiary stages of the original proceedings,

and (2) whether there was a relationship between the types of evidence presented at trial and those introduced on appeal.

Thematic analysis was again used to examine how the courts assessed the four statutory criteria governing fresh evidence on appeal. This analysis revealed consistent patterns in judicial reasoning and highlighted areas of unresolved ambiguities in the interpretation of these criteria.

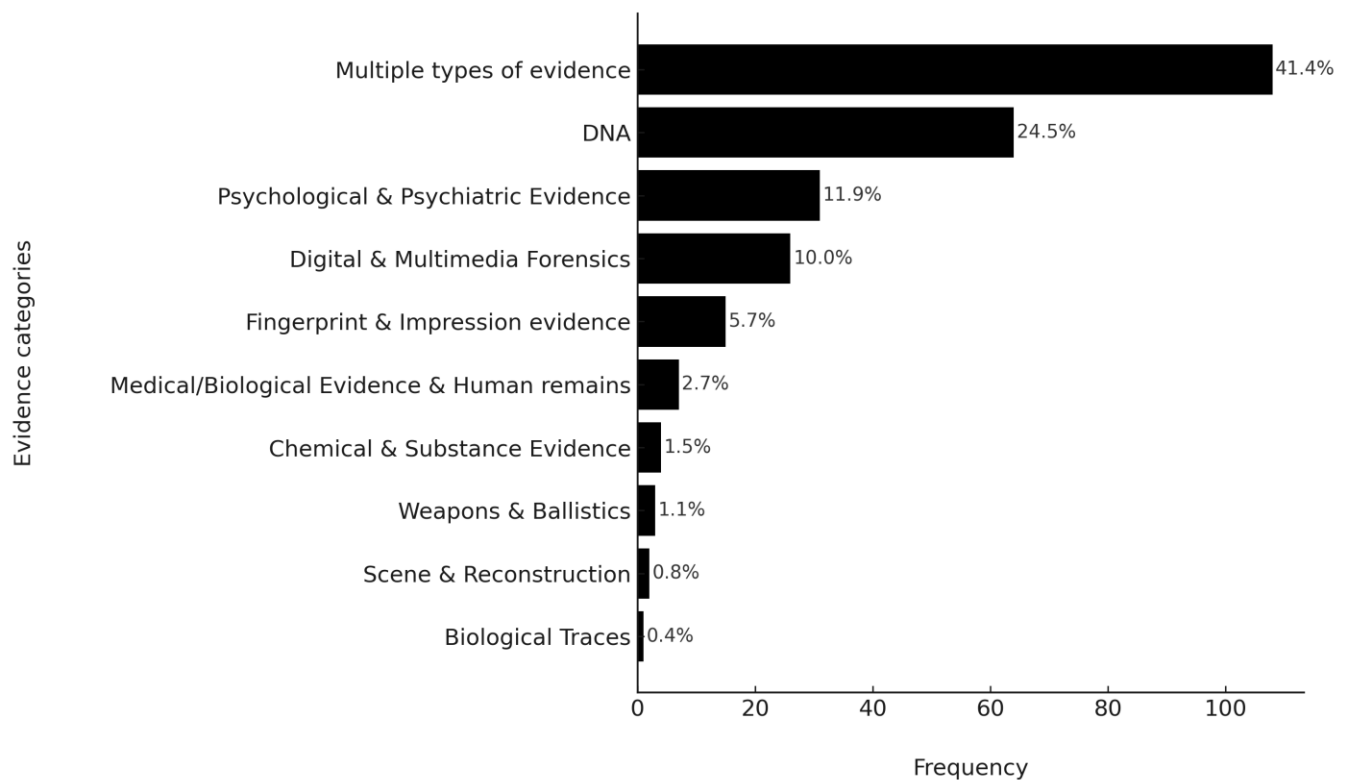
2.6.1. General Standards of Admissibility

Among the 305 appeal cases reviewed, forensic evidence was presented in 261 cases. Of these, the evidence was admitted in 242 cases (92.7%) and excluded in 19 cases (7.3%). Despite the high rate of admission, explicit reference to General Standards of Admissibility legislation was made in only 22 cases (8.4%), indicating a potential gap between evidentiary practice and legislative citation. A detailed breakdown of forensic evidence frequencies is illustrated in Figure 2.4.

Within the 261 cases where forensic evidence was presented, multiple types of evidence were introduced in 106 cases (40.6%). DNA evidence was the most frequently presented, appearing in 110 cases (42.1%). It was the sole type of evidence in 66 cases (25.3%) and was presented alongside other types in 128 cases (49.0%). Digital forensic evidence was introduced in 44 cases (16.9%), appearing exclusively in 26 cases (10.0%) and in combination with other types in 17 cases (6.5%). Fingerprint evidence was presented in 40 cases (15.3%), with 15 cases (5.7%) featuring it alone and 25 cases (9.6%) in conjunction with other evidence.

Figure 2.4

Categories of Forensic Evidence presented at the Criminal Court of Appeal



Note. This bar chart illustrates the categories of forensic evidence presented in appellate court hearings. Categories include Scene and Reconstruction (e.g., accident analysis, contamination, recovery); Medical/Biological and Human Remains (e.g., pathology, post-mortem, radiology); Biological Traces (e.g., blood, hair, transfer materials); Trace and Contact Evidence (e.g., fibres, debris, clothing damage); Weapons and Ballistics (e.g., firearms, toolmarks, residue); Impression Evidence (e.g., fingerprints, footwear); Digital and Multimedia Forensics (e.g., imaging, voice, document analysis); Chemical and Substance Evidence (e.g., toxicology, drug composition); Fire and Heat Evidence (e.g., fire, explosives); Psychological and Psychiatric Evidence (e.g., assessments, neurological evaluations); and Biomechanics and Movement Evidence (e.g., odontology, injury analysis). These classifications reflect the multidimensional scope of forensic contributions and support structured interpretation of evidentiary patterns.

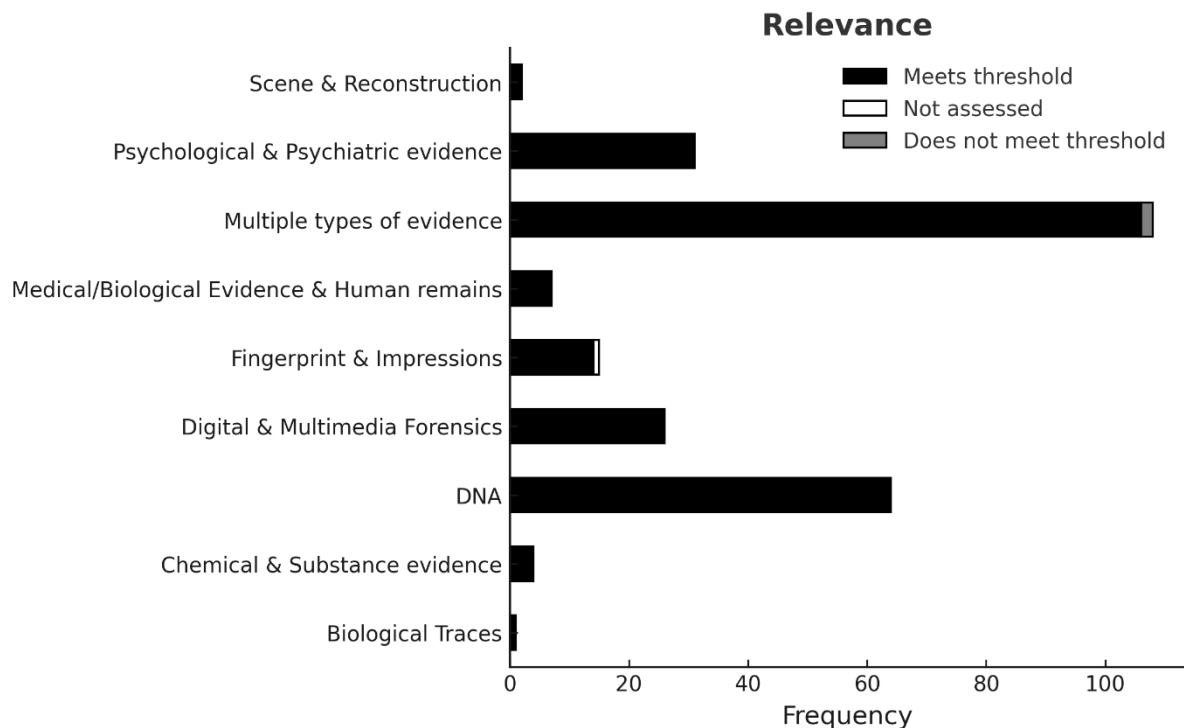
2.6.2. Tests of General Admissibility

Relevance of the evidence

Of the 261 cases in which forensic evidence was presented, the Court of Appeal assessed its relevance in 260 cases (99.6%). Among these, forensic evidence was deemed relevant in 258 cases (98.9%), while only two cases (0.8%) were assessed as not relevant. In one case (0.4%), the assessment of relevance was either not reported or not completed. These findings suggest a high level of judicial recognition of the probative value of forensic evidence in appellate proceedings. Figure 2.5 illustrates the distribution of the court's relevance assessments across forensic evidence categories.

Figure 2.5

Appeal Court Assessments of the Relevance of Expert Evidence across Forensic Categories



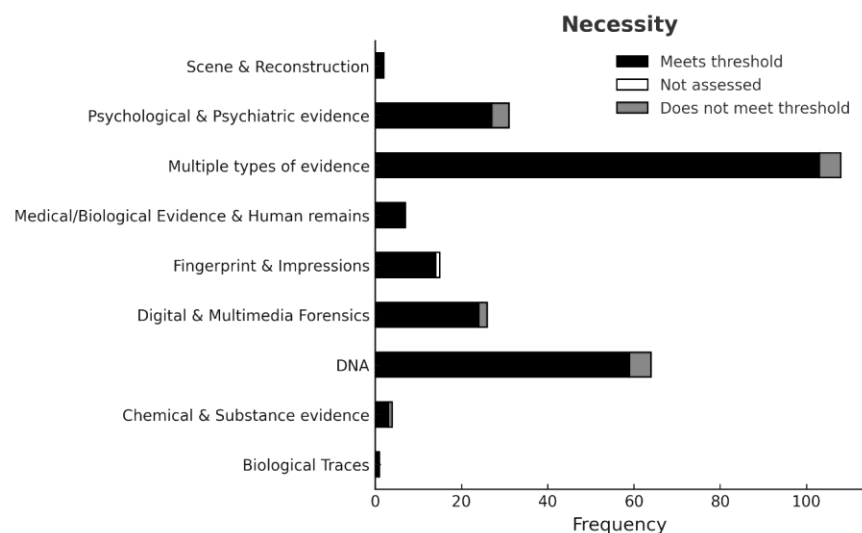
Note. This bar chart shows the distribution of court assessments of the relevance of expert evidence across categories of forensic science. Black bars indicate instances where evidence met the relevance threshold, white bars denote cases where relevance was not assessed, and grey bars represent instances where evidence did not meet the threshold. The results reveal marked variation across evidence types, with DNA and “multiple types of evidence” most often judged relevant, whereas biological traces, chemical evidence, and scene reconstruction were seldom considered.

Necessity of the evidence

Of the 261 cases in which forensic evidence was presented, the necessity of the evidence was evaluated by the court in 260 cases (99.6%). In 243 cases (93.1%), the evidence was deemed necessary to the legal proceedings, whereas in only two cases (0.8%) it was considered unnecessary. In one case (0.4%), the assessment of necessity was either not reported or not completed. These findings underscore the judiciary’s consistent recognition of forensic evidence as a critical component in appellate review. Figure 2.6 presents the distribution of the court’s necessity assessments across forensic evidence categories.

Figure 2.6

Appeal Court Assessments of the Necessity of Expert Evidence



Note. This bar chart shows how courts assessed the necessity of expert evidence across categories of forensic science. Bars indicate whether evidence met the necessity threshold, was not assessed, or did not meet the threshold.

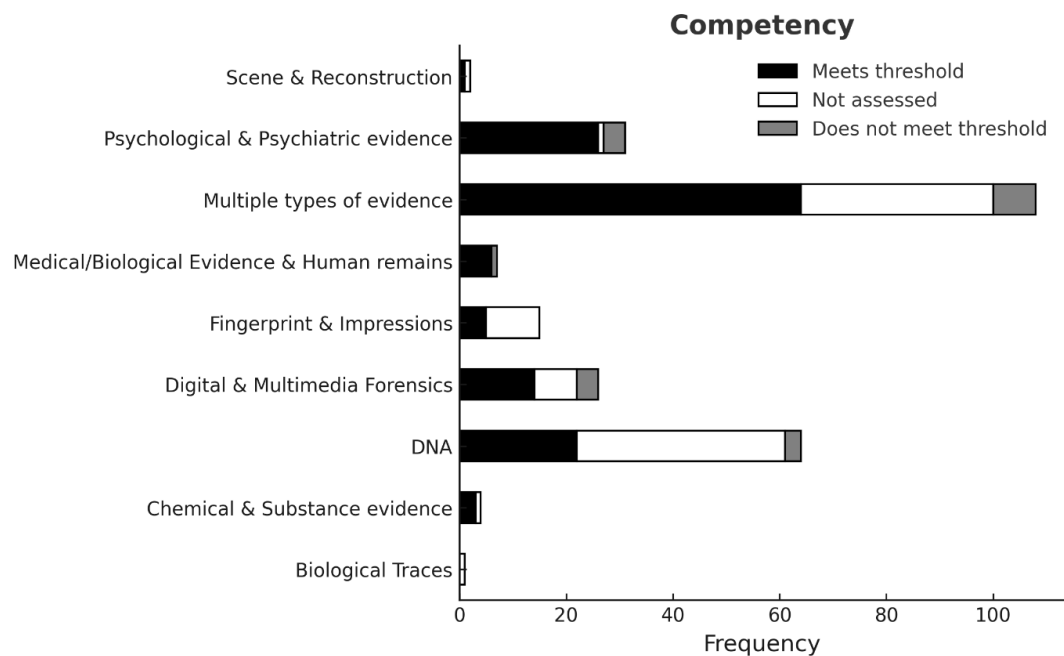
Expert Competency

Expert competency was evaluated in 164 of the 261 cases (63.1%). In the majority of these cases ($n = 144$; 55.2%), the courts raised no concerns regarding the expert qualifications or professional competence. However, deficiencies in expert competency were identified in 20 cases (7.7%), suggesting that while forensic expertise is generally accepted, lapses in professional standards do occur. Notably, in 97 cases (37.2%), no assessment of expert competency was reported or conducted, indicating a potential inconsistency in judicial scrutiny of expert qualifications. Figure 2.7 illustrates the distribution of competency evaluations across forensic evidence categories.

Concerns pertaining to expert credentials were documented in seven cases involving DNA, digital, and fingerprint evidence. These concerns emerged at distinct stages of the legal process: four cases during trial and three during appeal. Judicial scrutiny was directed equally toward experts presenting DNA and digital evidence ($n = 3$ each; 50%), whereas no such concerns were recorded for fingerprint experts. This selective pattern of evaluation suggests that certain forensic domains—inter alia, those involving technologically complex evidence—may be subject to heightened judicial oversight. Figure 2.7 illustrates the distribution of the courts' assessments of expert competency across evidence categories.

Figure 2.7

Court Assessments of Expert Competency Across Evidence Categories



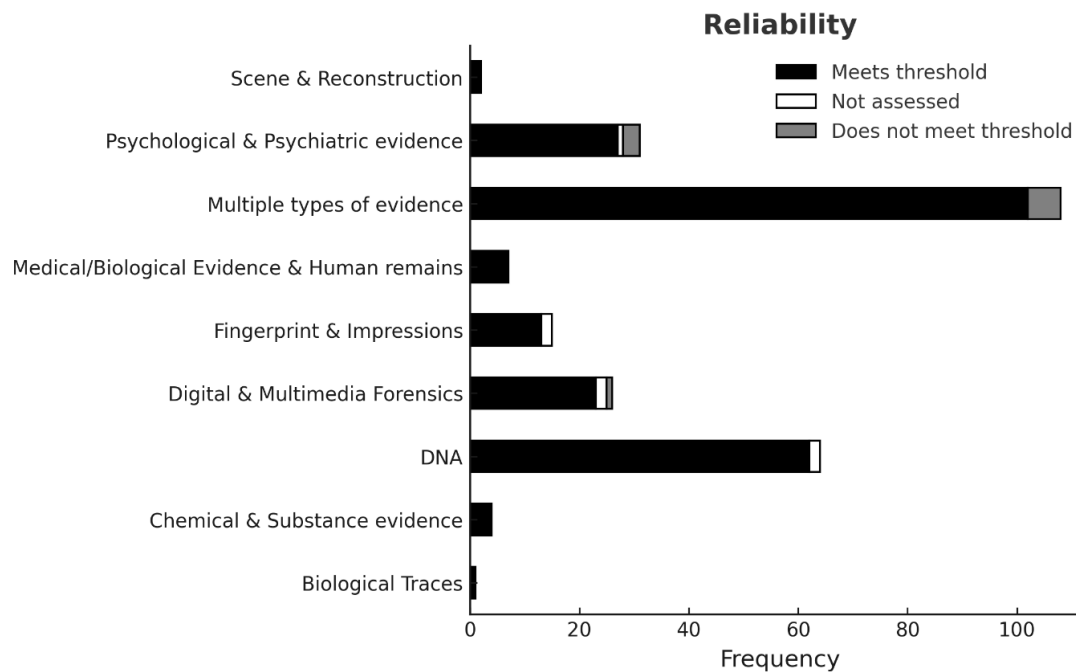
Note. This bar chart shows how courts assessed expert competency across categories of forensic science. Bars indicate whether competency met the threshold, was not assessed, or did not meet the threshold.

Evidentiary reliability

The reliability of the evidence was assessed by the court in 254 of the 261 cases (97.3%). In the majority of these cases ($n = 244$; 93.5%), the evidence was deemed reliable, whereas in 10 cases (3.8%) it was assessed unreliable. In seven cases (2.7%), the assessment of reliability was either not conducted or not reported. These findings suggest a strong judicial presumption of scientific validity in forensic submissions, although the presence of reliability concerns in a subset of cases highlights the importance of ongoing scrutiny. Figure 2.8 illustrates the frequency distribution of the courts' reliability assessments across forensic evidence categories.

Figure 2.8

Appeal Court Assessments of the Reliability of Expert Evidence



Note. This bar chart shows how courts assessed the reliability of expert evidence across categories of forensic science. Bars indicate whether reliability met the threshold, was not assessed, or did not meet the threshold.

2.6.3. Tests of Hypotheses – General Standards of Admissibility

Hypothesis 1. Relevancy of Expert Evidence

It was hypothesised that forensic evidence would be more likely to be admitted when the evidence was assessed as being relevant. A chi-square test of independence was initially considered to examine the association between the courts assessment of the relevance and the decision to admit the forensic evidence. However, the test assumptions were violated, with 50% of cells having expected counts less than 5 and a minimum expected count of .22. Consequently,

Fisher's exact test was conducted to assess the association between the court's assessment of evidential relevance (relevant vs not relevant) and the admissibility decision (admitted vs not admitted).

The test did not reveal a statistically significant association, $p = .204$, $N = 261$. The strength of the association was small, $\phi = .11$ (Cohen, 2013), indicating a weak relationship between relevance assessment and admissibility. Descriptive statistics showed that of the 258 cases assessed as relevant, 240 (93.0%) were admitted and 18 (7.0%) were not admitted. These findings suggest a trend towards admitting relevant evidence; however, the association was not statistically significant, and the effect size was weak, indicating limited practical influence in this sample.

Hypothesis 2. Necessity of Evidence

It was hypothesised that forensic evidence would be more likely to be admitted when the evidence was assessed as being necessary. The chi-square test assumptions were violated, with 25% of cells having expected counts less than 5 and a minimum expected count of 1.31. Therefore, Fisher's exact test was computed to examine the association between the court's necessity assessment and admissibility decision.

The test revealed a statistically significant association, $p < .001$, $N = 261$. The strength of the association was moderate, $\phi = .389$ (Cohen, 2013), indicating a meaningful relationship between necessity assessment and admissibility determinations. Descriptive statistics showed that of the 243 cases assessed as necessary, 232 (95.5%) were admitted and 11 (4.5%) were excluded. In contrast, of the 18 cases not assessed as necessary, only 10 (55.6%) were admitted and 8 (44.4%) were not admitted. These results support the hypothesis and highlight the importance of necessity assessments in judicial decision-making.

Hypothesis 3. Competency of Expert

It was hypothesised that there would be a statistically significant association between the court's evaluation of the expert's competency and the decision to admit the evidence. A chi-squared test was conducted to examine the relationship between the competency assessment (competent vs. competency not confirmed)⁵ and admissibility (admitted vs not admitted).

The test revealed there was no statistically significant association $\chi^2 (1, N = 261) = 4.61$, $p = .032$. The strength of the association was small $\phi = -.13$ (Cohen, 2013), indicating a weak negative relationship between competency evaluation and the admissibility decision. Descriptive statistics showed that when the expert was assessed as competent ($n = 144$), evidence was admitted in 138 cases (95.8%) and not admitted in 6 cases (4.2%). When competency was not confirmed ($n = 117$), evidence was admitted in 104 cases (88.9%) and not admitted in 13 cases (11.1%).

Hypothesis 4. Reliability of Evidence

It was hypothesised that there would be a statistically significant association between the court's evaluation of the evidentiary reliability and the decision to admit the evidence. A chi-square test was conducted to examine the relationship between the reliability assessment (reliable vs. not reliable) and admissibility determination (admitted vs not admitted).

The test revealed a statistically significant association, $\chi^2 (1, N = 261) = 30.96$, $p < .001$. The strength of the association was moderate, $\phi = .344$ (Cohen, 2013), indicating a meaningful relationship between the reliability assessment and admissibility. Descriptive statistics showed that when the evidence was assessed as reliable ($n = 244$), it was admitted in 232 cases (95.1%)

⁵ To ensure conceptual clarity and avoid redundancy in competency categorisation, the classifications "expert competency not assessed" and "assessed as not meeting the competency threshold" were consolidated under the unified designation "competency not confirmed."

and not admitted in 12 cases (4.9%). Conversely, when the evidence was assessed as not reliable ($n = 17$), it was admitted in only 10 cases (58.8%) and not admitted in 7 cases (41.2%).

2.6.4. Qualitative Findings. General Standards of Admissibility

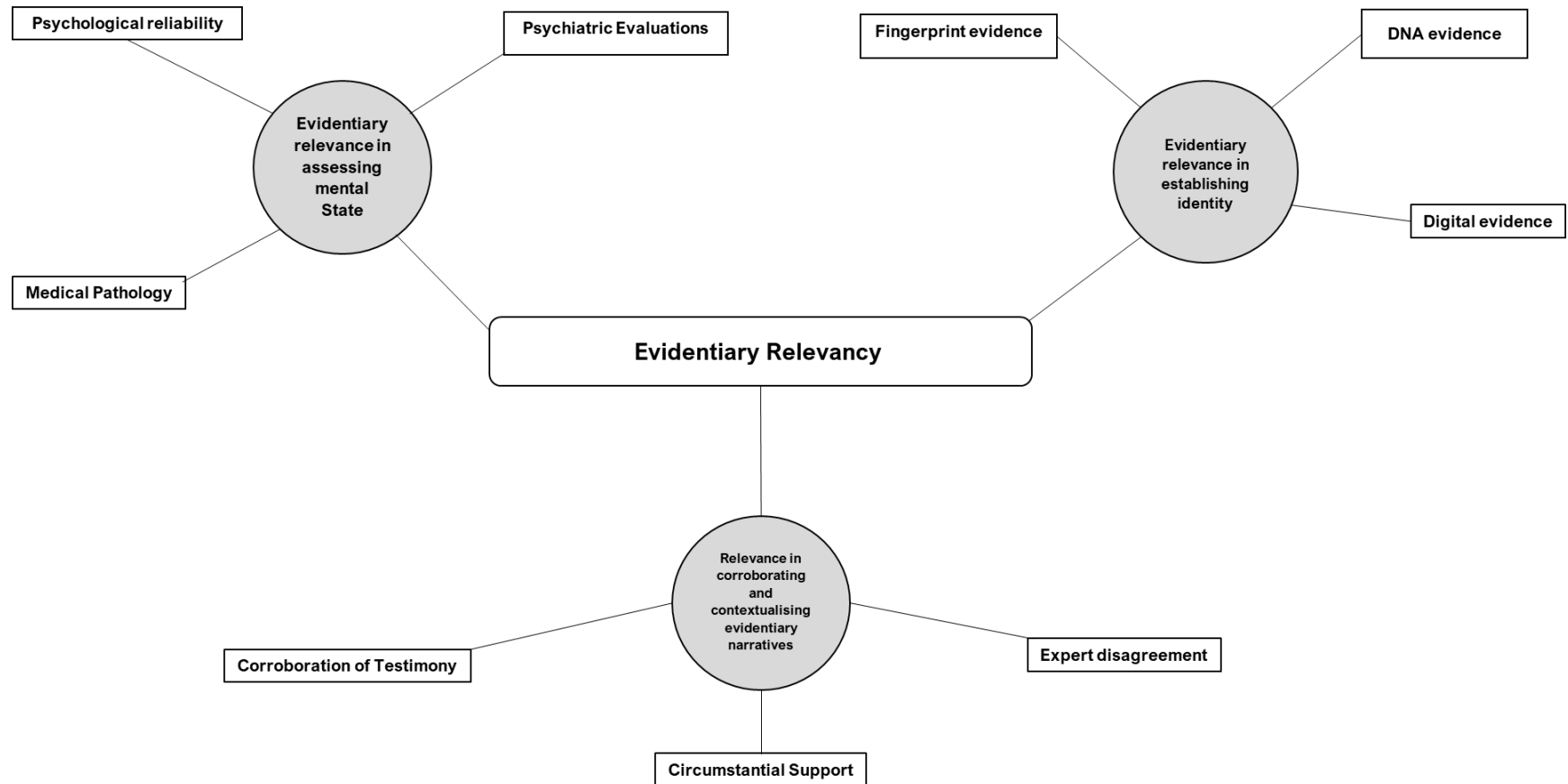
This section presents a synopsis of the thematic analysis conducted on the courts' application of the Criminal Procedure Directions (Section 7). The summary highlights the principal themes that emerged from the analysis, providing a concise yet rigorous account of the findings. To ensure transparency and to enable readers to contextualise the results within the primary data, the full thematic analysis—including all relevant excerpts and their corresponding interpretations can be accessed from the Middlesex University Research Repository. The overview below, therefore, serves as a focused synthesis of the key insights, offering a coherent foundation for subsequent discussion and interpretation.

Relevance of Expert Evidence

This thematic analysis explores how the Court of Appeal evaluates the relevance of forensic expert evidence in criminal proceedings. The analysis is anchored in Criminal Practice Directions 7.1.1(a), which stipulates that expert opinion is admissible in criminal proceedings if: “it is relevant to a matter in issue in the proceedings.” Three core themes emerge: (1) Evidentiary relevance in establishing identity, (2) Evidentiary relevance in assessing mental state, and (3) Relevance in corroborating and contextualising evidentiary narratives.

Figure 2.9

Thematic Map for Appeal Court Assessment of Evidentiary relevancy



The analysis revealed that the court adopted a structured yet sometimes contested approach to assessing the relevance of forensic evidence in criminal appeals. The courts generally adhered to the principle that expert evidence must logically assist in proving a fact in issue. This was evident across domains such as psychiatric evaluations, forensic pathology, and DNA analysis. However, while courts often treated forensic pathology and DNA as indispensable, their reliance on these forms of evidence occasionally raised concerns about overconfidence in scientific authority, particularly when methodological limitations or interpretive ambiguities were present. For example, in *Harding, R. v* [2010] EWCA Crim 2145, the court admitted DNA evidence despite acknowledged statistical limitations, suggesting a tendency to prioritise contextual coherence over quantitative rigour.

The judiciary also demonstrated a cautious engagement with psychological and psychiatric evidence, especially in cases involving mental state and reliability. While the court was willing to admit such evidence when it directly informed legal criteria—such as diminished responsibility or trial competence—they also exercised restraint, excluding expert testimony deemed insufficiently probative. This approach reflects a commitment to legal relevance but also reveals foreseeable challenges between evolving clinical understandings and rigid legal thresholds. In cases like *Gordon, R. v* [2018] EWCA Crim 1555, the exclusion of post-conviction psychological evidence, despite its diagnostic validity, suggests that court's may undervalue explanatory nuance when it conflicts with established narratives or procedural finality.

From this analysis, several critical insights emerged. First, while the courts generally strive to uphold evidentiary integrity, their assessments of relevance are not free from interpretive difficulties, especially in the face of expert disagreement or interdisciplinary

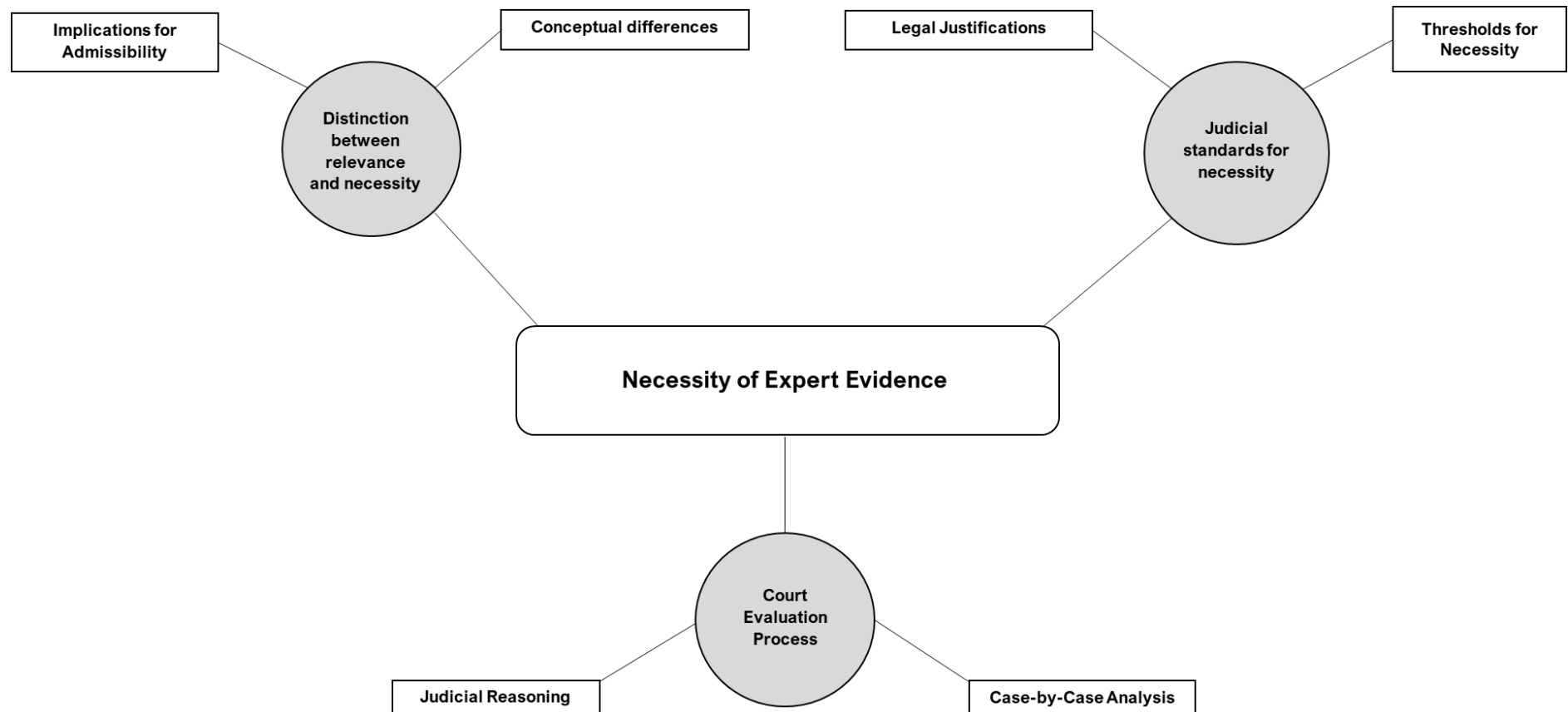
complexity. Cases involving conflicting psychiatric opinions or contested fingerprint identifications illustrate the judiciary's struggle to reconcile scientific uncertainty with legal decisiveness. Second, the increasing reliance on digital forensic evidence reflects a broader shift in evidentiary practice yet also raises questions about data interpretation and privacy. Finally, the courts' handling of corroborative evidence—especially in cases involving vulnerable witnesses—demonstrates a commitment to procedural fairness, though it occasionally risks conflating competence with reliability. Overall, the analysis suggests that while the Court of Appeal maintains a principled framework for evaluating forensic relevance, its application is uneven and warrants ongoing scrutiny to ensure that scientific evidence is not only admissible but also appropriately weighted within the legal process.

Necessity of Expert Evidence

This thematic analysis examined how the Court of Appeal evaluates the necessity of forensic expert evidence in criminal proceedings. The analysis is grounded in Criminal Practice Directions 7.1.1(b), which stipulates that expert opinion evidence is admissible in criminal proceedings if “*it is needed to provide the court with information likely to be outside the court's own knowledge and experience.*” Three core themes emerge: (1) judicial standards of necessity, (2) distinction between relevance and necessity, and (3) the courts evaluation process.

Figure 2.10

Thematic Map for Appeal Court Assessment of Evidentiary Necessity



This analysis revealed that courts differentiate necessity from mere relevance, through their application of the statutory criteria—particularly under Section 23 of the Criminal Appeal Act 1968—to determine whether evidence was highly important in the resolution of a case. Judicial reasoning was often framed by considerations of procedural fairness, timing, and the potential impact of the evidence on the safety of a conviction. In cases such as *Kenyon v R*. [2010] EWCA Crim 914 and *GS, R. v* [2018] EWCA Crim 1824, courts declined to admit fresh psychological or psychiatric evidence introduced post-trial, citing concerns about strategic delay and lack of material impact. Conversely, in *Burridge*, the court demonstrated flexibility by admitting new forensic pathology evidence that raised substantive doubts about the original verdict, suggesting that necessity can override procedural concerns when justice demands it.

The analysis also highlights the courts' role as gatekeepers in evaluating expert competence and evidentiary utility. In *Pabon*, the misuse of expert authority led to the exclusion of testimony deemed outside the expert's domain, reinforcing that necessity encompasses ethical and professional standards. The court was particularly cautious in cases involving retrospective evidence, such as *R v Osborne* and *R v O'Shea* [2010] EWCA Crim 2879, where the timing and relevance of expert findings were scrutinised against the backdrop of fairness and adjudicative coherence. The distinction between relevance and necessity was not merely conceptual but had direct implications for admissibility. Evidence deemed relevant but not materially impactful—such as DNA findings in *Cleobury, R. v* [2012] EWCA Crim 17 or proximity indicators in *Earle*—was excluded, underscoring the judiciary's insistence on necessity as a higher threshold.

This thematic analysis offered several critical insights into the appellate court's evidentiary practices. While the judiciary demonstrates rigour in applying legal standards, its approach is not without limitations. The insistence on procedural discipline may, at times, risk

excluding evidence that could offer meaningful clarification or support alternative narratives, particularly in cases involving vulnerable defendants or evolving scientific understanding. Moreover, the reliance on structured statutory tests, though principled, may constrain judicial discretion in complex or ethically nuanced cases. A recurring trade-off arises between safeguarding the integrity of the trial process and ensuring substantive justice. Overall, the analysis suggests that while the Court of Appeal maintains a principled framework for assessing necessity, its application requires ongoing scrutiny to balance legal consistency with responsiveness to evidentiary developments.

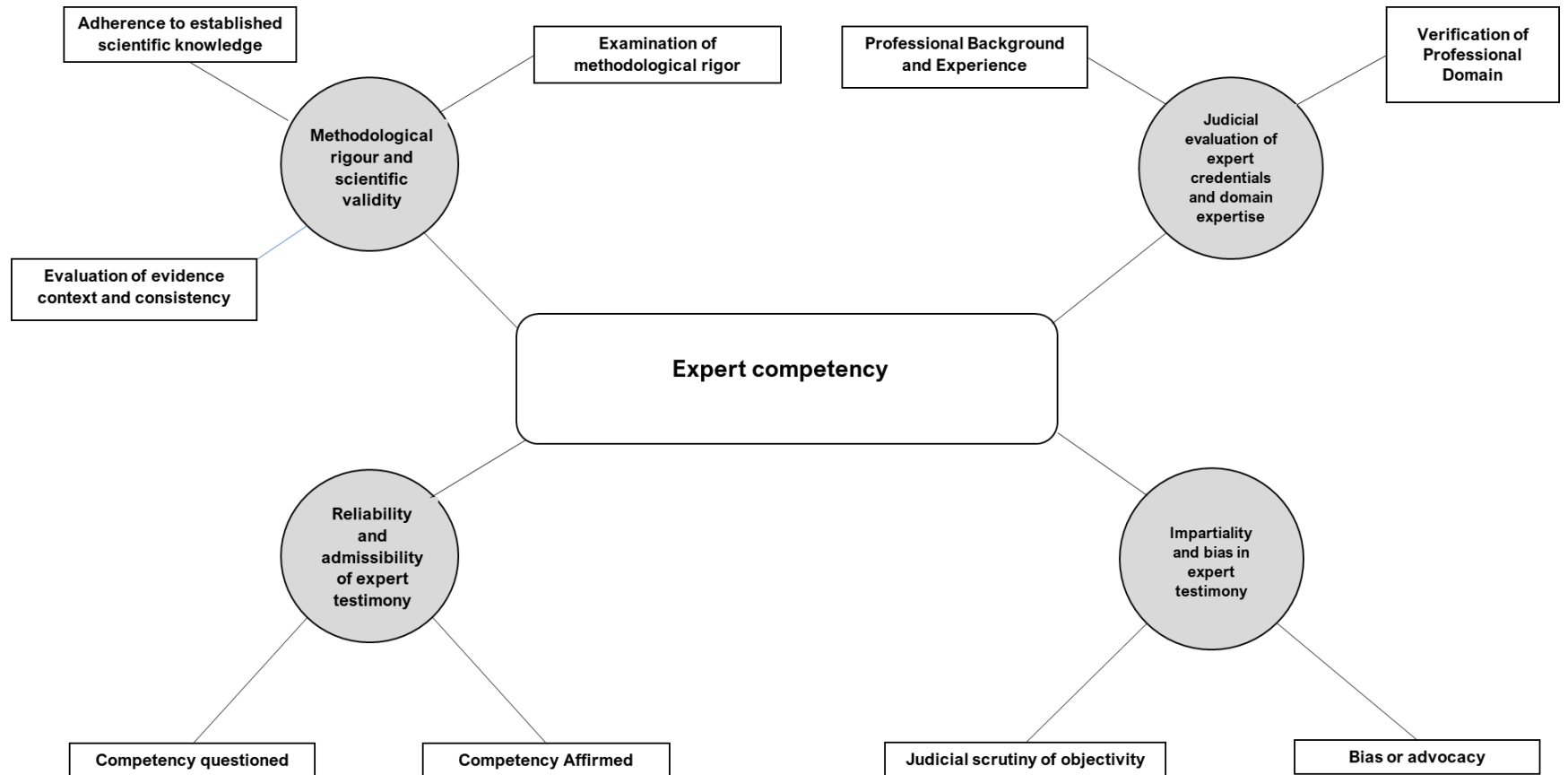
Expert Competency

This thematic analysis explored how the court evaluates the competency of the expert. The analysis is anchored in Criminal Practice Directions 7.1.1(c), which stipulates that expert opinion is admissible in criminal proceedings, if “*the witness is competent to give that opinion.*” From the analysis four dominant themes emerged: (1) Reliability and admissibility of expert testimony, (2) Methodological rigour and scientific validity, (3) Judicial evaluation of expert credentials and domain expertise, and (4) Impartiality and bias in expert testimony.

The thematic analysis revealed a structured and multifaceted approach by the appeal court in their evaluation of expert competency, grounded in legal standards and scientific principles.

Figure 2.11

Thematic Map for Appeal Court Assessment of Expert Competency



It can be surmised from the analysis that the court assesses forensic evidence through a tripartite framework comprising methodological rigour, domain-specific relevance, and evidentiary context. In *Broughton v R.* (Rev 1) [2020] EWCA Crim 1093 and *Weller, R. v* [2010] EWCA Crim 1085, the court scrutinised the scientific validity of forensic techniques, notably Low Template DNA analysis, and drew a clear distinction between theoretical acumen and practical forensic experience. Experts were expected to conform to established scientific standards and to demonstrate the capacity to apply their knowledge within the specific forensic and legal context. Judicial caution was particularly evident in *Sabi*, where blood pattern analysts were precluded from offering biomechanical interpretations, reflecting the court's insistence that expert testimony must be both scientifically credible and legally pertinent.

The analysis further revealed the court's vigilance regarding impartiality and the risk of advocacy in expert testimony. In *R v Cleobury, Oliver v R.* [2016] EWCA Crim 1053, and *O'Shea v R.* [2010] EWCA Crim 2879, expert reports resembling partisan submissions were excluded, reinforcing the principle that forensic opinion must remain objective and independent. Conversely, in *Watts and Connolly*, the court affirmed the competence of experts who demonstrated methodological neutrality and alignment with their domain of expertise. Notably, professional disagreement was not conflated with bias; in *Stewart*, divergent psychiatric opinions were deemed admissible, provided they adhered to ethical and methodological standards. This nuanced approach suggests that the court values both scientific integrity and procedural fairness, while remaining alert to rhetorical excess and disciplinary overreach.

From this analysis, several critical insights emerged. The court's evaluative framework is commendably structured, yet not without limitations. Its emphasis on domain relevance and experiential depth enhances evidentiary reliability but may inadvertently exclude innovative or

interdisciplinary perspectives that challenge orthodoxy. The reliance on established scientific consensus, though prudent, risks marginalising emergent methodologies that lack widespread validation but possess potential probative value. Moreover, the scrutiny of bias and advocacy, while essential, occasionally introduces subjectivity into judicial thresholds, raising concerns about consistency. Inter alia, the analysis reveals a judiciary committed to maintaining high standards of expert testimony, yet one that must remain responsive to evolving scientific paradigms and the epistemic complexity of forensic interpretation.

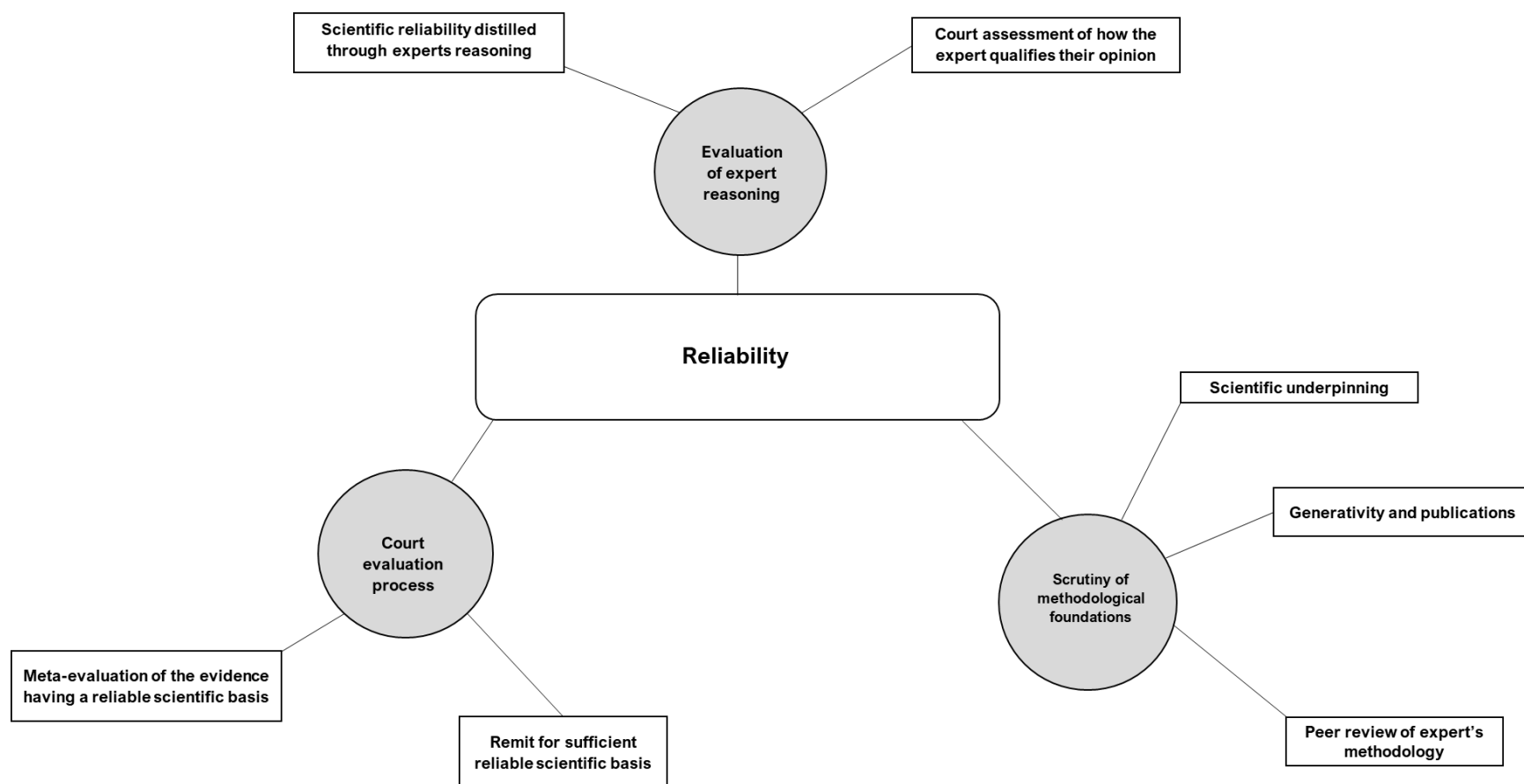
Reliability of Expert Evidence

This thematic analysis explored how the Court of Appeal evaluates the reliability of forensic expert evidence in criminal proceedings. The analysis is anchored in Criminal Practice Directions 7.1.1(d), which stipulates that expert opinion is admissible in criminal proceedings, if *“the expert opinion is sufficiently reliable to be admitted.”*

In summary, this content thematic analysis indicates that the Court of Appeal does not treat the reliability of forensic as a dynamic construct contingent upon methodological integrity, empirical validation, and evidentiary transparency. Judicial scrutiny extended beyond expert conclusions to encompass the reproducibility and peer-reviewed status of the underlying methods. In *R v Broughton*, *R. v Weller*, and *C v R.*, Low Template DNA (LTDNA) techniques were deemed admissible due to their scientific robustness, notwithstanding concerns regarding sample quantity. By contrast, in *Plummer*, *R. v* [2021] EWCA Crim 1392, the court rejected a footwear comparison method lacking empirical validation, thereby reaffirming its gatekeeping function in excluding speculative or untested science. This evidences a principled commitment to knowledge that is demonstrably reliable.

Figure 2.12

Thematic Map for Appeal Court Assessment of Evidentiary Relevance



The court's evaluative framework further emphasised the manner in which experts qualified their opinions and acknowledged methodological constraints. Reliability was not conflated with epistemic certainty; rather, it was assessed through the lens of reasoned and contextually appropriate testimony. In *Jones v R*. [2020] EWCA Crim 1021 and *Joseph v R*. [2010] EWCA Crim 2580, the court accepted evidence that was cautiously presented and transparent about its limitations, whereas in *Cobley, R. v* [2021] EWCA Crim 954 and *Popoola v R*. [2021] EWCA Crim 842, psychiatric opinions based on retrospective self-reporting without corroborative data were dismissed. This reflects a judicial preference for empirically grounded methodologies and a scepticism toward ipse dixit assertions. Across disciplines—ranging from DNA profiling and blood pattern analysis to psychological assessments—the court consistently prioritised methodological rigour and evidentiary relevance.

From this analysis, several salient insights emerged. The court's approach demonstrates a commendable commitment to evidentiary integrity, yet it also underscores a misalignment between legal admissibility and scientific uncertainty. While the prioritisation of reproducibility and peer-reviewed validation is defensible, it may inadvertently marginalise emerging or interdisciplinary methods that lack consensus but possess potential probative value. Furthermore, the reliance on expert transparency introduces a degree of subjectivity into judicial determinations, particularly when experts diverge in their interpretive frameworks. The analysis suggests that although the court's methodology is increasingly sophisticated, it must remain adaptable to evolving scientific paradigms and sensitive to the complexities inherent in forensic interpretation.

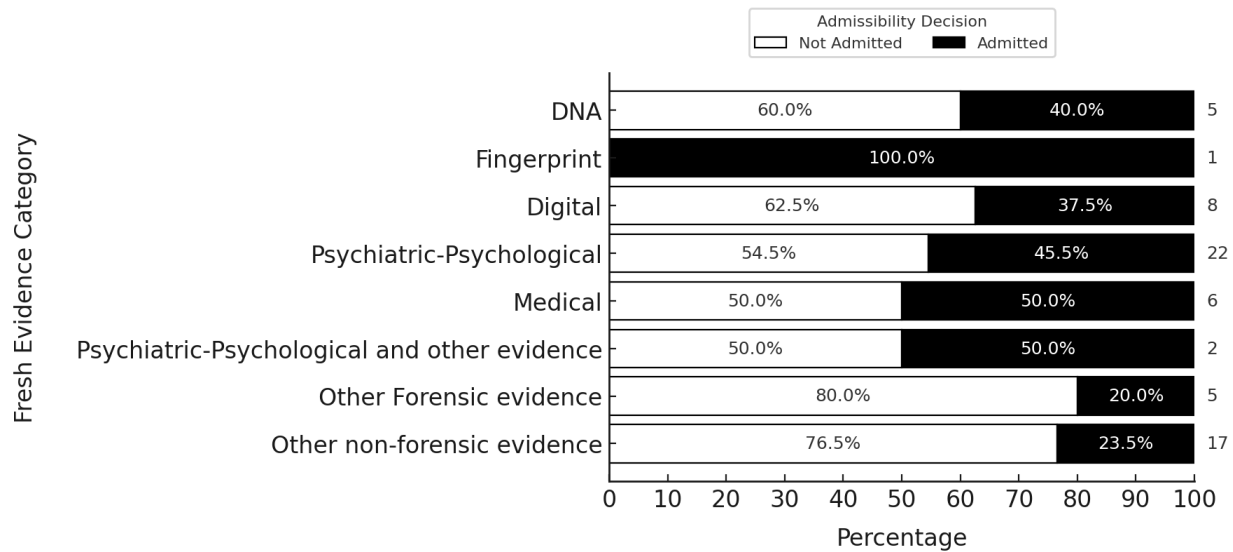
2.6.5. Fresh Evidence on Appeal (Study 1b)

Across 2010–2022, fresh evidence was introduced in 21.6% of appeals in this dataset ($n = 66$). Of these, the court admitted the evidence in 37.9% ($n = 25$) and excluded its admission in 62.1% ($n = 41$). In all cases where fresh evidence was presented (100%, $n = 66$), the court cited section 23(2) of the Criminal Appeal Act 1968. Admissibility outcomes by fresh-evidence category are shown in Figure 2.13; the annual frequency of appeals involving fresh evidence appears in Table 2.9; and domain-specific patterns by trial category are summarised in Figure 2.15.

The court assessed the credibility of fresh evidence, deeming it capable of belief in 72.7% of cases ($n = 48$) and not credible in 27.3% of cases ($n = 18$). Legal relevance was established in 31.8% of cases ($n = 21$), where the evidence provided grounds for allowing the appeal; conversely in 68.2% ($n = 45$), it was found insufficient to justify having grounds. Retrospective admissibility at the original trial was affirmed in 83.3% of cases ($n = 55$), with the remaining 16.7% ($n = 11$) deemed inadmissible. Finally, the court evaluated the rationale for the initial omission of the evidence, accepting the explanation in 68.2% of cases ($n = 45$) and rejecting it in 31.8% ($n = 21$).

Figure 2.13

Admissibility Decisions of the Court of Appeal Across Fresh Evidence Categories



Note. This bar chart shows the Court of Appeal’s admissibility decisions across categories of fresh evidence. Each bar represents a type of fresh evidence, with segments indicating the proportion admitted (black) and not admitted (white). Percentages appear within each segment, and total frequencies are displayed at the end of the bars.

Table 2.9

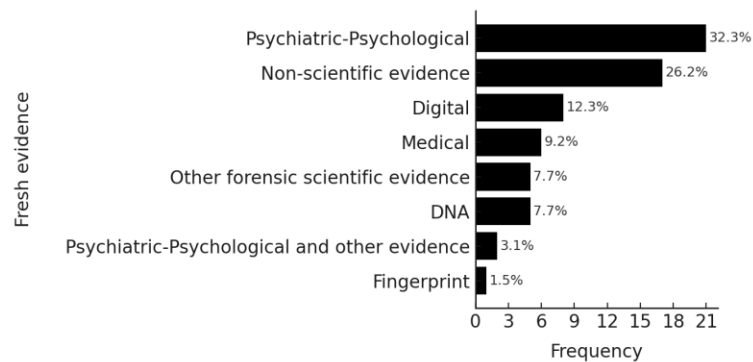
Annual Counts of Fresh Evidence Cases, 2010–2022

	Year												Total
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
Cases	381	324	197	231	200	173	204	248	331	347	265	324	3225
Fresh evidence	11	4	1	0	1	2	4	1	9	4	13	16	66

Note. This table highlights the number of criminal cases involving fresh evidence presented between 2010 to 2022.

Figure 2.14

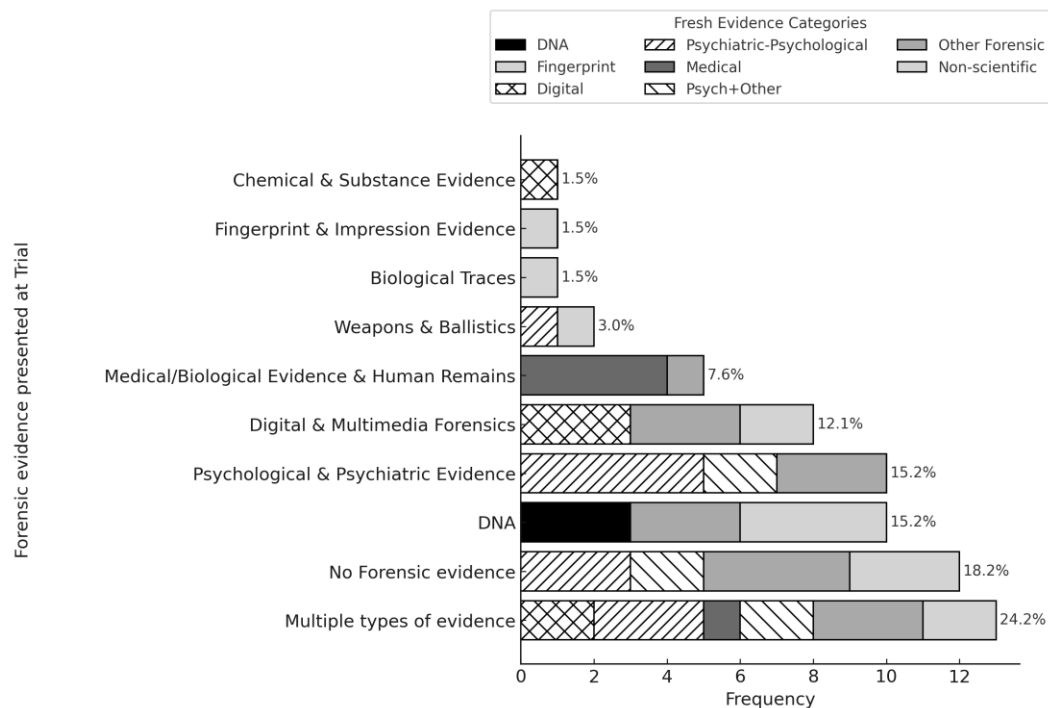
Types of Fresh Evidence Considered in Appeal Cases



Note. This figure summarises fresh evidence presented in appeal cases ($N = 66$). Non-scientific evidence refers to materials not based on forensic science techniques, including statements from solicitors or detectives and references to archived investigations. Other forensic scientific evidence encompasses technical analyses not otherwise classified, such as trace examinations and toxicology reports.

Figure 2.15

Fresh Evidence Introduced on Appeal by Trial Evidence Category



Note. This bar chart presents fresh evidence appeal cases ($N = 66$), showing the distribution of evidence categories at trial in relation to the types of fresh evidence introduced on appeal. Non-scientific evidence refers to materials not based on forensic science techniques, such as statements from solicitors or detectives and references to archived investigations. Other forensic scientific evidence encompasses technical analyses not otherwise classified, including trace examinations and toxicology reports. Each stacked bar represents a trial evidence category (y-axis), with segments indicating the frequencies of corresponding fresh evidence. Percentages at the end of each bar show each trial category's contribution to the overall dataset.

2.6.6. Test of Hypotheses—Tests of Fresh Evidence on Appeal

Hypothesis 5. It was hypothesised that there would be statistically significant association between the judicial determination that fresh evidence is “capable of belief” and the subsequent decision to admit the evidence. To test this hypothesis, a chi-Square test was conducted using data from 66 valid cases. The assumptions for the chi-Square test were met, as all expected cell counts were above 5, with the minimum expected count being 6.82. The results revealed a significant association between the variables, with the Pearson Chi-Square value of $\chi^2 (1) = 15.091$ and a p-value less than .001. This was further supported by the continuity correction ($\chi^2 = 12.959, p < .001$), the likelihood ratio ($\chi^2 = 21.119, p < .001$), and the linear-by-linear association ($\chi^2 = 14.863, p < .001$).

Descriptive statistics from the crosstabulation showed that when fresh evidence was deemed not capable of belief, none of the 18 cases resulted in the evidence being admitted. In contrast, when the evidence was considered capable of belief, 25 of the 48 of fresh evidence applications (52.1%) were admitted. This stark contrast underscores the potential influence of judicial belief on admissibility decisions. To ensure robustness, Fisher's Exact Test was also conducted and yielded a two-sided p-value of less than .001, confirming the statistical significance of the association.

The effect size was measured using Phi and Cramer's V, both yielding a value of 0.478, indicating a moderate to strong association between the belief in the evidence and its admissibility. This suggests that judicial assessments of credibility play a substantial role in determining whether fresh evidence is admitted. Overall, the findings support this hypothesis, demonstrating that the court decision of whether fresh evidence is “capable of belief” is significantly associated with the decision to admit that evidence. This has implications for understanding how credibility assessments influence legal outcomes in judicial proceedings.

Hypothesis 6. It was predicted that there would be a statistically significant relationship between the judicial assessment that fresh evidence “affords grounds for allowing the appeal” and the court’s decision to admit the evidence. To evaluate this hypothesis, a Pearson Chi-Square test was conducted using data from 66 valid cases. The assumptions for the Chi-Square test were satisfied, as all expected cell counts exceeded the minimum threshold of 5, with the lowest expected count being 7.95. The test revealed a highly significant association between the judicial assessment of grounds for appeal and the admissibility of fresh evidence. Specifically, the Pearson Chi-Square value was $\chi^2 (1) = 43.065$, with a p-value less than .001. This result was corroborated by the continuity correction ($\chi^2 = 39.564, p < .001$), the likelihood ratio ($\chi^2 = 48.142, p < .001$), and the linear-by-linear association ($\chi^2 = 42.412, p < .001$).

Descriptive statistics from the crosstabulation showed a clear pattern. Among the 45 cases where the evidence was not assessed as affording grounds for appeal, only 5 (11.1%) were admitted. In contrast, of the 21 cases where the evidence was deemed to afford grounds for appeal, 20 (95.2%) were admitted. This stark contrast highlights the strong influence of judicial assessment on the admissibility decision. To ensure robustness, Fisher’s Exact Test was also

conducted and confirmed the significance of the association, with both the two-sided and one-sided p -values being less than .001.

The effect size was measured using Phi and Cramer's V, both yielding a value of 0.808, indicating a very strong association between the variables. This suggests that when fresh evidence is judged to provide grounds for allowing an appeal, it is overwhelmingly likely to be admitted by the court. These findings strongly support the hypothesis and underscore the courts evaluation in determining the admissibility of fresh evidence. The results suggest that the perceived relevance of evidence to the appeal outcome is a key factor in judicial decision-making.

Hypothesis 7. It was predicted that there would be a statistically significant relationship between the appellate court's assessment that fresh evidence would have been admissible at the original hearing and its ultimate decision to admit the evidence. To test this, a Pearson Chi-Square test was conducted using data from 66 valid cases. The assumption of expected cell counts was partially violated, with one cell (25%) having an expected count less than 5 (minimum expected count = 4.17). Due to this violation, Fisher's Exact Test was also used to validate the findings.

The Pearson Chi-Square test revealed a statistically significant association between the variables, with $\chi^2 (1) = 8.049$ and a p -value of .005. The continuity correction yielded $\chi^2 = 6.233$, $p = .013$, and the likelihood ratio was $\chi^2 = 11.787$, $p < .001$. The linear-by-linear association also supported the relationship with $\chi^2 = 7.927$, $p = .005$. Fisher's Exact Test confirmed the significance of the association, with a two-sided p -value of .005 and a one-sided p -value of .003. Descriptive statistics from the crosstabulation showed that when the appellate court assessed the evidence as not admissible at the original hearing, none of the 11 cases resulted in admission.

Conversely, when the evidence was deemed admissible at the original hearing, 25 of the 55 fresh evidence applications (45.5%) were admitted. This contrast suggests that the court's retrospective assessment of admissibility plays a meaningful role in its final decision.

The effect size, measured using Phi and Cramer's V, was .349, indicating a moderate association between the variables. While not as strong as in previous hypotheses, this still reflects a meaningful relationship. Overall, the findings support the hypothesis, suggesting that the appeal courts assessment on whether evidence would have been admissible originally is significantly associated with the court decision to admit that evidence at appeal.

Hypothesis 8. It was posited that there would be a statistically significant relationship between the appellate court's assessment that there is a "reasonable explanation" for the failure to adduce fresh evidence at the original trial and the court's subsequent decision to admit the evidence. To test this hypothesis, a Pearson Chi-Square test was conducted using data from 66 valid cases. The assumptions for the Chi-Square test were met, as all expected cell counts were above the minimum threshold of 5, with the lowest expected count being 7.95. The test revealed a statistically significant association between the presence of a reasonable explanation and the admissibility decision. Specifically, the Pearson Chi-Square value was $\chi^2 (1) = 18.780$, with a p -value less than .001. This result was supported by the continuity correction ($\chi^2 = 16.494, p < .001$), the likelihood ratio ($\chi^2 = 25.751, p < .001$), and the linear-by-linear association ($\chi^2 = 18.496, p < .001$).

Descriptive statistics from the crosstabulation showed that when no reasonable explanation was provided, none of the 21 cases resulted in the evidence being admitted. In contrast, when a reasonable explanation was present, 25 of the 45 fresh evidence applications (55.6%) led to the evidence being admitted. This clear disparity highlights the importance of

judicial consideration of the reasons for failing to present evidence at the original trial. To ensure robustness, Fisher's Exact Test was also conducted and confirmed the statistical significance of the association, with both the two-sided and one-sided p -values being less than .001.

The effect size, measured using Phi and Cramer's V, was .533, indicating a moderate to strong association between the variables. This suggests that the appellate court's recognition of a reasonable explanation for the delay in presenting evidence significantly influences its decision to admit that evidence. Overall, the findings support this hypothesis and underline the role of judicial discretion in evaluating procedural fairness and its impact on evidentiary outcomes.

2.6.7. Investigatory and Evidentiary factors and Fresh Evidence Admissibility

To address whether admissibility varies by investigatory/evidentiary factor, Figure 2.17 profiles the distribution of outcomes; the next subsection tests these differences formally.

For hypothesis 9 it was predicted that the courts' decisions to admit the fresh evidence on appeal would be influenced by specific factors during the investigatory or evidentiary stages of the legal proceedings. These included whether defendants provided an alibi, the presence of circumstantial evidence, whether the defendant was treated as a suspect, and whether the defendant pleaded guilty or was convicted at trial. Chi-square tests of independence were conducted to examine the association between each factor and the admissibility of fresh evidence. Where assumptions of minimum expected cell frequencies were violated, Fisher's exact test was used.

To assess the impact of providing an **alibi**, a chi-square test of independence was conducted. The test yielded no statistically significant association between the provision of an alibi and the court's decision to admit fresh evidence, $\chi^2 (1, N = 66) = .006, p = .937$. The effect size measured Cramer's V was .01, which according to Cohen's (2013) guidelines indicates

negligible association. Of the 66 cases, 40 defendants (60.6%) did not provide an alibi, and 26 (39.4%) did. Among those who did not provide an alibi, 25 (61.0%) had their fresh evidence deemed inadmissible, while 15 (60%) had it admitted. Among those who did provide an alibi, 16 (39%) had their evidence deemed inadmissible, and 10 (40%) had it admitted. The finding suggest that the provision of an alibi does not significantly influence admissibility of fresh evidence.

The presence of **circumstantial evidence** was examined using Fisher's exact test due to violation of the chi-square assumption, with 50% of cells having counts less than five. The test indicated no statistically significant association, $p = 1.000$. The effect size, measured using Cramer's V, was .003, which falls well below Cohen's threshold for a small effect, indicating a negligible association. Of the 66 cases, 58 (87.9%) involved circumstantial evidence, and 8 (12.1%) did not. Among those with circumstantial evidence, 36 (87.8%) had their fresh evidence deemed inadmissible, while 22 (88.0%) had it admitted. Among those without circumstantial evidence, 5 (12.2%) had their evidence deemed inadmissible, and 3 (12.0%) had it admitted. Therefore, in the current sample circumstantial evidence did not significantly influence the court's decision to admit fresh evidence.

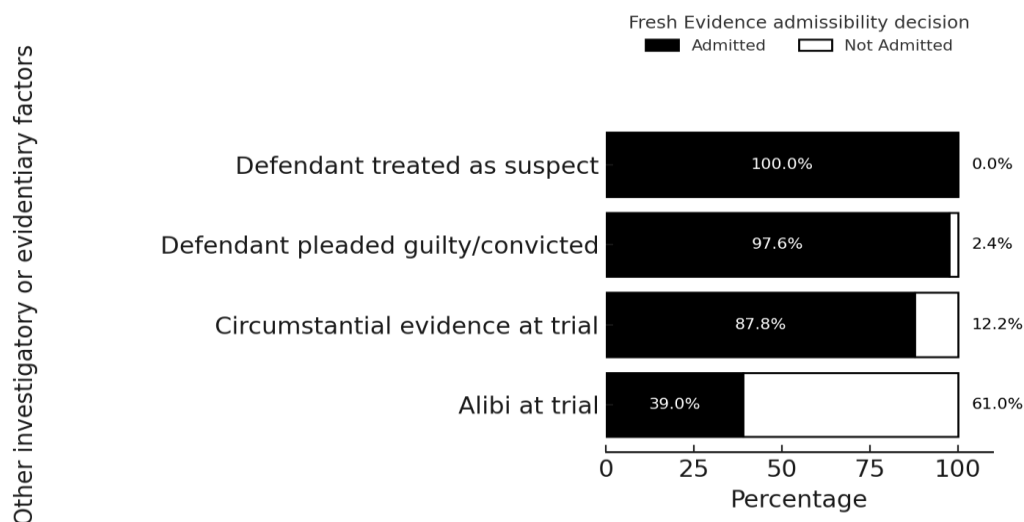
The association between being **treated as a suspect** and the admissibility of fresh evidence was also examined using Fisher's exact test, due to violation of the chi-square assumption (50% of cells with expected counts less than five, and minimum expected count being .38. The test yielded no statistically significant association, $p = .379$. The effect size, measured using Cramer's V, was .16, which according to Cohen's guidelines represents a small effect. Of the 66 cases, 65 defendants (98.5%) were treated as suspects, and only one (1.5%) was not. Among those treated as suspects, 41 (100%) had their fresh evidence deemed inadmissible,

while 24 (96.0%) had it admitted. These findings suggest that being treated as a suspect does not significantly influence the admissibility of fresh evidence, although the small effect size may warrant further exploration.

Finally, the relationship between **pleading guilty** or **being convicted at trial** and the admissibility of fresh evidence were examined using Fisher's exact test, due to violation of the chi-square assumption (50% of cells with expected counts less than five (minimum expected count 1.14). The test indicated no statistically significant association, $p = .552$. The effect size, measured using Cramer's V, was .13, which also falls within Cohen's small effect. Of the 66 cases, 63 defendants (95.5%) pleaded guilty or were convicted, and 3 (4.5%) did not. Among those who pleaded guilty or convicted, 40 (97.6%) had their fresh evidence deemed inadmissible, while 23 (92.0%) had it admitted. Among those who did not plead guilty or not convicted, 1 (2.4%) had their evidence deemed inadmissible, and 2 (8.0%) had it admitted. The findings suggest that pleading guilty, or being convicted at trial, does not significantly influence the court's decision to admit fresh evidence.

Figure 2.16

Court Decisions on Fresh Evidence by Investigatory and Evidentiary Factors



Note. This stacked bar chart shows the distribution of court decisions to admit fresh evidence in relation to other investigatory or evidentiary factors. Black segments indicate admitted evidence, and white segments indicate evidence not admitted. Percentages are displayed within the admitted sections and at the far right for the not-admitted outcomes.

2.6.8. Trial Evidence v Fresh Evidence on Appeal

For hypothesis 10, it was predicted that there would be a relationship between forensic evidence, i.e., DNA, fingerprint or Digital evidence, presented at the original trial proceedings and the type of fresh evidence presented at appeal hearing. Addressing whether domain-matching occurs between trial and appeal stages, Figure 2.17 profiles the composition of fresh evidence within each trial evidence category.

A chi-square test of independence was conducted to examine the association between the type of forensic evidence presented at trial (DNA, fingerprint, digital, psychological/psychiatric) and the type of fresh evidence submitted at appeal (DNA, fingerprint, digital, other/mixed). The assumption of minimum expected cell frequency was violated, with 97.1% of the cells having expected counts less than 5 and a minimum expected count of 0.02. Due to the large number of categories and sparse data, Fisher's exact test was not applicable for this multi-way table.

Therefore, the chi-square test was retained for exploratory purposes, but its results should be interpreted with caution. The chi-square test yielded a non-significant result, $\chi^2 (24, N = 66) = 34.62, p = .074$. The effect size, measured using Cramer's V, was .36, which according to Cogen's (1988) guidelines indicates a medium association.

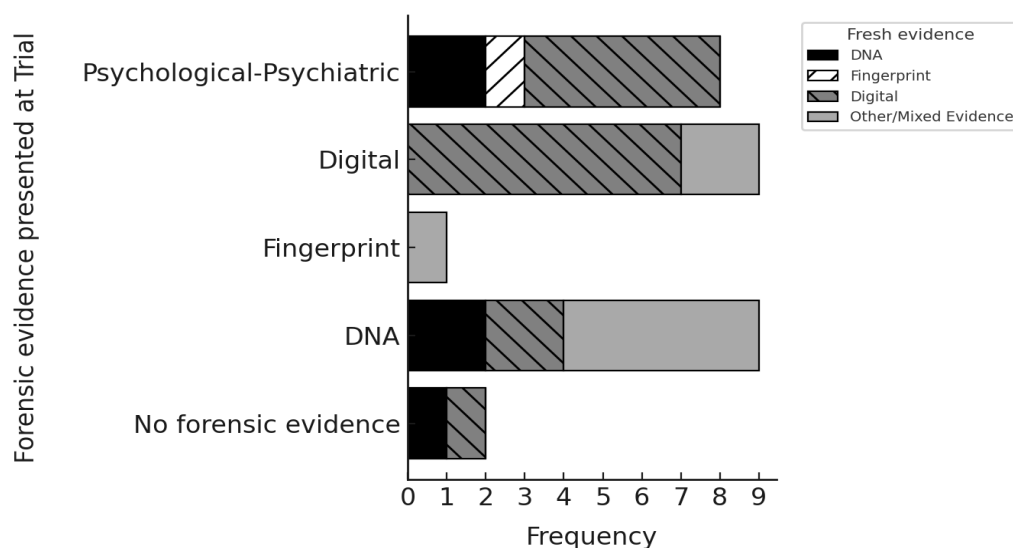
Descriptive statistics showed that among the 66 cases, the most common trial evidence were mixed-other evidence (24.2%), "Other" (13.6%), Digital (13.6%). For example, among those with no forensic evidence at trial, 25% submitted DNA as fresh evidence, 6.7% submitted

digital evidence, and 25% submitted other non-scientific evidence. Among those with DNA evidence at trial, 50% submitted DNA again as fresh evidence, while others submitted digital or other types. The distribution of fresh evidence types varied across trial evidence categories, but no clear pattern emerged.

Overall, the findings suggest that in this sample, the type of forensic evidence presented at trial does not appear to be statistically associated with the type of fresh evidence submitted, although the moderate effect size may warrant further investigation with a larger or more balanced data set.

Figure 2.17

Forensic Evidence at Trial and Corresponding Fresh Evidence on Appeal



Note. This bar chart shows the distribution of forensic evidence—specifically DNA, digital, and fingerprint evidence—presented at trial in relation to fresh evidence of the same types introduced on appeal. Each stacked bar represents a trial evidence type, with segments indicating the corresponding frequencies of fresh evidence.

2.6.9. Qualitative Findings. Fresh Evidence on Appeal

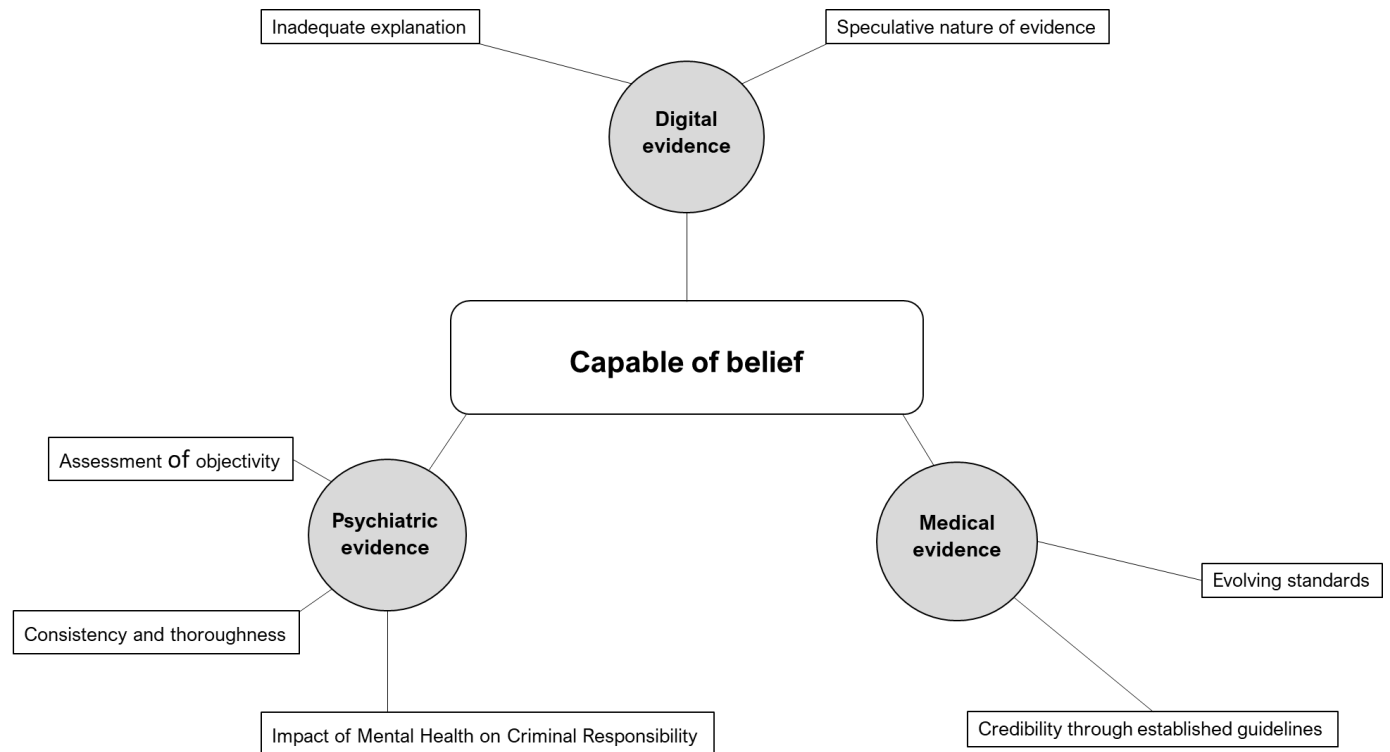
In this section, a synopsis of the qualitative document analysis is presented, outlining the emerging themes from exploring the courts' application of the legislation on fresh evidence on appeal. This summary aims to provide a clear and concise overview of the key findings without delving into the specific excerpts from the analysed documents. The complete thematic analysis, including all relevant excerpts and their corresponding interpretations, are available at the Middlesex University Research Repository.

Capable of Belief

The analysis demonstrated that the court's assessment of whether expert evidence is capable of belief rests on a combination of factors: methodological soundness, alignment with current scientific standards, clarity of reasoning, and professional objectivity. As well as evaluating credentials, the court examines the coherence, plausibility, and evidentiary support of expert opinions. It is particularly cautious of speculative assertions, outdated frameworks, and partisan bias. Where expert evidence is consistent, well-reasoned, and grounded in recognised scientific or clinical practice, it is more likely to be deemed credible. A Thematic map is presented in Figure 2.18 illustrating the emerging themes for the courts assessment of whether the evidence was capable of belief.

Figure 2.18

Thematic Map for Fresh Evidence being Capable of Belief



Main Theme 1: Digital Evidence

This theme explored the courts' cautious approach to digital expert testimony, especially when it lacks methodological rigour or explanatory clarity. The judiciary prioritises evidence that is grounded in verifiable reasoning and peer-reviewed support.

Under **Subtheme 1.1: Speculative Nature of Evidence**, the courts rejected digital evidence that is based on conjecture rather than substantiated analysis. In *R v O'Shea*, the court dismissed expert claims of identity fraud due to their speculative nature, stating: *"No hesitation in rejecting this evidence as incapable of belief. It was mere assertion, unsupported by any*

published or other material or any reasoning.” [para. 43]. This reflects the court’s insistence that expert testimony must be anchored in recognised scientific standards to be admissible.

Subtheme 1.2: Inadequate Explanation highlights the judiciary’s demand for technical clarity. In *R v O’Shea*, the digital expert failed to explain how data could be transferred to an incorrect IP address, prompting the court to reject the evidence: “...*Mr Bates was unable to explain how... the data transferred by A could go to an IP address other than the Freeserve IP address.*” [para. 43]. This shows that even plausible claims must be supported by coherent technical reasoning to be considered credible.

Main Theme 2: Medical Evidence

This theme focused on how courts incorporate evolving medical standards and authoritative guidelines when reassessing prior conclusions. The judiciary demonstrates openness to fresh evidence that reflects contemporary medical understanding.

Subtheme 2.1: Evolving Standards is exemplified in *C v R* [2011] EWCA Crim 1607, where the court acknowledged that newer medical guidelines significantly altered the interpretation of genital findings in child abuse cases. The defence expert noted: “*Although this is only 12 years ago considerably more information is available now to guide interpretation of genital findings than was available in 1997.*” [para. 15]. This indicates that courts are willing to revisit earlier conclusions when scientific consensus has shifted.

Subtheme 2.2: Credibility through Established Guidelines showed that courts favour medical evidence grounded in authoritative, evidence-based frameworks. In *C v R*, the court referred to a prior physical examination by a consultant paediatrician before Lord Justice Toulson observed: “*The fresh medical evidence which the appellant seeks to introduce came from...a consultant gynaecologist and forensic medical examiner. We have from her a report*

and supplemental report...The really significant point to our mind is that the case was presented to the jury on the basis that the medical evidence was for practical purposes decisive in at least establishing as a fact that M had suffered abuse. The fresh evidence makes that proposition anything but plain.” [para. 15].

In assessing whether the fresh evidence was capable of belief, the defence expert cited revised guidelines issued by the Royal College of Physicians (RCP), a regulatory body responsible, inter alia, for medical education, professional standards, research, and practice policies. Because the nature of the medical evidence lay beyond the court’s expertise, the judges deferred to medical opinion, reassured that the RCP guidelines were founded on an extensive, evidence-based review of the published literature. This illustrates the judiciary’s reliance on institutional credibility and scientific consensus when evaluating medical testimony.

Main Theme 3: Psychiatric Evidence

This theme examined how courts evaluate psychiatric and psychological testimony, particularly in relation to objectivity, consistency, and the impact of mental health on criminal responsibility.

Subtheme 3.1: Assessment of Objectivity, the courts scrutinised the impartiality of psychiatric experts, especially when their opinions appear to favour the appellant without sufficient neutrality. In *R v Osborne*, the court questioned the objectivity of a psychologist whose stance leaned toward the appellant, ultimately excluding the evidence despite its credibility under other criteria. This case highlights the judiciary’s insistence that expert evidence must be neutral and balanced to be considered credible, even if it meets other admissibility criteria.

Subtheme 3.2: Consistency and Thoroughness is demonstrated in *R v Foy* [2020] EWCA Crim 270, where the court compared fresh psychiatric evidence with original reports. Although Dr. Joseph's opinion differed from Dr. Isaac's, the court found both interpretations tenable but ultimately upheld the original findings due to their thoroughness: "*Dr Joseph – again very fairly – accepted that overall Dr Isaac essentially had ultimately had the same information as Dr Joseph himself.*" [para. 84]. This shows that courts value consistency and comprehensive analysis over alternative interpretations that lack new factual foundations.

Subtheme 3.3: Impact of Mental Health on Criminal Responsibility. Courts recognised that previously undiagnosed or misunderstood psychiatric conditions can significantly affect a defendant's behaviour and legal culpability. This theme is exemplified in *R v Stredwick* [2020] EWCA Crim 650. The court admitted fresh psychiatric evidence showing that the appellant suffered from paranoid schizophrenia, which had not been properly recognised during the original proceedings: "*We are satisfied that the appellant is suffering from a mental disorder, namely paranoid schizophrenia... and appropriate medical treatment is available for him.*" [para. 39]. This reflects the judiciary's recognition that untreated or misunderstood mental illness can significantly affect criminal responsibility and sentencing.

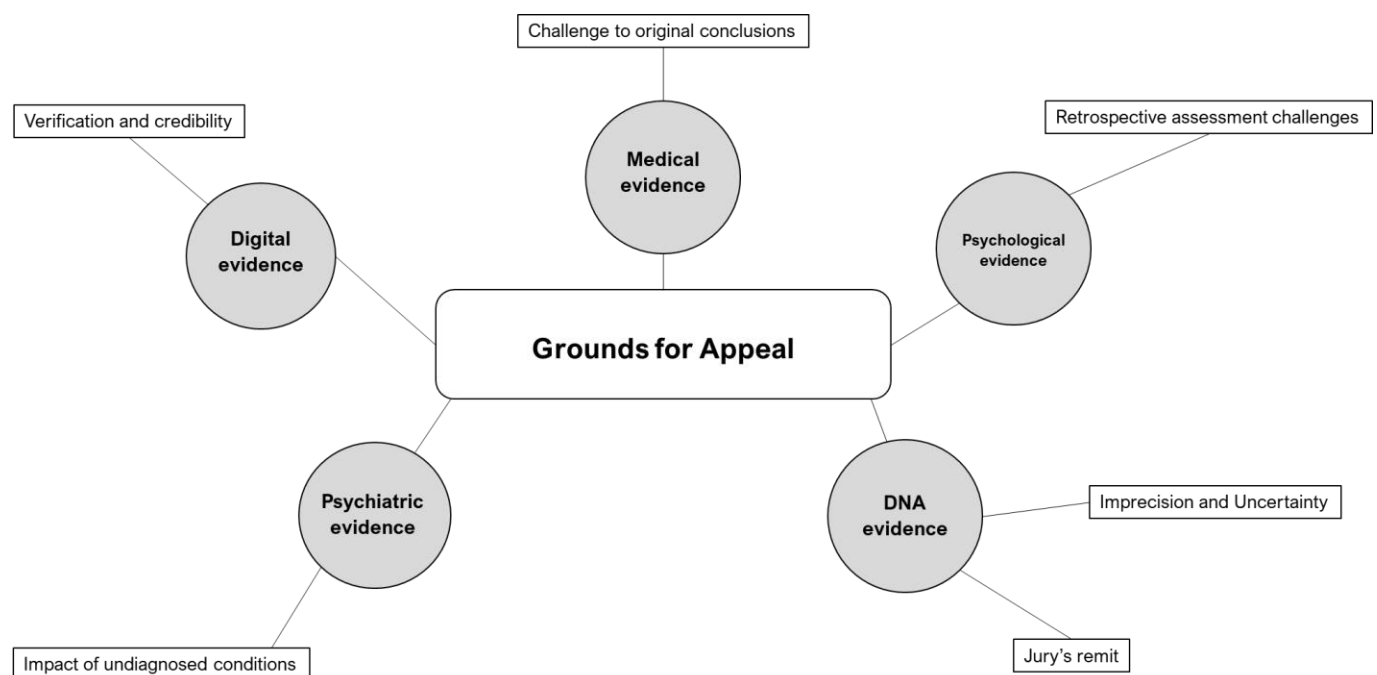
Grounds for Appeal

The analysis revealed that the appeal court's assessment of expert evidence is guided by an evaluation of its clarity, relevance, methodological soundness, and contextual applicability. With its evaluation of the evidence, the court considers evidentiary foundation, temporal proximity to the offence, and potential of the evidence to alter the outcome of the original trial. Where expert evidence is speculative, retrospective without sufficient grounding, or lacks credibility, it is rejected. Conversely, when the evidence yields a well-substantiated alternative

interpretation or reveals previously unrecognised factors that could materially affect the verdict, it is more likely to be accepted. See Figure 2.19 for the Thematic Map illustrating the emerging themes for the courts assessment of the evidence having grounds for appeal.

Figure 2.19

Thematic Map for Evidence having Grounds for Appeal



Main Theme 1: DNA Evidence

This theme addressed the courts' cautious approach to DNA evidence when it lacks clarity or when its interpretation overlaps with the jury's evaluative role.

Subtheme 1.1: Imprecision and Uncertainty. Courts rejected DNA evidence when it lacked clarity or is based on speculative interpretations of physical arrangements or biological transfer. In *R v Christian* [2015] EWCA Crim 1582, the court rejected fresh DNA evidence due

to its speculative nature and lack of precision regarding the position of bedding and the complainant during the alleged assault. The expert's inability to provide a clear, scientifically grounded interpretation led the court to assign little weight to the evidence. *"It seems to us that the other parts of Dr Haywood's report suffer from the difficulties of imprecision which we have already identified... there is no sufficiently sound basis for it to carry any real weight in this appeal."* [para. 25]. This reflects the judiciary's insistence that forensic evidence must be both scientifically credible and contextually precise to be admissible.

Subtheme 1.2: Jury's Remit. Courts emphasised that certain factual assessments, such as interpreting physical evidence, fall within the jury's domain and do not require expert testimony. The court in *Christian* also emphasised that certain aspects of the evidence—such as the distribution of semen—fell within the jury's remit and did not require expert interpretation. *"Section 23 is not to be used as a vehicle for appellants to re-litigate matters... or to mount an alternative theory after the event."* [para. 26]. This underscores the court's deference to the jury's fact-finding role and its reluctance to admit fresh evidence that merely reframes issues already considered at trial.

Main Theme 2: Psychological Evidence

This theme explored the challenges of introducing psychological assessments long after the original trial, particularly when the individual's condition may have changed.

Subtheme 2.1: Retrospective Assessment Challenges, the courts were cautious about psychological evaluations conducted long after the trial, especially when the individual's condition may have changed due to imprisonment or other factors. In *R. v GS* the court was sceptical of psychological evidence introduced 7–10 years after the trial, noting the difficulty of accurately assessing past mental states. *"It is difficult to apply a 2014–2017 assessment of the*

Applicant to her condition in late 2007... the experience of imprisonment would have impacted on her condition.” [para. 73]. This highlights the court’s concern that retrospective psychological evaluations may be distorted by intervening experiences, limiting their probative value.

Main Theme 3: Medical Evidence

This theme focused on how fresh medical evidence can challenge original conclusions and potentially alter the outcome of a case.

Subtheme 3.1: Challenge to Original Conclusion, fresh medical evidence was considered credible when it offers a plausible alternative explanation that directly undermines the original trial’s findings. In *Walker, R. v* [2021] EWCA Crim 1956, fresh expert opinions suggested that the victim’s death may have resulted from a fall or positional asphyxiation rather than assault, directly contradicting the prosecution’s case. *“The new perspective which the combined medical expert evidence now brings to the case... reveals the summing up as insufficiently nuanced to the detriment of the appellant.”* [para. 57]. This demonstrates the court’s willingness to admit fresh evidence that introduces a credible alternative explanation, especially when it undermines the safety of the original conviction.

Main Theme 4: Digital Evidence

This theme examined the credibility and reliability of digital evidence, particularly when used to support alibis.

Subtheme 4.1: Verification and Credibility, the courts scrutinised digital evidence for authenticity and reliability, especially when used to support alibis or contradict established facts. In *R v Barker* [2021] EWCA Crim 603, the court rejected a SnapChat video offered as alibi evidence, citing concerns about the credibility of the individuals involved and the context of the recording.

“It is not capable of belief and would not afford a ground for allowing an appeal.” [para. 38]

This reflects the judiciary’s insistence that digital evidence must be both verifiable and trustworthy to be considered capable of belief.

Main Theme 5: Psychiatric Evidence

This theme explored how undiagnosed psychiatric conditions can affect criminal responsibility and the fairness of trial outcomes.

Subtheme 5.1: Impact of Undiagnosed Conditions. The courts recognised that previously undiagnosed psychiatric conditions can significantly affect a defendant’s behaviour and the fairness of their trial. In *Sossongo, R. v* [2021] EWCA Crim 1777, the court admitted fresh psychiatric evidence diagnosing the appellant with Autism Spectrum Disorder (ASD) and ADHD, which had not been considered at trial. *“Had the jury known of his ASD and ADHD we cannot be confident that they would have reached the same conclusion.”* [para. 54]. This illustrates the court’s recognition that undiagnosed mental health conditions can significantly affect both behaviour and jury interpretation, potentially altering the outcome of a trial.

Reasonable Explanation

The analysis revealed that the appeal court’s assessment of whether there is a reasonable explanation for the late introduction of expert evidence is guided by an evaluation of timing, credibility, strategic intent, and procedural fairness. The court gives due consideration to whether the delay in adducing the evidence was justified, whether the evidence could have been presented earlier, and whether its introduction serves the interests of justice or reflects tactical repositioning. Where fresh evidence is consistent, well-substantiated, and its omission at trial is not the fault of the appellant, the court is more inclined to admit it. Conversely, where the evidence appears opportunistic, inconsistent, or unjustifiably delayed, it is likely to be excluded.

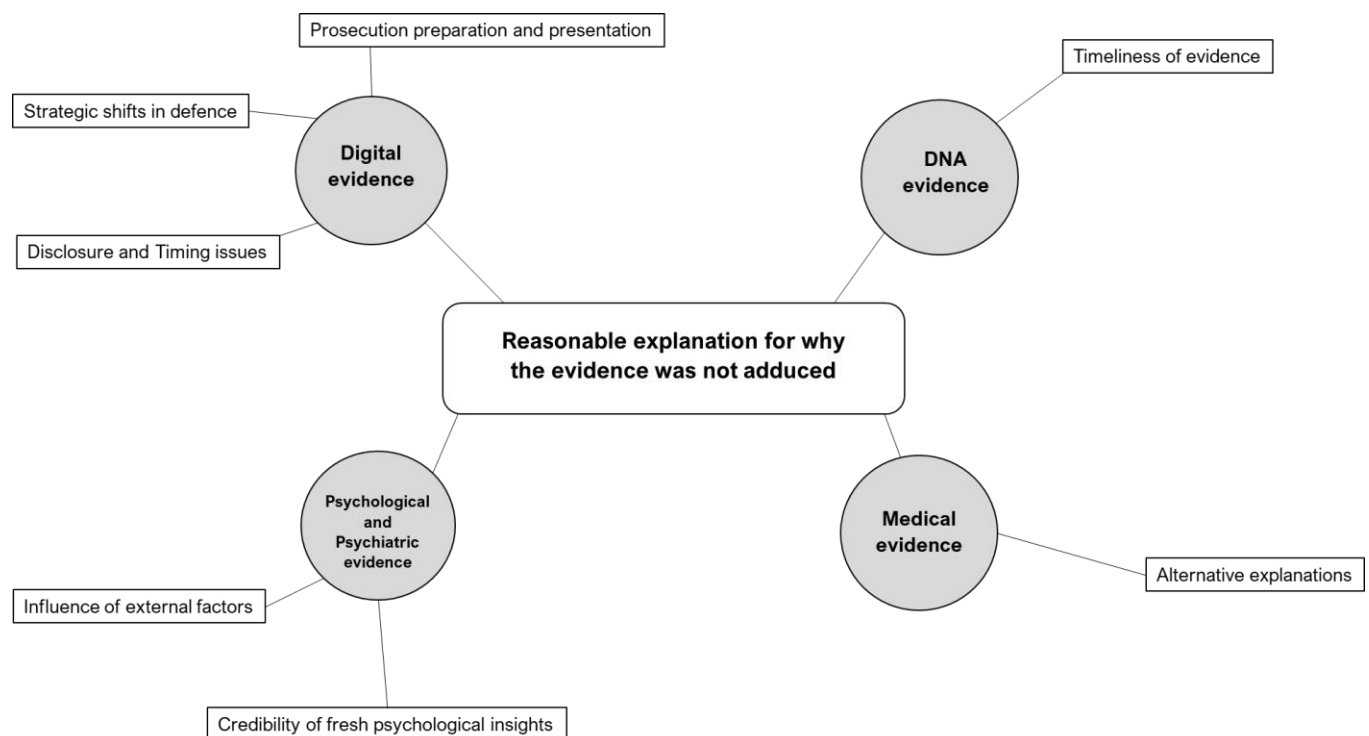
A Thematic map is presented in Figure 2.20 for the Thematic map for the courts assessment for there being a reasonable explanation for the late introduction of the evidence.

Main Theme 1: Psychological and Psychiatric Evidence

This theme explored how the court assessed the credibility and admissibility of psychological and psychiatric evidence, particularly in relation to the defendant's mental state and decision-making at the time of trial.

Figure 2.20

Thematic Map of Explanations for Non-Adduction of Evidence at the Original Hearing



Subtheme 1.1: Influence of External Factors. The court considered whether external influences, such as family pressure, reasonably explain why evidence was not presented at trial. For example, In the case of *R v L* [2019] EWCA Crim 1326, the court took into consideration opinion evidence from psychologists on the clinical presentation of the appellants:

“[Appellant’s] traumatic history, harsh parenting, PTSD, fear and shock... provide a reasonable explanation as to [his] denial of stabbing [the victim] and a reasonable explanation as to why it took longer to give the account he now relies upon.” [para. 36]. This subtheme highlights the court’s willingness to accept delayed disclosure when it is credibly linked to psychological vulnerability and external coercion.

Subtheme 1.2: Credibility of Fresh Psychological Insights. This theme was captured in *R v L*, when the court scrutinised whether new psychological evidence is genuinely explanatory or strategically motivated to gain post-conviction advantage. *“The timing of his subsequent admission was indeed tactical... an admission clearly designed to be used, as it was used, to gain sentencing advantage.”* [para. 48]. This subtheme reflects judicial scepticism toward psychological evidence introduced after conviction when it appears to be opportunistic rather than genuinely explanatory.

Main Theme 2: Digital Evidence

This theme addressed how the court evaluated the timing, disclosure, and strategic use of digital evidence in appeals.

Subtheme 2.1: Disclosure and Timing Issues. In *R v Zawadzka* [2016] EWCA Crim 1712 the court assessed whether delays or incomplete disclosure of digital evidence by the prosecution hindered the defence’s ability to respond effectively: *“Because service of the telephone evidence was ‘drip fed’ by the prosecution... it was not appreciated by the defence that the prosecution expert had not checked and measured the ‘footprint’ of the cells in question.”* [para. 38]. This subtheme underscores the importance of timely and complete disclosure in ensuring a fair trial and effective defence preparation.

Subtheme 2.2: Prosecution’s Preparation and Presentation. In *R v Zawadzka*, the court evaluated whether the prosecution’s expert evidence was sufficiently clear and complete to allow for proper scrutiny at trial: “*We are not overly impressed by the explanation for failing to adduce this evidence at trial, despite the difficulties put forward.*” This subtheme shows that courts expect both parties to engage with expert evidence thoroughly and in a timely manner and are reluctant to admit fresh evidence that could have been addressed earlier.

Subtheme 2.3: Strategic Shifts in Defence. Similarly, in *R v Zawadzka*, the court was wary of fresh digital evidence introduced alongside late changes in defence strategy, especially when blame is shifted to others: “*We strongly suspect that the main reason for not addressing the point sooner was the late change of instructions... that she was now blaming her brother.*” [para. 39]. This subtheme reflects judicial caution toward defence strategies that evolve mid-trial, particularly when they coincide with the introduction of new evidence.

Main Theme 3: Medical Evidence

This theme focused on how fresh medical evidence can challenge original conclusions and offer alternative explanations for injuries or causes of death.

Subtheme 3.1: Alternative Explanations. In *Walker, R. v* [2021] EWCA Crim 1956 the court accepted that fresh medical evidence could provide a plausible alternative cause of death or injury, especially when the failure to present it earlier was not the appellant’s fault. “*It cannot be laid at the door of the appellant and should not be refused if it would be to penalise him from pursuing a viable ground of appeal.*” [para. 52]. This subtheme illustrates the court’s openness to reconsidering convictions when new medical interpretations are credible and the delay in presenting them is justified.

Main Theme 4: DNA Evidence

This theme examined the role of timeliness in the admissibility of fresh DNA evidence.

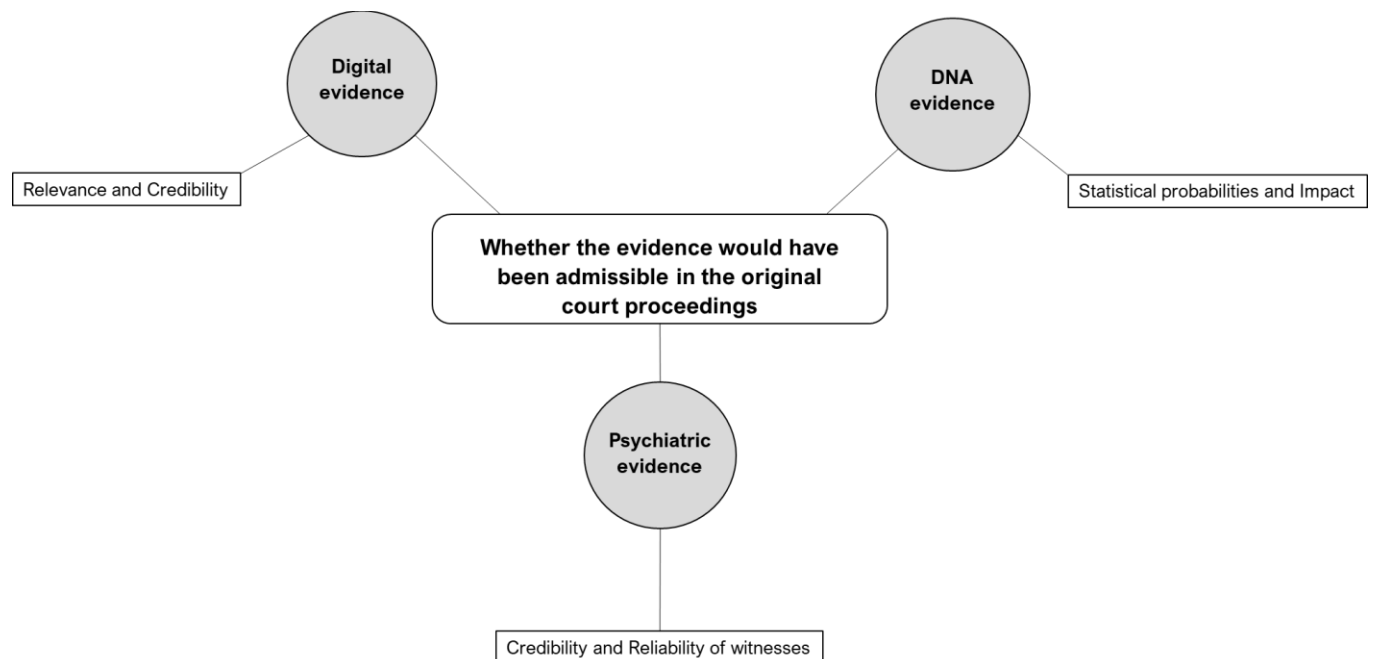
Subtheme 4.1: Timeliness of Evidence. In *Ferguson, R. v* [2021] EWCA Crim 1404 the court expressed their reluctance to admit DNA evidence introduced after significant delay, highlighting the "extraordinary delay" in bringing forth the new evidence, with some evidence being discovered within two years of the conviction but not acted upon until much later. They concluded that the delay was insurmountable and not justified, thus rejecting the explanation for the late introduction of the evidence.

The Evidence would have been Admissible in the Original Court Proceedings

Informing their decision on whether the evidence would have been admissible at the original trial hearing, the court considered whether the evidence was previously available, whether its omission was justified, and whether it could have materially influenced the verdict. Where evidence is found to be strategically withheld, lacking in probative value, or disconnected from the core issues of the case, it is excluded. Conversely, evidence that is timely, relevant, and capable of belief may be admitted if it serves the interests of justice.

Figure 2.21

Thematic Map of the Retrospective Admissibility of Evidence in the Original Hearing



Main Theme 1: Psychiatric Evidence

This theme explored how courts assess the admissibility of psychiatric evidence, particularly when it concerns the credibility of witnesses and whether such evidence should have been presented during the original trial.

Subtheme 1.1: Credibility and Reliability of Witnesses. In *R v Pluck* [2010] EWCA Crim 2936, the court evaluated psychiatric diagnoses from expert witnesses to determine whether their testimony may be unreliable without corroboration: *“The fact that the issue to which the fresh evidence relates was not raised at trial does not automatically preclude its*

reception. However, it is well understood that, save exceptionally, if the defendant is allowed to advance on appeal a defence and/or evidence would, could and should have been but were not put before the jury, our trial process would be subverted. Therefore, if they were not deployed when they were available to deployed, or the issues could have been but were not raised at trial, it is clear from the statutory structure, as explained in the authorities, that unless a reasonable and persuasive explanation for one or other of these omissions is offered, it is highly unlikely that the "interests of justice" test will be satisfied." [Para. 65].” This subtheme reflects the court’s cautious approach to admitting psychiatric evidence post-trial, especially when similar evidence was available and used during the original proceedings.

Main Theme 2: Digital Evidence

This theme addressed how courts assess the relevance and credibility of digital evidence, such as text messages, in relation to core trial issues like consent and credibility.

Subtheme 2.1: Relevance and Credibility. In *Hardy, R. v* [2021] EWCA Crim 635, the court assessed that the digital evidence was both credible and directly relevant to central issues in the case and it would have been admissible in the original proceedings: *“The evidence contained in the report appears to us to be capable of belief and would have been admissible at trial. Many of the messages fall to be described as we indicate in [para. 25] above, but others are pertinent to the issue of consent. We are satisfied that they may afford a ground for allowing at least some part of this appeal.”* [para. 26]. This subtheme highlights the judiciary’s emphasis on the probative value of digital evidence, particularly when it could materially affect the jury’s assessment of key facts.

Main Theme 3: DNA Evidence

This theme focused on how courts assess the statistical and evidentiary impact of DNA findings, especially in relation to their potential to alter the outcome of a trial.

Subtheme 3.1: Statistical Probabilities and Impact. The court considered whether the fresh DNA evidence could have provided different statistical probabilities but concluded that it would not have exonerated the accused. This theme underscores the role of statistical analysis in evaluating DNA evidence and its potential effect on the case outcome. In *R v Ferguson*, the courts considered whether the fresh evidence would have been admissible in the original proceedings. Regarding *Crawford's* DNA evidence, the court indicated that while it might have provided different statistical probabilities, it would not have exonerated *Ferguson* and thus would not have altered the outcome.

2.7 Discussion

This chapter critically examined the extent to which the Court of Appeal (Criminal division) adheres to a normative model when assessing expert evidence. The analysis was situated within two key legislative frameworks—the *Criminal Procedure Rules* (Part 19) and the *Criminal Practice Directions* (Section 7)—which provide the statutory basis for determining admissibility. The following discussion is structured into five principal sections: (1) interpretation of the findings in relation to the research questions; (2) evaluation of fresh evidence under Section 23 of the *Criminal Appeal Act 1968*; (3) theoretical and practical implications of the findings; (4) methodological limitations, and (5) Recommendations for future research studies.

2.7.1. Interpretation of the Findings in Relations to the Research Questions

Consistency in Judicial Application of Admissibility Criteria (Study 1a)

The principal research question addressed in this study was: *To what extent do the criminal appeal courts in England and Wales apply admissibility criteria consistently when evaluating forensic evidence?* The findings suggest that, although forensic evidence is frequently admitted, judicial reasoning seldom refers explicitly to the *Criminal Procedure Rules* (Part 19). Instead, the *Criminal Practice Directions* (Section 7) appear to exert greater normative influence, with courts routinely assessing forensic submissions against the criteria of relevance, necessity, and reliability.

However, the assessment of expert competency remains inconsistent. Only 63.1% of cases involved explicit judicial engagement with the expert's credentials, and concerns regarding professional expertise were raised in few cases. The limited scrutiny may, *ipso facto*,

compromise the epistemic integrity of appeal court decisions, especially when methodological rigour is contingent upon the expert's domain-specific competence.

Quantitative analysis revealed partially statistical support for the hypothesis derived from CrimPD 7.1.1. Specifically, Hypothesis 2 was confirmed: courts were significantly more likely to admit expert evidence when it was deemed necessary to resolving the legal issues in dispute. This finding underscores the judiciary's prioritisation of evidentiary utility. Hypotheses 4 was also supported, indicating a positive correlation between methodological reliability and admissibility decisions.

These results align with the Law Commission's longstanding emphasis on reliability being at the crux of admissibility, particularly in light of historical miscarriages of justice involving flawed forensic and statistical evidence. Consequently, appellate courts may be increasingly vigilant in scrutinising the methodology of expert evidence, especially in cases involving complex scientific claims (e.g., Low Template DNA, shaken baby syndrome).

Conversely, Hypotheses 1 and 3—concerning evidentiary relevance and expert competency, respectively—were not statistically supported. This may be attributed to their contextual variability. Relevance is often presumed if the expert evidence is admitted at trial, rendering it a subsidiary consideration on appeal unless explicitly contested. Regarding competency, expert credentials are typically assessed at the pre-trial stage via disclosure within expert reports. Unless there are manifest errors or new information undermining credibility, the appeal courts rarely revisit this criterion. These finding suggests that relevance and competence, while conceptually foundational, are not decisive factors in appeal court decisions.

Analysis of appeal court data (See tables 2.5 - 2.8) supported by the qualitative analysis, supports the assertion that courts seldom assess the scientific reliability of the evidence—

specifically DNA, fingerprint, and digital forensic—or the competency of the expert. Across all three categories of evidence, appeal judgments revealed no clear indication that trial courts assessed the chain of custody, particularly regarding who was responsible for safeguarding the evidence post-collection. For DNA and fingerprint evidence, courts failed to examine the potential for pre-collection contamination. In DNA cases specifically, there was no assessment of the origins of the sample, a critical factor in determining relevance and probative value. Digital evidence was similarly neglected, with a paltry number of cases being scrutinised for issues such as data security, missed or hidden data, corruption, residual wiping, or source damage—all essential to digital forensic integrity.

During the investigative stage, courts rarely assessed whether new techniques had been used to re-examine old evidence at appeal. There was limited engagement with expert confidence in conclusions, and few considerations of misunderstanding of forensic evidence by the prosecution, defence, jury, or judge at trial. The presentation of evidence was seldom evaluated, nor was the weight attributed to it critically examined. Courts also failed to consistently assess the introduction of inadmissible evidence. For DNA and fingerprint evidence, there were few instances where new match probabilities, points of dissimilarity, or updated contamination/error rates were considered at appeal.

Regarding forensic methodology, courts showed minimal engagement with the techniques of analysis used, whether samples were re-examined, or whether conclusions were verified by another examiner. There was little assessment of whether evidence had been destroyed prior to trial, or whether concerns were raised about the quality of examiner notes or reports. For DNA and fingerprint evidence, courts rarely considered sample degradation or whether the analysis involved a ‘cold’ database match versus a direct comparison. In digital

cases, courts almost never evaluated whether data was encrypted, hidden in carrier files, or obfuscated to conceal its source. Nor was there substantive assessment of whether investigators dealt with high data volumes or were limited to volatile memory.

At the evidentiary stage, courts did not clearly express concerns about the quality of expert reports submitted by either party. It remained unclear whether forensic experts were required to explain inconsistencies in their evidence at trial. This lack of critical engagement undermines the robustness of forensic evaluation and raises serious concerns about the reliability of judicial determinations in cases involving complex scientific evidence.

2.7.2. Limitations of the Current Discretionary Model

The second research question asked: *What are the limitations of the current discretionary model of admissibility in ensuring scientific reliability?* The findings indicate that the discretionary approach, as embedded in the *Criminal Procedure Rules* (CrimPR), lacks a binding codified framework and contributes to inconsistencies in judicial assessment. While some judgments demonstrated rigorous scrutiny—particularly where evidence was novel or contested—others admitted expert testimony with minimal justification, often relying solely on credentials without evaluating methodological soundness.

Thematic analysis further revealed that adversarial dynamics significantly influence evidentiary outcomes. In instances where questionable evidence went unchallenged by opposing counsel, the appellate court rarely interrogated its scientific basis. *Inter alia*, this underscores the vulnerability of the discretionary model to strategic litigation rather than principled scientific evaluation. The psychological literature on judicial decision-making supports this interpretation. Judges, operating under constraints of time and cognitive load, are susceptible to heuristics such as authority bias and confirmation bias (Guthrie, Rachlinski & Wistrich, 2001). In the absence of

mandatory reliability assessments, discretion may inadvertently favour persuasive advocacy over empirical validity. This has serious implications for procedural fairness and the integrity of criminal adjudication, as unreliable forensic evidence may be admitted and misinterpreted by jurors or appellate judges.

The analysis also highlighted conceptual inconsistencies in the courts' assessment of evidentiary relevance. Although identity, mental state, and contextualisation dominate judicial reasoning, engagement with forensic complexity remains superficial. DNA and forensic pathology are routinely treated as requisite evidence, even when methodological limitations are evident—as in *Harding, R. v* [2010] EWCA Crim 2145, where statistically weak DNA evidence was admitted to preserve forensic narrative alignment. Psychological and psychiatric evidence is often excluded when it challenges procedural finality (*Gordon, R. v* [2018] EWCA Crim 1555), and digital forensic evidence is increasingly relied upon without adequate scrutiny of its interpretive and ethical dimensions.

In relation to evidentiary necessity, the distinction from relevance is conceptually acknowledged but inconsistently applied. Judicial decisions frequently prioritise procedural discipline over substantive justice, as illustrated in *Kenyon v R.* [2010] EWCA Crim 914 and *R v GS*, where potentially clarifying psychological evidence was excluded due to timing concerns. Although *Burridge v R.* [2010] EWCA Crim 2847 demonstrates that necessity can override procedural rigidity, such flexibility appears reactive rather than principled. The court's insistence on domain purity (*Pabon, R v* [2018] EWCA Crim 420) and scepticism toward retrospective evidence (*R v Osborne, R. v O' Shea*) reflect a systemic bias against post-conviction scientific developments. Moreover, the exclusion of relevant but “not materially impactful” evidence (*R. v*

Cleobury, Earle v R. [2011] EWCA Crim 17) reveals a rigid threshold that undervalues cumulative or corroborative contributions.

The assessment of expert competency is similarly fraught with inconsistency. Although the court purports to apply a tripartite framework—methodological rigour, domain relevance, and evidentiary context—its application is uneven. Techniques such as Low Template DNA (*R v Broughton, R. v Weller*) were scrutinised, yet interdisciplinary insights were marginalised (*Sabi, R. v* [2010] EWCA Crim 180). Judicial vigilance regarding impartiality often veers into overcorrection, with exclusions based on perceived advocacy (*R v Cleobury, R. v Oliver, R v O'Shea*) resting on opaque criteria. Quantitative and qualitative findings reveal that courts rarely conduct substantive evaluations of expert credentials, and there is no evidence of proficiency data being considered, despite its potential to enhance objectivity. The lack of procedural mechanisms for vetting expertise—echoing concerns raised by Rix (2015) and Hirst (2015)—reflects an institutional failure to define and assess competence consistently. While professional disagreement is not conflated with incompetence (*Stewart*), tolerance is uneven across disciplines, favouring established fields over emerging ones.

Evidentiary Reliability and the Case for Reform

The Court of Appeal's approach to evidentiary reliability is formally principled but inconsistently applied. Techniques such as Low Template DNA (*R v Broughton, R v Weller, C v R.*) were admitted based on perceived methodological robustness, while others—such as footwear comparison in *R v Plummer*—were excluded due to a lack of empirical validation. This selective scrutiny reveals a conservative favouring established forensic methods, often at the expense of emerging or interdisciplinary techniques. The court's emphasis on expert transparency and methodological caution, though required, tends to penalise qualitative

disciplines, as illustrated by the exclusion of psychiatric evidence in *R v Copley* and *R v Popoola*. Moreover, the insistence on reproducibility and peer-reviewed validation risks excluding probative evidence that has yet to achieve consensus. The courts' reliance on rhetorical clarity over substantive content introduces interpretive bias, and notably, proven error rates—essential for assessing reliability—were not considered in the sample analysed. As Adam (2016) observes, the English and Welsh justice system lacks a coherent and consistently applied framework for evaluating expert reliability, underscoring the need for reform.

Towards a Codified Reliability-Based Framework

The third research question asked: *How might a codified reliability-based admissibility framework improve the consistency and scientific integrity of expert evidence evaluation in criminal proceedings?* Contra to concerns that codification may constrain judicial flexibility or undermine pragmatic adjudication (Gilson, 2010), the findings of this study provide empirical support for a structured framework that enhances consistency and curtails the admission of questionable forensic evidence. In line with Adam (2016), the thematic analysis revealed that when courts explicitly engaged with reliability—such as the methodological basis of digital forensic techniques or limitations of low-template DNA—their reasoning was more transparent and aligned with scientific standards. However, such engagement was the exception rather than the norm; in many cases, judicial discussion of reliability was cursory, limited to general affirmations of the expert's credentials.

This inconsistency reflects the absence of binding statutory guidance comparable to the *Daubert* standard in the United States (*Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 1993), which requires judges to assess expert evidence against specific scientific benchmarks, including falsifiability, peer review, known error rates, and general acceptance. Although the *Daubert*

framework is not without critique (Edmond & Roach, 2011), it demonstrates how codified standards can anchor judicial reasoning in explicit scientific criteria, thereby reducing arbitrariness and enhancing evidentiary integrity.

By contrast, the discretionary model in England and Wales permits variability across cases and judicial interpretations. Codifying reliability-based admissibility standards—whether through statutory reform or binding practice directions—would serve three essential functions: (a) establishing minimum thresholds for scientific quality, (b) promoting consistency in judicial decision-making, and (c) enhancing transparency in evidentiary reasoning, thereby strengthening public confidence in forensic adjudication. Such a framework would not eliminate judicial discretion *per se* but would ensure it is exercised within scientifically informed boundaries.

As Rix (2015) argues, codification should also require experts to delineate their areas of expertise, provide substantiated opinions, and demonstrate awareness of their legal responsibilities. Experience alone should not suffice to qualify an expert; rather, courts should assess recent, relevant credentials that are both domain-specific and legally pertinent. *Sine qua non*, a codified framework would elevate the evidentiary threshold, ensuring that expert testimony is not only admissible but also scientifically credible and legally meaningful.

Where Cicchini's (2021a, 2021b) analysis demonstrates that *Daubert* operates asymmetrically, overwhelmingly favouring prosecution experts while constraining defence testimony. This imbalance is reinforced through doctrinal strategies such as reclassifying police expertise as lay opinion and imposing disproportionate evidentiary burdens on defence witnesses. Therefore, a codified framework in England and Wales could embed symmetry of application, ensuring that reliability standards apply equally to prosecution and defence experts, and that judicial discretion cannot be exercised to privilege state expertise.

In regard to clarifying the reliability criteria, Gatowski et al. (2001) found that judges struggle to operationalise scientific concepts such as falsifiability and error rates, often defaulting to general acceptance. Similarly, Dror (2020) and Martire et al. (2019) highlight the conceptual difficulties of defining and communicating error rates. To remedy this, the criminal courts of England and Wales should avoid adopting overly technical criteria that judges cannot meaningfully apply. Instead, reliability assessment should emphasise transparent methodological disclosure, requiring experts to articulate the limits of their techniques in accessible terms, supported by judicial training in scientific reasoning.

In response to evidence that judges and jurors often rely on substandard proxies of validity, such as examiner experience or peer review (Koehler et al., 2016; Kovera & McAuliff, 2000), any codified framework introduced within the English courts should be accompanied by an explicit warning against reliance on such heuristics and should instead require courts to evaluate empirical validation studies rather than credentials or publication status alone.

Additionally, numerous scholars (i.e., Williams & Saks, 2015; Kaye, 2018) have documented how courts admit longstanding forensic techniques on the basis of historical pedigree rather than scientific validation, thereby diluting *Daubert's* gatekeeping function. To counter this historical entrenchment, the English courts should resist treating this longstanding acceptance as a proxy for reliability. Instead, admissibility should be predicated on the domains contemporaneous empirical validation, with periodic review mechanisms in place to reassess techniques as scientific knowledge evolves.

Lastly, where Cicchini (2021a; 2021b) highlight the inconsistency in *Daubert's* “application” prong, where defence experts are excluded for failing to draw case-specific conclusions while prosecution experts are permitted to offer generalised exposition testimony. A

codified framework should require consistent case-specific application across both sides, ensuring that expert testimony is demonstrably relevant to the facts at issue and not admitted merely to bolster narrative plausibility.

Judicial Gatekeeping and Scientific Literacy

The fourth research question asked: *How do judges gatekeep the admissibility of forensic evidence given their limited scientific literacy?* The findings of this study underscore that appellate judges frequently struggle to engage with the technical intricacies of forensic evidence. Instead of interrogating methodological validity, they often rely on proxies such as expert credentials, adversarial consensus, or the absence of challenge from opposing counsel. These findings support Morrison's (2018) contention that the judiciary is expected to possess a foundational understanding of scientific and technological developments—a requirement increasingly strained by the rapid evolution of domains such as medicine, DNA, and digital forensics.

The results also align with Gilson's (2010) recommendation that judicial training should extend beyond legal doctrine to include the philosophy and sociology of science. Such interdisciplinary education would enhance evaluative competence without requiring judges to become scientific experts. The qualitative findings suggest that competence was frequently treated as a proxy for reliability, with courts presuming that qualified experts necessarily provided scientifically sound testimony. Thematic analysis revealed that few judgments engaged substantively with the methodological underpinnings of forensic techniques. Where technical issues were addressed, courts tended to cite external authorities—such as precedent cases or professional guidelines—rather than conducting independent evaluations of the scientific evidence.

These findings are consistent with psychological research on expertise and bounded rationality. Judges, like other decision-makers, operate under cognitive constraints and limited domain-specific knowledge (Simon, 1990). Faced with complex forensic evidence and data, they often resort to heuristics such as deference to expert authority or reliance on adversarial consensus (Koehler, 2011). While such heuristics may facilitate decision-making under uncertainty, they risk conflating authority with accuracy, thereby compromising the epistemic integrity of admissibility determinations.

The adversarial nature of the legal system further compounds these challenges. Cross-examination can distort the presentation of forensic science, leading to the exclusion of reliable evidence that is rhetorically undermined, or the admission of flawed evidence that withstands superficial scrutiny. Moreover, adversarial allegiance—where experts unconsciously align their testimony with the interests of the retaining party (Murrie & Boccaccini, 2015)—poses a significant threat to impartiality. However, without structured reliability standards or enhanced scientific training, judicial gatekeeping may fail to adequately safeguard against the admission of unreliable forensic evidence.

Fresh Evidence on Appeal (Study 1b)

The second strand of this research examined how the Court of Appeal evaluates applications for fresh evidence under Section 23 of the *Criminal Appeal Act 1968*. Unlike the discretionary criteria under the *Criminal Procedure Rules* and *Criminal Practice Directions*, these tests are codified and explicitly non-compensatory, meaning failure to satisfy one criterion cannot be offset by meeting others.

Consistency in Application of Section 23 Tests

Fresh evidence was introduced in 21.6% of appeal cases, yet 61% of this evidence was ultimately excluded. This high exclusion rate suggests that the Court of Appeal applies a stringent evaluative threshold when considering new material. These findings align with Roberts (2017), who criticised the restrictive interpretation of Section 23(2); however, Roberts argues that the courts apply these conditions too rigidly. Griffin (2015) further observed that courts rarely conduct formal pre-admissibility assessments, often admitting evidence provisionally. This practice reflects a prioritisation of substantive justice over procedural formality, indicating that judicial concern lies more with the reliability of the conviction than with technical admissibility.

In the present study, courts consistently referred to Section 23 when assessing fresh evidence, demonstrating adherence to statutory criteria. Among the four tests, retrospective admissibility—whether the evidence would have been admissible at the original trial—was frequently applied. Statistical analysis revealed a significant association between this assessment and the decision to admit the evidence, with a moderate effect size. This suggests that retrospective admissibility functions as a meaningful predictor of appellate acceptance.

The criterion of whether the evidence was “capable of belief” was also regularly evaluated. In a substantial number of cases, this threshold was met and significantly associated with admissibility decisions. The strength of this association ranged from moderate to strong, indicating that perceived believability of the evidence plays a central role in judicial determinations.

In contrast, courts were less persuaded by explanations for why the evidence had not been presented at trial. Only 31.8% of the fresh evidence applications included a judicial finding that the delay was reasonably explained. Nonetheless, there was a moderate to strong association between the court’s acceptance of a reasonable explanation and its decision to admit the

evidence, suggesting that while less frequently endorsed, this criterion remains influential when satisfied.

The most stringent scrutiny was applied to the relevance of the fresh evidence. In 68.2% of cases, courts determined that the evidence lacked sufficient grounds for admission. Statistical analysis revealed a highly significant and very strong association between the assessment of relevance and the decision to admit. However, when fresh evidence is deemed to provide legitimate grounds for allowing the appeal, it is highly likely to be admitted, underscoring the primacy of relevance in appellate decision-making.

The quantitative analysis supported the hypotheses 5-8 that there would be an association between the 23(2) tests and the overall admissibility decision for fresh evidence. Decisions to admit fresh evidence was found to be associated with the courts assessment that the evidence was capable of belief, relevant, that it would have been admissible at the original hearing, and that there was a reasonable explanation for the failure to adduce fresh evidence at the original trial.

This finding is consistent with the statutory framework, which positions the four tests as central criteria guiding judicial discretion. The observed associations suggest that the court of appeal do not assess admissibility in isolation but rather integrate these statutory factors into an evaluative process. This reinforces the view that the statutory tests operate cumulatively rather than independently; the satisfaction of these criteria enhances the persuasive weight of an application to admit fresh evidence. Moreover, the statistical associations highlight the extent to which appellate courts rely on these statutory benchmarks to structure their reasoning, thereby promoting consistency and predictability in decision-making.

Investigatory and Evidentiary Stage Factors

The quantitative analysis did not support hypothesis 9. Decisions to admit fresh evidence were not significantly influenced by factors arising during the investigatory or evidentiary stages. Specifically, cases in which appellants had presented an alibi, were subject to circumstantial evidence, had been treated as suspects from the outset, or had entered a guilty plea or been convicted, were no more likely to result in the admission of fresh evidence. These findings suggest that appellate courts prioritise the intrinsic qualities of the evidence itself over contextual factors from earlier procedural stages. This reflects a judicial emphasis on evidentiary merit rather than retrospective procedural irregularities.

Type of Evidence Presented at Trial vs Fresh Evidence on Appeal

An analysis of the relationship between the type of evidence presented at trial and the fresh evidence introduced during appeal proceedings revealed distinct patterns. In cases where DNA evidence was originally submitted, non-scientific evidence was most frequently presented at appeal, followed by DNA itself. However, when DNA was introduced as fresh evidence, it was excluded in 60% of cases, indicating a relatively low rate of appellate acceptance for this category.

A similar trend was observed in cases involving digital forensic evidence. Where digital evidence was presented at trial, it was most often reintroduced during appeal, followed by non-scientific submissions. Nonetheless, when digital evidence was presented as fresh material, it was excluded in 62.5% of cases. These findings suggest that while courts may be open to revisiting previously considered forensic domains, they remain cautious about admitting new scientific evidence post-conviction.

In cases involving fingerprint evidence at trial, appeal proceedings tended to feature other forms of forensic evidence rather than a repetition of the same type. This shift may reflect an attempt to introduce complementary or alternative forensic perspectives rather than reiterate prior submissions. Notably, psychiatric and psychological evidence was most frequently presented as fresh evidence in appeals where the original trial involved mixed evidence, newly introduced forensic material, or prior psychiatric-psychological testimony. This pattern suggests that mental health-related submissions are often used to supplement or reinterpret trial evidence, particularly in complex or multifaceted cases.

Hypothesis 10 predicted a relationship between the type of forensic evidence presented at trial and the type of fresh evidence submitted on appeal. However, the statistical findings did not support this hypothesis. This result, while initially counterintuitive, may be explained by several jurisprudential and epistemological factors.

First, the admission of fresh evidence on appeal is governed by distinct legal criteria, which prioritises the credibility, relevance, and novelty of the evidence rather than its categorical alignment with trial-stage forensic material. As Giffin (2015) and Morrison (2018) observe, appellate courts are more inclined to reassess convictions when fresh evidence introduces novel methodologies or addresses epistemic limitations inherent in the original forensic analysis. This is particularly salient in domains such as DNA profiling, digital forensics, and psychiatric diagnoses, where scientific paradigms may evolve significantly post-conviction.

Second, the absence of statistical association may reflect the courts' reluctance to admit fresh evidence that merely reiterates previously presented material. The literature suggests that appellate judges seek substantially new insights, not replication. Thus, the type of forensic evidence originally presented may not predict the nature of fresh evidence unless the latter offers

a more robust or updated interpretation. This evidentiary threshold *ipso facto* uncouples the forensic categories at trial from those on appeal.

Third, the findings of Smit et al. (2017) underscore that misleading forensic evidence often stems from interpretive errors rather than flawed scientific techniques. This implies that appeal challenges may focus less on the forensic domain per se and more on the methodological or inferential validity of the original expert testimony. Consequently, fresh evidence may emerge from a different forensic discipline altogether, chosen for its capacity to clarify or contest the original interpretation.

In concert, these insights suggest that while the forensic context of the original trial may inform the appeal, it does not deterministically shape the type of fresh evidence submitted. The null result therefore reflects the complex interplay of legal discretion, scientific development, and case-specific dynamics, rather than a failure of theoretical alignment.

2.7.3. Theoretical and Practical Implications

This study contributes to the literature on judicial decision-making from a psychological perspective by demonstrating how judicial admissibility decision-making is shaped by cognitive limitations, institutional constraints, and adversarial dynamics. The findings reveal that judges frequently rely on heuristic strategies—such as deference to expert authority or adversarial consensus—when confronted with technically complex forensic evidence. This supports psychological theories of bounded rationality, which posit that decision-makers, constrained by limited expertise and cognitive resources, adopt simplifying strategies that may introduce systematic biases (Kahneman, 2011; Simon, 1990).

Crucially, the study provides empirical support for the claim that appeal court assessments of forensic evidence often reflect a descriptive rather than normative model of

decision-making. Normative models assume the consistent application of scientifically valid criteria across cases, whereas descriptive models acknowledge that judges are influenced by case-specific factors, adversarial tactics, and practical constraints. This distinction helps explain deviations from reliability standards commonly advocated in academic and scientific literature.

The research also extends psychological understandings of adversarial allegiance. While prior studies have documented the tendency of experts to align their testimony with the interests of the retaining party (Murrie & Boccaccini, 2015), the present findings suggest that such dynamics are indirectly reinforced by judicial discretion. Courts that fail to rigorously interrogate methodological reliability may inadvertently validate expert testimony shaped by adversarial incentives. This has significant implications for how psychologists conceptualise the interaction between legal systems, cognitive processes, and scientific validity.

2.7.4. Implications for Legal Practice and Policy

From a legal practice perspective, the findings highlight the limitations of the current discretionary framework and the need for reform. The variability in judicial reasoning raises concerns that scientifically unreliable evidence may continue to be admitted, particularly in rapidly evolving domains such as digital forensics, where methodological validation often lags behind technological innovation.

A codified reliability-based framework would provide clear benchmarks for the evaluation of forensic evidence, thereby reducing variability and enhancing consistency within the English criminal justice system. Such a framework could be introduced in a manner that selectively adopts the stronger features of international precedents, most notably the Daubert standard in the United States and developments in Canada under *White Burgess v. Abbott and Haliburton Co.* (2015), while avoiding or remedying their recognised shortcomings. In this way,

England and Wales could benefit from established comparative models demonstrating that judicial discretion may be guided by binding reliability criteria without undermining judicial flexibility, while also designing a more robust framework that places greater weight on empirical validation, limits reliance on weak proxies of reliability, and ensures more consistent gatekeeping in practice.

Furthermore, the findings suggest that judicial training in scientific reasoning is urgently needed. While judges are not expected to become forensic scientists, structured education in scientific methodology, error rates, and validity testing would enhance their capacity to critically evaluate expert evidence. Complementary reforms might include enhanced pretrial evidentiary hearings, stricter regulation of expert witness impartiality, and measures to address resource imbalances between prosecution and defence. *Sine qua non*, these reforms would strengthen the integrity of forensic adjudication and promote a more scientifically literate judiciary.

2.7.5. Limitations

Several limitations of this study warrant consideration. First, the reliance on written appellate judgments may not fully capture the reasoning expressed during oral argument or judicial deliberation. As such, some admissibility considerations may remain implicit, and the textual analysis may either underestimate or overstate the extent to which specific criteria were applied.

Second, the statistical power of the analyses was constrained by the uneven distribution of forensic domains. While DNA evidence was well represented, digital and fingerprint evidence appeared less frequently, limiting the ability to detect nuanced associations within these categories.

Third, limitations arose from the use of the coding scheme. Although it enhanced reliability and objectivity, the scheme offered a constrained lens through which to interpret judicial decision-making. Important subtleties in courtroom behaviour and evidentiary reasoning may have been overlooked. While the exploratory sequential design facilitated methodological triangulation, the use of loosely defined categories hindered absolute consensus in coding, as reflected in inter- and intra-rater reliability checks.

Finally, the study focused exclusively on the appeal courts, which operate under distinct institutional constraints and differ from trial courts in their evaluative priorities. Accordingly, the findings should be interpreted within the appellate context and not generalised uncritically to lower court proceedings.

2.7.6. Recommendations for Future Research Studies

Given that the present study focused exclusively on appellate courts, which operate under distinct institutional constraints and evaluative priorities, future research should investigate how trial courts assess forensic expert evidence. Trial courts are the primary locus of evidentiary gatekeeping, where admissibility decisions exert immediate influence on case outcomes. Accordingly, empirical inquiry into trial-level decision-making could offer a more granular understanding of how the Criminal Procedure Rules (Part 19) and Criminal Practice Directions (Section 7) are operationalised in practice. Methodologically, such research could incorporate court observations, analysis of trial transcripts—where accessible—and semi-structured interviews with judges and barristers to elucidate the interpretive and procedural dynamics at play.

Building on the present study's support for bounded rationality theory, future research should also examine the cognitive strategies and heuristic devices employed by judges when

evaluating complex scientific evidence. The findings suggest that appellate judges often rely on simplified decision-making processes, such as deference to expert authority or procedural safeguards, due to limited scientific literacy and cognitive constraints. To explore this phenomenon further, researchers could employ experimental vignette designs involving mock judges or legal professionals, complemented by qualitative interviews and think-aloud protocols. Such approaches would facilitate a deeper understanding of the psychological mechanisms underpinning judicial reasoning and the potential for bias in forensic evidence evaluation.

The present study identified a notable imbalance in the representation of forensic domains, with DNA evidence disproportionately featured relative to digital and fingerprint evidence. This uneven distribution limits the generalisability of findings and may obscure domain-specific patterns in judicial reasoning. To address this limitation, future research should adopt a longitudinal design to examine how judicial attitudes and admissibility practices evolve across forensic disciplines over time. Such an approach would enable researchers to detect shifts in evidentiary standards and institutional preferences that may not be apparent in cross-sectional analyses.

A time-series analysis of appellate case law, supported by thematic coding and citation network analysis, offers a robust methodological framework for this endeavour. Citation network analysis, in particular, can illuminate the intellectual structure of forensic jurisprudence by mapping how legal judgments and academic literature cite key cases and forensic standards—such as *Daubert* and the Criminal Procedure Rules (CrimPR). This technique can also identify which forensic domains are most frequently cited in appellate decisions and whether specific types of evidence are consistently linked to influential or precedent-setting cases. By tracing these citation patterns, researchers can chart the epistemic and institutional trajectories of

forensic science within the legal system and pinpoint areas where reform or standardisation may be necessary to enhance evidentiary reliability and judicial consistency.

2.7.7. Conclusion

The analysis points to a system in which forensic evidence is frequently admitted but often without sustained, explicit engagement with the full admissibility framework. This practice risks uneven reasoning and weakens the transparency of gatekeeping in cases that turn on complex scientific claims.

Where courts articulated their reasoning, assessments of necessity and reliability tended to carry the greatest weight. By contrast, relevance and expert competency were commonly treated as threshold matters rather than subjects of detailed evaluation. This pattern suggests that judicial gatekeeping is anchored more in pragmatic case considerations than in a systematic appraisal across all limbs of the admissibility test.

In appeals involving fresh evidence, admission was most likely where the material was integral to the grounds of appeal and could be shown to have been reasonably unavailable at trial, to have been retrospectively admissible, and to be capable of belief. These factors illustrate how the statutory framework is applied in practice and why borderline cases can depend on contextual salience rather than on a uniform reliability rubric.

The discourse in this chapter shows how doctrinal discretion, scientific complexity, and uneven scientific literacy combine to produce variability in operationalising standards—particularly in rapidly evolving forensic domains. These findings reinforce calls for a more structured, empirically informed, and context-sensitive approach that links scientific validity to legal reliability and improves the transparency of reasoning.

Against this backdrop, observed inconsistencies in the courts' assessment of expert competency provide the impetus for the next stage of inquiry. The identification of criteria that courts could apply when determining whether an expert is credible—thus competent—a key strand of admissibility determinations in practice.

3. Perceptions of Expertise: Legal and Lay Assessments of Forensic Expert

Witness Credibility

The preceding chapter critically examined the admissibility of expert evidence, highlighting the Court of Appeal's inconsistent application of normative legislation in the absence of a codified evaluative framework. Specifically, Part 19 of the Criminal Procedure Rules does not provide a structured methodology for assessing expert evidence, and the supplementary Criminal Practice Directions (Section 7), while intended to guide the courts assessments, are not legally binding. This absence of procedural regulation also has implications for fresh evidence, particularly when such evidence is contingent upon its hypothetical admissibility at trial. In the absence of mandatory evaluative criteria, appellate judges must rely on general principles and discretionary guidance, resulting in variable evidentiary thresholds and inconsistencies in judicial decisions. The ambiguity undermines the predictability and fairness of the appeal review process. A prominent issue emerging from the analysis is the lack of rigour with which appellate court scrutinise expert competency. Judicial evaluations of expert credentials are both infrequent and often superficial, with the court often deferring to the perceived authority of expert witnesses or relying on procedural safeguards such as cross-examination as proxies for reliability. This practice may reflect a broader epistemic deficit in scientific literacy among appellate judges, which compromises the integrity of forensic evaluation and heightens the risk of admitting inadequately vetted expert testimony. The study findings lend empirical support to calls for a coherent evaluative framework to guide credibility assessments and mitigate epistemic arbitrariness in judicial decision-making.

Building on these findings, the current chapter transitions to an interdisciplinary inquiry into the perception of expert credibility among legal professionals and laypeople. This investigation is grounded in an examination of legal guidelines, case law analysis, and interdisciplinary literature, to identify the evaluative cues that inform credibility judgments. These cues serve as the foundation for a survey instrument designed to capture the heuristics employed by both legal professionals and members of the public in assessing credible experts. The overarching objective is to propose a coherent and empirically grounded framework for identifying genuine experts, thereby addressing the conceptual and procedural inconsistencies identified in prior chapters.

As will become apparent, the extant literature—particularly within disciplines such as law and psychology—frequently employs the terms *expertise*, *expert*, and *credibility* interchangeably. This terminological fluidity reflects a broader disciplinary tendency to conflate epistemic competence with social trustworthiness, often without explicit recognition of their differing ontological and evaluative foundations. Such conflation introduces conceptual ambiguity, obscuring the distinction between individuals who possess demonstrable, domain-specific knowledge and those who merely appear authoritative or trustworthy. This lack of definitional precision not only complicates the interpretation of empirical findings but also undermines efforts to establish robust criteria for expert identification.

Accordingly, this chapter adopts a precise definitional framework that differentiates between expertise as an abstract epistemic attribute, genuine experts as individuals who verifiably embody that attribute, and perceived credibility as a socially constructed judgment that may or may not correspond to actual competence. This conceptual distinction is central to the study's analytical approach, as it permits a more rigorous evaluation of the cues by which

individuals are classified as experts. Nevertheless, when presenting empirical studies and theoretical models from the literature, it is occasionally necessary to employ the terminology used by the original authors. Such usage reflects the dominant language of the source material and does not constitute a conceptual endorsement of the conflation between epistemic competence and perceived trustworthiness. This approach ensures fidelity to the literature while preserving the analytical integrity of the study's definitional framework for identifying genuine experts. The following section introduces the legal foundations for expert witness qualification, establishing the normative criteria that courts use to assess expertise.

3.1. Legal criteria for Expert Witness Qualification

Given the pivotal role expert witnesses play in shaping legal outcomes—by offering specialised opinions on complex scientific or technical matters that is expected to lie beyond the knowledge and experience of jurors and judges—it is concerning that their qualification remains inconsistently evaluated across jurisdictions (Sapir, 2007; Cole, 2014; Hans & Saks, 2018). Their input assists the court by translating complex data into comprehensible and legally relevant insights. Determining the scope and degree of expertise in a given case is inherently complex. For instance, a general medical practitioner possesses greater knowledge of cardiac pathology than a layperson but substantially less than a cardiologist. Thus, while central issues may fall within an expert's training and experience, peripheral matters may exceed their competence, limiting the reliability of their testimony in those domains (Tottenham, 2021). This underscores the challenge of delineating the boundaries of expertise—courts must carefully assess not only the relevance of an expert's qualifications but also the extent to which their specialisation aligns with the evidentiary question at issue.

The primary objective of forensic investigation is to derive empirically supported answers to six essential questions: who was involved? what transpired? how did it occur? when and where did it take place? and why did it happen? (Tilstone, 2014). Expert witnesses contribute to this process by conducting and presenting scientific analyses that address one or more of these inquiries. Unlike eyewitnesses, whose testimony is confined to direct observation, expert witnesses are permitted to offer professional opinions, including those presented in written reports. This latitude, however, does not grant unrestricted freedom of expression—experts, like all witnesses, are prohibited from speculation. When primary facts are rigorously considered and specialist knowledge appropriately applied, experts may formulate reasoned inferences and communicate them to the factfinder as professional opinions (Tottenham, 2021). By furnishing empirically grounded interpretations, expert testimony assists courts in establishing causality and resolving complex factual issues (Gianvanni & Sharman, 2015; Barsky & Gould, 2004; Rix, 2021; Freckelton, 2011).

Notwithstanding their integral role, the criteria for qualifying expert witnesses remains contested across jurisdictions (Ireland & Beaumont, 2015; Garrett & Mitchell, 2017; Roberts & O'Brian, 2018; Solomon, 2019). In the UK, recognition as a bona fide expert is ultimately a judicial determination, rather than being solely based on formal credentials (Epstein, 2019). While this discretionary approach allows for contextual flexibility, it raises concerns about superficial vetting, particularly when legal professionals lack the scientific literacy required to critically assess expertise (Sapir, 2007). Inter alia, this underscores the need for a robust and case-sensitive *voir dire* process that extends beyond curriculum vitae and professional titles.

Legally, an expert witness is defined as an individual possessing specialised knowledge, skill, or experience acquired through research, professional practice, or training, which qualifies

them to assist the court in interpreting technical evidence (Crown Prosecution Service [CPS], 2010, 2022). This definition reflects a functional rather than formalist approach, recognising that being an expert may be demonstrated through diverse pathways. However, the absence of a unified evaluative framework has led to inconsistent standards in expert qualification, thereby inviting scrutiny of the conceptual boundaries between genuine experts and pseudo-experts. A comparative perspective is therefore necessary to examine how different legal systems codify or delegate the evaluation of expert testimony, with particular attention to the implications for consistency, fairness and judicial discretion.

3.2. Jurisdictional Frameworks and Evaluative Inconsistencies in Expert Qualification

The literature demonstrates a persistent lack of consensus regarding what constitutes a genuine expert across legal jurisdictions. Edmond et al. (2013) identified significant variation in admissibility standards among courts in the UK, US, Canada, and Australia. In the United States, the *Daubert* standard (*Daubert v. Merrell Dow Pharmaceuticals Inc.*, 1993) provides a structured framework for evaluating expert testimony, emphasising qualifications, relevance, reliability, and adherence to scientifically valid methodology. This codified approach prioritises empirical testing and methodological rigour, offering a consistent evaluative benchmark.

By contrast, the legal framework in England and Wales lacks a formal admissibility test, granting judges broad discretion in assessing expert evidence (Edmond, 2016). Although the Law Commission (2011) proposed reforms to standardise admissibility criteria, these recommendations remain largely unimplemented. As a result, expert vetting in the UK is fragmented, with courts applying divergent standards shaped by context, tradition, and judicial preference (Criminal Procedure Rules, 2020; Forensic Science Regulator, 2020; Rix, 2021).

Despite the absence of a codified framework, UK courts frequently display tacit acceptance of *Daubert*-like principles (Goymer, 2014; Saks & Faigman, 2005; Ireland & Beaumont, 2015; Fournier, 2016). Judicial discretion is nevertheless exercised within a minimal statutory framework, which requires only that experts interpret evidence within their domain of expertise (Ministry of Justice, 2020, s. 19(1)(a)(ii)). Such limited guidance places evaluative responsibility squarely on judges, resulting in a case-by-case approach that, while flexible, lacks the methodological consistency afforded by codified standards.

These jurisdictional differences extend beyond procedural matters to shape how credibility is constructed and contested in court. In the absence of a *Daubert*-like test, UK judges often rely on discretionary heuristics, including confidence, institutional affiliation, and courtroom fluency. This reliance increases the risk of admitting pseudo-experts whose testimony lacks methodological rigour. In contrast, the *Daubert* framework compels judges to interrogate the scientific validity of expert claims, thereby fostering more consistent and epistemically grounded evaluations. The lack of such a framework in the UK raises concerns about transparency, reliability, and the potential for miscarriages of justice, particularly in complex forensic cases where methodological scrutiny is essential.

A central concern in the literature is the discrepancy between objective qualifications and subjective perceptions of credibility. Formal credentials—such as academic degrees, certifications, and institutional affiliations—are commonly used to establish expertise (Crown Prosecution Service [CPS], 2010; Epstein, 2019). However, scholars caution against overreliance on these proxies. Sapir (2007) argues that legal professionals often conduct superficial assessments due to limited scientific literacy, accepting credentials without rigorous scrutiny.

Edmond (2016) similarly critiques the use of unreliable markers, such as titles or affiliations, which may not reflect actual domain-specific competence.

This problem is further amplified in adversarial legal systems, where experts are retained by opposing parties. Murrie et al. (2013) demonstrated that forensic clinicians exhibit adversarial allegiance, evaluating identical case files differently depending on which party retained them. These findings reinforce the need for courts to move beyond superficial indicators and adopt empirically grounded methods for evaluating expertise (Garrett & Mitchell, 2017). The problem is particularly acute in the UK, where judicial discretion often privileges subjective cues such as communication style, confidence, or courtroom experience over substantive competence (Garrett & Mitchell, 2018; Rix, 2021).

Although the formal role of the expert witness is broadly consistent across adversarial systems—to assist the factfinder by providing specialised knowledge, with credibility grounded in independence, methodological transparency, and fair assistance rather than advocacy—expert roles are not functionally identical across adversarial jurisdictions. Three sources of divergence are particularly salient: first, the judicial gatekeeping function varies in intensity and operationalisation; second, jurisdictions differ in whether, and how, they deploy court-centred mechanisms such as court-appointed experts and concurrent evidence (“hot-tubbing”); and third, the practical litigation of bias and reliability is structured differently, shaping how independence norms are enforced. Collectively, these differences mean that the expert’s role, while doctrinally similar, is realised through distinct institutional and procedural ecologies.

In England and Wales, empirical survey evidence regarding the increased deployment of concurrent expert evidence suggests the emergence of a procedural architecture geared to re-orienting expert testimony towards cooperative, tribunal-facing clarification of disputed technical

matters, rather than adversarial contestation framed through party control. This reformative logic is consistent with the orthodox conceptualisation of the expert as an aid to the court and reflects a deliberate institutional effort to reduce polarisation, enhance the quality of judicial comprehension, and promote analytical engagement with complex expert evidence (Civil Justice Council, 2016). Similarly, in Australia, judicial officer surveys present an expectation that experts should primarily assist the court, while also identifying recurrent practical concerns—such as problems of clarity, risks of partisanship, and limits in comprehension—that arise when expert evidence is delivered within adversarial formats. Importantly, these concerns are treated as constraints to be managed, implying that the normative ideal remains court assistance rather than “hired gun” advocacy (Freckelton et al., 2001). In Canada, an extensive empirical database of expert-bias challenges shows that courts actively police bias through procedural contestation, with a marked increase in challenges following *White Burgess*; however, these challenges do not necessarily translate into widespread exclusion of expert evidence. This pattern aligns with an adversarial ideal in which independence is treated as the benchmark, and potential bias is managed through gatekeeping and procedural safeguards rather than accepted as a legitimate attribute of the expert’s role (Chin et al., 2019).

At the same time, the cross-jurisdictional empirical literature supports a more nuanced proposition—even where the expert’s doctrinal role is formally constant, the *intensity* of adversarial allegiance pressures may vary, and the United States may be distinctive in practice. U.S. survey evidence suggests that judges endorse robust gatekeeping in principle, yet often lack the scientific literacy that the gatekeeping task presupposes (Gatowski et al., 2001). Complementing this, empirical analyses of appellate decisions indicate that admissibility reasoning and the application of reliability criteria shift over time and context (Groscup et al.,

2002). These dynamics can amplify incentives for parties to deploy experts strategically, including framing opinions in litigation-aligned ways, which may increase the practical salience of adversarial allegiance bias even where the formal duty remains “to assist the court.” By contrast, in England and Wales—and more broadly within Commonwealth jurisdictions—the principle that there is “no property in an expert witness” underscores that a retaining party does not own an expert’s opinion as a litigation asset; rather, independence is foregrounded and reinforced through procedural devices, including concurrent evidence, that seek to mitigate adversarial polarisation (Civil Justice Council, 2016)⁶. Australia and Canada exhibit comparable normative direction: Australian judicial surveys frame partisanship as a problem requiring control rather than a permissible stance, while Canadian challenge patterns similarly reflect a system in which independence is the reference point for evaluating expert participation (Freckelton et al., 2001; Chin et al., 2019). Consistent with this institutional logic, experimental research indicates that court-centred procedures—such as concurrent evidence and court-appointed testimony—can diminish adversarial allegiance effects on experts’ judgments, implying that jurisdictions that couch these mechanisms may reduce allegiance pressures relative to conventional party-led examination formats (Perillo et al., 2021).

Generalising these conclusions to inquisitorial processes requires careful qualification; nevertheless, the evidence supports a plausible inference about structural incentives. Inquisitorial systems typically rely more heavily on court-directed evidentiary development and may make greater use of court-appointed expertise, which should—at least in institutional design—reduce incentives for party alignment and position the expert more squarely as an instrument of the tribunal’s fact-finding rather than a vehicle for party case construction. Empirically, the finding

⁶ *Harmony Shipping Co SA v Davis*

that court-centred procedures can reduce allegiance effects lends support to the expectation that inquisitorial architectures may, on average, be less vulnerable to adversarial allegiance bias (Perillo et al., 2021). However, reduced party alignment does not entail the elimination of bias—even in systems where adversarial allegiance is structurally weaker—these systematic errors of thinking may persist through other channels, including institutional pressures, cognitive heuristics, and confirmation dynamics, and therefore remains a relevant concern for the governance of expert evidence (Chin et al., 2019). Accordingly, the extent to which expert bias is constrained in practice depends not only on procedural features (e.g., court-centred appointment and presentation) but also on the admissibility architecture within which experts operate—making the distinction between codified and discretionary gatekeeping frameworks critical for understanding how judges reason about, and regulate, expert evidence.

The divergence between codified and discretionary frameworks has profound implications for judicial reasoning. Codified standards, such as the *Daubert* test, impose a structured methodology that requires judges to interrogate the epistemic foundations of expert testimony. By mandating scrutiny of methodological validity, empirical reliability, and relevance, this framework anchors admissibility in scientific rigour. Judges thus serve not only as arbiters of admissibility but also as gatekeepers of scientific integrity, reducing the risk of admitting unreliable evidence. By contrast, the discretionary model in England and Wales affords judges broad latitude; in the absence of an explicit evaluative framework, decision-making can default to superficial proxies such as professional title or rhetorical fluency. This variability undermines predictability and transparency and creates epistemic vulnerabilities through which flawed expert evidence may enter the courtroom.

The consequences of this discretionary approach are significant. First, it diminishes the predictability of judicial decisions, creating uncertainty for legal practitioners and expert witnesses alike. Second, it risks epistemic arbitrariness, whereby judges—often lacking scientific literacy—may admit flawed or misleading expert evidence. This not only compromises the integrity of forensic adjudication but also heightens the risk of miscarriages of justice. Moreover, discretionary frameworks may inadvertently privilege performative credibility over substantive expertise. Experts who are rhetorically polished or institutionally prestigious may be favoured even when their methodological grounding is weak, while domain specialists with robust empirical competence but limited courtroom experience may be overlooked. Such distortions reinforce systemic biases, privileging style over substance in expert evaluation. The following section illustrates the real-world consequences of inadequate expert evaluation, linking systemic failures to the absence of robust evaluative criteria and epistemic oversight.

3.3. Miscarriages of Justice and the Risks of Flawed Expert Testimony

Miscarriages of justice have arisen over a variety of conditions, including cases where expert witnesses lacked appropriate credentials or impartiality, where unreliable evidence was given disproportional weight, where courts misinterpreted technical findings, or where new evidence contradicted earlier conclusions (Freckleton, 2011; Hans & Saks, 2018; Sangero, 2021; Shorter et al., 2022). However, these failures are not confined to emerging or novel forensic domains; they persist even within well-established fields such as DNA analysis. Documented errors include flawed calculations of match probabilities, misinterpretations about sample transfer mechanisms, and inadequate safeguards against lay misinterpretation of statistical data (Royal Society et al., 2017; Cole, 2014; Weathered et al., 2020).

Such cases highlight the systemic risks posed by methodological opacity and misplaced confidence in expert testimony and this can have serious ramifications. Flawed forensic evidence can distort fact-finding, mislead juries, and result in wrongful convictions. These risks are exacerbated when courts rely on superficial proxies for expert status rather than critically evaluating the methodological rigour and evidentiary basis of the expert's conclusions.

To mitigate these risks, scientific findings must be robustly derived and transparently reported, and they must be presented in a manner that is intelligible to non-experts. Without these safeguards, the epistemic gap between forensic experts and lay decision-makers becomes a liability, rather than a source of insight. To better understand how such epistemic vulnerabilities arise and persist, there is merit in understanding the concept of expertise through a psychological lens, where distinctions between declarative knowledge and procedural skill offer critical insight into the nature and limitations of expert performance.

The recurring failures associated with expert testimony, from flawed forensic analyses to misinterpretation of statistical data, reveal vulnerabilities that are not solely procedural but epistemic. These failures are systemic rather than anomalous, reflecting broader patterns in which courts admit expert evidence without sufficient scrutiny of either its methodological basis or the epistemic competence of the witness.

A central theme in the literature is the persistent overreliance on superficial markers of expertise—formal credentials, institutional affiliation, or courtroom fluency—at the expense of rigorous evaluation of reasoning processes and evidentiary foundations (Sapir, 2007; Edmond, 2016). This tendency is exacerbated by the absence of a codified evaluative framework, compelling judges to depend on discretionary heuristics that may privilege rhetorical confidence over scientific validity.

The lack of structured criteria for admissibility creates a vulnerability for epistemic error. Judges, often lacking domain-specific scientific literacy, may struggle to differentiate between genuine expertise and persuasive but unfounded claims. These risks are amplified in adversarial systems, where experts are retained to support partisan narratives. Without robust safeguards, courts risk admitting evidence that is not only scientifically unsound but also strategically biased.

Moreover, the persistence of errors within domains such as DNA analysis underscores that even well-established scientific fields are susceptible to misapplication when evaluative standards are weak. Miscalculations of match probabilities, misinterpretation of transfer mechanisms, and inadequate communication of statistical uncertainty are not simply technical oversights but symptoms of a legal culture lacking the epistemological tools necessary to interrogate scientific claims effectively.

These patterns of failure point to a deeper conceptual issue: the conflation of credibility with competence. In the absence of epistemic literacy, courts may equate confidence, clarity, or institutional prestige with reliability, thereby admitting testimony that appears authoritative but lacks substantive merit. Such conflation undermines the integrity of factfinding and increases the risk of wrongful conviction.

To address these vulnerabilities, it is imperative to develop evaluative frameworks that integrate both legal and scientific standards. Such frameworks must move beyond credentialism and rhetorical performance, focusing instead on the coherence, transparency, and empirical validity of expert reasoning. Without this shift, the justice system remains exposed to epistemic arbitrariness, where the credibility of expert testimony is determined less by evidentiary strength than by performative appeal.

Accordingly, the following section turns to psychological theories of expertise, which provide a granular account of how knowledge is acquired, demonstrated, and evaluated. These perspectives help explain why systemic failures persist and how expertise must be conceptualised beyond legal doctrine to safeguard against miscarriages of justice.

3.4. Expertise from a Psychological Perspective

The concept of expertise comprises two interrelated dimensions: knowing-that (declarative knowledge) and knowing-how (procedural skill). Declarative knowledge refers to formal, codified understanding—such as academic qualifications, theoretical principles, and institutional recognition—while procedural knowledge involves the practical application of skills in context, often acquired through experience and tacit learning.

While legal systems often rely on declarative markers such as qualifications and titles to assess expertise, psychological research suggests that procedural competence—often tacit and context-dependent—is equally vital. This insight challenges the sufficiency of legal vetting practices and underscores the need for evaluative frameworks that account for both dimensions. Ryle (1946) famously illustrated this distinction by noting that an individual may memorise tactical principles yet remain unable to apply them effectively in practice:

“We can imagine a clever player generously imparting to his stupid opponent so many rules, tactical maxims, ‘wrinkles,’ etc., that he could think of no more to tell him; his opponent might accept and memorise all of them, and be able and ready to recite them correctly on demand. Yet he might still play chess stupidly, that is, be unable intelligently to apply the maxims.” (Ryle, 1946, p. 5)

Polanyi (1962) extended this view by emphasising the role of tacit knowing in scientific discovery and expert judgment. More recently, Martire et al. (2025) introduced the distinction

between show-it and know-it expertise. The former refers to observable, measurable performance, while the latter involves interpretive reasoning and domain-specific judgment. In legal contexts, where know-it expertise predominates, evaluators must infer credibility from the coherence, depth, and evidentiary grounding of expert reasoning rather than from demonstrable skill alone.

While *show-it* expertise can be quantified using performance-based systems—such as Elo ratings in chess, which distinguish experts from novices through competitive outcomes (Elo, 1967; Gobet, 2016)—assessing know-it expertise is not straightforward; it rests on inferential processes that are more open to cognitive bias and epistemic error. Consequently, evaluative tools must integrate both objective indicators and contextual judgement to ensure the reliability and validity of expert testimony.

This psychological framework has direct implications for legal practice. It cautions against overreliance on superficial proxies and supports the development of multidimensional evaluative models that integrate both declarative and procedural indicators. Such models are essential for reliably distinguishing genuine experts from persuasive but epistemically weak witnesses.

Although previous research has introduced various instruments for assessing witness credibility, few are tailored to the specific evaluative demands of forensic expert testimony. The Witness Credibility Scale (WCS), developed by Brodsky, Griffin and Cramer (2010) represents a notable exception. Comprising twenty adjectives—such as “self-assured,” “truthful,” and “logical”—rated on a ten-point scale, the WCS provides a structured means of quantifying perceived credibility within courtroom settings. By enabling standardised assessments of witnesses, it has the potential to enhance the consistency in judicial evaluations.

While the WCS provides a valuable foundation, its reliance on isolated descriptors may limit its sensitivity to the nuanced and context-dependant nature of expert testimony. Building on

this framework, future studies in this domain could adopt a more refined methodology by employing full-sentence items rather than single word adjectives. This approach would enable evaluators to consider credibility in relation to specific testimonial contexts, thereby capturing nuances that may be overlooked by more deductive measures. By operationalising credibility through multidimensional indicators—incorporating clarity, coherence, evidentiary grounding, and domain-specific relevance, such measures would address the conceptual limitations in previous instruments.

Although the Witness Credibility Scale (WCS) offers a psychometrically robust means of operationalising credibility as perceived by factfinders, it is principally an *outcome* measure of global evaluative judgments rather than a direct assessment of the behavioural competencies through which expert evidence is communicated. This distinction is consequential within psychological models of expertise, which differentiate declarative knowledge (what an expert knows) from procedural skill (how that knowledge is enacted in performance contexts). In adversarial proceedings, where assessments of expertise are often inferred from observable courtroom behaviour, a credibility instrument is therefore strengthened when paired with a construct-specific measure of testimony delivery skill.

Addressing this deficit, Cramer, DeCoster, Neal, and Brodsky (2013) developed the Observer Witness Efficacy Scale (OWES), an observer-rated instrument designed to capture the perceived effectiveness of expert testimony delivery. Grounded in self-efficacy theory and the witness-preparation literature, the OWES was intended to provide a psychometrically defensible alternative to reliance on self-assessed testimony competence, which may be inflated or poorly aligned with external evaluations. Conceptually, the scale functions as a juror/observer analogue

to self-rated efficacy measures, thereby indexing procedural performance from the standpoint of those tasked with appraising the witness in situ.

Psychometric analyses reveal the OWES comprises two interrelated dimensions—*Poise* and *Communication Style*—which align with established theoretical accounts of testimony performance. These dimensions demonstrate differentiated associations with legally salient outcomes, including perceived credibility and verdict-related judgments, supporting the view that testimony delivery constitutes a distinct, empirically tractable component of expert performance. Accordingly, the WCS and OWES can be treated as complementary but non-redundant measures—the WCS indexes overarching credibility appraisals—whereas the OWES isolates observable procedural competencies implicated in the effective communication of expertise under examination.

Nevertheless, the effectiveness of psychologically informed measures ultimately depends on how credibility is construed and operationalised within legal contexts—an area complicated by divergent evaluative heuristics of legal professionals and lay jurors, who approach expert evidence with distinct roles and purposes. Understanding these interdisciplinary differences is essential for ensuring that credibility assessments are not only methodologically reliable, but also contextually valid. Therefore, the following section explores how different stakeholder groups—legal professionals and laypeople—perceive and evaluate expert credibility, revealing divergent heuristics and biases.

3.5. Evaluating Expert Epistemic Status: Legal Professionals and Lay Jurors

The divergence between legal professionals and laypeople in evaluating expert witnesses is well-documented. Lay jurors frequently rely on observable traits such as demeanour, confidence, attire, and presentation style—feature that do not reliably correlate with being a

genuine expert (Wilcox & NicDaeid, 2018; Goodman-Delahunty & Wakabayashi, 2012; Mieke, 2022; Jones et al., 2023). This reliance on superficial cues, can result in the overestimation of epistemic authority. The “white coat effect” exemplifies this tendency, wherein formal dress and closed posture enhance perceptions of credibility, particularly among female experts (Vaerenbergh, 2010; Koppl, 2015). Such markers may inadvertently substitute for substantive evaluation, especially, when jurors lack requisite domain knowledge to critically assess technical content.

Although legal professionals are expected to apply more structured evaluative criteria, they are not immune to similar biases. Within adversarial systems, experts are frequently selected on the basis that they will endorse legal narratives, potentially compromising objectivity and fostering reliance on heuristics such as courtroom experience, rhetorical fluency and finesse, and clarity of presentation (Grønnerød et al., 2016; Edmond, 2016; Garrett & Mitchell, 2018; Rix, 2021). While these assessments may be more informed than those of lay jurors, they nonetheless risk conflating communicative competence with scientific validity.

Empirical studies have delineated the attributes valued by different legal stakeholders. Vignette-based studies by Weschler et al. (2015) revealed that attorneys prioritise communication skills, the quality of conclusions, and trustworthiness when commissioning experts. Complementary findings by McCarthy Wilcox and NicDaeid (2018) based on interviews with actual jurors, identified academic qualifications, confident demeanour, and professional status as salient credibility markers. These findings underscore the need for examining both lay and professional perspectives. While legal professionals act as curators and gatekeepers of expert testimony, jurors serve as its ultimate arbiters—rendering verdicts that may depend on their interpretation of being an expert, however imperfectly informed.

Further distinctions emerge in how legal professionals and lay jurors interpret what it means to be an expert. Grønnerød et al. (2016) reported that legal professionals value experts who express doubts, employ intelligible and coherent language, and present information in a verifiable and methodological manner—reflecting a professional emphasis on accountability and procedural integrity. In contrast, jurors often privilege semblance indicators and stylistic cues, particularly in cases involving complex scientific evidence that exceeds lay interpretive capacity (Sapir, 2007; Cole, 2014; Hans & Saks, 2018). This divergence underscores the epistemic asymmetry between legal professionals and laypeople, with the latter more susceptible to rhetorical and symbolic persuasion.

Mock jury studies have yielded valuable insights into how laypeople interpret and evaluate expert testimony. Ferreira and Wingrove (2024), in an experimental study involving 553 mock jurors, found that both training and prior experience significantly influenced perceived credibility, with experience exerting a slightly greater effect. Similarly, Goodman-Delahunty and Wakabayashi (2012) demonstrated that jurors do not passively defer to experts; rather, they engage critically with conflicting testimony, particularly when aided by visual tools and balanced presentation. These findings suggest that the juror's susceptibility to peripheral cues may be mitigated through targeted interventions that enhance cognitive engagement and interpretative competence.

Despite these encouraging findings, the effectiveness of courtroom procedures in enhancing juror discernment remains contested. Austin and Kovera (2019) examined scientifically informed cross-examinations and found that such interventions did not significantly improve jurors' ability to assess the reliability of expert evidence. These results suggest that, although jurors are capable of critical evaluation, their judgments are shaped by contextual

factors, including presentation style, perceived authority and framing of testimony. This affirms the needs for more robust procedural safeguards and educational strategies geared towards fostering critical evaluation of expert testimony among lay factfinders.

3.6. Evaluative Proxies of being a Genuine Expert: Legal and Lay perspectives in Forensic Contexts

The preceding subsection critically examined the divergent evaluative practices employed by legal professionals and lay jurors when assessing expert witness credibility. Synthesising the preceding insights, this section identifies and categorises the specific cues used to assess expert credibility across legal and psychological domains. Drawing on empirical and theoretical literature, it became evident that perceptions of expertise are mediated by an intricate interplay of psychological heuristics and legal conventions. To consolidate these insights, the present subsection offers a structured synthesis of the legal and non-legal proxies to qualify individuals as expert witnesses across the literature. This summary endeavours to bridge descriptive findings and normative implications, facilitating a clearer understanding of the attributes that inform the assessment of genuine experts in forensic contexts.

To the best of the researcher's knowledge, no empirical research has yet to examine the perceptions of legal experts and laypeople regarding the cues used to qualify genuine forensic experts from a psychological perspective. To address this gap, a systematic search was undertaken across both legal sources (e.g., statute law, legal guidelines, case law) and non-legal/psychological databases (PubMed, PubPsych, PsychARTICLES, Psychology and Behavioural Sciences Collection, and Google Scholar). Using predefined search terms and restricting the scope to publications between 1990 and 2023, the search yielded 22 distinct cues relevant to the assessment of forensic experts, credibility and/or expertise.

Table 3.1*Cues and Supporting Evidence for Assessing Forensic Expert Credibility*

Cue	Supporting Description and Evidence
Extensive practical experience	Jurors are strongly influenced by examiner experience, often more than by scientific validation. Empirical studies show that experience and education outweigh laboratory accreditation or certification, with some jurors identifying practical experience as the primary determinant of credibility (Koehler et al., 2016; Wilcox & NicDaeid, 2018).
Court witness training	Preparation for cross-examination and courtroom delivery enhances credibility under scrutiny (Gobet, 2016; Neal, 2009).
Court witness criticism	Courts routinely exercise a public denunciatory power, and written judgments may include criticism of parties or witnesses (Tottenham, 2021). Past criticism for deviations from scientific standards undermines credibility. The CPS highlights disclosure of adverse findings or disciplinary actions as part of expert duties (Notley, 2011; CrimPD 7.1.4[e]).
Previous experience as court witness	Repeated appearances, particularly in higher courts, are regarded as markers of competence and reliability (CPS, 2022; Garrett & Mitchell, 2018). CPD 7.1.1(b) affirms admissibility where competence is established.
Peer-reviewed publications	Domain-relevant publications reinforce authority and expertise (Jones, 2022).
Courtroom presentation skills	Clear, confident, and accessible communication strongly shapes credibility (Champagne et al., 1991; McCarthy Wilcox & NicDaeid, 2018).
Formal qualifications and training	Academic and professional credentials serve as key proxies for expertise, though not always sufficient (Epstein, 2019; CPS, 2010; McCarthy Wilcox & NicDaeid, 2018; Tottenham, 2021).
Professional appearance and demeanour	Attire and posture influence juror perceptions, often operating as superficial but impactful cues (Jones et al., 2023; Mieke, 2022).

Licensing and accreditation	Accreditation by professional bodies signal's reliability and adherence to standards (McCartney & Amoako, 2019).
Application of domain knowledge to legal questions	Translating scientific expertise into legally relevant insights is essential. Both observable ("show-it") and inferential ("know-it") expertise are valued (Hodgkinson & James, 2015; Martire et al., 2025).
Recommendation by legal professionals	Endorsements from lawyers reinforce perceived credibility (Grønnerød et al., 2016).
Professional status	Higher-status professional labels enhance credibility. Jurors weighted examiner profession over method validity (Koehler et al., 2016). Psychiatrists, for instance, were rated more credible than psychologists (Kipoulas et al., 2024).
Impartiality	Independence, neutrality, and orientation toward truth are central to credibility (Ikarian Reefer; Katz, 1992; Simon-Kerr, 2021; Tottenham, 2021).
Field of expertise	Credibility depends on the scientific reliability of the discipline itself (Edmond, 2016).
Relevancy of expert knowledge to testimony	Testimony must directly address case-specific issues (CPD 7.1.1[a]).
Transparent testimony	Clarity about methods and disclosure of limitations enhances trust (Ballantyne et al., 2024; Weschler et al., 2015).
Handling of cross-examination	Credibility is reinforced by composure under adversarial questioning (Austin & Kovera, 2019).
External proficiency assessment	Proficiency testing is recommended to substantiate claims of expertise (Garrett & Mitchell, 2017).
Tendency to represent specific legal parties	Repeated alignment with prosecution or defence raises bias concerns (Murrie et al., 2013).
Endowed chair status	Holding a prestigious academic position may signal authority (Rezaee et al., 2004).
Ability to provide reliable evidence	Reliability of conclusions is central to admissibility (Edmond et al., 2012; CPD 7.1.1[d]).
Experience in higher courts	Appearances in appellate or high courts indicate advanced expertise (CPS, 2022).

3.7. The Present Study

Discrepancies in how laypeople and legal professionals evaluate the attributes that qualify an individual as an expert reflect fundamental distinct evaluative heuristics. The literature suggests laypeople frequently rely on superficial cues—such as demeanour, confidence, attire, and presentation style—that may not reliably indicate the presence of genuine expertise. In contrast, legal professionals tend to prioritise procedural fluency, courtroom experience, and rhetorical clarity, which are conventionally regarded as indicators of professional competence. These divergent criteria highlight the need for evaluative instruments that are both precise and sensitive to the contextual complexity of expert testimony.

Despite growing interest in the empirical study of expert credibility, the literature remains marked by methodological inconsistencies, particularly in how expertise is operationalised and measured across studies. These inconsistencies hinder the comparability of findings and obscure the nuanced interplay between perceived expertise and testimonial context. Existing instruments, such as the Witness Credibility Scales, offer a structured foundation for assessment. However, their reliance on isolated descriptors—typically single-word adjectives—limits their capacity to capture the dynamic and situational nature of expert knowledge. This reductionist approach risks treating expertise as a static attribute, rather than a construct shaped by the interaction between the expert's performance and the demands of the legal context. This reductive approach risks oversimplifying credibility, treating it as a static trait rather than a context-dependent construct. Addressing this limitation requires methodological refinement in future research.

To address these shortcomings, the present study introduces a single, multidimensional survey instrument designed for use with both legal professionals and lay participants. This approach is informed by the expert–novice paradigm in cognitive psychology, which posits that

novice judgments can serve as a comparative baseline for evaluating expert reasoning (Gobet, 2016). By incorporating full-sentence items that situate credibility within specific testimonial contexts, the instrument aims to capture subtleties that are often overlooked by more deductive or decontextualised measures. Operationalising credibility through multiple dimensions—such as clarity, coherence, evidentiary grounding, and domain-specific relevance—offers a more robust and ecologically valid means of assessing expert performance. By enabling direct comparison, this approach facilitates a systematic understanding of how forensic witnesses are qualified as experts across the interdisciplinary cohorts and lays the groundwork for more consistent evaluative models.

Using this method, the study advances a theoretical framework for assessing forensic experts in legal contexts. The framework is based on the 22 evaluative cues identified from both legal and psychological literatures. These cues encompass a spectrum of variables, including epistemic indicators (e.g., methodological transparency, domain-specific knowledge) and symbolic proxies (e.g., presentation style). In concert, they constitute the multidimensional criteria through which individuals claiming expert status are constructed, communicated, and interpreted in legal proceedings.

To ensure analytic clarity and conceptual coherence, these cues were systematically organised by the researcher using a top-down, theory-driven approach grounded in the extant literature. This categorisation yielded five overarching categories: *Knowing-that*, *Knowing-how*, *Integrity*, *Testimony Presentation Skills*, and *Decoy*. Each category reflects a distinct facet of how forensic expert knowledge is evaluated by both legal professionals and laypeople.

Knowing-that is operationalised codified, declarative knowledge that is formally recognised through institutional validation. Indicators include qualifications, prior courtroom

experience, training in expert testimony, academic appointments (e.g., endowed chair), senior professional status, and appearances in higher courts. These cues reflect mastery of abstract principles legitimised through established institutional structures.

Conversely, **Knowing-how** captures tacit, procedural competence accrued through sustained, context-specific practice. It encompasses the ability to apply expertise flexibly and effectively within legal settings. Relevant indicators include domain-specific field experience, peer-reviewed publications, external proficiency assessments, and demonstrated adaptability to case-specific demands. This distinction aligns with Ryle's (1945) philosophical differentiation between knowing-that and knowing-how, underscoring that Substantive Credibility requires not only the possession of knowledge but its skilful application.

The third category—**Testimony presentation skills**—acts as a bridge between expert knowledge and courtroom reception. It pertains to the clarity, coherence, and rhetorical effectiveness with which testimony is delivered. In the absence of objective performance metrics, jurors often rely on delivery cues such as confidence, fluency and coherence (Martire et al., 2025). Empirical evidence suggests that well-calibrated confidence—where expressed certainty aligns with evidentiary strength—enhances perceived credibility (Cramer et al., 2009; Spellman & Tenney, 2010). Thus, presentation skills are not simply rhetorical or performative but carry epistemic weight. Relevant indicators include the expert's ability to withstand cross-examination, ability to provide transparent testimony, and communicate complex information effectively.

Forming the fourth category, **Integrity** embodies the expert's commitment to ethical and methodological rigour. It encompasses impartiality, honesty, and being independent from adversarial interests. As demonstrated by Guarnera et al. (2017) and Stern et al. (2019) integrity can be diminished by allegiance to the commissioning legal party, inadequate training, or

reliance on unreliable methods. These challenges accentuate the need for scrutinising both the expert's methodology and their courtroom conduct. Within this study, integrity is operationalised through indicators such as impartiality, the provision of reliable evidence, and previous judicial criticism.

The final category, **Decoy cues**, refers to superficial heuristics—such as appearance, professional status, or habitual alignment with legal parties—that may simulate credibility without substantive epistemic merit. These cues are introduced here to caution against their overuse in credibility assessments. Subsequent sections reference this category without reiterating its definition.

Taken together, the five domains outlined in this framework provide a systematic and comprehensive approach to assessing both the credibility and competence of expert witnesses. By distinguishing between substantive indicators and superficial heuristics, the framework resolves conceptual ambiguities and enhances the rigour of forensic evaluations. The categorisation of individual cues within their respective domains is presented in Table 3.2.

Table 3.2*Categorisation of Cues for Assessing Forensic Expert Credibility*

Category	Cues
Knowing-that	Formal qualifications Previous experience as an expert witness in Court Training as a court witness Endowed Chair High status Experience of providing testimony to higher courts
Integrity	Impartiality (Independent to legal parties) Reliable evidence Forensic witness previously subjected to criticism
Testimony presentation	Good presentation skills Capable of providing transparent testimony Handling cross-examination
Knowing-how	Extensive practical experience Peer review publications Licensed or accreditation Application of expert knowledge to legal question Knowledge relevant to testimony Proficiency assessed
Decoy	Appearance and behaviour Expert witness has been recommended Domain perceived as well-established Tendency to work for a particular legal party

The present study is guided by the following research questions:

1. What evaluative criteria do legal professionals prioritise when commissioning forensic experts for courtroom testimony?
2. What factors do laypeople consider the most important in determining the credibility of forensic expert witnesses?

3. To what extent do the criteria used by legal professionals differ from those used by laypeople in assessing the credibility of forensic expert witnesses?

3.7.1. Aims and Objectives

The aim of the present study is to determine the most important cues that the courts could be using to admit forensic witnesses who are genuine experts.

The objectives are:

1. To examine the courts existing approach for admitting forensic experts.
2. To examine how the courts qualify witnesses as having specialised expert knowledge.

To address the persistent gap in understanding how forensic expert credibility is conceptualised across stakeholder groups, this study employs a mixed-methods design integrating data from legal professionals and laypeople eligible for jury service in the United Kingdom. Using a stratified sampling strategy, participants from each cohort will rate the importance of qualification criteria drawn from both legal doctrine and psychological research on expertise. This design enables direct, systematic comparison between those embedded within the adversarial system and those external to it, revealing how different perspectives shape the evaluation of expert witnesses.

This methodological approach is uniquely positioned to capture both normative judgments informed by legal practice and descriptive judgments shaped by lay reasoning. Legal professionals may privilege criteria that align with litigation strategy, while laypersons—operating without specialist legal or scientific knowledge—may rely on heuristic cues and surface-level markers of credibility. By critically examining these differing judgment paradigms, the study introduces a novel empirical lens that brings psychological theory into dialogue with legal analysis. In doing so, it generates evidence capable of reshaping admissibility standards,

enhancing transparency, and deepening theoretical and practical understanding of how credibility is constructed, contested, and operationalised in adversarial proceedings.

The study employs a unified methodological framework, administering the same survey instrument to legal professionals and laypeople eligible for jury service in the UK. This design facilitates direct comparison and aligns with the expert–novice paradigm in cognitive psychology (Gobet, 2016), enhancing the validity of findings. By integrating legal, psychological, and sociological insights, the research aims to inform judicial gatekeeping practices, improve expert witness training, and promote the use of scientifically validated criteria in expert evaluation.

Ultimately, the findings of this study will contribute to the development of a more coherent and empirically grounded framework for qualifying expert witnesses. This framework has the potential to enhance the fairness and accuracy of courtroom decision-making by ensuring that expert testimony is both credible and competent.

3.8 Method

3.7.1. Participants

A total of 231 Participants were recruited using a purposive snowball sampling method, initiated through convenience sampling. Recruitment was conducted via the researcher's professional LinkedIn network and the Middlesex University listserv. Prospective participants were also encouraged to share the study with others meeting the eligibility criteria.

The sample was comprised of two distinct groups: legal professionals ($n = 122$) and laypeople ($n = 109$). Inclusion in the legal professional group required demonstrable evidence of formal legal training. Within this group, 73.0% were practising lawyers ($n = 89$), with the remainder consisting of judges (1.6%, $n = 2$), prosecutors (6.6%, $n = 8$), paralegals (1.6%, $n = 2$), and other legally trained professionals (17.2%, $n = 21$). Due to an initial shortfall in responses, the recruitment period for legal professionals was extended from 2 June–21 October 2021 to 22 January–6 March 2024, resulting in an additional 62 participants.

Lay participants were recruited based on the eligibility criteria for UK jury service: being aged 18 years or older and having resided in the United Kingdom, Channel Islands, or Isle of Man for at least five years since the age of 13. The criterion of voter registration was excluded due to the impracticality of verifying electoral records, which would have required access to sensitive personal data. Eligibility was self-reported, consistent with established practice (Craig et al., 2021).

An a priori power analysis was conducted using G*Power 3.1.9.7 (Faul, Erdfelder, Buchner & Lang, 2009) to estimate the required sample size for an independent-samples t test. Assuming a medium effect size ($d = 0.50$; Cohen, 2013), and alpha level of .05, and a desired power of .80, the analysis indicated that a minimum of 128 participants (64 per group) was

required. Recruitment efforts surpassed this threshold: of the 293 individuals initially enrolled, 24 were excluded for failing to meet eligibility criteria and 38 were excluded due to incomplete responses. The final analytic sample therefore comprised 231 participants.

All data were entered into SPSS (version 28) for analysis. Prior to data cleaning, the dataset was inspected for missing values, outliers, and variable type accuracy (i.e., numeric data for items 1–22; string data for item 23). To ensure data integrity and minimise bias, only fully completed responses were retained; partial responses were excluded rather than imputed. This resulted in the removal of 30 lay responses and 8 legal responses. Figure 3.1 presents a visual summary of the participant enrolment process.

Following data preparation, a post hoc power analysis was conducted to evaluate the robustness of the statistical findings. The analysis yielded a critical t -value of 1.65 and an observed power of .98 indicating a high likelihood that the observed group differences are reliable and not attributable to random variation. These results support the adequacy of the sample size and reinforce the validity of the inferential conclusions drawn from the data.

3.7.2. Survey

Participants anonymously completed a 22-item online survey administered via Qualtrics (See Appendix 4). Each item described a hypothetical expert witness and was designed to assess attributes related to perceived credibility. Of the total items, sixteen were positively valanced (e.g., “Witness has several peer-reviewed publications on the topic relevant to their testimony”), while six were negatively valanced (e.g., “Witness does not have any previous experience as an expert witness in court”). All items were derived from the literature as summarised in Table 3.1.

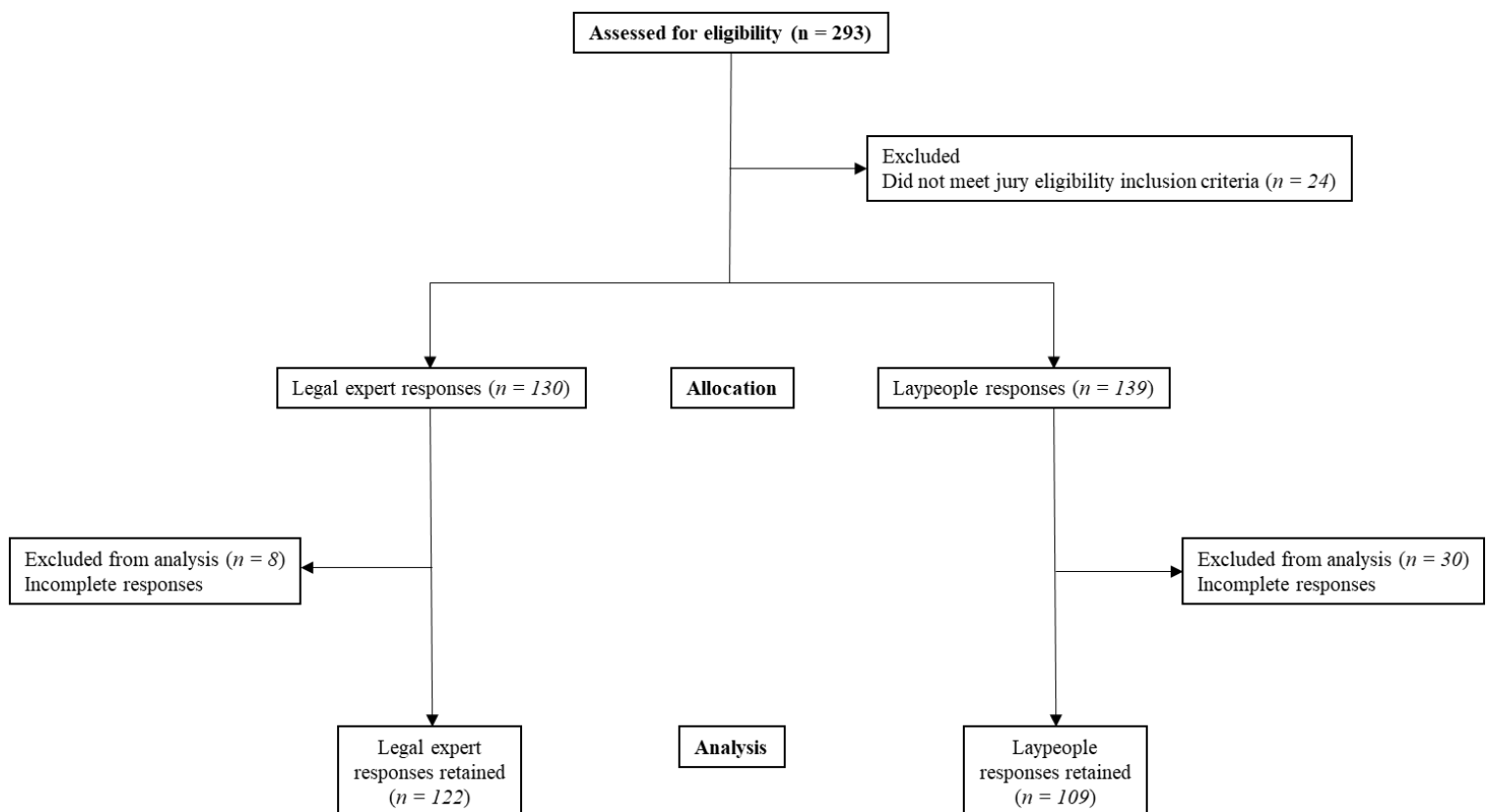
Participants rated the importance of each criteria using an 11-point Likert scale ranging from 0 (“not at all important”) to 10 (“extremely important”). To capture additional perspectives,

an open-ended item at the end of the survey invited participants to specify any further criteria they considered relevant to expert witness credibility.

Prior to the main study, the survey instrument was piloted with eight individuals to evaluate its clarity, structure, and content. The pilot group comprised three legal academics, three psychology academics affiliated with Middlesex University, and two members of the public. Feedback from the pilot informed minor revisions to item wording, thereby ensuring the accessibility and comprehensibility of the survey for both legal and lay participants.

Figure 3.1

Recruitment and Analytical Sample of Legal professionals and Laypeople



Note. The diagram depicts the allocation and retention of participants, distinguishing between legal experts and laypeople.

3.7.3. Procedure

Data collection was conducted online, consistent with established practices in expert witness evaluation research (Craig et al., 2021; Diamond & Lempert, 2025; Himes & Brandner, 2021; Johan, 2024). After following the study link, participants were presented with an information sheet and an electronic consent form. They were then asked to complete demographic questions, including age, UK residency status, legal profession status (if applicable type of legal role, i.e. lawyer, judge, coroner, or paralegal). In order to proceed, participants were required to indicate that they had read the information, understood the study, and provide informed consent.

Upon completion of the 22-item questionnaire, participants were directed to a debriefing page. This page explained the study's purpose, outlined ethical safeguards, and provided contact details for follow-up queries. The survey required approximately 10–12 minutes to complete. Ethical approval was obtained from the Psychology Research Ethics Committee at Middlesex University (Application No. 16196).

3.7.4. Data Cleaning

Data cleaning and preprocessing was conducted systematically to ensure data quality and integrity before analysis. The objectives were to identify and address missing data, detect outliers and prepare the variables to meet the assumptions required for statistical analysis.

A preliminary screening of the raw data from the two participant groups—legal professionals and laypeople—was conducted independently to assess for completeness, consistency, and accuracy. As previously reported, 38 incomplete responses were excluded from the final dataset. Descriptive statistics and frequency distributions were reviewed to identify any irregularities, and histograms were visually inspected to detect outliers among continuous

variables. Extreme values were further evaluated for plausibility by referencing distributional norms.

Although no implausible values were identified, several cases exhibited extreme z-scores (values ± 3). These cases were retained on the basis that they reflected genuine variability within the population. Their exclusion would have risked limiting the generalisability of the findings and potentially obscuring meaningful population characteristics. Moreover, the presence of these outliers was not expected to substantially skew results.

The final dataset contained no missing values and no duplicate entries, indicating a high level of data accuracy and readiness for analysis.

3.7.5. Data Analysis

All statistical analyses were conducted using IBM SPSS Statistics (version 28). Descriptive statistics—comprising mean importance ratings, measures of dispersion, and frequency distributions, were computed separately for legal professionals and lay participants across the 22 credibility-related variables.

To explore potential grouping of items, two complementary approaches were employed. Initially, a top-down method approach informed by extant literature was used to group the 22 items into five theoretically derived composite categories. Independent-samples t-tests were then planned to compare legal professionals and lay participants across these categories. However, internal consistency analyses revealed that the reliability coefficients for these composites fell below acceptable thresholds ($\alpha < .60$), indicating inadequate internal coherence. Consequently, to preserve interpretative validity, subsequent analyses were conducted at the level of individual items.

Accordingly independent-samples t tests were performed separately for each of the 22 variables to compare the ratings of legal professionals and lay participants. Assumptions for the t -test were met: the dependent variables were continuous; the independent variable consisted of two distinct groups; and observations were independent. Although a small number of extreme values were identified during data screening, these were retained as they reflected authentic variability. Importantly, no influential outliers were detected that would compromise the validity of the analyses. The dependent variable was approximately normally distributed within each group, and homogeneity of variance was assessed using Levene's test. Where Levene's test was non-significant ($p > .05$), equality of variance was assumed; when significant ($p < .05$), adjusted test statistics were reported (Field, 2009).

In parallel, a bottom-up approach was undertaken to examine whether participants responses suggested naturally emerging item clusters. Inter-item correlations were computed using Pearson's r to assess the degree of association among the 22 scale items. To further quantify group differences and associations, effect sizes were calculated using Cohen's d for between-group comparisons and Pearson's r for correlations. Given the number of statistical tests conducted, a conservative significance threshold of $p < .01$ was adopted to mitigate the risk of Type I errors.

To assess whether participants' ratings deviated significantly from the neutral midpoint of the 0-10 response scale (i.e., 5), one-sample t test was conducted separately for each group. These tests compared the mean rating of each item against the fixed reference, thereby identifying items perceived as particularly important or unimportant.

Finally, qualitative data derived from the open-ended item were analysed using reflexive thematic analysis following the Braun and Clarke (2006) six-phase protocol. This approach

facilitated the identification of additional criteria that participants considered relevant to expert witness credibility, thereby enriching the quantitative findings with contextually grounded insights.

3.8. Results

3.8.1. Descriptive Statistics

Descriptive statistics were computed for each of the 22 credibility-related cues, with aggregate scores calculated across both legal professionals and lay participants. The mean ratings indicated that, overall, the cues were regarded as important. The highest mean rating was observed for *knowledge relevant to testimony*, followed in descending order by *independence and impartiality*, *transparent testimony*, and *ability to provide reliable evidence*. Table 3.3. presents the overall aggregate means, standard deviations, and standard errors for the credibility cue ratings, collapsed across legal and lay participants.

The pattern of variability, as reflected in the standard deviations, suggested moderate dispersion in ratings for cues such as *court witness training*, *previous experience as an expert witness in court*, and *professional appearance and demeanour*. In contrast, greater consensus was evident for *knowledge relevant to testimony*, *independence and impartiality*, and *transparent testimony*, which exhibited lower variability across participants.

To facilitate group-level comparisons, the separate credibility ratings provided by legal professionals and lay participants are presented in Figure 3.2. This visualisation highlights differences in perceived importance across the two groups and allows for independent examination of rating patterns.

To examine the degree of association among the 22 credibility-related cues, Pearson's correlation coefficients were computed. The full inter-item correlation matrix is presented in Table 3.4. This analysis was conducted to explore potential conceptual overlap between cues and to assess whether any items demonstrated redundancy.

Several statistically significant correlations were observed with many falling in the moderate range (e.g., $r = .30-.50$). Notably, *appearance and demeanour* was moderately-to-strongly correlated with *presentation skills* ($r = .52, p < .001$), and *ability to handle pressure of cross-examination* was moderately-to-strongly associated with *training as a court witness* ($r = .53, p < .001$) and *experience as an expert witness in court* ($r = .47, p < .001$). These findings suggest some thematic clustering, particularly around courtroom performance and communication related cues.

However, none of the inter-item correlations exceed the conventional threshold for redundancy (i.e., $r > .80$; Clark & Watson, 1995), indicating that each cue contributed uniquely to participants' evaluations of expert witness credibility. For instance, while *transparent testimony* and being *able to provide reliable evidence* were positively correlated ($r = .43, p < .001$), the strength of this association remained below the redundancy threshold, supporting the conceptual distinctiveness of these constructs.

The absence of multicollinearity among the items justifies the decision to retain item-level analyses rather than aggregating them into composite scores. This approach preserves the interpretative granularity necessary for understanding how specific attributes influence perceptions of expert credibility.

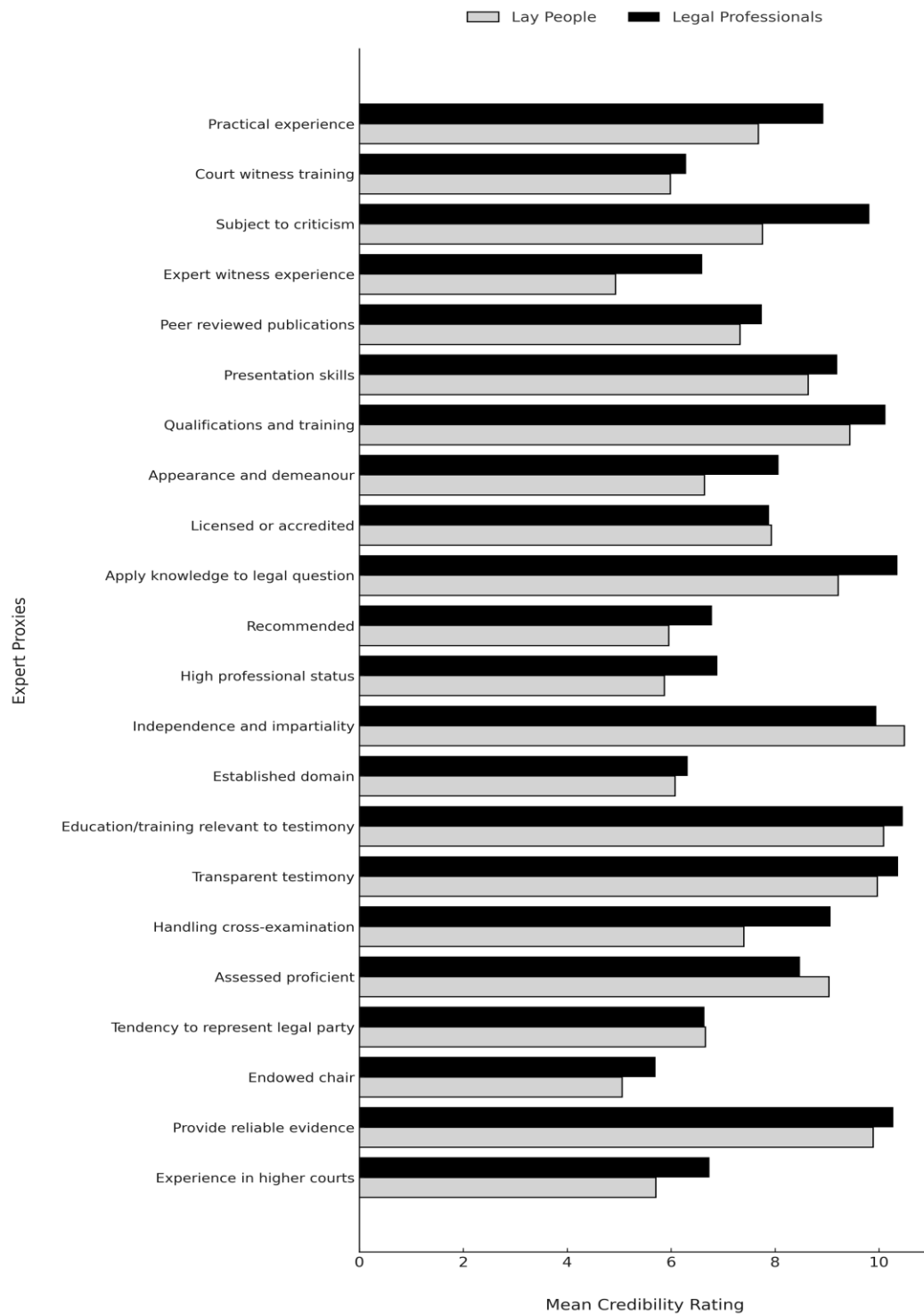
Table 3.3*Overall Descriptive Statistics Legal Professionals and Lay Participant ratings combined.*

	Item	<i>M</i>	<i>SD</i>	<i>SEM</i>
1.	Witness has extensive practical experience (e.g., 15 years or more) within domain of expertise.	8.34	2.30	0.15
2.	Witness has not received any training in being a court witness	6.15	2.70	0.18
3.	Witness has been subject to criticism in a previous court appearance (e.g., previous testimony unreliable, questioning credentials, etc.)	8.85	2.50	0.16
4.	Witness does not have any previous experience as an expert witness in court	5.81	2.73	0.18
5.	Witness has several peer-reviewed publications on the topic relevant to their testimony	7.55	2.07	0.14
6.	Witness has good presentation skills (e.g., uses clear language to explain things)	8.94	1.92	0.13
7.	Witness has formal qualifications and training (i.e., knowledge) of their domain of expertise which is beyond that known by the judge/jury	9.81	1.73	0.11
8.	Witness has professional appearance and demeanour	7.40	2.52	0.17
9.	Witness is not licensed or accredited with (or a member of) a professional body in the domain of expertise	7.90	2.51	0.17
10.	Witness can apply their expert knowledge to the legal question they have been asked	9.82	1.92	0.13
11.	Witness has been recommended to either the prosecution or defence by others in the criminal justice domain (e.g., police, other lawyers, etc.)	6.40	2.37	0.16
12.	Witness has not attained a high status (e.g., Consultant, Professor, Chief, etc.) within their profession.	6.41	2.29	0.15
13.	Witness is independent to the parties in the legal proceedings (i.e., able to provide unbiased, impartial and objective evidence on the matters within their field of expertise)	10.20	1.32	0.09
14.	Witness is from a field that is not very well-established (e.g., forensic linguistics, ear print analysis, etc.)	6.21	2.39	0.16
15.	Witness has education, study, knowledge, or training which is relevant to their testimony	10.29	1.32	0.09
16.	Witness is capable of providing transparent testimony (e.g., reasoning process is clear)	10.18	1.41	0.09
17.	Witness cannot handle the pressure of intense cross-examination	8.28	2.68	0.18
18.	Witness has been assessed by an external body as being proficient in their domain or specialism	8.74	1.59	0.11
19.	Witness tends to work for a particular side/party (e.g., prosecution, defence or both)	6.65	2.75	0.18
20.	Witness is a holder of an endowed chair (i.e., position) in their speciality at a reputable university	5.40	2.69	0.18
21.	Witness can provide reliable evidence (e.g., it has a scientific basis, or the opinion evidence is based on validated laboratory techniques or technologies)	10.10	1.40	0.09
22.	Witness has previously provided testimony to higher tier courts (i.e., Crown court or Appeal courts)	6.25	2.28	0.15

Note. Ratings are based on the combined responses of 231 participants (122 legal professionals and 109 lay participants). Higher means indicate greater perceived importance of the cue for evaluating expert witness credibility.

Figure 3.2

Mean Credibility Ratings of Forensic Expert Proxies by Laypeople and Legal Professionals



3.8.2. Inter-Item Correlations

Table 3.4

Correlation Matrix of Expert Credibility Cues

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1. Extensive practical experience within domain	--																					
2. Training as Court witness	0.083	--																				
3. Being subject to criticism	.199**	.296**	--																			
4. Experience as expert witness in court	.237**	.481**	.317**	--																		
5. Peer reviewed publications	.292**	-0.067	0.097	0.109	--																	
6. Presentation skills	.136*	.259**	.242**	.294**	0.081	--																
7. Qualifications and training	0.052	0.048	0.097	.134*	0.08	.205**	--															
8. Appearance and demeanour	.221**	.215**	.397**	.366**	0.057	.520**	.163*	--														
9. Licencing or accreditation	.251**	.270**	.285**	.147*	.165*	.159*	0.099	0.018	--													
10. Application of expert knowledge to legal question	.148*	.164*	.227**	.168*	0.062	.398**	.273**	.343**	.144*	--												
11. Recommended	.355**	.324**	.218**	.375**	.211**	.324**	0.041	.380**	0.058	.352**	--											
12. Status within their profession	.240**	.186**	.304**	.368**	.187**	.177**	0.105	.281**	.233**	.138*	.255**	--										
13. Impartiality	0.068	0.059	-0.066	-0.081	0.013	.140*	0.086	-0.128	.153*	.147*	0.029	-.146*	--									
14. Established domain	.249**	.293**	.199**	.251**	.205**	.245**	0.109	.317**	.200**	.190**	.369**	.253**	-0.06	--								
15. Education/training relevant to testimony	.189**	.132*	.149*	0.009	-0.001	.299**	.396**	.169*	.275**	.352**	0.047	0.079	.216**	0.118	--							
16. Transparent testimony	0.088	.145*	.159*	.138*	0.089	.488**	.270**	.331**	.149*	.366**	.203**	.165*	0.109	.150*	.463**	--						
17. Ability to hand pressure of cross-examination	0.113	.530**	.470**	.425**	-0.023	.360**	0.096	.406**	.236**	.331**	.197**	.205**	-0.097	.241**	.150*	.219**	--					
18. Assessed as proficient within domain	.131*	0.057	-0.101	-0.099	0.06	-0.073	0.062	-.167*	.413**	-0.108	-0.016	0.028	.198**	0.09	.137*	0.025	-.144*	--				
19. Tendency to work for a particular legal team	.210**	.138*	0.085	0.029	.166*	-0.049	-0.103	-0.016	.327**	0.049	0.11	0.061	0.082	.178**	0.029	-0.036	.129*	.165*	--			
20. Holder of endowed chair	.306**	0.046	0.116	.144*	.337**	0.085	-0.022	.223**	0.041	.133*	.436**	.237**	-0.057	.161*	-0.101	0.034	0.072	-0.002	0.042	--		
21. Can provide reliable evidence	.203**	0.055	.245**	.130*	0.096	.218**	.247**	0.128	0.114	.212**	0.079	0.005	.204**	0.124	.368**	.428**	.208**	0.07	0.061	-0.038	--	
22. Previous testimony to higher tier court	.402**	.237**	.198**	.518**	.349**	.201**	-0.014	.285**	.186**	0.115	.390**	.268**	0.015	.217**	-0.054	0.003	.208**	0.012	0.125	.435**	0.021	--

Note. $N = 231$ respondents

* $p < .05$; ** $p < .001$

3.8.3. One-Sample t Tests

To assess whether participants rated specific credibility cues as significantly more important than the neutral midpoint of the scale (i.e., 5 on a 0–10 scale), one-sample t tests were conducted for 14 items where no significant group differences were previously detected. These items included: Items 2, 5, 6, 7, 9, 11, 13, 14, 15, 16, 18, 19, 20, and 21. A Bonferroni-adjusted alpha level of $\alpha = .004$ was applied to control for Type I error across multiple comparisons.

As shown in Table 3.5, results indicated that 12 of the 13 items were rated significantly above the midpoint, suggesting a broad consensus across legal professionals and lay participants regarding their importance in evaluating expert witness credibility. These items encompassed domains such as presentation skills, formal qualifications, transparent testimony, and the ability to provide reliable evidence.

Only Item 20, witness being a *holder of an endowed chair* did not reach statistical significance, indicating a comparatively lower perceived relevance in the context of expert credibility assessment.

Table 3.5*One-Sample t Tests Comparing Item Ratings Against the Midpoint*

Item	<i>t</i> (230)	<i>p</i>	95% CI of the Difference	Cohen's <i>d</i>
1. Practical experience	22.09	< .001	[3.04, 3.64]	1.45
2. No training as court witness	6.50	< .001	[0.80, 1.50]	0.43
3. Subject to criticism	23.43	< .001	[3.52, 4.17]	1.54
4. No prior expert witness exp.	4.51	< .001	[0.46, 1.16]	0.3
5. Peer-reviewed publications	18.80	< .001	[2.29, 2.82]	1.24
6. Good presentation skills	31.12	< .001	[3.69, 4.19]	2.05
7. Formal qualifications	42.16	< .001	[4.58, 5.03]	2.77
8. Professional appearance	14.49	< .001	[2.07, 2.72]	0.95
9. Not licensed/accredited	17.61	< .001	[2.58, 3.23]	1.16
10. Apply knowledge to question	38.13	< .001	[4.57, 5.07]	2.51
11. Recommended by others	8.97	< .001	[1.09, 1.71]	0.59
12. Not attained high status	9.38	< .001	[1.11, 1.71]	0.62
13. Independent to parties	59.71	< .001	[5.03, 5.38]	3.93
14. From less established field	7.68	< .001	[0.90, 1.52]	0.51
15. Relevant education/training	60.98	< .001	[5.11, 5.46]	4.01
16. Transparent testimony	56.03	< .001	[5.00, 5.36]	3.69
17. Cannot handle cross-exam.	18.61	< .001	[2.93, 3.63]	1.22
18. Assessed proficient	35.72	< .001	[3.53, 3.95]	2.35
19. Tends to work particular side	9.13	< .001	[1.29, 2.01]	0.6
20. Holder of endowed chair	2.25	0.025	[0.05, 0.75]	0.15
21. Provides reliable evidence	55.49	< .001	[4.91, 5.28]	3.65
22. Testimony in higher courts	8.35	< .001	[0.96, 1.55]	0.55

Note. Ratings were compared against the neutral midpoint of the 0–10 scale (*Test Value* = 5)

3.8.4. Group Comparisons: Independent-Samples t Test

Independent-samples *t* tests were conducted to compare the credibility ratings provided by legal professionals and lay participants across all 22 items. To control for the increased risk of Type I error due to multiple comparisons, a Bonferroni correction was applied, adjusting the significance threshold to $\alpha = .002$.

As shown in Table 3.6, significant group differences were observed for eight items: Items 1, 3, 4, 8, 10, 12, 17, and 22. For eight of these items, legal professionals assigned significantly higher importance ratings than lay participants, suggesting a greater sensitivity to specific indicators of expert witness credibility. These items included cues related to practical experience, courtroom performance, and professional status.

Item 13—Witness is independent to the parties in the legal proceedings—was the sole exception, with lay participants rating this criterion significantly higher than legal professionals. This finding may reflect differing expectations regarding impartiality and objectivity between the two groups.

Table 3.6

Independent-Samples t Tests of Expert Credibility Ratings by Legal and Lay Participants

Items	<i>M (SD)</i>		<i>t</i> -test
	Laypeople	Legal prof.	
1. Witness has extensive practical experience (e.g., 15 years or more) within domain of expertise.	7.68 (2.56)	8.93 (1.85)	$t(195) = 4.22, p < .001^*, d = .57$
2. Witness has not received any training in being a court witness	5.99 (3.14)	6.29 (2.20)	$t(190) = 0.82, p = .413, d = 0.11$
3. Witness has been subject to criticism in a previous court appearance (e.g., previous testimony unreliable, questioning credentials, etc.)	7.76 (2.64)	9.82 (1.91)	$t(194) = 6.73, p < .001^*, d = 0.90$
4. Witness does not have any previous experience as an expert witness in court	4.93 (3.05)	6.60 (2.12)	$t(189) = 4.78, p < .001^*, d = 0.64$
5. Witness has several peer-reviewed publications on the topic relevant to their testimony	7.33 (2.26)	7.75 (1.86)	$t(210) = 1.55, p = .124, d = 0.21$
6. Witness has good presentation skills (e.g., uses clear language to explain things)	8.64 (1.94)	9.20 (1.88)	$t(229) = 2.24, p = .026, d = 0.30$
7. Witness has formal qualifications and training (i.e., knowledge) of their domain of expertise which is beyond that known by the judge/jury	9.44 (2.09)	10.13 (1.26)	$t(173) = 3.00, p = .003, d = 0.41$
8. Witness has professional appearance and demeanour	6.64 (2.60)	8.07 (2.24)	$t(214) = 4.46, p < .001^*, d = 0.59$
9. Witness is not licensed or accredited with (or a member of) a professional body in the domain of expertise	7.93 (2.92)	7.89 (2.09)	$t(193) = 0.12, p = .903, d = 0.02$
10. Witness can apply their expert knowledge to the legal question they have been asked	9.22 (2.27)	10.36 (1.35)	$t(171) = 4.58, p < .001^*, d = 0.62$
11. Witness has been recommended to either the prosecution or defence by others in the criminal justice domain (e.g., police, other lawyers, etc.)	5.96 (2.79)	6.79 (1.85)	$t(183) = 2.61, p = .010, d = 0.35$

12. Witness has not attained a high status (e.g., Consultant, Professor, Chief, etc.) within their profession.	5.87 (2.24)	6.89 (2.23)	$t(229) = 3.47, p < .001^*, d = 0.46$
13. Witness is independent to the parties in the legal proceedings (i.e., able to provide unbiased, impartial and objective evidence on the matters within their field of expertise)	10.49 (1.18)	9.95 (1.40)	$t(228) = 3.15, p < .002, d = 0.41$
14. Witness is from a field that is not very well-established (e.g., forensic linguistics, ear print analysis, etc.)	6.08 (2.72)	6.32 (2.05)	$t(199) = 0.74, p = .460, d = 0.10$
15. Witness has education, study, knowledge, or training which is relevant to their testimony	10.09 (1.50)	10.46 (1.11)	$t(197) = 2.10, p = .037, d = 0.28$
16. Witness is capable of providing transparent testimony (e.g., reasoning process is clear)	9.97 (1.29)	10.37 (1.48)	$t(229) = 2.16, p = .032, d = 0.28$
17. Witness cannot handle the pressure of intense cross-examination	7.40 (3.05)	9.07 (2.02)	$t(183) = 4.83, p < .001^*, d = 0.65$
18. Witness has been assessed by an external body as being proficient in their domain or specialism	9.04 (1.55)	8.48 (1.59)	$t(229) = 2.71, p = .007, d = 0.36$
19. Witness tends to work for a particular side/party (e.g., prosecution, defence or both)	6.66 (3.17)	6.64 (2.31)	$t(195) = 0.06, p = .954, d = 0.01$
20. Witness is a holder of an endowed chair (i.e., position) in their speciality at a reputable university	5.06 (3.03)	5.70 (2.32)	$t(201) = 1.82, p = .071, d = 0.24$
21. Witness can provide reliable evidence (e.g., it has a scientific basis, or the opinion evidence is based on validated laboratory techniques or technologies)	9.89 (1.47)	10.28 (1.30)	$t(216) = 2.12, p = .036, d = 0.28$
22. Witness has previously provided testimony to higher tier courts (i.e., Crown court or Appeal courts)	5.71 (2.54)	6.74 (1.89)	$t(197) = 3.47, p < .001^*, d = 0.46$

Note. *** $p < .001$.

Survey statements (as viewed by participants) and descriptive statistics comparing legal professionals and (non-legal) laypersons (higher scores indicate higher ratings of credibility). Bonferroni correction set to $\alpha = 0.02$.

3.8.5. Qualitative Findings

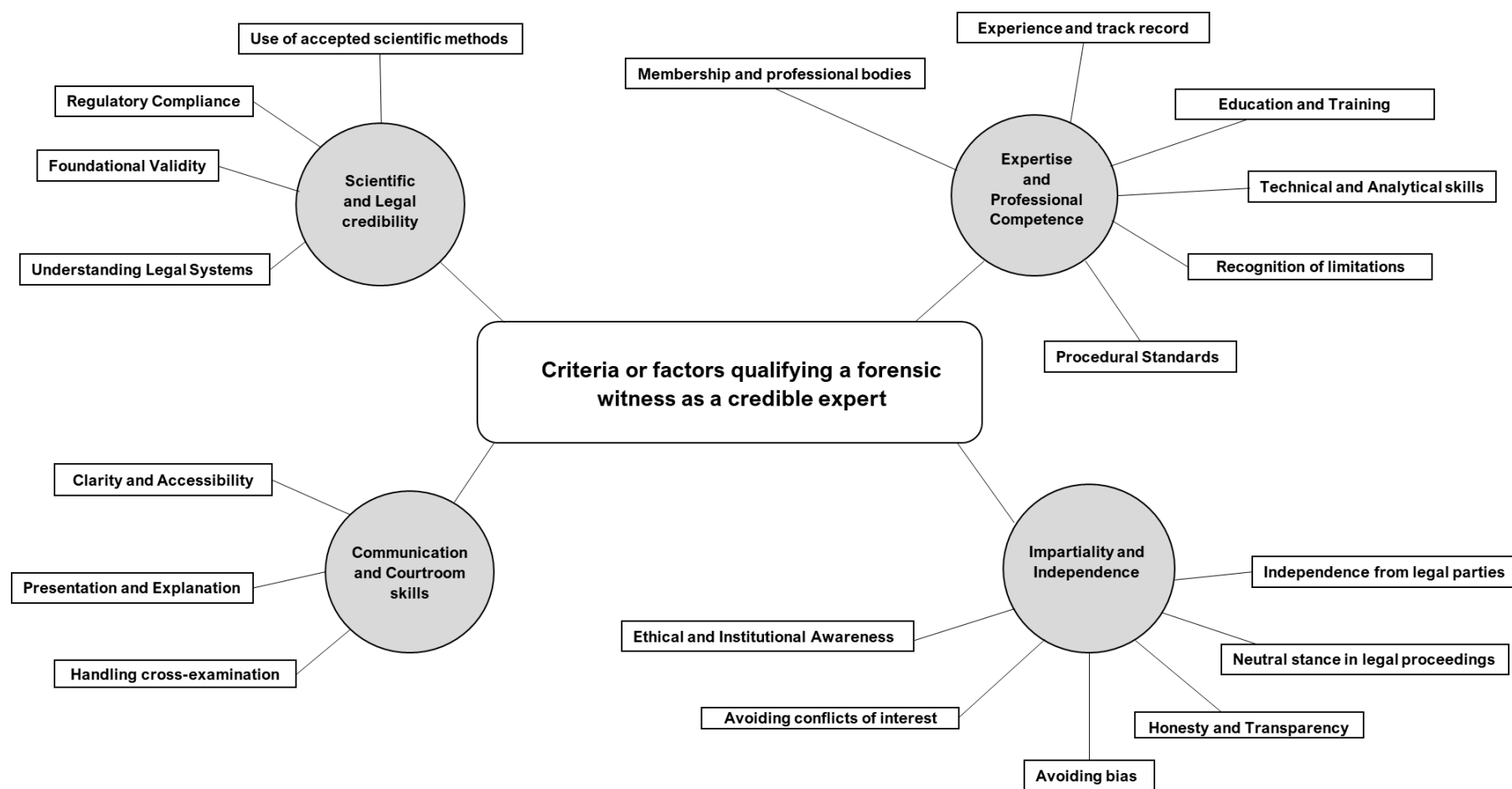
The participants qualitative responses regarding additional criteria relevant to expert witness credibility were examined using content thematic analysis. This analytic approach was adopted to identify evaluative dimensions that extend beyond those captured by the structured

survey items. The subsequent section presents the principal themes that emerged from this analysis.

Drawing specifically on the 54 responses received (Lay 61.1%, $n = 33$; legal 38.8%, $n = 21$)) the analysis yielded four overarching main themes, each representing distinct components of expert witness credibility: (1) Expertise and Professional Competence, (2) Impartiality and Independence, (3) Communication and Courtroom Skills, (4) Scientific and Legal Credibility. These themes encompass both objective markers—such as academic qualifications, domain-specific experience, and adherence to professional standards—and subjective attributes, including ethical transparency, communicative clarity, and perceived neutrality. A summary of the qualitative findings is presented below, with the complete thematic analysis accessible from the Middlesex University Research Repository.

Figure 3.3

Thematic Map of Additional factors to qualify credible forensic expert



Main Theme 1: Expertise and Professional Competence

Credibility was consistently tied to qualifications, practical experience, and case familiarity. Respondents stressed the need for both advanced training and forensic practice, with technical skills such as statistics considered essential. One lay participant captured this view: “High level of training/education in their field, solid experience of working in that field prior to becoming an expert witness”. Membership in professional bodies was seen as assurance of standards, and credibility also required recognising evidential limits and complying with court rules. Some flagged systemic barriers, noting, *“Legal aid fees are so poor that very few good experts are prepared to get involved.”*

Main Theme 2: Communication and Courtroom Skills

Expertise alone was insufficient; credibility required clarity, composure, and resilience in court. Respondents emphasised that testimony must be accessible, with one stating: “The ability to convey information in a clear and accessible manner is most important.” Credibility was undermined when experts faltered under questioning, while presentation and neutrality enhanced their standing. As one participant noted, “Good presentation skills... unbiased approach and accountable to the Courts only (Not a hired gun).”

Main Theme 3: Scientific and Legal Credibility

Credibility was linked to adherence to scientific consensus and compliance with legal frameworks. Experts were expected to rely on validated methodologies, not fringe theories. One respondent warned against reliance on “theories or practices which are controversial and/or not accepted by the general scientific community”. Others highlighted concerns about *“the foundational validity of many forensic science and sometimes clinical disciplines,”* underscoring the need for robust empirical support. Knowledge of procedural rules,

especially the Forensic Science Regulator’s Codes and Criminal Procedure Rules, was seen as fundamental to admissibility.

Main Theme 4: Impartiality and Independence

Respondents stressed impartiality, defining credible experts as those serving the court rather than partisan interests. Transparency and independence from financial or relational ties were central, with honesty repeatedly cited as essential. One participant explained: “*Someone who is honest and transparent in their views, even if it is against them.*” Others warned against the dangers of bias, noting that some experts act as “hired guns”. Social media and past publications were also seen as potential sources of perceived partiality, reinforcing calls for full disclosure to preserve neutrality.

3.8.6. Integrative insights

The qualitative responses were strongly aligned with the structured cues from the quantitative survey, reinforcing the importance of core criteria such as formal qualifications, practical experience, peer-reviewed publications, and communication skills. Respondents consistently emphasised the value of education, domain-specific expertise, and the ability to clearly explain complex information—especially under cross-examination. These findings validate the survey’s framework and confirm that these attributes are widely recognised as essential for forensic expert credibility.

However, the qualitative data also introduced several nuanced dimensions not explicitly captured in the survey. Respondents highlighted the importance of epistemic humility—recognising the limits of one’s evidence—as a marker of ethical responsibility. Procedural literacy also emerged as a key theme, with respondents stressing the need for experts to understand and adhere to legal frameworks such as the Criminal Procedure Rules and the Forensic Science Regulator’s Codes of Practice. Additionally, statistical competence was

noted, particularly by legal experts, who emphasised the need for experts to accurately interpret and apply statistical data in their analyses.

Practical considerations also surfaced—e.g., cost, availability, and responsiveness—as factors that can influence expert selection, especially in cases involving legal aid. These logistical concerns reflect the real-world constraints within which legal professionals operate and suggest that credibility is not only about expertise but also about accessibility and reliability.

Finally, comparisons between the legal and lay responses revealed shared values and distinct emphases. Both groups agreed on the importance of impartiality, experience, and effective communication. However, legal professionals tended to focus more on procedural compliance, methodological rigor, and systemic constraints, reflecting their operational familiarity with the justice system. In contrast, lay respondents placed greater weight on ethical traits such as honesty, humility, and perceived trustworthiness.

3.9. Discussion

This study set out to compare legal professionals (experts) and laypeople (novices) in the way they assess expert witness credibility. Through a comprehensive review of legal sources (case law, statute law, legislation, and legal guidance) and psychological literature on expert witnesses, expertise and expert credibility, 22 cues were identified.

The study addressed three research questions using a mixed-methods design. Quantitative data from a 22-item questionnaire revealed statistically significant differences in cue prioritisation between legal professionals and laypeople. Qualitative responses further illuminated the reasoning behind these preferences and suggested additional cues not captured in the original framework. The following discussion is structured into three principal sections: (1) interpretation of findings in relation to the research questions; (2) Theoretical and practical implications of the findings; (3) methodological limitations, and (4) Recommendations for future research studies.

3.9.1. Interpretation of the Findings in Relation to the Research Questions

This study was guided by three research questions: (1) What evaluative criteria do legal professionals prioritise when commissioning forensic experts for courtroom testimony? (2) What factors do laypeople consider the most important in determining the credibility of forensic expert witnesses? (3) To what extent do the criteria used by legal professionals differ from those used by laypeople in assessing the credibility of forensic expert witnesses?

Individual Cues

Overall, the findings revealed substantial alignment between participant responses and existing legal policies and guidance on the admission of expert evidence (Criminal Practice Directions, 2023, s.7; Forensic Science Regulator, 2020; Judiciary of England and Wales, 2023; Criminal Procedure Rules, s.19). The results were also consistent with the literature on expert witness evaluation (McCarthy Wilcox & NicDaeid, 2018; Weschler et al., 2015).

The cues comprising *know-it* expertise (e.g., status, experience, and competence), appear to be regarded as important predictors of credibility. Notwithstanding the similarities, there were some differences between the two cohorts. Understandably, legal professionals were more cognisant to the policies and guidance than the lay participants. Moreover, the legal cohort identified other criteria as important proxies for credibility that are not explicitly identified in existing guidance but do hold evaluative utility.

Fourteen of the 22 items showed no statistically significant difference between the legal and lay participants. There was broad consensus across the groups for twelve items (rated as being significantly above the midpoint of the scale) as important determinants for expert credibility. Several of these proxies are explicitly referenced in legal policies and guidance, i.e., has been assessed by an external body as being proficient in their domain or specialism, has formal qualifications and training in their domain of expertise, has several peer-reviewed publications on the topic relevant to their testimony, licensed or accredited with a professional body in the domain of expertise, can provide reliable evidence, has formal qualifications and training in their domain of expertise, is from a field that is not very well-established, has education, study, knowledge, or training which is relevant to their testimony.

Additionally, the finding that both groups rated the criterion that a witness holding an endowed academic chair at a reputable institution as being unimportant, supports the notion that both groups were attuned to current policy and guidelines; however, the legal participants were more attuned than lay participants in other respects. For instance, legal professionals held extensive practical experience within the expert's domain as a significantly more important marker for discriminating credibility than the lay participants. Affirming this was the finding that legal professionals rated the idea that a witness has not attained a high professional status as a significantly more important proxy of credibility than the lay participants. Additionally, legal participants deemed the notion that someone who can apply

their expert knowledge to the legal question at hand as being significantly more important than the lay participants. As aforementioned, courts in the US, and other jurisdictions, endeavour to identify expert witnesses who, as well as being qualified, also have the capacity to provide testimony premised on robust scientific methodology, that is reliable and relevant (Ministry of Justice, 2020). Accordingly, legal professionals are more proficient in discerning the qualities and attributes of a credible expert witness than laypeople.

Beyond the codified criteria outlined in the *Daubert* standard and the guidance offered in the Criminal Practice Directions in the United Kingdom, the findings are indicative of legal professionals relying on an “*intuitive checklist*” for qualifying expert witnesses—one that subsume factors influencing courtroom dynamics. This assertion is supported by the findings that legal professionals assign significantly greater importance than lay participants to someone [the expert witness] *that does not have any previous experience as an expert witness, cannot handle the pressure of intense cross-examination, has been subject to criticism in a previous court appearance*, when determining expert witness credibility than the lay participants. Moreover, it was demonstrated that legal professionals deemed witnesses who had previously provided testimony to higher courts as significantly more important as a marker for credibility than the lay cohort. In relation to impartiality, legal experts tend to better understand the descriptive reality that owing to the nature of the justice system in this jurisdiction—permitting legal adversaries to select experts based on their alignment with their legal arguments—expert witnesses are never always independent (Wall, 2009; Curley et al., 2022).

The observed differences between legal professionals and lay participants in credibility assessments suggest that legal training shapes a distinct mental checklist. To better understand this there is merit in contemplating what constitutes legal expertise. A legal education involves the development of decision-making skills grounded in legal reasoning,

enabling practitioners to apply legal principles to complex problems such as determining culpability (Macedo Júnior, 2023). Empirical evidence supports the notion that individuals with legal knowledge think differently. For instance, Johan (2024, pp. 156-186) used a between-subjects design study comprising of two conditions and demonstrated that participants with legal education were more adept at discriminating scientific merit of simulated witness statements. One of the conditions presented stimuli based on a reasoning checklist that the researcher had developed to enhance scientific reasoning in legal statements. In the control condition, the statements had not been articulated using this checklist. Participants rated the statement significantly higher in merit when the reasoning checklist was used. Thus, interpreting arguments is a skill useful for legal professionals.

Essential to having legal expertise is the capacity to undertake meta-reasoning—an ability to evaluate the structure and coherence of legal arguments predicated on previous reasoning schemas (Jiménez, 2024). Nonetheless, even the most logically tight arguments are susceptible to flawed premises. Legal professionals, while experts in law, remain laypersons in scientific domains. Therefore, wrong premises surface because the legal professionals have a lay understanding when it comes to science since expertise does not readily transfer across epistemic domains (Sala & Gobet, 2017). Legal professionals may indeed possess rhetorical prowess, guile and wisdom when it comes to constructing persuasive legal arguments, cross-examining witnesses or curating compelling legal narratives. However, such capabilities do not inherently confer domain-specific knowledge in areas such as cognitive psychology of expertise or forensic science. Consequently, they may lack the necessary epistemological tools to critically appraise scientific testimony, particularly when it concerns complex or specialised evidence.

Courts have historically been underinformed about the findings of behavioural science (Commons & Miller, 2007). Laypeople have an intuitive comprehension of the psychology of

expertise which is not entirely inaccurate (Keating & Walker, 2025), but rather it falls short of a scientifically grounded understanding. As Martire et al. (2025) and others have argued, improving general education about the nature of expertise is essential for enhancing the quality of legal decision-making. Sapir (2007) posited that courts frequently fail to exercise sufficient due diligence during the process of retaining expert witnesses, often overemphasising credentials and prestige while overlooking critical attributes such as the expert's ability to effectively educate or communicate to the court (Garrett & Mitchell, 2017; Hans & Saks, 2018). It is evidence that experts are often retained for the wrong reasons because “*judges and juror alike are often blinded by the aura of science*” (Sangero, 2021, p.223; cf. Hans & Saks, 2018; Martire et al., 2025). In legal contexts where expert testimony is required, a gulf in knowledge will always exist between subject-matter experts and lay factfinders. This disparity in domain-specific knowledge can impede accurate comprehension and evaluation of scientific evidence. One proposed strategy for narrowing this epistemic gap involves the provision of targeted science education to factfinders, adapted to the specific scientific issues presented in each case (Hans & Saks, 2018). Nevertheless, educational programmes of this ilk are difficult to implement beyond the provision of introductory primers (e.g., Royal Society et al., 2017). Moreover, such interventions are inherently limited in scope and cannot begin to replicate the depth of expertise acquired through years of specialised training and experience (Hans & Saks, 2018; cf. Feldon, 2016). Whereas stakeholder users of forensic science have been grappling to accurately understand scientific and technical evidence for years (Kutnjak Ivković & Hans, 2003; Hans & Saks, 2018), it would be unrealistic—and unjust—to place the burden of the interpretative work in its entirety on laypeople.

Expert witnesses have a legal duty to ensure their testimony is intelligible to non-experts, to assist the court in making accurate decisions predicated on the expert's

interpretation of the evidence (See Forensic Science Regulator, 2020, citing case law). This duty positions the expert in an educator role. They translate complex scientific reasoning into accessible, contextually relevant explanations, so the factfinder is able to sufficiently elucidate their line of reasoning (Sjerps & Berger, 2012; Hans & Saks, 2018). Therefore, effective testimony requires domain-specific knowledge but also the expert's ability to convey that knowledge with clarity and transparency (Sapir, 2007; Garrett & Mitchell, 2017; Solomon, 2019; Rix, 2021; Martire et al., 2025). Newly appointed or unseasoned expert witnesses, regardless of the depth of their scientific knowledge, can struggle with this task (Prestwich, 2012).

Although both science and law may be construed as truth-seeking enterprises, their operational objectives diverge markedly. Science is primarily directed toward the development of empirically substantiated theories and laws, which remain open to falsification, refinement, or rejection through systematic testing. Conversely, the legal system is concerned with the authoritative resolution of disputes, frequently relying upon scientific evidence to support causal inferences (Diamond & Lempert, 2025; Sanders, 2009). Whereas scientific conclusions are provisional and subject to continuous scrutiny, legal adjudication demand finality. Judicial processes are characterised by binary determinations—evidence is either admitted or excluded; a defendant is found guilty or not guilty; and an appeal is either allowed or dismissed. Such outcomes reflect the law's imperative for closure, even in the face of epistemic uncertainty.

In a survey of American scientists, Diamond and Lempert (2025) identified two distinct subgroups, those with experience as expert witnesses and those without. The former demonstrated greater understanding of how the legal system functions (positive and negative aspects) and their expected role in it. Significantly, the experienced expert witnesses were successful because they adapted to the legal context.

Given that expert evidence can decisively sway verdicts—whether justly or wrongly (Cole, 2014)—the rigorous selection of credible expert witnesses is of paramount importance (Sapir, 2007; Rix, 2021; Martire et al., 2025). Errors in the recruitment of inadequately qualified experts, coupled with the frequent misinterpretation or misapplication of their testimony, remain a persistent concern within legal proceedings. Despite the intended objectivity of expert evidence, its complexity often renders it susceptible to misunderstanding by judges, jurors and even legal professionals (Freckelton, 2011; Ireland & Beaumont, 2015; Cole, 2014; Garrett & Mitchell, 2018; Roberts & O’Brian, 2018; Sangero, 2021; Shorter et al., 2022; Martire et al., 2025). These shortcomings not only compromise the integrity of judicial outcomes but also highlight the need for more stringent standards in the vetting and presentation of expert testimony.

Numerous proposals have been advanced to enhance the reliability of expert evidence. Garrett and Mitchell (2018) advocated for the implementation of proficiency testing to assess the competency of expert witnesses. Ireland and Beaumont (2015) proposed the adoption of a UK equivalent to the *Daubert* standard, geared towards establishing clearer admissibility criteria for scientific testimony. Sangero (2021), meanwhile, emphasised the need for systematic evaluation of evidentiary quality to circumvent the risk of wrongful convictions. As scientific developments continue to expand the scope of legal reliance on expert testimony (Diamond & Lempert, 2025), it is increasingly imperative to acknowledge the multifaceted nature of expertise, the intricacies of the forensic evidence, and the inherent limitations of cross-domain reasoning within judicial contexts.

The qualitative findings in this study reinforced the notion that credibility is a multidimensional construct encompassing education, experience, technical proficiency, ethical awareness, and procedural compliance. While there was broad agreement that long-term expertise, accountability, and adherence to established standards are essential, subtle

divergences between legal and lay respondents were observed. Lay participants tended to emphasise visible attributes such as reputation, clarity, and humility, whereas legal respondents placed greater weight on methodological rigour, statistical competence, and regulatory adherence. Notably, the ability to acknowledge limitations and to balance scientific validity with legal procedure emerged as nuanced and contemporary markers of credibility, extending beyond traditional qualifications.

Communication skills were also consistently deemed indispensable. Respondents stressed that technical expertise alone is insufficient; credibility in forensic testimony requires the capacity to present, defend, and explain evidence in ways that are simultaneously accessible and authoritative. This was particularly emphasised in the context of adversarial courtroom settings, where clarity and persuasiveness are directly tied to perceived competence. Indeed, Tottenham (2021) underscores the importance of expert witnesses maintaining a consistently formal demeanour, while also observing that persuasive testimony does not depend on exceptional eminence or distinction. Judges and juries may respond more favourably to witnesses who communicate in a manner that is clear, measured and interpersonally accessible, thus informality remains inadvisable. To be effective, the expert witness must strike a balance between accessibility and decorum. This includes the observance of appropriate forms of address to decision-makers, whether judges or jurors, as well as towards examining counsel (Tottenham, 2021).

Additionally, scientific robustness and procedural literacy were seen as inseparable pillars of credibility. Experts are expected to ensure that their testimony is grounded in consensus science, compliant with regulatory frameworks, and underpinned by the foundational validity of their field. Equally, they must demonstrate an informed understanding of legal systems and processes. Taken together, these expectations establish a

dual standard: credible forensic experts must be both scientifically reliable and legally competent.

The emphasis placed by respondents on impartiality and independence can be situated within broader institutional reforms in England and Wales. As highlighted by the Civil Justice Council (2016), the increased use of concurrent expert evidence reflects a deliberate procedural re-orientation: expert testimony is framed less as an adversarial contest controlled by the parties and more as a cooperative, tribunal-facing exercise aimed at clarifying technical disputes. This reform logic resonates with the survey responses, which consistently underscore neutrality as a non-negotiable cue of credibility. By positioning the expert as an aid to the court, concurrent evidence seeks to reduce polarisation and enhance judicial comprehension, thereby aligning institutional design with the values identified by both legal professionals and lay participants.

Complementing this, Groscup et al. (2002) demonstrate that admissibility reasoning and the application of reliability criteria are not static but evolve across time and context. This observation provides a useful lens through which to interpret the variability in survey responses: perceptions of credibility cues may similarly shift depending on case type, evidentiary complexity, or institutional setting. Thus, the findings of the present study should be understood as contingent rather than universal, reflecting broader patterns of doctrinal and procedural adaptation.

The principle that there is “no property in an expert witness” further reinforces the centrality of independence. Within England and Wales, and across Commonwealth jurisdictions, this principle underscores that an expert’s opinion is not a proprietary litigation asset but must remain autonomous. Procedural devices such as concurrent evidence operationalise this independence by mitigating adversarial polarisation (Civil Justice Council, 2016). The survey findings, which highlighted impartiality and integrity as equal in

importance to technical skill, therefore align closely with this institutional commitment to independence.

Experimental evidence also supports this alignment. Perillo et al. (2021) show that court-centred mechanisms, including concurrent evidence and court-appointed experts, can attenuate adversarial allegiance effects on expert judgments. This suggests that jurisdictions embedding such mechanisms may reduce pressures on experts to align with retaining parties. The survey responses, which emphasised neutrality and honesty, can thus be interpreted as reflecting the credibility-enhancing potential of these institutional safeguards.

Nevertheless, as Chin et al. (2019) caution, reduced party alignment does not eliminate bias altogether. Even in systems where adversarial allegiance is structurally weaker, bias may arise through institutional pressures, cognitive heuristics, or confirmation dynamics. This insight tempers the survey findings: while respondents valued impartiality, systemic vigilance remains necessary to guard against subtler forms of bias that can undermine credibility.

Conversely, Tottenham (2021) draws attention to the communicative dimension of expert testimony. The survey findings that highlighted demeanor and professionalism as credibility cues can be critically evaluated against Tottenham's argument that persuasive testimony depends not on exceptional eminence but on a balance between accessibility and decorum. Judges and jurors may respond positively to clarity and friendliness, yet informality risks undermining authority. Thus, the findings suggest that credibility is shaped not only by independence and technical expertise but also by courtroom performance, requiring experts to navigate the delicate balance between engagement and professionalism.

Lastly, respondents highlighted the importance of systemic safeguards—such as regulatory oversight and judicial scrutiny—in sustaining trust in expert testimony. The avoidance and transparent disclosure of conflicts of interest were identified as fundamental to

preserving independence and ensuring the legitimacy of expert contributions within the courtroom.

3.9.2. Implications

The findings in this study have important implications for the justice system, particularly regarding the selection, qualification and evaluation of forensic experts. Understanding which credibility cues are most valued by legal professionals and laypeople can inform development of more rigorous criteria for admitting expert testimony in court. These insights can enhance the ethical and evidentiary standards of forensic contributions to legal decision-making.

The importance of these cues is crucial for refining the criteria ensuring that only individuals with genuine expert knowledge can proffer opinion evidence. It can also be used to evaluate expert testimony, ensuring that it contributes effectively and ethically to legal outcomes. The findings highlight that the most crucial cue for qualifying a forensic expert is their relevant education, study, or training. This underscores the necessity for forensic experts to have a solid foundation in the specific area relevant to the case. For the criminal justice system, this suggests a need to prioritise experts who not only have general expertise, but whose specific educational background directly aligns with the requirements of the case at hand. This alignment ensures that the expert can provide pertinent and reliable insights, enhance the credibility of the testimony, and aid the court in making informed decisions. Additionally, the significance of experts being able to apply their knowledge practically to legal questions highlights the gap between theoretical knowledge and its practical utility in court. The justice system must ensure that experts not only understand their field but can also apply this understanding effectively to the unique circumstances of legal cases. This capability is crucial for articulating complex scientific principles in ways that are relevant and intelligible to the court, thereby influencing the

case outcomes positively. The emphasis on transparency as a critical cue for credible testimony suggests that the justice system should favour experts who can clearly and openly communicate their methods, findings, and the limitations of their evidence. This transparency is vital for building trust with the court and allows for a thorough evaluation of the evidence presented. It supports a fair trial process by ensuring that all parties have access to the same information, which is crucial for cross-examination and rebuttal.

The consistent recognition of integrity and impartiality across both legal professionals and laypeople highlights the universal importance of ethical conduct. The justice system must prioritise these traits in selecting experts to maintain the legitimacy of legal proceedings. The primary duty of the expert witness, consistent with that of any witness, is to the court, with the overarching purpose of assisting the factfinder in ascertaining the truth. No witness may provide partial or selective evidence. Because experts are afforded greater latitude in presenting hearsay and opinion evidence, they are correspondingly held to the highest standards of professional integrity. As Tottenham (2021) cautions, experts are not “guns for hire” but officers of the court, responsible for advancing impartial, empirically grounded insights. This obligation requires avoiding bias or advocacy for the retaining party and instead providing objective, fact-based analysis. By maintaining impartiality and adhering to disciplinary evidentiary standards, experts reinforce the reliability of their testimony and safeguard the integrity of the adjudicative process.

Where the findings also suggest that certain cues, such as holding an endowed chair, or having experience as an expert witness, are deemed less critical, this observation highlights the need for the justice system to place less emphasis on the prestige of an expert’s position or the frequency of their court appearances and instead focus on their actual capabilities and ethical stance. It points to the need for a more nuanced

understanding of the factors that truly enhance the reliability and utility of expert testimony in court.

To implement these findings, judicial systems could develop more standardised protocols for evaluating and selecting forensic experts, perhaps incorporating a checklist or scoring system based on the identified cues. Training programs could also be designed for legal professionals to better understand and evaluate the credentials, attributes and testimony of forensic experts based on these cues. Additionally, the legal framework could be adjusted to ensure that the qualifications of forensic experts are thoroughly vetted, emphasising their ability to apply their knowledge practically and communicate it transparently.

3.9.3. Strengths and Limitations

The study design enabled efficient data collection and facilitated the examination of relationships among multiple credibility cues. Randomisation of the 22 survey items helped mitigate order effect and reduce systemic bias in participant responses. However, studies adopting a mock-jury format inherently limit ecological validity. Unlike real-world courtroom settings, participants did not receive judicial instructions, observe the expert's appearance and demeanour, or experience the dynamics of live testimony and cross-examination. These contextual elements are integral to juror decision-making and may significantly influence perceptions of credibility.

Although participants were recruited in accordance with the eligibility requirements for UK jury service (e.g., age range, residential status, and legal capacity), the study did not collect more detailed demographic information. Gathering such data would have allowed a more critical appraisal of whether the sample was, *prima facie*, representative of the wider UK population. Without these demographic details, it is difficult to determine the extent to which the recruited group reflects the diversity of

individuals who may be called to serve on a jury, thereby limiting the generalisability of the findings to the broader UK legal context.

Social desirability bias also presents a notable threat to internal validity. There is the possibility that participants—particularly those with legal training—may have rated cues such as “impartiality” highly due to alignment with professional ethical standards. However, in practice, legal professionals often engage in adversarial strategies aimed at constructing compelling narratives rather than pursuing objective truth. This discrepancy between idealised and actual courtroom behaviour may have influenced participants’ evaluations, thereby limiting the generalisability of the findings to real world legal decision-making.

Participants evaluations may also have been influenced by personal biases. Pre-existing attitudes towards expert witnesses—such as trust or scepticism towards specific disciplines—could have influenced credibility ratings. Additionally, sociodemographic factors including age, gender, sexuality, education level and cultural background may affect how authority and expertise are perceived. These individual differences introduce variability that is difficult to control and may confound interpretations of the data.

Recruitment via the researcher's LinkedIn account introduced potential sampling bias, as participation was voluntary and self-selected. The motivations for participation were not assessed, which limits the insights into the representativeness of the sample. Without evaluating these motivations, it remains unclear whether the sample is representative of broader populations relevant to legal decision-making contexts.

3.9.4. Recommendations for Future Research Studies

Future research could adopt a similar methodological approach to the present study, while extending its scope to investigate the motivations underlying participation in credibility assessments. This could be achieved by incorporating pre-survey questions addressing

participants' professional background, interest in forensic science, and reasons for engaging with the study. Additionally, comparative analysis across recruitment platforms would help identify potential sampling biases. Such refinements would enhance sample validity and improve the generalisability of findings to broader legal and lay populations.

Although the present study identified 22 cues that are utilised to qualify expert witness credibility; however, it did not empirically test their relative influence or potential interaction effects. Subsequent research could examine how specific combinations of these cues shape perceptions of expert reliability and admissibility. This could be operationalised through factorial vignette experiments, wherein legal professionals and lay participants evaluate mock expert profiles systematically varied by—for instance—qualifications, experience, affiliations, and presentation style. Such designs would clarify which cues exert the greatest influence and whether certain combinations elicit heuristic biases or promote more accurate assessments. Furthermore, factorial designs could be extended to explore discipline-specific biases (e.g., forensic psychology vs. digital forensics) and the impact of sociodemographic variables—such as expert gender, ethnicity, and communication style—on credibility ratings.

Given that the current study was situated within the UK legal context, future research could explore whether evaluative criteria for expert credibility differ across jurisdictions. Comparative studies could investigate distinctions between adversarial and inquisitorial systems by replicating the survey in countries such as the United States, France, and Germany. Statistical and thematic analyses of cross-jurisdictional data would illuminate culturally and procedurally driven differences in expert evaluation, potentially informing international standards and identifying jurisdiction-specific vulnerabilities.

Lastly, the present study's findings suggest that while legal professionals demonstrate structured reasoning, they often lack domain-specific scientific literacy. Future research could

assess the impact of targeted educational interventions on legal professionals' ability to evaluate scientific evidence. Longitudinal studies tracking cohorts before and after training programmes could measure changes in evaluative accuracy and confidence. Such research would provide empirical support for curriculum reform and continuing professional development in forensic science literacy, thereby enhancing the rigour of expert witness evaluation in legal proceedings.

3.9.5. Conclusion

This chapter has shown that, while legal and lay decision-makers converge on a core set of epistemic and integrity-based indicators—knowledge directly relevant to the testimony, independence and impartiality, transparent reasoning, and the capacity to provide reliable, well-grounded conclusions—the field still lacks a coherent, operational framework for translating these indicators into consistent gatekeeping practice.

The comparative analysis also revealed a systematic divergence: legal professionals tended to privilege practice-grounded and courtroom-performance cues, whereas lay participants placed greater weight on impartiality. These distinct evaluative heuristics underscore the need to foreground impartiality and methodological transparency when expert testimony is presented to factfinders.

Building on these conclusions, the next chapter reports an experimental study that tests whether extra-legal cues—specifically the perceived scientific reliability of the expert's forensic domain and the mode of testimonial presentation—shape lay jurors' credibility judgements. As such, it assesses the extent to which such cues steer evaluations beyond the formal admissibility criteria.

4. Effects of Communication Mode and Forensic Domain on Lay Assessments of Expert Witness Credibility

The preceding chapter critically examined the criteria used to evaluate the credibility of forensic experts, drawing on the perspectives of legal professionals and laypeople to distil the implicit hierarchies in credibility judgments. The analysis revealed marked differences in the evaluative priorities employed by these groups, particularly in relation to the role of extra-legal factors. These findings lend further credence to the notion that credibility assessments extend beyond evidentiary merit, incorporating subjective and contextual cues that shape perceptions in subtle yet significant ways.

Building on these insights, the current chapter investigates two specific extra-legal factors that influence juror assessments of expert witness credibility—the presentation style adopted during testimony and the forensic domain of expert’s specialisation. Although expert witnesses are intended to function as impartial educators, jurors often lack the scientific literacy to critically required to evaluate complex forensic evidence. This epistemic gap is particularly consequential given the cognitive demands placed on jurors, who must examine and process substantial volumes of evidence in accordance with legal instructions to reach a verdict. While jurors generally execute this task with commendable diligence, the technical nature of forensic testimony typically lies beyond their’ “common knowledge” (Nicholson, Yarbrough & Penrod, 2014). In such contexts, they may rely on peripheral cues (e.g., facial expressions, posture, vocal tone; Denault, Leclerc & Talwar, 2025), likeability, confidence, perceived impartiality (Guarnera, Murrie & Boccaccini, 2017), and formal credentials (Flick, Smith & Schweitzer, 2021—to guide their judgments.

Despite the growing body of research on juror cognition in the context of forensic evidence (e.g., Crozier, Kukucka & Garrett, 2020; Garrett, Scurich & Crozier, 2020;

Thompson & Scurich, 2019; Devine & Macken, 2016), comparatively less attention has been given to the communicative strategies employed by experts themselves and their impact on juror perceptions. This oversight is significant, given that that experts may adapt their presentation styles according to disciplinary norms, professional training, or courtroom strategy (Szczyrbak, 2022). Moreover, the effectiveness of these communication approaches may vary across forensic domains; for instance, jurors may expect greater methodological transparency from a DNA analyst than from a digital forensic expert.

This chapter addresses these conceptual gaps by systematically examining how the interaction between testimony presentation style and forensic domain influences juror assessments of expert credibility. In the process, it aims to resolve contradictions in the literature regarding the role of extra-legal factors and to advance a more nuanced understanding of how expert testimony is received and evaluated in legal contexts.

4.1. Juror Comprehension of Expert Testimony

The efficacy of forensic expert testimony in legal proceedings is contingent not only on its scientific integrity but also on the extent to which jurors can comprehend and appropriately evaluate its content. In an ideal normative framework, jurors would evaluate forensic expert testimony solely on its evidentiary contents—specifically, the expert’s methodological rigor, interpretive accuracy, and relevance to case facts. This model presumes that jurors engage in systematic, content-driven reasoning, guided by legal standards and scientific validity. However, this assumption overlooks the psychological and contextual realities of courtroom decision-making. Empirical research consistently demonstrates that extra-legal factors—such as presentation style, language and demeanour—can significantly influence jurors’ assessments of credibility (e.g., Eldridge 2019; LaBat et al., 2023; Brodsky et al., 2010). These influences operate through heuristic and affective pathways, often affecting judgments independently of the evidentiary substance. Thus, while normative ideals

advocate impartial evaluation, it is unrealistic to disregard the role of extra-legal cues in shaping juror perceptions and verdict outcomes.

Research demonstrates that jurors often misinterpret forensic testimony, particularly when confronted with technical or probabilistic language. Eldridge (2019) found that terms such as “match” are frequently overvalued, while probabilistic expressions are undervalued, leading to systematic misunderstandings. These findings emphasise the risks of categorical framing and highlight the importance of communication strategies that make scientific uncertainty accessible without oversimplification.

However, linguistic clarity alone is insufficient. Jurors’ evaluations are also influenced by the perceived authority of expert credentials (Flick et al., 2022), which may project an aura of reliability which may not be valid. Experts may present flawed methodologies, unsupported assumptions, or lack domain-specific expertise. In the absence of rigorous cross-examination, such deficiencies may go unchallenged, leading jurors to overestimate the credibility of the testimony (Miller, 1987). This dynamic has contributed to numerous wrongful convictions, where forensic evidence was misrepresented or misinterpreted (Norris, Bonventre, Redlich, Acker & Lowe, 2017).

Moreover, jurors’ evaluations of forensic evidence are shaped not only by courtroom dynamics but also by pre-existing beliefs and cultural expectations. A prominent example is the “CSI effect,” (Mopas, 2007, p. 116) whereby exposure to crime dramas fosters inflated expectations regarding the availability and conclusiveness of forensic science. This phenomenon illustrates that jurors do not enter trials as neutral observers; rather, their reasoning reflects both situational factors and individual predispositions (Roberts & Zuckerman, 2010). Smith and Bull (2012) argue that such influences operate less through direct verdict shifts and more through biased interpretation of evidence, particularly when probative value is uncertain. They critique previous CSI-effect research for methodological

limitations, including reliance on television viewing as the exposure variable and a narrow focus on verdict outcomes.

To address these shortcomings, Smith and Bull (2012) developed the Forensic Evidence Evaluation Bias Scale (FEEBS), a ten-item instrument measuring two pathways of bias: (i) pro-forensics orientation (inflated faith in forensic science as conclusive) and (ii) forensics-required orientation (expectations that absence of forensic evidence undermines the prosecution). In their mock-trial study, DNA evidence was perceived as the strongest form of proof, with pro-forensics bias (FEEBpp) significantly predicting perceived DNA strength and, indirectly, guilt judgments. By contrast, the forensics-required subscale (FEEBpd) showed no predictive effect. Although limited by a homogeneous student sample and partial validation, FEEBS provides empirical support for the claim that jurors' biases shape their evaluation of expert testimony. These findings underscore the need to consider both courtroom and extra-legal influences when assessing juror decision-making.

As a point of reiteration, understanding expert testimony requires more than decoding technical language or assessing credentials—it demands cognitive integration across multiple domains. Jurors must simultaneously process legal instructions, adversarial arguments, and complex scientific evidence. This multifaceted cognitive overload can impair jurors' ability to systematically evaluate testimony, particularly when the expert evidence is ambiguous, incomplete, or strategically framed. Such strain may shift jurors towards heuristic processing, further complicating the pursuit of accurate and impartial verdicts.

This challenge is amplified when jurors are presented with conflicting expert testimonies. In such cases, they must discern which expert is more credible and which interpretation is more plausible. Experts perceived as less credible are less likely to influence verdicts. Consequently, the presentation style of forensic testimony becomes pivotal, as jurors tend to assign substantial weight to forensic evidence in their decision-making (LeBat et al.,

2023). Studies of conflicting expert testimony demonstrate that when presented with competing accounts, jurors often rely on peripheral cues such as confidence and clarity rather than evidentiary quality (Scobie et al., 2019; West et al., 2014; Eastwood & Caldwell, 2015). Educational interventions can partly mitigate this effect (Levett & Kovera, 2008), though findings suggest that juror comprehension remains fragile under adversarial conditions.

Moreover, juror decision-making is shaped by more than evidentiary content; it is filtered through cognitive biases and subjective impressions. Research shows that jurors may be influenced by inadmissible testimony (Stebay et al., 2006), that pre-existing schemas can conflict with legal instructions (Smith, 1991), and that verdict preferences often drive selective attention to evidence (Carlson & Russo, 2001). Collectively, these findings highlight how jurors' evaluations of expert testimony are entangled with prior beliefs and contextual cues, making credibility assessments especially vulnerable to bias.

4.2. Source Credibility

The conceptualisation of credibility as a dynamic and context-dependent construct is well-established within communication theory. Theorists (e.g., Berlo, Lemert, and Mertz, 1969; McCroskey, 1966) argue that credibility is subjectively perceived and formed by situational factors. Berlo et al. (1969) delineated credibility into three core dimensions: safety (e.g., honesty), qualifications (e.g., competence), and dynamism (e.g., energy). Giffin (1967) expanded this framework by incorporating additional attributes such as reliability, intentions, and personal attractiveness, thereby offering a more nuanced understanding of how source characteristics affect perceived trustworthiness.

Despite the breadth of literature on source credibility (e.g., McCroskey & Young, 1981), empirical investigations into the credibility of expert witnesses in legal contexts remain relatively limited. Stanley Brodsky and colleagues have been instrumental in addressing this gap through a series of empirical studies aimed at delineating the dimensions

of expert witness credibility (Brodsky, Griffin, & Cramer, 2010; Brodsky, Neal, Cramer, & Ziemke, 2009; Cramer, Brodsky, & DeCoster, 2009). Brodsky et al. (2010) developed the Witness Credibility Scale (WCS), which operationalises credibility across four dimensions: confidence, likeability, trustworthiness, and knowledge.

Building on this framework, Cramer et al. (2009) demonstrated that moderate levels of expert confidence were perceived as most credible, whereas both low and high extremes diminished credibility. Importantly, they found that juror characteristics—such as extraversion—also influenced evaluations, suggesting that credibility is co-constructed through the interaction between expert behaviour and juror predispositions. These findings underscore the relational and psychological complexity inherent in credibility assessments.

Further extending this line of inquiry, Brodsky et al. (2009) examined the role of expert likeability in shaping juror perceptions of credibility and sentencing outcomes. In a simulated capital trial, expert witnesses were portrayed with either high or low likeability through controlled verbal and nonverbal cues. Although the four WCS dimensions were retained, likeability was excluded from analysis to avoid conceptual redundancy with the manipulated variable. Results indicated that high likeability significantly enhanced perceptions of trustworthiness and overall credibility, though it did not influence sentencing decisions. Gender emerged as a moderator: female jurors rated highly likeable experts as more credible, whereas male jurors showed no such differentiation. Juror extraversion further interacted with gender, with extraverted men more likely to endorse the testimony and recommend the death penalty, while extraverted women exhibited the opposite pattern. These findings suggest that likeability contributes to perceived trustworthiness but may not directly affect sentencing in capital cases. However, methodological limitations—such as the use of videotaped testimony, a demographically narrow sample, and male-only expert witnesses—highlight the need for broader replication.

Challenging the assumption of fixed credibility dimensions, Younan and Martire (2021) proposed that credibility judgments are more responsive to situational cues. Across two experiments involving 456 jury-eligible participants, they manipulated expert likeability and evidence quality using trial materials grounded in the Expert Persuasion Expectancy framework. While both variables enhanced perceived persuasiveness, only evidence quality—particularly its trustworthiness, foundational validity, and clarity—significantly predicted sentencing outcomes. These findings delineate a conceptual distinction between interpersonal appeal and evidentiary substance, indicating that while likeability may shape perceptions of persuasiveness, it does not independently drive juror decision-making.

Taken together, these studies reveal a conceptual divergence: whereas earlier models treat credibility as a stable set of dimensions, more recent research emphasises its situational and interactive nature. This discrepancy raises critical questions about the ecological validity of instruments such as the WCS in capturing the multifaceted nature of credibility as it operates in real courtroom settings.

Additional insights into the conditional nature of source credibility are offered by Sternthal, Dholakia, and Leavitt (1978), who found that the persuasiveness of an argument is influenced by the timing of credential disclosure and the audience's pre-existing attitudes. Similarly, Mondak (1990), in the context of Supreme Court decisions, observed that while message content typically outweighs source credibility, high-credibility sources can enhance persuasive impact under conditions of uncertainty. These findings reinforce the notion that the influence of expert testimony is context-dependent, particularly in legal settings where jurors must navigate complex and contested information. Moreover, emerging scholarship suggests that credibility may also be shaped by the specific forensic domain in which the expert operates, further complicating attempts to generalise across legal contexts.

4.3. Influence of Forensic Domain on Perceived Credibility

Drawing from its comprehensive evaluation of forensic science, the landmark report *Strengthening Forensic Science in the United States: A Path Forward* (National Research Council, 2009, p. 3) positioned nuclear DNA testing as the “forensic gold standard by which all other forensic disciplines are measured.” The report commended DNA analysis for its widespread acceptance, rigorous scientific validation, and capacity to produce individually specific conclusions.

In contrast, the report withheld similar endorsement from other forensic disciplines, raising substantive concerns about their scientific validity foundations. Techniques such as bite mark analysis, hair microscopy, and tool mark comparison were criticised for lacking empirical validation, standardised methodologies, and quantifiable error rates. These deficiencies not only compromise the credibility of such methods but also cast doubt on their admissibility and probative value in judicial proceedings.

This disparity in scientific robustness delineates a conceptual threshold between well-established forensic domains, such as DNA analysis, and emerging or less validated fields like digital forensics. Within the present discourse, the establishment of forensic domain is conceptualised as the extent to which it is regarded as scientifically entrenched. This perception is indexed through several indicators, including the availability of published validation studies, the existence of standardised protocols, participation in proficiency testing, and the reporting of error or accuracy rates (including likelihood ratios where applicable). Additional markers of entrenchment include the presence of accreditation frameworks, the degree of institutional uptake, and the extent of judicial familiarity with the domain.

The elevated standing of DNA analysis is not confined to expert bodies such as the National Research Council (NRC) in the United States or the House of Commons Science and Technology Committee in the UK; it is also reflected in public perception. Lay audiences

increasingly recognise the hierarchical standing of forensic disciplines, often equating scientific legitimacy with courtroom reliability.

Brewer and Ley (2010) conducted a study to investigate how different forms of media use—such as overall television viewing, crime television viewing, newspaper reading, and local news consumption—affect public perceptions of DNA evidence. In a survey of 908 individuals in the US, the researchers measured self-perceived understanding of DNA, perceived reliability of DNA evidence, and its influence on jury decision-making. The study also included an experimental manipulation of question order to test priming effects. Findings revealed that overall television viewing was negatively associated with perceived understanding of DNA but positively associated with belief in its reliability. Crime television viewing predicted higher perceived understanding and reliability but did not influence jury decision-making. The priming experiment showed that thinking about media increased the weight participants gave to the presence or absence of DNA evidence in hypothetical jury scenarios. The findings suggest that media exposure plays a significant role in shaping public attitudes toward DNA evidence. These findings provide a contextual foundation for examining whether public perceptions align with the actual scientific hierarchies of forensic techniques.

In an empirical study by Lieberman, Carrell, Miethe and Krauss (2008) the researchers studied whether jurors recognise the scientific superiority of DNA evidence compared to other forensic techniques, and whether they are sensitive to its limitations. Across three studies involving undergraduate students and actual jurors, participants evaluated various types of forensic evidence—including DNA, fingerprints, hair fibres, and eyewitness testimony—using surveys and experimental vignettes. Results consistently showed that DNA evidence was rated as the most accurate and persuasive, leading to higher conviction rates when incriminating and more acquittals when exculpatory. Even after cross-

examination and judicial instructions, DNA retained its strong influence, although evidence-focused cross-examination in unreliable lab conditions reduced verdict confidence.

Therefore, DNA evidence demonstrates a potent heuristic effect on jurors, often overriding concerns about lab reliability or expert credibility.

In a study examining public beliefs about the reliability of forensic science techniques, Kaplan, Ling, and Cuellar (2020) surveyed 155 U.S. participants to assess perceptions of error likelihood and human judgment across six stages of forensic investigation and ten forensic methods. Contrary to expectations, respondents expressed considerable scepticism, estimating high error rates (averaging around 50%) and substantial human involvement at each stage. Perceived accuracy varied widely, from 55% for voice analysis to 83% for DNA. Despite these reservations, a significant proportion of participants, approximately 40%, still regarded forensic evidence as decisive in criminal trials, even when other evidence suggested innocence. These findings highlight a conceptual disjunction between perceived credibility and actual scientific validity.

Expanding on this issue, McPhee (2012) investigated how potential jurors evaluate the reliability and probative value of different types of forensic evidence and how these evaluations influence verdict decisions. In a controlled experiment involving 309 undergraduate students, participants were randomly assigned to one of twelve scenarios, each featuring a distinct type of evidence (e.g., DNA, fingerprint, confession, hair microscopy, criminal profiling). Participants then rated the reliability and importance of the evidence and rendered a verdict. The results revealed that confessions elicited the highest rate of guilty verdicts, followed by criminal profiling and hair microscopy—despite the limited empirical support for these methods. DNA evidence, although scientifically validated, did not produce the highest conviction rates, suggesting that contextual factors may override scientific merit in juror decision-making. The study highlights a critical gap in juror awareness, wherein

unvalidated forensic techniques are often perceived as equally reliable as DNA, reinforcing the need for targeted juror education and expert guidance.

Koehler, Schweitzer, Saks, and McQuiston (2016) investigated the cues jurors rely on when evaluating forensic pattern-comparison testimony, focusing on examiner experience, scientific validation, and technological sophistication. Across two jury-simulation experiments—one using written trial summaries and the other a video-trial with jury-eligible adults and deliberation—the strongest and most consistent influence was examiner experience. Scientific validation effects were limited and context-dependent, appearing in the online setting but disappearing in the more realistic simulation, while technological sophistication had no reliable impact. The researchers conclude that jurors often use examiner credentials as heuristic proxies for evidential validity, which is a problematic tendency given that experience is not diagnostic of accuracy in many forensic domains. This weak sensitivity to validation underscores the need for robust judicial gatekeeping and clearer communication of methodological limitations.

Goodman-Delahunty and Hewson (2010) examined whether juror misunderstandings of DNA profiling and random match probability (RMP) can be mitigated through a brief tutorial embedded in a simulated criminal trial. Using a quasi-randomised factorial design, jury-eligible Australians were exposed to different modes of expert-evidence presentation (verbal, partial multimedia, full multimedia) and varying sources (judge-led vs prosecution-led). Baseline DNA knowledge was low ($\approx 24\%$ correct), but exposure to the tutorial yielded substantial gains ($\approx 37\%$ improvement), with evidence of transfer to novel items. Conviction rates increased when incriminating DNA evidence was presented, though mode of presentation influenced how less knowledgeable jurors interpreted the evidence—verbal-only formats heightened conviction tendencies, while multimedia aids reduced disparities without unduly favouring the prosecution. Judge-led experts were perceived as slightly more credible

than prosecution-led experts. Nevertheless, the study was limited by the use of simulated online trials and structured tutorials, which cannot fully replicate real jury dynamics.

These empirical findings underscore the critical role that perceived scientific standing of a forensic domain plays in shaping juror credibility assessments of forensic evidence. The consistent elevation of DNA evidence across both scientific discourse and public perception—suggests that jurors tend to attribute greater credibility and expertise to testimony originating from disciplines viewed as scientifically methodologically rigorous and empirically validated. Conversely, the comparable weight often assigned to less substantiated techniques, such as hair microscopy or criminal profiling, reveals a disconnect between scientific validity and juror judgment. This discrepancy highlights the need to investigate how perceived scientific standing across forensic domains influences lay assessments of expert credibility.

4.4. Communication Modes of Testimony

As discussed in the earlier discourse, juror comprehension of expert testimony is frequently compromised by cognitive overload and unfamiliarity with technical content, which impedes their ability to engage with complex forensic evidence (Eldridge, 2019). This challenge is particularly prevalent in cases involving statistical or scientific testimony, where cognitive demands exceed jurors baseline capacities for analytical reasoning (Thompson & Schumann, 1987).

Empirical evidence highlights the need for expert communication to be aligned with how jurors respond to expert evidence. Jurors consistently demonstrate a preference for case-specific over abstract testimony suggesting that contextual relevance enhances comprehension and engagement (Brekke & Borgida, 1988). Moreover, credibility judgments are not only based on the content of the testimony, but also by the perceived reliability and presentation style of the expert (Scobie et al., 2019; Reinhard & Sporer, 2008, 2010; Wilcox

& NicDaeid, 2018). These findings underscore the importance of aligning expert communication with juror cognitive and perceptual expectations.

Krauss and Sales (2001) investigated whether lay decision-makers in capital sentencing can distinguish between clinical opinion testimony and actuarial risk assessments, and whether adversarial safeguards mitigate undue reliance on weaker expertise. In a controlled mock-jury simulation, 208 participants rated defendants' future dangerousness across three stages. Results showed that clinical opinion testimony exerted stronger influence than actuarial testimony, and this preference persisted despite cross-examination or opposing experts. The findings challenge the assumption that jurors reliably discount less valid expertise, or that adversarial procedures consistently correct bias, suggesting instead that testimony complexity fosters peripheral processing and cancels substantive evaluation. However, the researchers identified a number of limitations in the study including ecological validity concerns, contested applicability of the actuarial tool (VRAG), and stylised adversarial manipulations.

In their study, Goodman-Delahunty, Cossins, and O'Brien (2011) examined whether psychological expert evidence and judicial directions reduce juror misconceptions in child sexual abuse (CSA) trials. In a repeated-measures simulation with 118 psychology undergraduates, exposure to specialised CSA information—whether via expert testimony or judicial directions—significantly reduced misconceptions compared to controls. Knowledge gains were comparable across interventions, but verdict effects were selective—conviction rates increased when judicial directions were delivered in summation and when experts were clinical. Mediation analyses indicated that credibility assessments fully explained the link between knowledge gains and conviction. However, the study was limited by the reliance on undergraduate mock jurors, small sample size, and absence of deliberation, underscoring the need for replication with more ecologically valid designs.

Horan and Goodman-Delahunty (2020) extended this line of inquiry through a rare-access case study of an Australian jury trial involving child sexual assault allegations. Despite jurors' endorsement of a psychiatrist's credibility, counter-myth expert evidence proved ineffective in shaping verdicts. Jurors anchored their reasoning in perceived evidential deficits, criticising inadequate forensic documentation and preparation, and treating these shortcomings as grounds for reasonable doubt. The psychiatrist's testimony was perceived as overly general and insufficiently case-specific, partly because the expert had not interviewed the complainant. The researchers contend that reforms permitting the admission of counterintuitive expert evidence will remain structurally vulnerable unless they are integrated into broader evidential strategies that meet jurors' informational expectations (Horan & Goodman-Delahunty, 2020). However, the study is subject to a number of limitations including its reliance on a single case, the relatively modest level of juror participation, and the methodological constraints imposed by jury secrecy.

Despite extensive research on juror cognition, the communicative strategies used by expert witnesses and their influence on factfinders remain underexplored. Addressing this gap is critical for enhancing the efficacy and accessibility of expert testimony, particularly in adversarial legal systems where clarity and credibility are essential.

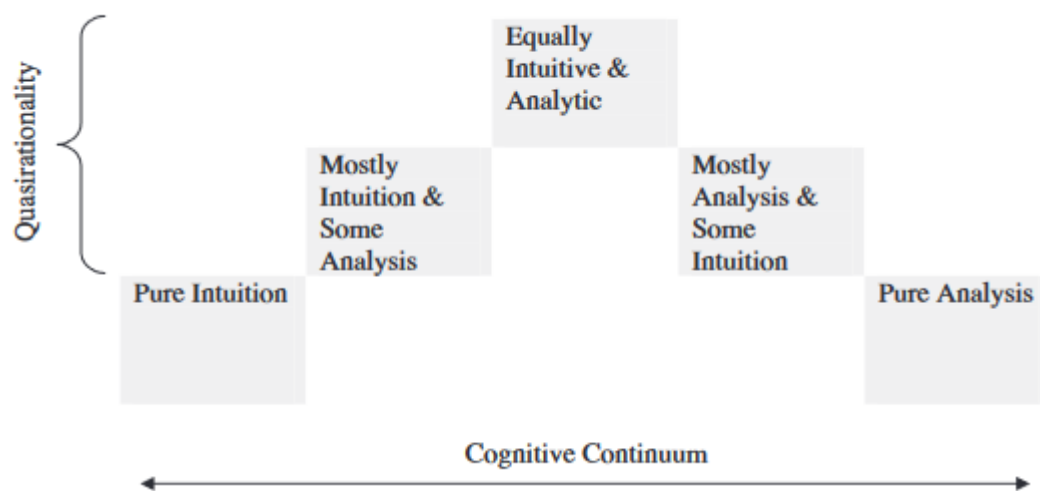
To address these deficiencies, the present discourse shifts from juror cognition to the expert's presentation of testimony and proposes Cognitive Continuum Theory (CCT) as a robust framework for conceptualising how experts modulate their communicative style when testifying.

Coined by Keith R. Hammond and grounded in Egon Brunswik's ecological rationality paradigm, CCT conceptualises cognition as a fluid continuum encompassing intuitive, quasi-rational, and analytical modes of reasoning (Hammond, 1981; Cader, Campbell & Watson, 2004). This continuum—in a courtroom context—enables experts to

adapt their testimony—oscillating between narrative, experiential formats, and structured data-driven presentations—contingent on the nature of the evidence and the anticipated cognitive orientation of the jury. This continuum reflects the adaptive interplay between cognitive modes, shaped by task structure (Figure 4.1) and environmental demands (Dunwoody et al., 2000). CCT accommodates the notion that expert reasoning is rarely purely intuitive or analytical but often situated within a quasi-rational zone. Therefore, the theory facilitates a more nuanced understanding of how testimony is curated and delivered.

Figure 4.1

The Cognitive Continuum



Note. This figure shows the cognitive continuum, ranging from pure intuition to pure analysis, with quasirationality in the middle ground (i.e., varying combinations of intuitive and analytic processing). Adapted from Dhimi and Thomson (2012).

Analytical testimony. In this mode, the expert adopts a deliberate, sequential, and rule-based approach designed to maximise coherence and cognitive consistency (Hammond, 1996; Dhimi & Thomson, 2012). The testimony is methodologically rigorous and

decomposable, with clearly defined cues, explicit weighting schemes, and formal decision rules that reflect task properties known to induce analytic processing (Dunwoody et al., 2000). Because processing is intentionally slow and stepwise, factfinders can follow the warrant from data through to inference; confidence is therefore grounded primarily in the method and its transparency rather than in the outcome itself (Custers, 2013; Hammond, 1996).

The formalisation of judgment policies means that errors are relatively infrequent. However, when misspecifications occur, they may propagate systematically through the rule set, resulting in consequential errors (Hammond, 1996; Hammond et al., 1987; Dhimi & Mumpower, 2018). Crucially, this mode provides high process insight: the expert renders reasoning publicly reviewable and defensible, while cue evaluation is based on objective and empirically validated criteria (Custers, 2013; Dunwoody et al., 2000).

Intuitive testimony. In this mode, the expert relies on rapid, experience-based judgment operating under low cognitive control (Hamm, 1988; Hammond, 1996). Rather than decomposing the task into explicit cues and decision rules, the expert draws on perceptual cues tacit schemas and exemplars, producing testimony that is fluid, narrative, and context rich. This mode is particularly prevalent when tasks are time-pressured, ill-structured, or ambiguous, conditions that encourage reliance on intuition over systematic analysis (Hamm, 1988; Hammond, 2000; Custers, 2013).

Since processing is rapid and largely spontaneous, but access to intermediary steps is limited, making justifications largely post hoc and more difficult to scrutinise or audit (Hamm, 1988; Hammond, 1996). Errors are more frequent than in the analytical mode, though they typically cluster around the correct answer, producing a roughly normal distribution (Dunwoody et al., 2000; Hammond, 1996). Confidence in this mode is anchored less in transparent method and more in prior outcomes and tacit procedures. Cue evaluation is

therefore holistic and perceptual, rather than rule-based and explicitly justified (Hamm, 1988; Hammond et al., 1987).

Quasi-rational testimony. Situated between intuitive and analytical modes, quasi-rational testimony reflects an alignment of cognition to task structure, consistent with the predictions of CCT (Hammond, 1996; Dunwoody et al., 2000). This mode represents the predominant cognitive orientation in real-world decision-making where experts integrate both rule governed and pattern-based recognition (Brunswik, 1956; Dunwoody et al., 2000). Testimony in this mode typically combines stepwise explication for complex or novel issues with efficient summarisation of familiar elements.

Performance is optimised for tasks characterised by moderate structure and partially redundant cues, leading to higher accuracy than a purely intuitive approach while retaining flexibility absent in fully analytical reasoning. Processing speed is balanced, allowing experts to alternate between structured explanation and adaptive narrative summarisation. Errors occur less frequently than in the intuitive mode, and when they do arise, they are less systematic and severe than those associated with the analytical mode.

Confidence in quasi-rational testimony is calibrated to both method and outcome, reflecting a pragmatic stance towards communication. The expert demonstrates partial insight into their judgment process, articulating key aspects of reasoning while relying on experiential heuristics where detailed explication is unnecessary or unavailable. Cue evaluation in this mode is mixed, combining perceptual judgments with objective strategies depending on the complexity and familiarity of the evidence.

Framed as a tripartite continuum—intuitive, quasi-rational, and analytical—the model underscores the adaptive nature of forensic expert testimony and the need to align expert communicative strategies with how jurors respond to expert evidence. Grounded in CCT, this approach conceptualises testimony as varying in cognitive control, integrating narrative and

rule-based modes and thereby resolving the supposed dichotomy between accessibility for lay factfinders and methodological rigour. Within legal settings, this framing supports testimony that is clearer, more internally consistent, and more amenable to appraisal of its reliability.

Building on this framework for cognitive processing, empirical studies could examine how different communication modes of testimony along the continuum influence lay judgments of expert credibility, and whether these effects vary across forensic domains that differ in their perceived scientific reliability.

4.5. The Present Study

The preceding review identifies unresolved questions about the communicative strategies used by forensic experts in court. Although juror cognition and decision-making have been widely studied, there is scant research into how expert testimony styles align with how jurors respond to expert evidence. Expert communication is not monolithic, it varies by discipline, professional training, and strategic intent—factors which potentially influence juror evaluations.

Another issue concerns the interaction between presentation style and perceived scientific standing of the expert's forensic domain. Although DNA analysis is widely viewed as methodologically robust and credible, emerging fields such as digital forensics lack comparable public and institutional validation. Akin to this, a persistent gap exists between empirical validity and perceived reliability since techniques with limited support, e.g., microscopic hair comparison and behavioural profiling, can be credited on par with DNA. This miscalibration suggests there may be reliance on heuristics (e.g., authority and narrative coherence cues) rather than methodological rigour, thereby increasing the risk of over-weighting weak evidence in verdict-relevant judgments. Extra-legal factors, e.g., Likeability and confidence, may further influence evaluations of expert credibility. However, the relative weight of these factors compared to evidentiary substance remains unclear. This dynamic

interplay between interpersonal appeal and evidentiary merit warrants further exploration to clarify how jurors integrate these dimensions in credibility assessments. Compounding this, jurors often struggle with complex forensic testimony due to cognitive overload, unfamiliar terminology, and competing courtroom demands.

Although CCT provides a plausible account of how experts modulate reasoning and delivery, its empirical application in legal settings remains limited. Collectively, these observations warrant a focused empirical investigation. The present study seeks to address the gaps identified by examining how the mode of testimony and forensic domain affect lay perceptions of expert credibility, thereby contributing to a more nuanced understanding of forensic testimony in legal contexts.

4.5.1. Aims and Objectives

This research aims to determine how testimony presentation mode—intuitive, quasi-rational, analytical—and the perceived scientific standing of the forensic domain, separately and in interaction, influence lay assessments of expert credibility.

The sub-objectives of this study include:

1. To assess the impact of analytical, intuitive and quasi-rational modes of expert testimony on laypeople's perceptions of expert credibility.
2. To evaluate how forensic domains with levels of perceived scientific standing influence laypeople's perceptions of expert credibility.
3. To identify communication and evaluative strategies that can enhance the accuracy of lay assessments of expert credibility.
4. To explore the role of cognitive feedback and decision aids in supporting judges, lawyers, and jurors in the assessment of expert forensic evidence.

Although admissibility is determined by judges rather than jurors, the findings in the proposed study can inform gatekeeping by identifying communication features that improve comprehension and reduce miscalibration. For emerging ‘lower-standing’ scientific domains, judges and legal practitioners may encourage testimony that makes the inferential warrant explicit—that is, testimony that sets out hypotheses, identifies protocols used, reports validation and error information, explains the decision pathway and threshold, considers alternatives and limitations, and states a conclusion proportionate to methodological support. In well-established ‘higher standing’ scientific domains, simpler or quasi-rational delivery may suffice without degrading perceived credibility. These are evidence-informed recommendations intended to augment, not replace, legal standards on probative value versus prejudicial effect.

4.5.2. Operationalising Expert Credibility

Building on the empirical work of Brodsky and colleagues (Brodsky et al., 2010; Brodsky, et al., 2009; Cramer et al., 2009) the present study investigates lay evaluations of expert witness credibility using five dimensions consistently identified in prior research—Believability, Trustworthiness, Knowledge, Confidence, Likeability. While these dimensions reflect core attributes that influence juror perceptions across varied courtroom contexts, they do not fully account for procedural admissibility criteria central to legal decision-making. To address this conceptual gap, two additional dimensions are introduced—evidential relevance and Scope of evidence—derived from the Criminal Practice Directions 7.1.1., which stipulate that *expert opinion evidence is admissible in criminal proceedings if, in summary: (a) it is relevant to a matter in issue in the proceedings, and (c) the witness is competent to give that opinion.*

Drawing on Social Credibility Theory, which distinguishes between substantive and procedural expertise, the present study groups the seven credibility measures into two

theoretically grounded dimensions. The first, **Substantive credibility**, comprises scope, relevance, trustworthiness, believability, knowledge, and confidence—dimensions that reflect the expert’s epistemic and professional integrity. The second, interpersonal credibility, is captured through the single dimension of **Likeability**, representing relational and stylistic appeal. This bifurcated structure facilitates a nuanced analysis of how communication mode and forensic domain interact to shape perceptions of both professional competence and interpersonal effectiveness.

4.5.3. Research Questions and Hypotheses

On the basis of this framework, the study is guided by the following research questions:

1. To what extent does the perceived establishment of forensic domain influence the credibility that jurors assign to expert testimony?
2. How does the communication mode of testimony affect juror perceptions of expert credibility?

From these research questions, the following hypotheses were formulated:

Hypothesis 1. DNA expert witnesses will receive higher ratings of substantive credibility compared to those from the Digital forensic domain.

Hypothesis 2. Likeability ratings will differ between experts from the DNA domain and Digital domains.

Hypothesis 3. Analytical testimony will elicit higher ratings of substantive credibility than quasi-rational testimony, followed by intuitive testimony.

Hypothesis 4. Intuitive testimony will elicit higher likeability ratings than quasi-rational and analytical testimony.

Hypothesis 5. The effect of testimony mode on substantive credibility will vary by forensic domain (DNA vs Digital).

Hypothesis 6. The effect of testimony mode on likeability will vary by forensic domain (DNA vs Digital).

To investigate these issues, a controlled experimental design employing mock-jury style vignettes will be used. Following exposure to the expert testimony, participants will evaluate expert credibility across two domains: substantive credibility—comprising believability, trustworthiness, knowledge, confidence, relevance, and scope—and interpersonal credibility, captured through likeability. By manipulating both forensic domain and communication mode, the study explores whether the persuasive impact of expert testimony is moderated by the perceived scientific standing of the forensic field.

4.6. Method

4.6.1. Participants

A total of 434 individuals responded to the survey. Of these, 58 responses were excluded from analysis: 35 were submitted by legal professionals and 23 by individuals residing outside the United Kingdom. Eligibility criteria required participants to meet the conditions for UK jury service, including being aged between 18 and 76 years and having resided in the United Kingdom, Channel Islands, or the Isle of Man for at least five years since the age of 13. Legal professionals were also excluded to avoid potential bias arising from specialised knowledge of courtroom procedures.

The final sample comprised 376 eligible participants. Recruitment was conducted through convenience sampling using the researchers LinkedIn network, with participants encouraged to refer others who might be interested in taking part. An a priori power analysis was conducted using G*Power (Version 3.1.9.7; Faul, Erdfelder, Buchner & Lang, 2009) for the planned 2 x 3 between-subjects MANOVA (global effects) with seven dependent variables and six groups. Assuming a medium multivariate effect $f^2(V) = .0625$, $\alpha = .05$, and power $(1 - \beta) = .80$, the analysis indicated that a minimum of 90 participants (~ 15 participants per group) would be required. This threshold was exceeded. Although the a priori calculation was based on MANOVA, subsequent analyses were conducted using ANOVA (See Data Analyses). Sociodemographic characteristics of the sample are presented in Table 4.1.

Table 4.1*Sample Distribution by Gender, Education, and Ethnicity*

Characteristics	Category	Frequency	
		<i>n</i>	%
Gender	Male	179	47.6%
	Female	194	51.6%
	Other	1	0.3%
	Prefer not to disclose	2	0.5%
Education	No formal education	25	6.6%
	High school or Secondary education	49	13.0%
	College	116	30.9%
	First degree	106	28.2%
	Master's degree	60	16.0%
	Doctorate	12	3.2%
	Other qualifications	8	2.1%
Ethnicity	Asian or Asian British	46	12.2%
	Black, Black British, Caribbean, or African	50	13.3%
	Mixed or multiple ethnic groups	26	6.9%
	White	226	60.1%
	Other ethnic group	26	6.9%
	Prefer not to disclose	2	0.5%

Note. $N = 376$. This table summarises the demographic characteristics of participants across three domains: gender, educational attainment, and ethnicity. Frequencies (n) and percentages (%) are provided for each category. Age range of 18–75 years ($M = 43.35$, $SD = 14.50$).

4.6.2. Design

This study employed a 2 x 3 between-subjects experimental design, in which both independent variables were manipulated between participants. The first variable, domain of forensic expertise, had two levels: well-established (DNA domain) and not-established (Digital forensic domain). The second variable, communication mode of expert testimony, comprised three levels: intuitive, quasi-rational and analytical. Participants were randomly assigned to one of six vignette experimental conditions: (i) DNA expert testimony presented in an intuitive mode ($n = 60$), (ii) DNA expert testimony presented in a quasi-rational mode ($n = 63$), (iii) DNA expert testimony presented in an analytical mode ($n = 62$), (iv) Digital expert testimony presented in an intuitive mode ($n = 63$), (v) Digital expert testimony

presented in a quasi-rational mode ($n = 62$), and (vi) Digital expert evidence testimony in an analytical mode ($n = 66$).

Given the research goals and aim of this study, the use of vignette methodology is justified. Vignette designs are particularly well suited to this type of inquiry because they allow legally recognisable case contexts to be simulated while maintaining experimental control. By embedding manipulations within a written criminal case summary and expert testimony, the researcher ensures that participants are engaging with decision-making processes that closely resemble those encountered in real trials, while still being able to isolate the psychological mechanisms of interest.

Methodologically, vignettes provide the capacity to manipulate legally relevant variables in a systematic and controlled manner. Helm (2021) demonstrates that vignette protocols can embed factorial manipulations—such as evidential strength or judicial directions—within brief case narratives, thereby disentangling causal influences that are difficult to observe in naturalistic courtroom settings. The existing 2×3 between-subjects design directly benefits from this methodological strength, as it allows the researcher to attribute differences in credibility judgments to the manipulated factors of communication mode and forensic domain, rather than to uncontrolled trial dynamics. Moreover, despite their simplification, vignettes remain informative because they target discrete adjudicative components—such as credibility assessments—where the same cognitive processes are expected to operate. This balance between ecological validity and experimental control is crucial for psycho-legal research.

From a theoretical perspective, vignette methodology bridges the gap between doctrinal accounts of law and empirical evaluation. As Agüero San Juan, Fernández, and Tiznado (2026) argue, vignettes convert abstract legal categories into controlled textual cues, thereby operationalising constructs such as “expert credibility” into testable manipulations. The

current study exemplifies this by translating the abstract notion of communication style into concrete textual representations of expert testimony. Similarly, Cullen et al. (2024) highlight how vignette-style trial simulations can isolate the causal impact of informational inputs on jurors' judgments, demonstrating the broader utility of this approach in examining mechanisms that are otherwise inaccessible.

Finally, vignettes are efficient tools for eliciting responses to legally sensitive or infrequent scenarios. Collett and Childs (2011) emphasise their value in accessing participant judgments in contexts that would be difficult to replicate otherwise, while cautioning that imagined contexts may underrepresent affective intensity. Consequently, the use of pretesting and standardisation helps mitigate this limitation, ensuring readability and engagement. Nivette, Nägel, and Stan (2024) further argue that vignette designs enhance methodological credibility by combining random assignment with transparent manipulation of legally salient variables, which strengthens causal inference and construct validity.

4.6.3. Materials and Stimuli

Criminal Case Summaries

Participants were randomly assigned to one of two criminal case scenarios involving either DNA or digital forensic evidence. These scenarios were adapted from two England and Wales court of appeal judgments to create realistic mock trial vignettes. To preserve anonymity and prevent recognition, the expert witnesses were assigned pseudonyms.

The digital forensic scenario was based on *Kelly, R. v* [2018] EWCA Crim 1893, which concerned a drugs conspiracy and legal challenges surrounding expert methods for accessing encrypted mobile data. The DNA expert scenario was adapted from *R. v Broughton* focusing on the admissibility of low-template DNA (LTDNA) evidence at the threshold of reliable analysis.

Expert Testimonies

In accordance with Cognitive Continuum Theory, expert testimony was operationalised into three distinct modes of expression: intuitive, quasi-rational, and analytical. These modes were systematically manipulated across six dimensions—structure, language, evidence presentation, confidence framing, transparency and cue evaluation—to reflect the underlying cognitive orientation of each reasoning style.

The intuitive mode reflects experience-based reasoning in which testimony relies on tacit knowledge and perceptual cues rather than explicit procedural articulation. Within this style, emphasis is placed on outcomes rather than the methods by which they are achieved. In contrast, the analytical mode embodies method-driven reasoning, characterised by structured, rule-based testimony that is supported by empirical validation and high levels of procedural transparency. Situated between these two poles, the quasi-rational mode integrates aspects of both approaches, combining methodological clarity with experiential adaptability. This hybrid style is widely considered to capture the predominant orientation of expert judgment in real-world practice.

To illustrate these distinctions, Table 4.2 presents examples of communication modes, demonstrating how intuitive, analytical, and quasi-rational approaches differ in their articulation and emphasis. Further details of the six vignettes developed for this study, which served as the manipulated stimuli presented to participants, are provided in Appendix 5.

Table 4.2

Communication Mode manipulations of expert testimony

Dimension	Communication mode of testimony		
	Intuitive	Quasirational	Analytical
Structure	Narrative driven with anecdotal framing (e.g., <i>“In my experience, cases like this usually...”</i>)	Mixed structured explanation with adaptive summarisation (e.g., <i>“based on both the data and my experience”</i>)	Sequential, rule-based, decomposable

Language	Use everyday language, metaphors, and analogies	Blend of technical and everyday language	Technical, formal, precise
Evidence presentation	Tacit knowledge with reliance on perceptual cues (e.g. <i>“The behaviour seemed off, lie something I’ve seen before”</i>)	Combination of empirical data and experiential examples	Empirical data, validated metrics, statistical rigour
Confidence framing	Confidence in outcome without elaborating on method (e.g., <i>“I’m sure this is correct...”</i>)	Balanced confidence in method and outcome (e.g., <i>“I’m reasonably confident, given both the evidence and my prior case...”</i>)	Confidence in method (e.g., <i>“based on the methodology, it can be inferred that...”</i>)
Transparency	Low insight; reasoning difficult to retrace	Partial insight: some steps explained, others heuristic	High insight into reasoning (e.g., <i>“First, I evaluated X using method Y...”</i>)
Cue evaluation	Perceptual subconscious with emphasis on gut feelings or visual impressions	Mixed: Objective and perceptual depending on context	Objective, data-driven (e.g., lab results, standardised scores)

Note. Table illustrating manipulations of the three communicative modes of expert testimony—intuitive, quasirational, and analytical—across six dimensions: structure, language, evidence presentation, confidence framing, transparency, and cue evaluation.

Credibility Measures

Expert witness credibility was assessed using seven dependent measures. Participants evaluated a prosecution expert using bipolar adjective pairs presented on a 10-point Likert scale. Four of these measures—Believable–Unbelievable, Trustworthy–Untrustworthy, Knowledgeable–Unknowledgeable, and Likeable–Unlikeable—were adapted from the Witness Credibility Scale (WCS; Brodsky et al., 2010), which conceptualises credibility across four dimensions: intelligence, trustworthiness, believability, and likeability. To mitigate response bias, two items were reverse scored.

The original WCS was refined from an initial 41-item pool to a 20-item scale through factor analytic procedures, demonstrating high internal consistency ($\alpha = .95$), with subscale reliabilities ranging from $\alpha = .86$ to $\alpha = .93$. A fifth dimension—Confident–Not Confident—

was included based on findings from Cramer et al., (2009), who reported an internal consistency of $\alpha = .88$ for this construct. This addition reflects the growing recognition of confidence as a distinct and influential component of perceived expert credibility.

In line with these prior studies, the present study adopted the same dimensions and their previously reported reliability estimates, rather than re-estimating reliability in the current sample. This approach ensured psychometric rigour while allowing the study to focus on how testimony mode interacts with task characteristics in shaping perceived credibility.

In addition to the five core credibility dimensions, two supplementary items were incorporated to assess procedural admissibility criteria, as outlined in the CrimPD 7.1.1. Specifically, participants rated: (1) the relevance of the expert's opinion to the forensic evidence (Relevant–Irrelevant) and (2) whether the expert's opinion fell within their scope of expertise (Within Scope–Outside Scope), with the latter item reverse scored. All seven measures were presented in randomised order and required forced-choice responses, thereby ensuring complete data capture and minimising the risk of missing data.

4.6.4. Procedure

Ethical approval for this study was granted by the Middlesex University Psychology Research Ethics Committee (Reference: 24376). Participants were recruited using multi-sampling strategy comprising convenience, snowball, and purposive techniques. Recruitment was conducted via the researcher's LinkedIn network and the Middlesex University listserv. Invitations outlined the study purpose and directed prospective individuals to a secure weblink, where they could access the online survey and provide informed consent.

The study was administered using Qualtrics survey software. Upon accessing the survey, participants were first presented with an information-consent form, followed by demographic questions assessing age, gender, ethnicity, jury service eligibility, educational attainment, and professional status. Participants were then instructed to read a criminal case

summary, followed by the testimonies of two opposing expert witnesses. The credibility of the second expert witness was subsequently evaluated using a series of rating scales, presented across pages 6 to 13 of the survey.

Participants were randomly assigned to one of six experimental conditions, based on a 2 x 3 between-subjects design manipulating domain of forensic expertise (DNA vs Digital) and cognitive mode of expert testimony (intuitive, quasi-rational, analytical). The survey was designed to ensure blinding to the study hypotheses; participants were unaware of the specific manipulations being tested. The average completion time for the survey was approximately 20 minutes. All responses were collected anonymously and stored securely in accordance with institutional data protection policies. Upon completion, participants were debriefed and thanked for their contribution.

Prior to the main study, pilot testing was conducted to validate the measurement instrument and assess the effectiveness of the experimental manipulations. A sample of 22 members of the UK public was randomly allocated to one of six criminal case scenarios and asked to identify the communication mode (intuitive, quasi-rational, or analytical) used by the second testifying expert. The pilot sample included 10 females ($M_{\text{age}} = 36.6$, $SD = 11.09$, range 22–58) and 12 males ($M_{\text{age}} = 38.5$, $SD = 9.59$, range 26–60). Reported ethnicities were 51.7% White, 13.8% Asian or Asian British, 10.3% Black, Black British, Caribbean or African, 6.9% Mixed or multiple ethnic groups, and 13.8% other ethnic groups. Educational attainment included 3.4% with high school or secondary qualifications, 34.5% undergraduates, and 62.1% postgraduates.

A chi-square test of independence indicated no reliable association between condition and response accuracy, $\chi^2 (5, N = 22) = 2.90$, $p = .716$. However, the chi-square assumption was violated—expected counts less than 5 in all 12 cells; therefore, these results should be interpreted with caution. Despite this limitation, descriptive statistics indicated consistently

high accuracy across all conditions ranging from 75% to 100%. This pattern suggests that the participants generally recognised the manipulations intended, supporting the effectiveness of the stimuli (See Table 4.3).

Table 4.3

Accuracy of Responses Across Pilot Study Treatment Conditions

Treatment condition	Response		Total
	Correct <i>n</i> (%)	Incorrect <i>n</i> (%)	
Digital Intuitive	3 (75.0%)	1 (25.0%)	4
Digital Quasi-rational	3 (100.0%)	0 (0.0%)	3
Digital Analytical	4 (100.0%)	0 (0.0%)	4
DNA Intuitive	3 (100.0%)	0 (0.0%)	3
DNA Quasi-rational	3 (75.0%)	1 (25.0%)	4
DNA Analytical	3 (75.0%)	1 (25.0%)	4
Total	19 (86.4%)	3 (13.6%)	22

Note. *N* = 22. Percentages are calculated within each treatment condition.

Following data cleansing, manipulation checks conducted on the remaining 22 participants to determine whether they could accurately identify the expert’s testimony communication mode without prior knowledge of the stimulus variations.

4.6.5. Data Analysis

Data were analysed using IBM SPSS Sciences (version 28). A 2 (Forensic domain: DNA vs. Digital) × 3 (Communication mode: Intuitive, Quasi-rational, Analytical) multivariate analysis of variance (MANOVA) was initially planned to examine seven dependent variables—believability, trustworthiness, knowledge, confidence, Likeability, scope appropriateness, and evidentiary relevance—independently. MANOVA was selected to assess the combined influence of the independent variables on multiple, conceptually related outcome measures. Statistical significance was evaluated at an alpha level of .01. Where appropriate, effect sizes (e.g., partial η^2) were calculated to assess the magnitude of observed effects.

Prior to conducting the MANOVA, statistical assumptions were evaluated. Most assumptions were satisfied: the independent variables comprised categorical, mutually exclusive groups; the dependent variables were measured on interval scales; group sizes exceeded the number of dependent variables; and no participant was assigned to more than one condition. Outliers were assessed using Mahalanobis distance, with the maximum observed value (2.557) falling well below the critical threshold of 13.82 at the 0.1% level. Corresponding p -values were non-significant ($p \geq .28$), confirming the absence of multivariate outliers. Linearity and multicollinearity assumptions were also met, with scatterplot matrices indicating predominantly linear relationships and no correlation coefficients exceeding .90.

However, two key violations were identified. The Shapiro–Wilk test revealed significant non-normality across all dependent variables ($p < .01$), indicating a breach of the multivariate normality assumption. Additionally, Box’s M test yielded a significant result ($F = 5.685, p < .001$), suggesting a violation of the homogeneity of variance-covariance matrices. These findings are consistent with prior literature noting the sensitivity of Box’s M to deviations from normality (Field, 2016; Warner, 2008).

Given these violations, the planned MANOVA was deemed inappropriate. Instead, a pair of univariate ANOVAs were conducted. To facilitate a theoretically grounded analysis, the seven credibility measures were grouped into two dimensions: Substantive credibility (comprising scope, relevance, trustworthiness, believability, knowledge, and confidence) and Likeability. For the Substantive credibility dimension, mean ratings across the six constituent measures were computed to form a composite score, thereby reducing measurement complexity while preserving conceptual integrity. This dimensional structure enabled a more nuanced examination of how testimony communication mode and forensic domain influenced both professional and interpersonal aspects of expert credibility.

4.7. Results

The primary aim of this study was to investigate how communication modes of expert testimony and domains of forensic expertise influence laypeople's assessments of expert credibility. A between-subjects factorial design was employed, with participants randomly assigned to one of six mock-jury vignettes. Each vignette presented testimony that varied by forensic domain and communication mode. After exposure, participants evaluated the credibility of a testifying expert across seven dimensions: believability, trustworthiness, knowledge, confidence, scope of expert evidence, relevance, and likeability. The design was selected to prevent potential carryover effects and to preserve the independence of observations across conditions.

The experimental design crossed two factors—forensic domain (DNA vs digital) and communication mode (intuitive, quasi-rational, analytical)—thereby yielding six conditions. After data screening, 376 valid cases remained, with allocation approximately equal across conditions.

The seven credibility indicators were then organised into two overarching dimensions to enable a theoretically grounded analysis. A composite score was calculated by averaging across the six substantive credibility items, while likeability was retained as a standalone measure to capture the interpersonal dimension of credibility, and its distinct contribution to perceptions of testimony.

4.7.1. Reliability and Inter-Item Correlations

Before presenting the descriptive statistics, the reliability and internal consistency of the credibility measures were examined. The seven measures of expert credibility demonstrated consistent inter-item relationships. Six measures—scope, relevance, confidence, trustworthiness, knowledgeable, and believability—were significantly and positively correlated with each other at the $p < .01$ level. Correlations ranged from moderate

to strong ($r = .50$ to $.87$), indicating substantial shared variance and supporting their aggregation into a composite measure of Substantive Credibility (See Table 4.4).

Table 4.4

Inter-Item Correlation among Expert Credibility Measures

Measure	Likeability	Scope	Relevance	Confidence	Trustworthiness	Knowledgeable	Believability
Likeability	1						
Scope	-.375**	1					
Relevance	-.409**	.589**	1				
Confidence	-.571**	.536**	.596**	1			
Trustworthiness	-.535**	.559**	.573**	.873**	1		
Knowledgeable	-.551**	.554**	.589**	.833**	.830**	1	
Believability	-.442**	.550**	.540**	.782**	.741**	.715**	1

Note. ** $p < .01$ (two-tailed). All correlations significant at the .01 level.

Likeability, although significantly associated with the other measures, showed weaker and, across the other six measure, negative correlations ($r = -.37$ to $-.57$). This divergence suggests that likeability captures a distinct, interpersonal dimension of credibility that is conceptually separate from the substantive evaluative indicators. Consequently, these findings support the two-dimensional structure of credibility utilised in the subsequent analysis, with Substantive Credibility and Likeability being treated as distinct constructs.

A Pearson product–moment correlation was conducted to examine the association between participants’ ratings of substantive credibility and likeability. Substantive credibility was operationalised as the mean of six items (believability, confidence, knowledgeable, trustworthiness, scope of evidence, and relevance of evidence), whereas likeability was measured as a separate mean score. The correlation was large and negative, $r(4) = -.82$, $p = .046$, indicating that higher ratings of substantive credibility tended to be associated with lower ratings of likeability. However, this result did not meet the study’s threshold for statistical significance ($p < .01$) and should therefore be interpreted with caution.

4.7.2. Descriptive Statistics

Descriptive statistics were computed to provide an overview of the study variables across experimental conditions. Means and standard deviations were calculated for each of the seven credibility indicators (See Table 4.5) as well as for the composite Substantive Credibility score and the separate Likeability measure (See Table 4.6). These descriptive findings provide the foundation for the inferential analyses that follow.

Likability ratings were consistently lowest for the analytical communication mode across both forensic domains. In the digital domain, intuitive and quasi-rational communication were rated more favourably than analytical, with a marked difference between conditions. A similar pattern emerged in the DNA domain, although the gap between analytical and the other modes was less pronounced.

Ratings of scope were broadly similar across communication modes, with intuitive delivery consistently receiving lower scores than quasi-rational and analytical modes. The differences, however, were modest. Domain effects were also evident: analytical experts in the DNA domain were rated more favourably than their digital counterparts, whereas digital experts using the quasi-rational mode received slightly higher scores than those in the DNA domain.

A similar pattern was observed for relevance. Both quasi-rational and analytical communication were rated more highly than intuitive delivery across domains, with DNA experts again generally perceived as more credible than digital experts.

Confidence, trustworthiness, knowledgeability, and believability ratings followed a consistent pattern across both forensic domains. Intuitive communication was rated lowest on each measure, while quasi-rational and analytical modes received substantially higher ratings. This suggests that although intuitive delivery may enhance interpersonal appeal (as reflected in likability scores), it undermines

perceptions of expertise and evidentiary strength. The divergence between interpersonal and professional dimensions of credibility highlights the need to distinguish style-based appeal from judgments of substantive competence when evaluating expert testimony.

Communication mode had a clear effect on both likeability and substantive credibility across forensic domains. Analytical communication consistently received the lowest likeability ratings, suggesting that while it may convey rigour, it undermines interpersonal appeal. In contrast, intuitive delivery was rated highly likeable but performed poorly on substantive credibility, particularly in the digital domain. Quasi-rational communication appeared to strike a balance, producing more favourable ratings across both measures.

These findings underscore an important divergence between interpersonal and professional dimensions of credibility. While intuitive communication may foster juror rapport, it risks diminishing perceptions of knowledge, reliability, and evidentiary strength. Conversely, analytical communication enhances perceived competence but sacrifices likeability. The quasi-rational mode appears best positioned to integrate accessibility with credibility, highlighting its potential as the most persuasive communication style for expert witnesses.

Table 4.5*Mean Credibility Ratings by Dimensions for Digital and DNA Experts*

Dependent variable	Digital						DNA					
	Intuitive		Quasi-rational		Analytical		Intuitive		Quasi-rational		Analytical	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Likability	8.32	1.03	7.10	1.33	5.45	1.11	7.40	1.08	5.73	1.15	4.26	1.45
Scope	7.41	1.03	9.00	0.96	8.62	0.82	7.57	0.91	8.71	0.92	8.98	0.84
Relevance	7.81	1.08	8.74	1.04	9.18	0.78	7.98	0.98	9.11	0.83	9.45	0.69
Confidence	4.41	1.36	8.23	1.14	8.83	0.89	4.38	1.95	9.14	1.16	9.40	0.76
Trustworthiness	4.78	2.17	8.32	0.88	8.76	0.84	4.80	1.88	9.05	0.73	9.13	0.61
Knowledgeable	4.68	0.93	8.29	1.17	8.89	0.81	5.47	1.08	9.33	0.98	9.65	0.58
Believability	5.90	1.34	8.84	1.03	8.47	0.77	4.80	1.66	8.63	0.73	7.51	2.18

Note. The most noticeable means have been highlighted in bold in the table, as they appear relatively small compared to the other related treatment groups.

Table 4.6*Mean Credibility Ratings of Likeability and Substantive Credibility for Digital and DNA Experts*

Measure	Digital						DNA					
	Intuitive		Quasi-rational		Analytical		Intuitive		Quasi-rational		Analytical	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Likeability	8.32	1.03	7.10	1.33	5.45	1.11	7.40	1.08	5.73	1.15	4.26	1.45
Substantive Credibility	5.83	1.32	8.57	1.04	8.79	0.82	5.83	1.41	9.00	0.89	9.02	0.94

Note. The most noticeable means have been highlighted in bold in the table, as they appear relatively small compared to the other related treatment groups.

4.7.3. Analysis of Variance

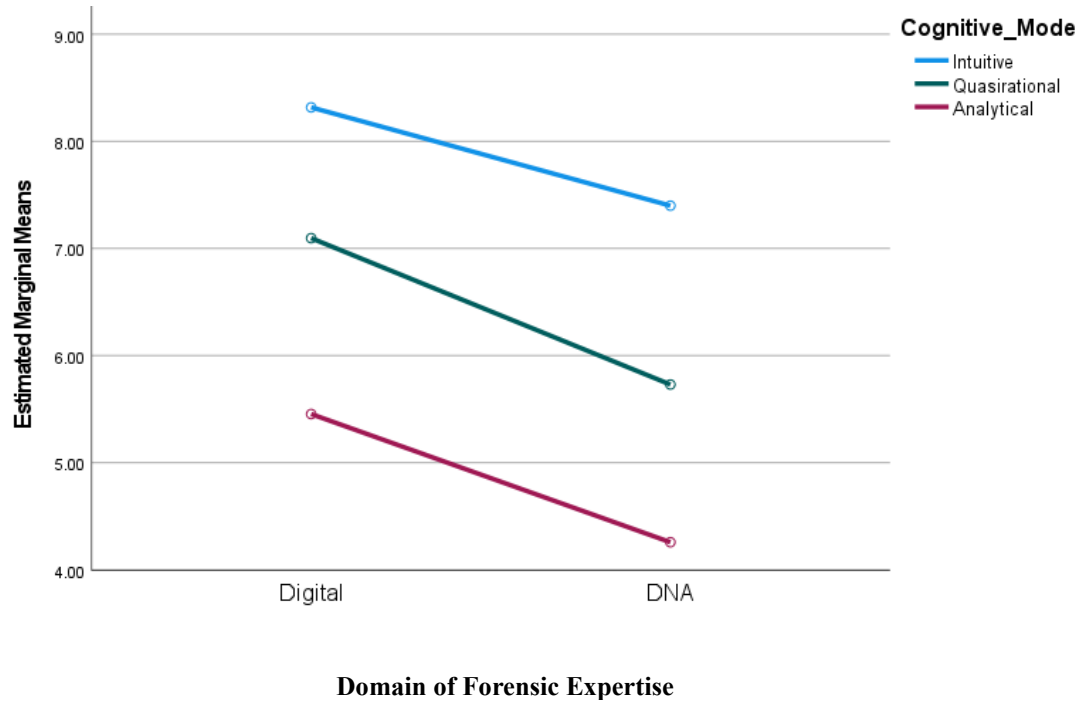
Likeability

A two-way ANOVA was conducted to examine the effects of forensic domain (Digital vs. DNA) and Communication mode (Intuitive, Quasirational, Analytical) on expert likability. The analysis revealed significant main effects for both forensic domain and Communication mode ($p < .001$), but no significant interaction, $F(2, 370) = 1.107, p = .332$).

Regarding the main effect of forensic domain, Digital experts were rated as more likable ($M = 6.96, SD = 1.44$) than DNA experts ($M = 5.80, SD = 1.57$). For communication mode, experts using an intuitive mode received the highest likability ratings ($M = 7.87, SD = 1.14$), followed by Quasirational ($M = 6.41, SD = 1.41$) and Analytical ($M = 4.88, SD = 1.41$). Pairwise comparisons indicated that differences between all three communication modes were statistically significant ($p < .001$). See Figure 4.9 for the estimated marginal means and Table 4.7 multiple comparisons of Cognitive Modes on Dependent Variable.

Figure 4.2

Estimated Marginal Means of Likability by Cognitive Mode and Forensic Expertise



Note. This figure shows the estimated marginal means of likability for expert testimony across two domains of forensic expertise (digital and DNA). Results are presented separately for the three cognitive modes of testimony: intuitive, quasi-rational, and analytical.

Table 4.7

Multiple Comparisons of Cognitive Modes on Dependent Variable

Dependent Variable	(I) Cognitive mode	(J) Cognitive mode	Mean Rank Difference (I-J)	Sig.
Intuitive	Quasirational	1.4619*	.15231	<.001
	Analytical	2.9949*	.15142	<.001
Quasirational	Intuitive	-1.4619*	.15231	<.001
	Analytical	1.5330*	.15080	<.001
Analytical	Intuitive	-2.9949*	.15142	<.001
	Quasirational	-1.5330*	.15080	<.001

Notes. $p < .001$. Mean rank differences are based on post-hoc multiple comparisons across cognitive modes (Intuitive, Quasirational, Analytical). The significance level indicates a highly significant difference between all comparisons.

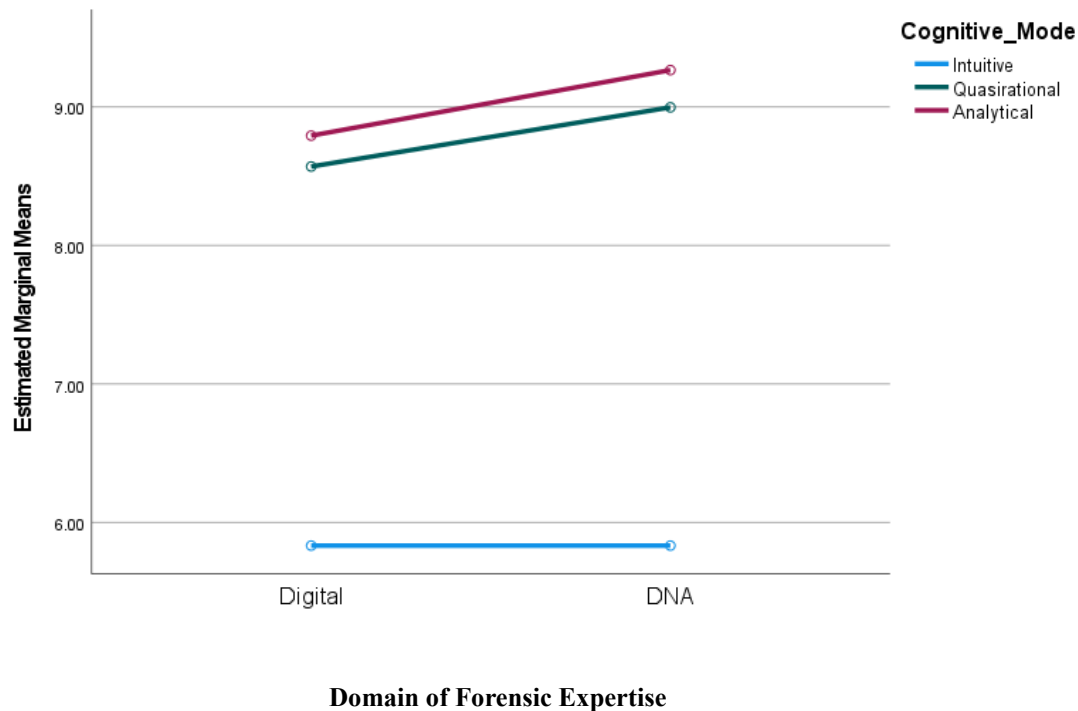
Substantive Credibility

A two-way ANOVA was conducted to examine the effects of forensic domain (Digital vs. DNA) and communication mode (Intuitive, Quasirational, Analytical) on ratings of Substantive Credibility. The analysis revealed significant main effects for both forensic domain and communication mode ($p < .001$) but no significant interaction, ($F(2, 370) = 4.06, p = .018$).

For the main effect of forensic domain, DNA experts were rated higher in Substantive Credibility ($M = 8.03, SD = 1.91$) than Digital experts ($M = 7.73, SD = 1.65$). To further explore the main effects of communication mode, Bonferroni-adjusted pairwise comparisons were conducted at the .05 level. Results indicated that experts using the Analytical mode ($M = 9.02, SD = .577$) were rated significantly higher in Substantive Credibility than those using Quasirational ($M = 8.79, SD = .741, p < .001$) and Intuitive modes ($M = 5.83, SD = .883, p < .001$). See Figure 4.10 for the estimated marginal means and Table 4.8 multiple comparisons for cognitive modes across dependent variables.

Figure 4.3

Estimated Marginal Means of Credibility by Cognitive Mode and Forensic Domain



Note. This figure presents the estimated marginal means of Substantive Credibility for expert testimony across two domains of forensic expertise (digital and DNA). Results are shown separately for cognitive modes of testimony: intuitive, quasi-rational, and analytical.

Table 4.8

Multiple Comparisons for Cognitive Modes Across Dependent Variables

Dependent Variable	(I) Cognitive mode	(J) Cognitive mode	Mean Rank Difference (I-J)	Sig.
Intuitive	Quasirational	-2.9520*	.09171	<.001
	Analytical	-3.1888*	.09117	<.001
Quasirational	Intuitive	2.9520*	.09171	<.001
	Analytical	-.2368*	.09080	.028
Analytical	Intuitive	3.1888*	.09117	<.001
	Quasirational	.2368*	.09080	.028

Note. This table presents post hoc comparisons of cognitive modes (intuitive, quasirational, analytical) averaged across dependent variables.

4.8. Discussion

This study set out to investigate how different communication modes of expert testimony and the domains of forensic expertise—varying in perceived scientific reliability—influence laypeople’s perceptions of expert credibility. Credibility was operationalised across seven dimensions: believability, trustworthiness, knowledge, confidence, likability, relevance, and scope of expert evidence. These were subsequently grouped into two theoretically grounded constructs: Substantive credibility, reflecting the expert’s epistemic and professional integrity, and Likeability, capturing relational and stylistic appeal.

To interpret the findings, it is essential to consider two foundational cognitive frameworks: dual-process theory and bounded rationality. Dual-process theory (Kahneman, 2011) posits that individuals process information via two systems—System 1 (intuitive, fast, and heuristic-based) and System 2 (analytical, slow, and deliberate). In courtroom contexts, jurors often face high cognitive demands and limited domain-specific knowledge, which can prompt a shift from systematic to heuristic processing. Bounded rationality (Simon, 1957) complements this view by suggesting that individuals satisfice—seeking judgments that are “good enough”—rather than optimise, especially under conditions of time pressure and informational complexity. These frameworks provide a lens through which to understand how jurors evaluate expert testimony, particularly when faced with unfamiliar forensic content.

4.8.1. Interpretation of the Findings in Relation to the Research Questions

Substantive Credibility and Forensic Domain

The finding that DNA experts were consistently rated higher in terms of substantive credibility supports **Hypothesis 1** and aligns with literature positioning DNA analysis as the “forensic gold standard” (National Research Council, 2009). This elevated credibility appears to stem from DNA’s methodological rigour, widespread institutional endorsement, and its portrayal in media as a decisive form of evidence. Brewer and Ley (2010) found that crime

television viewing increased perceived reliability of DNA evidence, even when actual understanding was limited. Lieberman et al. (2008) similarly demonstrated DNA's heuristic dominance in juror decision-making, with higher conviction rates when incriminating and more acquittals when exculpatory. Despite general scepticism about forensic science (Kaplan, Ling & Cuellar, 2020), DNA retained its status as the most trusted technique. These findings suggest that substantive credibility is reinforced by a confluence of scientific validation, public familiarity, and media-driven narratives.

The Role of Communication Style and Likeability

Findings related to **Hypotheses 2, 4, and 6** converged on the conclusion that communication style significantly influences perceptions of expert likeability, and that this effect is consistent across forensic domains. Specifically, experts who testified using an intuitive mode were rated as more likeable than those using an analytical mode, regardless of whether they represented DNA or digital forensic domains.

Intuitive testimony, as conceptualised within Cognitive Continuum Theory (CCT) (Hammond, 1981; Dhimi & Thomson, 2012), is characterised by fluid, narrative, and experience-based reasoning. This mode tends to foster emotional resonance and interpersonal warmth, which enhances jurors' ability to relate to the expert. Unlike analytical testimony, which prioritises methodological transparency and rule-based reasoning, intuitive testimony often adopts a conversational tone and draws on familiar exemplars, thereby reducing cognitive strain and increasing interpersonal appeal (Hamm, 1988; Custers, 2013).

Empirical research supports this interpretation. Brodsky et al. (2009) found that high expert likeability significantly enhanced perceptions of trustworthiness and overall credibility, particularly among female jurors. Younan and Martire (2021) demonstrated that while evidentiary quality predicted sentencing outcomes, expert likeability increased perceived persuasiveness. These findings underscore the conceptual distinction between

interpersonal appeal and evidentiary substance, suggesting that likeability operates as a peripheral cue that influences juror engagement and receptivity.

The absence of an interaction effect between forensic domain and communication mode (Hypothesis 6) further reinforced the domain-general nature of these interpersonal evaluations. Jurors responded similarly to intuitive communication styles whether the expert testified in DNA or digital forensics, indicating that affective and relational cues transcend disciplinary boundaries. This is consistent with dual-process theory and bounded rationality, which suggest that under cognitive strain, jurors rely on accessible cues such as warmth, relatability, and narrative fluency to form impressions—regardless of the expert’s domain.

Substantive Credibility and Communication Mode

The finding that experts who testified using an **analytical mode** were rated highest in substantive credibility supports **Hypothesis 3** and reflects jurors’ preference for structured, logical, and evidence-based communication when evaluating technical testimony. Analytical testimony, situated at the deliberate end of the CCT continuum, is characterised by sequential reasoning, explicit cue weighting, and formal decision rules (Dunwoody et al., 2000). This mode provides high process insight, rendering expert reasoning publicly reviewable and defensible (Custers, 2013). Jurors were therefore more likely to perceive such experts as trustworthy and knowledgeable—core components of substantive credibility.

This preference is particularly salient in contexts involving complex forensic evidence, where juror comprehension is often compromised by cognitive overload (Eldridge, 2019). Brekke and Borgida (1988) found that jurors favour case-specific over abstract testimony, suggesting that contextual relevance and structured presentation enhance engagement. Credibility judgments are shaped not only by content but also by delivery style, with structured communication increasing perceived reliability (Scobie et al., 2019; Reinhard & Sporer, 2008, 2010; Wilcox & NicDaeid, 2018). The present findings underscore the importance of

tailoring expert communication to how jurors respond to expert evidence and epistemic expectations.

Despite the theoretical appeal of analytical testimony, Krauss and Sales (2001) found that jurors often favoured clinical opinion over actuarial evidence, even when the latter was more valid. This suggests that jurors may not consistently privilege structured, evidence-based testimony. Instead, testimony complexity can foster peripheral processing, undermining substantive evaluation. Thus, while analytical testimony may be rated highly in credibility, it does not guarantee that jurors will rely on it in verdict decisions. Moreover, where Goodman-Delahunty et al. (2011) demonstrated that credibility assessments mediated the relationship between expert testimony and conviction outcomes. This supports the present finding insofar as structured testimony enhances credibility, but it also highlights that credibility alone does not uniformly translate into verdict changes. Delivery style interacts with juror epistemic expectations and case context. Moreover, the jurors in the Goodman-Delahunty (2020) case study discounted expert evidence that was overly abstract and insufficiently case-specific, despite perceiving the psychiatrist as credible. This underscores a critical limitation: analytical testimony must be tailored to the specific evidential context. Without case-specific anchoring, even highly credible testimony may fail to influence verdicts.

Substantive Credibility Across Forensic Domains

The finding that lay participants rated experts' substantive credibility comparably across DNA and digital forensic domains suggests that perceived credibility may be less influenced by the specific forensic field than by the mode of testimony delivery and the expert's communicative competence. This outcome diverges from earlier literature that positions DNA as inherently more credible due to its scientific validation and institutional status. However, when digital forensic experts adopt similarly structured, analytical testimony, they appear to achieve parity in juror evaluations.

This convergence may reflect a broader shift in juror expectations, as digital evidence becomes more prevalent and publicly understood. Jurors increasingly assess expert credibility based on presentation style, perceived knowledgeability, and clarity of reasoning (Scobie et al., 2019; Reinhard & Sporer, 2008, 2010). When experts—regardless of domain—communicate in a structured, logical, and evidence-based manner, they are more likely to be perceived as epistemically reliable. This finding reinforces the importance of communicative alignment over disciplinary prestige in shaping juror perceptions.

The finding that analytical testimony enhances substantive credibility highlights jurors' preference for structured, logical, and evidence-based communication. However, when situated against the broader literature, several tensions and limitations emerge. The finding that lay participants rated experts' substantive credibility comparably across DNA and digital forensic domains challenges the longstanding assumption that DNA evidence enjoys an inherent credibility advantage due to its scientific validation and institutional prestige. Instead, the results suggest that jurors' evaluations hinge more on communicative competence and delivery style than on disciplinary hierarchy. The emphasis on structured, analytical testimony resonates with Koehler et al. (2016), who found that jurors often rely on examiner experience as a heuristic cue rather than scientific validation. This indicates that jurors' privilege perceived expertise and presentation style over methodological rigor, supporting the claim that credibility is shaped by communicative alignment rather than forensic domain. As digital evidence becomes increasingly prevalent in everyday life, jurors may be more comfortable evaluating it. This echoes Goodman-Delahunty & Hewson (2010) findings, which demonstrated that juror comprehension of DNA evidence could be significantly improved through tutorials, suggesting that familiarity and clarity of presentation can elevate credibility across domains. Moreover, the finding that digital forensic experts achieved parity with DNA experts when adopting analytical testimony diverges from Koehler et al.'s

observation that jurors show limited responsiveness to scientific validation cues. If jurors are indeed insensitive to validation, then the convergence across domains may reflect reliance on heuristic cues (e.g., examiner confidence, structured reasoning) rather than substantive evaluation of methodological robustness. This raises concerns about whether credibility judgments are epistemically reliable. Lastly, where DNA evidence has historically been regarded as a “gold standard” due to its scientific validation. Goodman-Delahunty & Hewson found that jurors initially had low baseline knowledge but were highly influenced by DNA tutorials, with conviction rates increasing when incriminating DNA evidence was presented. However, the present finding suggests that digital forensic testimony can achieve comparable credibility, implying a shift in juror expectations as digital evidence becomes more familiar.

4.8.2. Practical Implications

The findings of this study provide a nuanced understanding of credibility assessments for forensic experts by laypeople. In particular, it highlights the differential effects of cognitive modes of expert testimony and domains of forensic expertise on measures of credibility. These insights have practical implications for training forensic experts, legal professionals and jurors.

The findings offer practical guidance for the admissibility phase of expert evidence. By identifying key factors—domain standing and communication style—that influence juror perceptions, the study provides a framework for evaluating the reliability of expert opinion. Judges can use these insights to screen expert witnesses more effectively, ensuring that testimony meets both scientific and communicative standards.

Judges and lawyers should be aware of the inherent biases’ jurors may have to different domains of forensic expertise and work to mitigate these biases through effective communication and education including their limitations. Judges can also give pre-trial instructions to jurors about the importance, or repercussions, of impartiality and the need to

evaluate expert testimony based on the evidence presented not personal biases. Additionally, judges and lawyers could be trained to identify the strengths and limitations of different modes of testimony and to guide the experts in presenting their findings effectively.

Experts should tailor their communication style to the context of their testimony. Those in well-established domains may benefit from an analytical approach, while those in emerging fields may need to adopt more intuitive or quasirational styles to build rapport and trust. Training programs for expert witnesses should incorporate communication strategy modules based on these findings.

The training of forensic experts could focus on the importance of balancing detailed, technical explanations with clear, accessible communication. Experts need to be aware that while accuracy and precision are crucial, overly analytical testimony can overwhelm jurors. Therefore, experts adapting the style of their testimony to the factfinder through a composite of analytical and intuitive elements (quasirational mode) could potentially enhance their credibility by making testimony rigorous yet relatable. Therefore, training could incorporate the practice of different cognitive modes of communicating testimony and guidance when each mode is most appropriate. This would enable experts to adapt their communication style to different legal contexts and audiences.

Experts could convey greater confidence during testimony through the use of structured and clear communication, which would enhance perceptions of expertise and reliability. Similarly, experts should avoid overly technical language and consider using relatable anecdotes and examples to make their testimony more engaging and relatable, particularly in fields perceived as less understandable, such as DNA analysis. Alternatively, experts from emerging fields like digital forensics needs to work towards establishing credibility. Herein training could focus on clearly articulating the relevance and reliability of their findings.

The findings of this study also suggests that jurors may benefit from decision aids or cognitive feedback mechanisms that help them distinguish between content validity and interpersonal cues. Jury instructions could be enhanced to include guidance on evaluating expert credibility across multiple dimensions, reducing reliance on heuristics and improving decision quality.

Training could also be given to jurors, which could include exercises to help them engage in analytical thinking when assessing testimony. This can improve their ability to discern and evaluate the content of expert testimony and enhance the accuracy of credibility assessments.

4.8.3. Limitations

Despite the researcher's efforts to produce realistic and compelling mock criminal cases, online experiments do not accurately capture the intricacies of actual courtroom dynamics—trial proceedings in a court environment. It follows that reading an extract from a criminal case summary is no substitution for seeing and hearing the expert testimony, cross-examinations, or rebuttal expert evidence—these are potentially pivotal factors when assessing whether experts are likable, believable, trustworthy, or confident. Rather than being exposed to an excerpt taken from a criminal hearing, in a real-world court proceeding jurors would be exposed to other key factors which may influence their perceptions of expert credibility such as their qualifications and experience, their responses under direct and cross-examination and their engagement as well as their courtroom demeanour and behaviour including composure cross-examination. Additionally, through the use of an online study participants were unable to interact with each other as they would in a jury deliberation. This lack of interaction inhibits the observation of how group dynamics and discussion influence juror expert credibility assessments.

Alongside ecological validity, contextual factors are another limitation. The online environment may introduce factors that are not present in real-world settings, such as participants being able to backtrack in order to read through the testimonies potentially multiple times.

Moreover, the design of this experimental study did not allow the researcher to examine the decision-making processes underlying how domain of forensic expertise and the nuances of distinct cognitive mode of testimony are translated into assessments of credibility in the minds of the laypeople in this study.

4.8.4. Recommendations for Future Research Studies

To address the limitations of online experimental designs in capturing the complexity of courtroom dynamics, future research should incorporate realistic courtroom simulations. These simulations may include video-recorded expert testimony, cross-examinations, judicial instructions, and rebuttal evidence to more accurately reflect the conditions under which jurors assess expert credibility. This approach would allow researchers to examine how non-verbal cues, courtroom demeanour, and interpersonal engagement influence perceptions of believability, trustworthiness, and confidence—elements that are not easily replicated in text-based vignettes.

In addition to enhancing ecological validity, future studies should investigate the role of group deliberation in shaping juror assessments of expert credibility. Structured mock jury trials or focus groups could be used to explore how individual judgments are influenced through discussion and consensus-building. This would provide insight into whether certain expert attributes—such as forensic domain or communication style—are more persuasive in collective decision-making contexts.

To deepen understanding of the cognitive mechanisms underlying credibility assessments, researchers could employ methodologies such as think-aloud protocols,

cognitive interviews, or response-time analysis. These approaches would enable participants to verbalise their reasoning while evaluating expert testimony, thereby revealing how forensic domain and communication mode interact in shaping credibility judgments. Such data would help operationalise the decision-making processes of laypersons and clarify whether evaluations are driven by heuristic shortcuts or deliberative reasoning.

Expanding the scope of forensic domains and communication modalities would further strengthen the generalisability of findings. Future studies could include disciplines such as forensic psychology, psychiatry, or toxicology, which vary in perceived scientific precision. Additionally, testimony formats could be diversified to incorporate visual aids, interactive presentations, or rebuttal exchanges, allowing for a more nuanced analysis of how presentation style affects juror evaluations.

Finally, researchers are encouraged to collect data from jurors immediately following participation in actual criminal proceedings. Post-trial surveys or interviews would provide ecologically valid insights into how expert testimony is perceived in real-world contexts. These could be complemented by retrospective think-aloud protocols to capture jurors reasoning processes and identify causal relationships between expert attributes and credibility assessments. This would address contextual limitations inherent in experimental designs and contribute to a more comprehensive understanding of juror decision-making.

4.8.5. Conclusion

This chapter demonstrates that how experts communicate and which forensic domain they represent influence distinct facets of perceived credibility. An analytical style—marked by structured reasoning, explicit warrants, and transparent methods—consistently elevates substantive credibility. By contrast, intuitive delivery tends to increase likeability but does

not carry the same epistemic weight. These effects appear domain-general, indicating that presentation mode influences judgements across disciplines.

Domain status nonetheless matters. DNA experts are typically credited with greater substantive credibility than digital experts, whereas digital experts are often judged more likeable. Crucially, there is no evidence that delivery style and domain combine to produce unique effects, underscoring the need to separate interpersonal appeal from evidentiary strength in credibility judgements.

These findings suggest that jurors respond positively to accessible, narrative delivery, yet they attribute expertise to testimony that renders its inferential path publicly reviewable. The practical implication is to align communication with epistemic demands—leading with method, assumptions, and limits—while using narrative elements to aid comprehension. This, in turn, supports targeted judicial directions and decision aids that help factfinders distinguish warmth from warrant.

Building on the findings of the three empirical studies, the following chapter offers actionable recommendations for stakeholder users of forensic experts and evidence—judges, advocates, and juror-instruction designers—as well as for policymakers. These recommendations focus on expert qualification, presentation, and evaluation practices, alongside training and governance measures that better connect scientific validity to legal reliability.

5. Recommendations

This research project highlighted a series of interrelated deficiencies within the legal framework governing the assessment of forensic evidence in the English and Welsh criminal justice system. These deficiencies include structural and procedural inconsistencies in admissibility standards, as well as limitations in judicial reasoning concerning expert testimony.

More broadly, enduring challenges persist in the deployment of forensic expert evidence across multiple domains—legal doctrine, forensic science, cognitive psychology, and courtroom communication. These challenges reveal persistent gaps in the evaluation and interpretation of expert opinion, suggesting that the current approach to admissibility lacks both conceptual coherence and methodological rigour. Such shortcomings do not merely affect technical aspects of evidentiary practice but also undermine the reliability of judicial reasoning. This raises fundamental concerns regarding fairness, consistency, and the potential for miscarriages of justice. Ultimately, these deficiencies risk compromising public trust in the English judicial system, reinforcing the need for a more transparent and scientifically informed framework for the assessment of expert evidence.

This final chapter presents a series of evidence-informed recommendations derived from the findings of the preceding empirical investigations. It begins by briefly synthesising the key findings from the three studies *in toto*, each of which examined distinct but interrelated dimensions of forensic expert evidence and admissibility. Collectively, these studies revealed critical shortcomings in current evaluative practices, including, *inter alia*, the courts' reliance on informal heuristics, inconsistent application of admissibility standards, and the influence of testimony presentation style and forensic domain on credibility assessments.

The overarching aim of this chapter is to assist judicial stakeholders in transitioning from descriptive models of decision-making—those that reflect how decisions are typically

made in practice—to normative models, which prescribe how decisions ought to be made to ensure epistemic integrity and procedural fairness. Descriptive models, while reflective of real-world constraints and cognitive tendencies, often lack the rigour required to reliably assess the admissibility and probative value of forensic expert evidence. In contrast, normative models are grounded in principles of scientific reasoning, legal coherence, and evidentiary robustness.

To facilitate this transition, the researcher advances a set of actionable recommendations that subsume prescriptive tools designed to support normative decision-making. These tools aim to improve the admissibility, use, and understanding of forensic expert evidence by enhancing the evaluative capacities of stakeholder users—namely judges, legal professionals (i.e., barristers), and jurors—as well as informing policy makers. The recommendations address both procedural and epistemological concerns, offering practical guidance for improving expert vetting, testimony delivery, judge and juror education, and systemic safeguards.

In doing so, this chapter contributes to the development of a more principled and transparent framework for the use of forensic expert evidence in legal proceedings. It advocates for a recalibration of current practices, aligning them with best-practice standards in both law and science, and ultimately seeks to strengthen the integrity of judicial decision-making in cases involving forensic expert evidence.

5.1. Overview of Empirical Findings

The first empirical study in this research examined the extent to which the criminal Court of Appeal adopts a normative model when assessing forensic expert evidence. A longitudinal analysis of appellate judgments revealed that, although the court consistently applied criteria such as relevance and necessity, the engagement with reliability and expert competence was often lacking in critically scrutinising the methodological rigour and

inconsistent. These findings suggest that, in practice, judicial reasoning tends to reflect a descriptive rather than normative framework of admissibility, raising *prima facie* concerns about the robustness of evidentiary evaluation in appellate contexts.

Further analysis demonstrated that the discretionary model embedded within the Criminal Procedure Rules and Criminal Practice Directions render admissibility decisions susceptible to variability, adversarial influence, and judicial reliance on heuristic reasoning. While the statutory tests under Section 23 of the Criminal Appeal Act 1968 for Fresh Evidence offer a more structured approach, their application remains interpretively flexible, frequently balancing procedural fairness versus the finality of litigation. This underscores the conceptual contradiction between the aspiration for principled admissibility standards and the pragmatic constraints of appellate adjudication *ipso facto*.

The study's findings carry both theoretical and practical implications. From a psychological perspective, they advance understanding of judicial decision-making by highlighting the influence of cognitive limitations, adversarial dynamics, and institutional structures on evidentiary assessments. Practically, the results lend empirical support to policy reforms aimed at enhancing the reliability of expert evidence. These include the introduction of codified admissibility standards, improved judicial training in scientific reasoning, and strengthened oversight of expert witness practices.

A critical issue emerging from the analysis is the court's inconsistent application of normative legislation in the absence of a codified evaluative framework. Part 19 of the Criminal Procedure Rules does not provide a structured methodology for assessing expert evidence, and the supplementary Criminal Practice Directions (Section 7), while intended to guide such assessments, lack legal enforceability. This regulatory deficiency has significant implications for appeal hearings, particularly where the admissibility of fresh evidence depends on its hypothetical acceptance at trial. In the absence of mandatory evaluative

criteria, appellate judges must rely on general principles and discretionary guidance, resulting in variable evidentiary thresholds and inconsistent judicial reasoning. The empirical findings confirm these concerns and underscore the need for a systematic and transparent evaluative model.

A particularly salient issue emerging from the findings of this research is the lack of rigour with which appellate courts scrutinise expert competency. Judicial evaluations of expert credentials are infrequent and often superficial, with courts frequently deferring to perceived authority or relying on procedural safeguards such as cross-examination to assess reliability. This practice may reflect a broader epistemic deficit in scientific literacy among appellate judges, which compromises the integrity of forensic evaluation and increases the risk of admitting inadequately vetted expert testimony. The study provides empirical support for calls to establish a coherent evaluative framework that guides credibility assessments and mitigates epistemic arbitrariness in judicial decision-making.

Building on the findings of the first study, the second empirical investigation sought to discern the criteria that the criminal courts could be using to qualify forensic witnesses as credible experts. This inquiry was premised on the concern that judicial assessments may be grounded in insufficiently validated proxies, potentially resulting in the admission of forensic evidence that lacks reliability or scientific rigour. To examine this issue, a comparative survey was administered to both legal professionals and lay participants.

The findings revealed that while conventional indicators of expertise—such as qualifications, accreditation—are widely recognised, legal professionals typically rely on an informal, experience-based evaluative framework. This “intuitive checklist” tends to incorporate courtroom performance, rhetorical skill, and perceived authority. Although contextually grounded, such criteria risks conflating legal procedural familiarity with scientific validity.

In contrast, lay participants exhibited a more generalised and intuitive conception of credibility, shaped predominantly by everyday reasoning and heuristics rather than specialised knowledge. This divergence accentuates the epistemic gap between legal reasoning and the evaluation of scientific evidence. Significantly, neither group possesses domain-specific expertise in forensic science, yet both are routinely tasked with using or adjudicating its reliability within legal proceedings.

Crucially, the study underscored that credibility is not a monolithic construct but a multidimensional one—encompassing technical proficiency, ethical integrity, communication skills, and procedural literacy. Among these dimensions, the capacity to articulate complex evidence in a clear and compelling manner was consistently identified as essential. However, this communicative skill is often undervalued in judicial vetting processes. This suggests that current evaluative practices may be insufficiently calibrated to distinguish between rhetorical skill and scientific reliability. Without a more robust, evidence-based framework for assessing expert credibility *per se*, courts remain vulnerable to admitting testimony that is persuasive but epistemically unreliable.

Building on the findings from the preceding studies, the third and final empirical investigation employed an experimental mock-jury design to examine how the mode of testimony communication and forensic domain influence lay perceptions of expert credibility. The study introduced a conceptual distinction between substantive credibility—encompassing dimensions reflecting the expert’s epistemic and professional integrity—and likeability, defined as interpersonal appeal and affective resonance.

Experts from the DNA domain were consistently rated higher in substantive credibility, a result attributed to the field’s longstanding scientific validation, institutional endorsement, and favourable media portrayal. This finding suggests that public familiarity

and perceived methodological rigour continue to shape credibility judgments, even amidst broader scepticism about forensic science.

The mode of communication emerged as a salient factor influencing perceptions of likeability. Experts who adopted an intuitive testimony style—characterised by narrative delivery and emotional resonance—were perceived as more personable and engaging. This effect was consistent across both DNA and digital forensic domains, indicating that interpersonal appeal is shaped more by delivery style than by disciplinary affiliation. Intuitive testimony also appeared to reduce cognitive strain and foster rapport, particularly in contexts involving complex scientific evidence and limited juror expertise.

Conversely, analytical testimony—characterised by structured reasoning and rule-based logic—was associated with higher ratings of substantive credibility. The lay participants valued clarity and coherence in expert explanations, especially when evaluating technically complex forensic material. This suggests that while intuitive communication enhances interpersonal connection, analytical delivery strengthens perceptions of epistemic reliability.

Importantly, when experts from both domains adopted analytical styles, their credibility ratings converged. This finding indicates a shift in juror evaluation criteria, where communicative competence and presentation style may override disciplinary prestige. As digital forensic evidence becomes more prevalent and publicly understood, digital forensic experts may achieve parity in credibility with their DNA counterparts.

5.2. Recommendations for Lay Jurors

5.2.1. Enhanced Jury Instructions for Forensic Evidence

To improve the epistemic quality and procedural fairness of jury decision-making—specifically the understanding and evaluation of forensic evidence—it is proposed that courts adopt enhanced jury instructions that incorporate standardised, plain-language explanations

of forensic concepts. This recommendation is geared towards promoting normative decision-making characterised by being logically coherent, evidence-based, and aligned with legal standards. This would equip jurors with the cognitive tools necessary to critically evaluate complex scientific testimony.

The theoretical rationale for this intervention is informed by extensive empirical research in cognitive psychology, which has demonstrated that jurors frequently rely on heuristic processing when confronted with unfamiliar or technically dense information. Systematic errors in thinking, (i.e., heuristics and biases) can distort juror reasoning, which can be exacerbated in contexts where they lack the requisite scientific literacy to independently assess the validity and probative value of forensic evidence. By improving the structure, clarity, and accessibility of jury instructions, courts can mitigate these cognitive vulnerabilities and foster more accurate and deliberative verdicts.

Enhanced instructions should begin by explicitly articulating the purpose, scope, and limitations of the forensic evidence presented. For example, in the context of DNA analysis, jurors could be informed that a reported “match” does not equate to definitive identification of the defendant as the source but rather indicates a statistical consistency that must be interpreted in light of population frequency data, sample integrity, and laboratory procedures.

Moreover, the language employed in these instructions must be non-technical and conceptually transparent. Scientific terminology could be translated into analogies and examples that are accessible to lay factfinders. For instance, rather than referencing a “random match probability,” the instruction might state: “This means that one person out of every 10,000 in the general population might have a similar DNA profile, even if they were not involved in the crime.” Reframing would help jurors appreciate the probabilistic nature of forensic conclusions whilst circumventing absolutist interpretations.

Instructions could also incorporate structured prompts that encourage jurors to critically evaluate the forensic evidence. Herein, jurors could be guided to consider whether the method employed is scientifically validated, whether it was applied appropriately in the specific case, and whether the expert's interpretation was balanced and transparent. The inclusion of evaluative checklists or decision trees may further calibrate jurors reasoning processes and reduce undue deference to expert authority.

5.2.2. Pre-hearing Orientation Module on Forensic Evidence

To enhance juror competence in evaluating forensic evidence, courts could utilise a brief (30–60 minute), pre-hearing orientation module offering non-case-specific education on commonly used forensic techniques and their limitations. This intervention could potentially improve cognitive processing and reduce reliance on expert credibility heuristics, thereby fostering more accurate and equitable verdicts.

Grounded in cognitive and decision science, the rationale is clear. Jurors are frequently exposed to complex scientific testimony, albeit without the requisite fundamental knowledge to assess it critically. In such cases, they may resort to heuristic shortcuts—such as authority bias or anchoring—which can distort their interpretation of forensic claims. A structured educational module can mitigate these risks by equipping jurors with a baseline understanding of forensic science and encouraging analytical engagement. This module should cover frequently encountered techniques—DNA profiling, fingerprint analysis, ballistics, digital forensics, and toxicology—explaining each method's function, capabilities, and known limitations in accessible language. For instance, while DNA evidence is generally robust, jurors should understand its susceptibility to contamination, degradation, and interpretive ambiguity. Additionally, the module could introduce the fundamental principles of scientific reasoning, including probabilistic interpretation and the concept of uncertainty. Jurors must be taught that terms like “match” or “likelihood ratio” denote degrees of

probability, not certainties. This would be an essential step toward nuanced, evidence-based critical evaluation. Lastly, the module should be presented in a neutral, non-case-specific format, thus preserving impartiality while promoting scientific literacy and reducing disparities among jurors. Ultimately, this pre-hearing intervention would support normative decision-making by fostering informed scepticism, mitigating cognitive bias, and encouraging jurors to assess forensic evidence on its scientific merits rather than the perceived authority of the expert witness.

To support jurors in critically assessing forensic evidence and expert testimony, judicial systems could also integrate structured decision aids—such as checklists, guiding questions, or flowcharts—into courtroom procedures. These tools foster systematic reasoning and help jurors evaluate both the credibility of experts and the reliability of forensic methods.

This recommendation draws on cognitive science, particularly the concept of bounded rationality (Simon, 1957), which highlights the constraints of limited information, time, and cognitive capacity. Decision aids support deliberative rather than intuitive judgments (Kahneman, 2011), orientating jurors to scientifically relevant criteria and reducing reliance on heuristics.

Structured decision aids may serve as a valuable mechanism for directing jurors' attention toward the core evaluative dimensions of scientific validity and reliability. By prompting targeted questions—such as whether the forensic method is generally accepted, empirically tested, and appropriately applied, or whether its error rate and limitations have been acknowledged—these aids encourage an analytical engagement with the probative value of the expert evidence.

Rather than relying on superficial markers of credibility, jurors would be guided to interrogate the methodological substance of the evidence *per se*. In cases involving

conflicting expert testimony, such tools can facilitate a more balanced and systematic comparison of competing claims, thereby mitigating the influence of cognitive biases.

Implementation of decision aids could take multiple forms, including integration into jury instructions, distribution as supplemental handouts, or visual presentation during proceedings. To ensure accessibility, these tools should be composed in clear, non-technical language and tailored to the cognitive and educational diversity of jurors. Indeed, LaBat et al. (2023) provide empirical support for such interventions, demonstrating that brief, standardised pre-trial educational videos can improve jurors' evaluation of forensic testimony. Their study found that exposure to forensic science informational (FSI) videos increased jurors' sensitivity to differences in testimony quality without fostering indiscriminate scepticism toward forensic science. Such videos—less than five minutes in duration—are administratively feasible and could promote greater consistency across courtrooms, making them a practical complement to orientation modules. By contrast, the use of specialised post-trial jury instructions in their study produced no measurable effects on expert or evidence ratings, case outcomes, or the impact of the video. Accordingly, policy should prioritise scalable pre-trial education rather than rely on post-trial instructions to correct misunderstandings once testimonial impressions have already formed.

For jury functioning more broadly, Hans and Saks (2018) endorse “active jury” practices—such as controlled juror questions, mid-trial discussions, note-taking, and structured decision supports (e.g., checklists, jury notebooks)—to improve comprehension of scientific evidence. At the systemic level, they propose broader reforms—strengthening judicial and juror education in scientific reasoning, enhancing jury capacity through deliberation and diversity, and more controversially, considering special juries or expert-judge models. While acknowledging concerns regarding representativeness and legitimacy, they argue that such measures could improve the adjudication of scientific evidence.

Therefore, pre-hearing orientation modules alongside structured decision aids represent complementary strategies for enhancing juror competence in evaluating forensic evidence. Together, they provide a systematic, empirically grounded approach to mitigating cognitive bias, fostering informed scepticism, and promoting more accurate and equitable trial outcomes.

5.3. Judges

5.3.1. Training on Cognitive Bias and Information Evaluation

To enhance the quality, consistency, and integrity of judicial decision-making, it is recommended that continuing education programs for judges incorporate dedicated training in cognitive psychology, heuristics and bias theory, and evidence evaluation. This recommendation is predicated on the well-established understanding that judicial actors, like all human decision-makers, are subject to cognitive constraints and biases—particularly under conditions of time pressure, high caseloads, and the complexity inherent in legal reasoning.

Judges are routinely tasked with making rapid, yet critical determinations, on the admissibility of expert and forensic testimony. Such decisions carry considerable weight, as they can decisively influence the trajectory of the legal proceedings. These typically involve the evaluation of scientific validity, methodological rigour, evidentiary relevance, and expert competency. However, in the absence of formal training in scientific reasoning or cognitive psychology, judges may inadvertently rely on heuristic processes, which can compromise the objectivity and consistency of admissibility rulings.

These cognitive shortcuts, while often adaptive in routine decision-making contexts, pose significant risks in legal settings where evidentiary standards must be rigorously applied. For example, a judge may be unduly influenced by the perceived authority or confidence of an expert witness, rather than critically appraising the methodological rigour of

the testimony. Similarly, prior exposure to similar cases may bias the judge's interpretation of novel evidence, leading to overgeneralisation or neglect of case-specific nuances.

Integrating cognitive psychology into judicial education can mitigate these risks by fostering metacognitive awareness and promoting reflective decision-making. Training modules should elucidate the mechanisms and manifestations of cognitive bias, provide empirical evidence of their impact on legal judgments, and offer strategies for debiasing and cognitive control. In parallel, instruction in evidence evaluation could equip judges with the capacity to assess scientific claims, including familiarity with concepts such as reliability, validity, error rates, peer review, and general acceptance within the scientific community.

Such training is particularly critical in the context of forensic science, where methodological limitations and interpretive uncertainties are often underappreciated. Judges who possess a foundational understanding of scientific reasoning are better positioned to scrutinise expert testimony, apply admissibility standards consistently, and safeguard the integrity of the judicial process.

To maximise efficacy, educational interventions should be practical, interactive, and tailored to the exigencies of judicial work. Recommended formats include expert-led workshops, case-based learning, and scenario-based exercises that simulate evidentiary challenges encountered in real-world adjudication. Couching this content within ongoing professional development initiatives ensures that judges remain not only legally proficient but also cognitively aware and scientifically literate—these are attributes essential for the fair and informed administration of justice.

5.3.2. Improved Admissibility Guidelines

Based on the most recent updates to the Criminal Procedure Rules 2020 and associated Criminal Practice Directions (as of June 2025), Part 19 remains the principal framework governing the use of expert evidence in criminal proceedings in England and Wales. While it

outlines procedural requirements—such as the duties of experts, the content of expert reports, and the court’s powers to manage expert evidence—it does not yet incorporate substantive guidance on how judges should assess the credibility and reliability of expert testimony in light of contemporary psychological research.

To bolster the consistency and scientific integrity of admissibility decisions, it is recommended that Part 19 of the Practice Directions be revised to explicitly incorporate findings from cognitive psychology and decision science. This reform is warranted by empirical evidence demonstrating that judicial assessments of expert evidence are often influenced by cognitive heuristics and biases as discussed above.

Although Part 19 currently provides procedural guidance for the introduction and management of expert evidence, it lacks detailed evaluative criteria for assessing the scientific validity, methodological reliability, and communicative clarity of such evidence. This omission contributes to variability in admissibility rulings, particularly in cases involving novel or contested forensic techniques, and may increase the risk of inconsistent outcomes or miscarriages of justice. The revised guidance could incorporate codified evaluative criteria akin to *Daubert*-style principles. These would include considerations such as whether the expert’s methodology is empirically testable and validated, whether it has been subjected to peer review and publication, and the known or potential error rate associated with the technique. The degree of general acceptance within the relevant scientific community should also be assessed, alongside the expert’s clarity in communicating the limitations and uncertainties of their findings. Essentially, the testimony must be presented in a manner that is comprehensible to factfinders, ensuring that scientific evidence is both accessible and appropriately scrutinised.

These additions would not only improve the transparency and accountability of judicial reasoning but also promote greater uniformity in the application of admissibility standards

across jurisdictions. To ensure practical utility, the revised Practice Directions should be written in clear, non-technical language that is accessible to legal practitioners without scientific training. They should also be structured in an actionable format with the use of checklists or decision aids that can be utilised in real-time courtroom settings. Significantly, the guidance must be evidence-informed, drawing on empirical research from cognitive psychology, legal decision-making, and forensic science to consolidate its recommendations and enhance its credibility. Such reforms would represent a significant step toward a more scientifically literate judiciary and a more consistent and equitable application of justice.

5.3.3. Judicial Checklists for Admissibility Decisions

To improve the consistency, transparency, and scientific rigour of judicial decisions regarding the admissibility of forensic expert testimony, it is recommended that courts adopt structured evaluation tools. These tools (e.g., standardised checklists, scoring rubrics, or decision matrices) would be configured to assist judges and legal professionals in systematically applying admissibility criteria to expert evidence. Structured decision aids can mitigate the influence of cognitive biases and bounded rationality, particularly in high-pressure or complex evidentiary contexts (Kahneman, 2011; Gigerenzer & Gaissmaier, 2011).

Structured evaluation tools could be used to guide judges through a stepwise process grounded in objective, scientifically validated criteria. For instance, such tools might prompt factfinders to assess whether the expert's qualifications are directly relevant to the forensic method employed, and whether that method has undergone peer review and empirical testing for reliability and validity. Additionally, the tool would encourage scrutiny of whether the expert has clearly communicated the limitations and uncertainties of their findings, and whether the evidence is both directly relevant to the legal issues and presented in a way that is comprehensible to a lay jury. By requiring evaluators to document their reasoning and

apply consistent evaluative standards, such tools promote both procedural transparency and epistemic accountability.

The implementation of structured evaluation tools aligns with broader efforts to enhance the scientific literacy of the judiciary and to institutionalise best practices in forensic evidence evaluation. When integrated into judicial training and courtroom procedure, these tools can serve as a critical safeguard against cognitive error, thereby strengthening the integrity and consistency of the legal process.

5.4. Legal Professionals

5.4.1. Ongoing Training in Basic Forensic Science for Barristers

To strengthen the integrity and evidentiary rigour of criminal proceedings, it is recommended that barristers be required and encouraged to undertake ongoing professional development in foundational forensic science. This training should encompass core scientific principles, commonly employed forensic methodologies, and the interpretive frameworks necessary for evaluating forensic evidence. The underlying rationale is that legal practitioners must possess sufficient scientific literacy to critically interrogate expert testimony, identify methodological weaknesses, and construct effective cross-examinations that challenge the reliability and relevance of forensic claims.

Despite the increasing prominence of forensic evidence in criminal trials, many barristers receive minimal formal education in the scientific disciplines that underpin such evidence (Davies & Piasecki, 2016). This epistemic asymmetry antagonises their ability to assess the methodological rigour of expert reports, detect overgeneralised or overstated conclusions, and discern when experts fail to disclose limitations or uncertainties inherent in their analyses. The absence of such competencies may result in missed opportunities to challenge unreliable evidence or clarify its probative value for the jury, thereby compromising the fairness and accuracy of trial outcomes.

Additionally, barristers should be introduced to fundamental scientific concepts, e.g., error rates, validation studies, reproducibility, and the distinction between correlation and causation. These concepts are essential for evaluating the strength and limitations of expert claims and for identifying instances of methodological overreach or evidentiary ambiguity.

With this scientific foundation, barristers would be better positioned to scrutinise expert credentials, critically examine the reliability and applicability of forensic methods, and expose weaknesses in the execution or interpretation of forensic analyses. This enhanced competence would directly improve the quality of cross-examination, enabling barristers to pose targeted, informed questions that discriminate strengths and limitations of the evidence presented.

Moreover, such training would contribute to the epistemic transparency of the legal process, supporting factfinders in making informed decisions and reducing the risk of wrongful convictions based on misunderstood or misrepresented forensic testimony. By institutionalising forensic science education within the framework of legal professional development, the legal system can promote a more scientifically literate bar, thereby enhancing the overall quality, fairness, and reliability of criminal adjudication.

5.4.2. Use of Expert-Preparation Protocols

To promote greater consistency, transparency, and scientific integrity in the presentation of forensic expert testimony, it is recommended that structured preparation protocols be developed and systematically implemented. These protocols should be specifically designed to ensure that forensic experts are adequately prepared to communicate the scope and limitations of their conclusions, thereby reducing the risk of overstatement and juror misinterpretation. The theoretical foundation for this recommendation lies in empirical findings from cognitive psychology and legal scholarship, which demonstrate that jurors often conflate confidence with accuracy and may misinterpret technical testimony as more

definitive than warranted (Cooper et al., 1996). When expert testimony is delivered with excessive certainty or without adequate contextualisation of methodological limitations, it may lead to juror overreliance on forensic conclusions, thereby distorting the fact-finding process. This issue is compounded when experts fail to clearly articulate the underlying assumptions, error rates, and inherent uncertainties associated with their methods. Such omissions can obscure the provisional nature of scientific inference and undermine the critical scrutiny required in legal adjudication.

Structured preparation protocols can function as a corrective mechanism by guiding forensic experts through a standardised process that prioritises clarity, balance, and scientific integrity. These protocols may begin with pre-testimony briefings designed to align expert communication with evidentiary standards and courtroom expectations, ensuring that testimony is both relevant and comprehensible. Experts may also be required to use standardised report templates that explicitly detail methodological limitations, the validation status of the techniques employed, and the interpretive boundaries of their conclusions.

To further support rigorous and transparent testimony, experts can be prompted to address key evaluative criteria. These include the scope and limitations of the forensic method used, known error rates, and potential sources of uncertainty. Experts should also indicate the extent to which their methods have been empirically validated and accepted within the scientific community. Finally, they must articulate the degree of confidence in their conclusions and acknowledge the plausibility of alternative interpretations. Together, these measures help ensure that forensic evidence is presented in a scientifically robust and legally appropriate manner.

In addition to content-focused guidance, protocols should encourage the use of plain language to enhance juror comprehension. By fostering accessible and scientifically

grounded communication, these protocols help bridge the gap between expert knowledge and lay understanding.

The implementation of these protocols could potentially reduce the variability in expert communication, enhance juror comprehension, and promote more accurate and equitable trial outcomes. Furthermore, they reinforce the ethical obligation of forensic practitioners to present their findings with integrity, caution, and respect for the limits of scientific inference.

Jackson and Roesch (2016) provide further support for this approach, recommending the embedding of principle-based, evidence-oriented frameworks to enhance the quality and defensibility of forensic services in adversarial contexts. They highlight recurring failures that such frameworks could circumvent, e.g., evaluations that fail to address the relevant legal standard, exceed the scope of referral by offering opinions reserved for the legal decision-maker, or provide insufficient credible information to support conclusions. In applied practice, they advocate aligning forensic services with legally relevant competencies, integrating evidence-based practice that combines research, professional expertise, and individual characteristics, and avoiding inefficient use of limited clinical resources.

As a court-facing implication, Jackson and Roesch (2016) argue that principled frameworks promote thoroughness, consistency, clarity, and impartiality in forensic work products. By reducing arbitrariness in judicial decision-making, such frameworks bolster the reliability of forensic contributions to the justice process. Taken together, expert-preparation protocols and principle-based frameworks represent a systematic and academically grounded strategy for enhancing the integrity of forensic testimony, thereby supporting more reliable and equitable adjudication.

5.5. Expert Testimony

The courts should also consider revising the criteria for qualifying forensic expert witnesses to include communicative competence as a core evaluative dimension. As a point

of reiteration, the findings in study three revealed that when experts from both DNA and digital forensic domains adopted analytical styles, their credibility ratings converged. This finding challenges the assumption that disciplinary prestige alone determines perceived reliability. Courts should therefore avoid privileging certain forensic domains based on historical reputation or media portrayal and instead place greater emphasis on the expert's ability to communicate findings effectively and substantiate their claims with methodological rigour.

To support this shift, courts may benefit from procedural guidelines that align testimony style with case complexity. For highly technical evidence, analytical delivery should be prioritised to facilitate juror comprehension and reduce the risk of misinterpretation. Conversely, intuitive styles may be more appropriate in cases involving emotionally charged but less technically demanding evidence, where rapport-building can enhance engagement without compromising epistemic standards.

Finally, the enduring trust in DNA evidence underscores the role of public familiarity in shaping credibility judgments. As digital forensic evidence becomes increasingly prevalent, courts should support public education initiatives aimed at improving understanding of emerging forensic domains. Enhancing juror competence through targeted education would help mitigate reliance on outdated heuristics and contribute to more informed and equitable decision-making. Hans and Saks (2018) conceptualise trials as “educational forums,” emphasising the importance of presenting expert evidence in cognitively accessible formats. They recommend structuring testimony to maximise comprehension by employing numerical rather than vague verbal quantifiers, presenting data in tables, translating conditional probabilities into natural frequencies, and supporting probabilistic reasoning with visual aids such as bar graphs, pie charts, 2×2 tables, and Venn diagrams.

In concert, these measures highlight the need for courts to reconceptualise expert testimony not only as a vehicle for conveying technical information but also as a communicative act that must be tailored to the cognitive capacities of jurors. By couching communicative competence into qualification criteria, aligning testimony styles with evidentiary complexity, and supporting public education on emerging forensic domains, courts can strengthen the integrity of expert evidence and promote more equitable trial outcomes.

5.6. Policy Makers

5.6.1. National Standardisation of Admissibility Criteria

To enhance the consistency, scientific integrity, and legal robustness of expert evidence in criminal proceedings, it is recommended that policymakers pursue the harmonisation of admissibility standards across England and Wales. This reform could be achieved by selectively adapting elements from established international models—such as the *Daubert* standard in the United States or the empirical framework proposed by the President’s Council of Advisors on Science and Technology (PCAST)—and integrating them into domestic legal instruments, including the Criminal Practice Directions and Criminal Procedure Rules.

The rationale for this recommendation is grounded in longstanding concerns regarding the current approach to expert evidence in England and Wales, which has been characterised as inconsistently applied and insufficiently rigorous. As noted by the Law Commission (2011), the prevailing judicial stance is largely permissive, with expert opinion evidence often admitted without adequate scrutiny due to the absence of a clearly articulated reliability threshold. This lack of a structured admissibility test has contributed to the admission of flawed or unvalidated scientific opinions.

In the absence of a uniform mandatory standard, judges may apply divergent thresholds for admissibility, resulting in arbitrary or inconsistent decisions across jurisdictions. This

variability undermines both the fairness of proceedings and public confidence in the criminal justice system. A harmonised framework would provide a more transparent and scientifically grounded basis for evaluating expert evidence, ensuring that such testimony is admitted only when it meets established criteria for reliability, methodological soundness, and relevance.

The *Daubert* standard requires courts to assess the scientific credibility of expert evidence by considering factors such as testability, peer review, known or potential error rates, and general acceptance within the relevant scientific community. Similarly, the PCAST framework underscores the importance of empirical validation and reproducibility, distinguishing between foundational validity—whether a method is scientifically reliable—and validity as applied—whether it was correctly implemented in a specific case.

Integrating these principles into the legal framework of England and Wales could yield substantial benefits, including greater consistency in judicial decisions, clearer admissibility standards for legal and forensic professionals, and reduced vulnerability to cognitive biases in complex scientific cases. Moreover, such reform would enhance transparency and public trust in the justice system. To be effective, this integration would require careful legislative and procedural revision, ideally guided by interdisciplinary collaboration among judges, scientists, legal scholars, and forensic practitioners. Aligning domestic standards with internationally recognised best practices would help safeguard against unreliable expert evidence and promote more scientifically informed adjudication.

At the policy level, Jackson and Roesch (2016) recommend embedding broad principle-based frameworks into legislation, legal standards, and administrative codes governing forensic assessment and intervention, thereby promoting consistency and quality across jurisdictions. They highlight structural barriers to implementation, noting that most jurisdictions lack a forensically specific standard of care—enforceable minimum standards that clarify expectations for forensic practice. This absence complicates both enforcement and

quality assurance, underscoring the need for system-level standard-setting to make professional obligations clearer and more actionable for courts and justice-system stakeholders.

Hans and Saks (2018) further advocate for procedural reforms to reduce ambiguity arising from fragmented expert battles, including pre-trial stipulations on technical issues, “hot-tubbing” (pre-trial expert meetings to clarify points of agreement and disagreement), and sequencing opposing experts back-to-back for comparative evaluation. Recognising resource asymmetries in criminal litigation, they also recommend mechanisms to ensure that the council for defence can obtain and present expert evidence, thereby reducing the risk of incomplete or distorted accounts. Other features for a codified reliability standard include:

- **Symmetrical gatekeeping**—Reliability standards must apply equally to prosecution and defence experts, with judicial discretion constrained by codified criteria.
- **Accessible scientific criteria**—Focus on methodological transparency, replicability, and disclosure of limitations rather than technical constructs (e.g., error rates) that are difficult to operationalise.
- **Empirical validation requirement**—Admissibility contingent on demonstrable empirical support, with peer review and credentials treated as supplementary rather than determinative.
- **Dynamic review mechanism**—Periodic reassessment of forensic techniques to prevent reliance on outdated or historically entrenched practices.
- **Judicial education**—Structured training to equip judges with the capacity to critically evaluate expert evidence without requiring scientific expertise.
- **Consistency in application**—Uniform standards for case-specific relevance, preventing asymmetrical burdens on defence experts.

Collectively, these recommendations underscore the importance of national standardisation of admissibility criteria as a means of strengthening the evidentiary foundations of criminal justice in England and Wales. By embedding scientifically validated principles into judicial practice, policymakers can promote consistency, transparency, and integrity in the evaluation of expert testimony, thereby reinforcing both the fairness and legitimacy of the justice process.

5.6.2. Funding for Psychological Research in Legal Decision-Making

It is recommended that policymakers allocate sustained and expanded funding for interdisciplinary research focused on the cognitive dimensions of forensic evidence evaluation. This research agenda should integrate expertise from psychology, law, forensic science, and data science to systematically investigate how jurors, judges, and legal practitioners process, interpret, and reason about forensic evidence within real-world legal contexts. The rationale for this recommendation is grounded in the principle that legal policy should be empirically informed and iterative—responsive to emerging data rather than constrained by tradition or untested assumptions.

Despite the increasing centrality of forensic science in criminal adjudication, a substantial empirical gap persists in understanding how legal decision-makers cognitively engage with complex scientific testimony. This deficit has significant implications for the integrity of judicial outcomes, particularly in cases involving contested or technically sophisticated evidence.

Empirical research is also essential for evaluating the efficacy of legal reforms. As courts begin to implement novel procedural tools (such as those proposed above), e.g., structured admissibility criteria, pre-trial orientation modules, or visual aids for jurors, there must be a robust empirical foundation to assess their impact on decision-making processes and trial outcomes. Interdisciplinary methodologies, including experimental designs, mock

trial simulations, and analysis of real-world case data, can provide the necessary evidence base to determine whether these interventions improve comprehension, reduce bias, and promote more accurate verdicts.

Moreover, this research can inform the development of best practices for expert witness communication, jury instruction design, and judicial training. By empirically testing the cognitive effects of various courtroom practices, scholars and practitioners can collaboratively refine legal procedures to better align with the psychological realities of human reasoning.

Investing in this domain would ensure that reforms to forensic evidence practices are not only well-intentioned but also scientifically validated and adaptable over time. This approach aligns with broader principles of evidence-based policymaking and continuous improvement, fostering a justice system that is both scientifically literate and responsive to the evolving challenges of forensic science in the courtroom.

Summers and Wyler (2022) recommend extending “stage one” written-trial simulations into more ecologically valid “stage two” designs incorporating fuller trial contexts and jury deliberation, to test whether comprehension gains persist under realistic conditions. They call for clarifying when multimedia aids add value beyond structured verbal explanations, and whether such aids risk biasing verdicts through heuristic processing. Methodologically, they highlight the need for larger samples, improved data quality (e.g., attention checks, reading-time monitoring), and more representative jury-eligible populations. At the policy level, they caution against assuming multimedia will improve comprehension, urging evidence-led adoption accompanied by guidance on effective use and juror “visual literacy” supports. For Jackson and Roesch (2016), however, the development and empirically testing principle-based models of forensic assessment and intervention remain a priority, given that substantial areas of the practice literature remain underdeveloped. They advocate the use of principles

both as a means of articulating normative practice and as a framework for defining desirable practice, while treating principle sets as dynamic hypotheses that remain open to ongoing empirical refinement.

LaBat et al. (2023) propose future research should test the boundary conditions of juror sensitivity to testimonial quality by incorporating deliberation, manipulating case/evidence strength, and refining instructional interventions (e.g., interactive video formats). They call for further empirical research to examine how testimonial quality interacts with case strength under video-present conditions. Alternatively, Hans and Saks (2018) call for a systematic empirical programme to evaluate courtroom reforms, focusing on interventions that increase central (System 2) processing of scientific evidence. They recommend research on communication formats for quantitative evidence (e.g., natural frequencies, tabular and visual representations), active-jury innovations (e.g., question-asking, note-taking, checklists), and jury composition/deliberation processes. They stress the importance of mapping both benefits and risks, including representativeness trade-offs and disproportionate influence of highly numerate jurors.

In summary, sustained funding for psychological research in legal decision-making is essential to ensure that reforms to forensic evidence practices are empirically validated, scientifically credible, and adaptable to evolving challenges. By embedding interdisciplinary research into policy development, the justice system can bolster its capacity to evaluate forensic evidence rigorously, reduce cognitive bias, and promote fairer and more reliable adjudication.

5.6.3. Creation of an Expert Evidence Oversight Body

It is recommended that a dedicated, independent body be established—or that an existing institution be formally empowered—with the authority to vet, accredit, and regulate forensic disciplines and practices prior to their admissibility in court. This body would

function autonomously from the trial-by-trial judicial process and would be tasked with conducting rigorous, pre-adjudicative evaluations of the scientific validity, methodological reliability, and evidentiary relevance of forensic techniques. The rationale for this recommendation is to prevent the infiltration of pseudoscientific or unvalidated methods into legal proceedings, thereby safeguarding the epistemic integrity of the justice system.

An independent forensic science accreditation authority would offer a robust solution to systemic vulnerabilities in the evaluation of forensic evidence by establishing a centralised, evidence-based mechanism for assessing the scientific validity of forensic methods. Its primary functions would encompass rigorous vetting of techniques based on empirical validation, peer review, reproducibility, known error rates, and general acceptance within the scientific community; issuing accreditation decisions that determine admissibility thresholds; maintaining a publicly accessible registry of approved, conditionally approved, and disapproved methods; and providing best practice guidelines for their application and interpretation. Crucially, it would also conduct periodic reviews to ensure that forensic disciplines remain aligned with evolving scientific standards. By offering authoritative, pre-hearing assessments, such a body would support judicial decision-making, reduce reliance on discretionary judgments in technically complex areas, and help insulate the legal process from persuasive yet scientifically unsupported testimony—ultimately enhancing the integrity, consistency, and transparency of forensic evidence in the courtroom.

Moreover, by institutionalising a proactive, science-led approach to forensic evidence governance, this reform would align the legal system with international best practices and reinforce public confidence in the objectivity and reliability of criminal adjudication.

5.7. Artificial Intelligence for Commissioning and Assessing Forensic Experts

Artificial Intelligence (AI) can potentially streamline the recruitment process by analysing large datasets of expert profiles, publications, case histories, and certifications to

identify candidates whose qualifications align precisely with the forensic needs of a case. For example, predictive modelling can assess the relevance of an expert's experience to specific forensic domains—such as DNA analysis or digital forensics—ensuring that legal professionals commission expert witnesses with demonstrable, domain-specific expertise. AI systems can also flag potential conflicts of interest or inconsistencies in credentials, enhancing transparency and accountability in expert selection.

Moreover, AI-driven platforms can maintain dynamic databases of vetted experts, ranked by peer-reviewed contributions, courtroom experience, proficiency data, and methodological rigor. This allows legal teams to make informed, evidence-based decisions when recruiting expert witnesses, reducing reliance on informal networks or subjective impressions. Moreover, AI systems can be used to simulate cross-examinations, identify inconsistencies, and highlight methodological weaknesses in expert reports, thereby supporting more rigorous scrutiny of forensic evidence.

Nevertheless, despite its promise, AI must be used responsibly. Experts caution against overreliance on opaque "black-box" models that lack transparency and reproducibility—qualities that are essential for admissible expert testimony. Human oversight remains critical: AI should complement, not replace, expert judgment. Therefore, legal professionals must ensure that AI-generated insights are validated, explainable, and defensible under cross-examination.

5.8. Conclusion

This chapter has advanced a series of evidence-informed recommendations aimed at addressing the conceptual, procedural, and epistemological deficiencies identified in the assessment and use of forensic expert evidence within the English and Welsh criminal justice system. Drawing on the findings of three empirical studies, the chapter has demonstrated that current evaluative practices are often shaped by descriptive models of decision-making—

characterised by heuristic reasoning, disciplinary prestige, and rhetorical appeal—rather than normative models grounded in scientific rigour and legal coherence.

The experience of *Daubert* in U.S. illustrates the dangers of discretionary, asymmetrical, and heuristic-driven admissibility standards. For England and Wales, a codified reliability framework should draw on these lessons by prioritising methodological transparency, empirical validation, and symmetrical application. By avoiding *Daubert*'s pitfalls—particularly its susceptibility to prosecutorial bias and judicial discretion—the English courts can establish a more neutral and scientifically grounded system of gatekeeping that genuinely safeguards against unreliable forensic testimony.

To facilitate a transition toward normative decision-making, the chapter proposed prescriptive tools and reforms tailored to the needs of key stakeholder groups: jurors, judges, legal professionals, policy makers, and forensic experts. These include enhanced jury instructions, pre-hearing orientation modules, structured decision aids, judicial training in cognitive bias and scientific reasoning, revised admissibility guidelines, expert-preparation protocols, and the integration of artificial intelligence to support expert commissioning and evidence evaluation. Collectively, these interventions aim to improve the reliability, transparency, and epistemic integrity of forensic expert testimony, while promoting fairness and consistency in judicial outcomes.

The recommendations also underscore the importance of interdisciplinary collaboration and empirical validation in shaping legal reform. By integrating insights from cognitive psychology, forensic science, legal theory, and decision science, the chapter advocates for a recalibrated framework that aligns evidentiary practices with the demands of contemporary justice. Furthermore, the proposed establishment of an independent oversight body and the standardisation of admissibility criteria represent structural reforms that could significantly enhance the governance of forensic evidence.

Ultimately, the chapter calls for a principled shift in how forensic expertise is understood, evaluated, and applied in legal proceedings. By embracing normative models and evidence-based practices, the courts can better safeguard against epistemic error, reduce the risk of miscarriages of justice, and reinforce public confidence in the integrity of the criminal justice system.

References

- Adam, C. (2016). *Forensic evidence in court: Evaluation and scientific opinion*. John Wiley & Sons. <https://doi.org/10.1002/9781119054443>
- Agüero San Juan, C., Morgado Fernández, P., & Zambrano Tiznado, J. P. (2026). *Social perceptions of judges and the rule of law: A protocol for designing judicial vignettes. Diritto & Questioni Pubbliche, Special Publication*, 311–338.
- Alenezi, A. M. (2023). *Digital forensics in the age of smart environments: A survey of recent advancements and challenges* [Preprint]. <https://doi.org/10.48550/arXiv.2305.09682>
- Alketbi, S. K. (2024). DNA contamination in crime scene investigations: Common errors, best practices, and insights from a survey study. *Biomedical Journal of Scientific & Technical Research*, 58(5), 50970-50982 <https://doi.org/10.2139/ssrn.4979243>
- Alshurafat, H. (2024). New variables and measurements of forensic accounting: Implications on financial reporting and auditing. *Discover Sustainability*, 5(1), 376. <https://doi.org/10.1007/s43621-024-00544-4>
- Bakhtiar, H. S. (2024). The evolution of scientific evidence theory in criminal law: A transformative insight. *Media Iuris*, 7(2), 221–240. <https://doi.org/10.20473/mi.v7i2.51095>
- Balhareth, A. A. S., Jamesh, M., Zabarah, G. A., Almotlaq, M. M., Alabaaltahin, M. A. M., Al Jaarah, A. H. A., Aldawsari, A. G. A., Almastaneer, K. A. M., Alyami, S. M., & Al Yami, A. S. H. (2024). The role of forensic medicine in modern criminal justice: A review of current practices and innovations. *Journal of Ecohumanism*, 3(7), 4669. <https://doi.org/10.62754/joe.v3i7.4669>

- Ballantyne, K. N., Summersby, S., Pearson, J. R., Nicol, K., Pirie, E., Quinn, C., & Kogios, R. (2024). A transparent approach: Openness in forensic science reporting. *Forensic Science International: Synergy*, 8, 100474.
<https://doi.org/10.1016/j.fsisyn.2024.100474>
- Berlo, D. K., Lemert, J. B., & Mertz, R. J. (1969). Dimensions for evaluating the acceptability of message sources. *Public Opinion Quarterly*, 33(4), 563–576.
<https://doi.org/10.1086/267745>
- Bernstein, D. E. (2007). Expert witnesses, adversarial bias, and the (partial) failure of the *Daubert* revolution. *Iowa Law Review*, 93, 451-502
- Bernstein, D. E. (2013). The misbegotten judicial resistance to the *Daubert* revolution. *Notre Dame Law review*, 89, 27-80
- Bernstein, D. E., & Lasker, E. G. (2015). Defending *Daubert*: It's time to amend Federal Rule of Evidence 702. *William & Mary Law Review*, 57, 1–50.
- Berry, C. (2005). Expert witnesses—Can their credibility be restored. *Business Law Review*, 26, 239-244.
- Billauer, B. P. (2015). Admissibility of scientific evidence under *Daubert*: The fatal flaws of “falsifiability” and “falsification”. *Boston University Journal of Science & Technology Law*, 22(1), 21-87. <https://doi.org/10.2139/ssrn.2701737>
- Bird, C. L., & Yang, X. (2024). Forensic document examination: A global snapshot. *Forensic Sciences Research*, 9(4), owaf001.
<https://doi.org/10.1093/fsr/owaf001>
- Bornstein, B. H. (2004). The impact of different types of expert scientific testimony on mock jurors' liability verdicts. *Psychology, Crime & Law*, 10(4), 429–446.
<https://doi.org/10.1080/1068316030001629292>

- Boudin, C., & Fish, E. S. (2025). Towards pretrial criminal adjudication. *Boston College Law Review*, 66(4), 1135–1228. <https://doi.org/10.70167/lvdg4087>
- Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27–40. <https://doi.org/10.3316/qri0902027>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Brekke, N., & Borgida, E. (1988). Expert psychological testimony in rape trials: A social-cognitive analysis. *Journal of Personality and Social Psychology*, 55(3), 372–381. <https://doi.org/10.1037//0022-3514.55.3.372>
- Brewer, P. R., & Ley, B. L. (2009). Media use and public perceptions of DNA evidence. *Science Communication*, 32(1), 93–117. <https://doi.org/10.1177/1075547009340343>
- Bright, J. A., Curran, J. M., & Buckleton, J. S. (2013). Investigation into the performance of different models for predicting stutter. *Forensic Science International: Genetics*, 7(4), 422–427. <https://doi.org/10.1016/j.fsigen.2013.04.008>
- British Psychological Society. (n.d.). *Forensic psychologist job profile*. <https://www.bps.org.uk/forensic-psychologist-job-profile>
- Brodsky, S. L., Griffin, M. P., & Cramer, R. J. (2010). The witness credibility scale: An outcome measure for expert witness research. *Behavioral Sciences & the Law*, 28(6), 892–907. <https://doi.org/10.1002/bsl.917>

- Brodsky, S. L., Neal, T. M., Cramer, R. J., & Ziemke, M. H. (2009). Credibility in the courtroom: How likeable should an expert witness be? *Journal of the American Academy of Psychiatry and the Law Online*, 37(4), 525-532.
- Broeders, A. P. A. (2006). Of earprints, fingerprints, scent dogs, cot deaths and cognitive contamination: A brief look at the present state of play in the forensic arena. *Forensic Science International*, 159(2–3), 148–157.
<https://doi.org/10.1016/j.forsciint.2004.11.028>
- Brunswik, E. (1956). Perception and the representative design of psychological experiments. In J. S. Bruner, R. R. Blake, & G. A. Austin (Eds.), *Perception and thinking* (pp. 89–98). University of California Press.
<https://doi.org/10.1525/9780520350519-017>
- Butler, J. M. (2011). *Advanced topics in forensic DNA typing: Methodology*. Academic press. <https://doi.org/10.1016/c2011-0-04189-3>
- Butler, J. M. (2023). Recent advances in forensic biology and forensic DNA typing: INTERPOL review 2019–2022. *Forensic Science International: Synergy*, 6, 100311. <https://doi.org/10.1016/j.fsisyn.2022.100311>
- Bystranowski, P., Janik, B., & Próchnicki, M. (Eds.) (2022) *Judicial decision-making: Integrating empirical and theoretical perspectives*. Economic Analysis of Law in European Legal Scholarship. Springer International Publishing.
<https://doi.org/10.1007/978-3-031-11744-2>
- Cader, R., Campbell, S., & Watson, D. (2005). Cognitive Continuum Theory in nursing decision-making. *Journal of Advanced Nursing*, 49(4), 397-405. Portico. <https://doi.org/10.1111/j.1365-2648.2004.03303.x>
- Campbell, R., Feeney, H., Goodman-Williams, R., Sharma, D. B., & Pierce, S. J. (2020). Connecting the dots: Identifying suspected serial sexual offenders

- through forensic DNA evidence. *Psychology of Violence*, 10(3), 255–267.
<https://doi.org/10.1037/vio0000243>
- Carlson, K. A., & Russo, J. E. (2001). Biased interpretation of evidence by mock jurors. *Journal of Experimental Psychology: Applied*, 7(2), 91–103.
<https://doi.org/10.1037//1076-898x.7.2.91>
- Carr, S., Piasecki, E., Tully, G., & Wilson, T. J. (2016). Opening the scientific expert’s black box: ‘Critical trust’ as a reformative principle in criminal evidence. *The Journal of Criminal Law*, 80, 364–386. <https://doi.org/10.1177/0022018316669220>
- Carrier, B. (2003). Defining digital forensic examination and analysis tools using abstraction layers. *International Journal of Digital Evidence*, 1(4), 1-12.
- Carrier, B. D., & Spafford, E. H. (2004, August 11–13). *An event-based digital forensic investigation framework*. In *Proceedings of the Digital Forensic Research Workshop (DFRWS) 2004* (pp. 1–12). Digital Forensic Research Workshop, Baltimore, MD, United States.
- Casey, E. (2011). *Digital evidence and computer crime: Forensic science, computers, and the internet*. Academic Press.
- Casey, E. (2019). The chequered past and risky future of digital forensics. *Australian Journal of Forensic Sciences*, 51(6), 649–664.
<https://doi.org/10.1080/00450618.2018.1554090>
- Casey, E., Ferraro, M., & Nguyen, L. (2009). Investigation delayed is justice denied: Proposals for expediting forensic examinations of digital evidence. *Journal of Forensic Sciences*, 54(6), 1353–1364. <https://doi.org/10.1111/j.1556-4029.2009.01150.x>
- Casino, F., Dasaklis, T. K., Spathoulas, G. P., Anagnostopoulos, M., Ghosal, A., Borocz, I., Solanas, A., Conti, M., & Patsakis, C. (2022). *Research trends*,

- challenges, and emerging topics in digital forensics: a review of reviews.*
- IEEE Access, 10, 25464–25493. <https://doi.org/10.1109/access.2022.3154059>
- Caudill, D. S., & Redding, R. E. (2000). Junk philosophy of science?: the paradox of expertise and interdisciplinarity in federal courts. *Washington. & Lee Law Review*, 57(3), 685-766.
- Champagne, A., Shuman, D., & Whitaker, E. (1992). Expert witnesses in the courts: An empirical examination. *Judicature*, 76(1), 5-10.
- Champod, C., Lennard, C. J., Margot, P., & Stoilovic, M. (2004). *Fingerprints and other ridge skin impressions*. CRC Press.
- <https://doi.org/10.1201/9780203485040>
- Chard, A. J. (2025). *Perceptions of the strength of forensic science evidence vs. forensic psychology evidence* [Master's thesis, Drexel University].
- Chen, D., Tan, M., Xue, J., Wu, M., Song, J., Wu, Q., Liu, G., Zheng, Y., Xiao, Y., Lv, M., Liao, M., Qu, S., & Liang, W. (2024). Optimizing analytical thresholds for low-template DNA analysis: insights from multi-laboratory negative controls. *Genes*, 15(1), 117. <https://doi.org/10.3390/genes15010117>
- Cheng, E. K. (2006). Should judges do independent research on scientific issues? *Judicature*, 90(2), 58-61.
- Chin, J. M., Dror, I. E., & Lutsky, M. (2019). The biases of experts: An Empirical analysis of expert witness challenges. *Manitoba Law Journal*, 42(4).
- <https://doi.org/10.29173/mlj1124>
- Chin, J. (2025). Why trust adversarial justice? *Current Issues in Criminal Justice*, 1-18. <https://doi.org/10.2139/ssrn.5082907>
- Cho, A., & Montasari, R. (2024). Addressing current and emerging challenges in digital forensics: An examination and recommendations. In R. Montasari, H.

- Jahankhani, & A. J. Masys (Eds.), *Navigating the intersection of artificial intelligence, security, and ethical governance: Sentinels of cyberspace* (pp. 47–63). Springer. https://doi.org/10.1007/978-3-031-72821-1_3
- Chorn, J. A., & Kovera, M. B. (2019). Variations in reliability and validity do not influence judge, attorney, and mock juror decisions about psychological expert evidence. *Law and Human Behavior*, 43(6), 542–557. <https://doi.org/10.1037/lhb0000345>
- Chung, Y.-K., & Fung, W. K. (2011). The evidentiary values of “cold hits” in a DNA database search on two-person mixture. *Science & Justice*, 51(1), 10–15. <https://doi.org/10.1016/j.scijus.2010.07.002>
- Cicchini, M. D. (2021a). The *Daubert* double standard. *Michigan State Law Review*, 705–764.
- Cicchini, M. D. (2021b). *Daubert* strategies for the criminal defense bar. University of Illinois *Law Review Online*, 97–112.
- Civil Justice Council. (2016). *Concurrent expert evidence and “hot-tubbing” in English litigation since the “Jackson reforms”: A legal and empirical study*. <https://www.judiciary.uk/wp-content/uploads/2011/03/cjc-civil-litigation-review-hot-tubbing-report-20160801.pdf>
- Clark, L. A., & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment*, 7(3), 309–319. <https://doi.org/10.1037/1040-3590.7.3.309>
- Cohen, J. (2013). *Statistical power analysis for the behavioral sciences* (2nd ed.). Routledge. <https://doi.org/10.4324/9780203771587>
- Cole, S. A. (2007). How much justice can technology afford? The impact of DNA technology on equal criminal justice. *Science and Public Policy*, 34(2), 95–107. <https://doi.org/10.3152/030234207x190991>

- Cole, S. A. (2009). *Suspect identities: A history of fingerprinting and criminal identification*. Harvard University Press.
- Cole, S. A. (2014). Forensic science and miscarriages of justice. In G. Bruinsma & D. Weisburd (Eds.), *Encyclopedia of criminology and criminal justice* (pp. 1763–1773). Springer. https://doi.org/10.1007/978-1-4614-5690-2_233
- Collett, J. L., & Childs, E. (2011). Minding the gap: Meaning, affect, and the potential shortcomings of vignettes. *Social Science Research*, 40(2), 513–522. <https://doi.org/10.1016/j.ssresearch.2010.08.008>
- Commons, M. L., & Miller, P. M. (2007). Folk psychology and the law: Why behavioral science needs to replace folk psychology. *Revista Brasileira de Estudos Políticos*, 96, 7–30. <https://pos.direito.ufmg.br/rbep/index.php/rbep/article/view/34/32>
- Cooper, J., & Neuhaus, I. M. (2000). The “hired gun” effect: Assessing the effect of pay, frequency of testifying, and credentials on the perception of expert testimony. *Law and Human Behavior*, 24(2), 149–171. <https://doi.org/10.1023/a:1005476618435>
- Cooper, J., Bennett, E. A., & Sukel, H. L. (1996). Complex scientific testimony: How do jurors make decisions? *Law and Human Behavior*, 20, 379–394. <https://doi.org/10.1007/bf01498976>
- Cornett, L., & Knowlton, N. A. (2020). *Public perspectives on trust and confidence in the courts*. Institute for the Advancement of the American Legal System. https://iaals.du.edu/sites/default/files/documents/publications/public_perspectives_on_trust_and_confidence_in_the_courts.pdf
- Craig, L. A., & Expert Witness Advisory Group. (2021). Psychologists as expert witnesses: Survey results from the Expert Witness Advisory Group (EWAG). *Journal of Forensic Practice*, 23(2), 77–89. <https://doi.org/10.1108/JFP-11-2020-0048>

- Cramer, R. J., Neal, T. M. S., DeCoster, J., & Brodsky, S. L. (2009). Expert witness confidence and juror personality: Their impact on credibility and persuasion in the courtroom. *Journal of the American Academy of Psychiatry and the Law*, 37(1), 63–74. <https://jaapl.org/content/37/1/63>
- Cramer, R. J., Neal, T. M. S., Brodsky, S. L., & DeCoster, J. (2013). The observed witness efficacy scale: A measure of effective testimony skills. *Journal of Applied Social Psychology*, 43(8), 1696-1703. <https://doi.org/10.1037/e669802012-432>
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage.
- Criminal Procedure Rule Committee. (2020). *The Criminal Procedure Rules 2020: Part 19—Expert evidence* (S.I. 2020/759). legislation.gov.uk. <https://www.legislation.gov.uk/uksi/2020/759/part/19>
- Criminal Procedure Rule Committee. (2025). *The Criminal Procedure Rules 2025: Part 19—Expert evidence* (S.I. 2025/909). legislation.gov.uk. <https://www.legislation.gov.uk/uksi/2025/909/part/19>
- Cropanzano, R., Bowen, D. E., & Gilliland, S. W. (2007). The management of organizational justice. *Academy of Management Perspectives*, 21(4), 34–48. <https://doi.org/10.5465/amp.2007.27895338>
- Crozier, W. E., Kukucka, J., & Garrett, B. L. (2020). Juror appraisals of forensic evidence: Effects of blind proficiency and cross-examination. *Forensic Science International*, 315, 110433. <https://doi.org/10.1016/j.forsciint.2020.110433>
- Cullen, H. J., Dilevski, N., Nitschke, F. T., Ribeiro, G., Brind, S., & Woolley, N. (2024). The impact of misinformation presented during jury deliberation on juror memory and decision-making. *Frontiers in Psychology*, 15. Article 1232228. <https://doi.org/10.3389/fpsyg.2024.1232228>

- Curley, L. J., Munro, J., & Dror, I. E. (2022). Cognitive and human factors in legal layperson decision making: Sources of bias in juror decision making. *Medicine, Science and the Law*, 62(3), 206–215. <https://doi.org/10.1177/00258024221080655>
- Custers, E. J. F. M. (2013). Medical education and cognitive continuum theory: An alternative perspective on medical problem solving and clinical reasoning. *Academic Medicine*, 88(8), 1074–1080.
<https://doi.org/10.1097/ACM.0b013e31829a3b10>
- Dargue, P. (2019). The safety of convictions in the Court of Appeal: fresh evidence in the Criminal Division through an empirical lens. *The Journal of Criminal Law*, 83(6), 433–449. <https://doi.org/10.1177/0022018319877982>
- Davies, G., & Piasecki, E. (2016). No more laissez faire? Expert evidence, rule changes and reliability. *The Journal of Criminal Law*, 80(5), 327–343.
<https://doi.org/10.1177/0022018316670967>
- De Villiers, W. P. (2014). Fingerprint comparison evidence has been under sustained attack in the United States of America for the last number of years: Is the critique with regard to reliability sufficiently penetrating to warrant the exclusion of this valuable evidence?. *International Journal of Law, Crime and Justice*, 42(1), 54–70. <https://doi.org/10.1016/j.ijlcrj.2014.01.004>
- Denault, V., Leclerc, C., & Talwar, V. (2025). The influence of extra-legal factors and nonverbal communication in virtual trials. *International Criminology*, 5(2), 166–177. <https://doi.org/10.1007/s43576-025-00168-2>
- Deslauriers-Varin, N., & Fortin, F. (2021). Improving efficiency and understanding of criminal investigations: toward an evidence-based approach. *Journal of Police and Criminal Psychology*, 36(4), 635–638.
<https://doi.org/10.1007/s11896-021-09491-6>

- Devine, D. J., Clayton, L. D., Dunford, B. B., Seying, R., & Pryce, J. (2001). Jury decision making: 45 years of empirical research on deliberating groups. *Psychology, Public Policy, and Law*, 7(3), 622–727.
https://doi.org/10.1007/978-3-319-43083-6_4
- Dhami, M. K., & Mumpower, J. L. (2018). Kenneth R. Hammond's contributions to the study of judgment and decision making. *Judgment and Decision Making*, 13(1), 1-22. <https://doi.org/10.1017/s1930297500008780>
- Dhami, M. K., & Thomson, M. E. (2012). On the relevance of Cognitive Continuum Theory and quasirationality for understanding management judgment and decision making. *European Management Journal*, 30(4), 316-326.
<https://doi.org/10.1016/j.emj.2012.02.002>
- Diamond, S. S., & Lempert, R. O. (2025). How experts view the legal system's use of scientific evidence. *Columbia Science and Technology Law Review*, 26(2), 51–75.
<https://doi.org/10.52214/stlr.v26i2.13888>
- Dimpe, P. M., & Kogeda, O. P. (2017). Impact of using unreliable digital forensic tools. In S. I. Ao, O. Castillo, C. Douglas, W. W. Ding, & J.-A. Lee (Eds.), *Proceedings of the World Congress on Engineering and Computer Science 2017* (Vol. 1, pp. 118–125). International Association of Engineers.
- Douglas, K. S., & Skeem, J. L. (2005). Violence risk assessment: Getting specific about being dynamic. *Psychology, Public Policy, and Law*, 11(3), 347–383.
<https://doi.org/10.1037/1076-8971.11.3.347>
- Dror, I. E. (2020). The error in “error rate”: Why error rates are so needed, yet so elusive. *Journal of Forensic Sciences*, 65(4), 1034-1039.
<https://doi.org/10.1111/1556-4029.14435>

- Dror, I. E., & Hampikian, G. (2011). Subjectivity and bias in forensic DNA mixture interpretation. *Science & Justice*, 51(4), 204–208.
<https://doi.org/10.1016/j.scijus.2011.08.004>
- Dror, I. E., & Mnookin, J. L. (2010). The use of technology in human expert domains: challenges and risks arising from the use of automated fingerprint identification systems in forensic science. *Law, Probability & Risk*, 9(1), 47–67. <https://doi.org/10.1093/lpr/mgp031>
- Dror, I. E., & Murrie, D. C. (2018). A hierarchy of expert performance applied to forensic psychological assessments. *Psychology, Public Policy, and Law*, 24(1), 11–23. <https://doi.org/10.1037/law0000140>
- Dror, I. E., Charlton, D., & Péron, A. E. (2006). Contextual information renders experts vulnerable to making erroneous identifications. *Forensic Science International*, 156(1), 74–78. <https://doi.org/10.1016/j.forsciint.2005.10.017>
- Dror, I. E., Pascual-Leone, A., & Ramachandran, V. (2011). The paradox of human expertise: Why experts get it wrong. In S. Kapur (Ed.), *The paradoxical brain* (pp. 177–198). Cambridge University Press.
<https://doi.org/10.1017/cbo9780511978098.011>
- Dunwoody, P. T., Haarbauer, E., Mahan, R. P., Marino, C., & Tang, C. C. (2000). Cognitive adaptation and its consequences: A test of Cognitive Continuum Theory. *Journal of Behavioral Decision Making*, 13(1), 35–54.
[https://doi.org/10.1002/\(sici\)1099-0771\(200001/03\)13:1%3C35::aid-bdm339%3E3.0.co;2-u](https://doi.org/10.1002/(sici)1099-0771(200001/03)13:1%3C35::aid-bdm339%3E3.0.co;2-u)
- Eastwood, J., & Caldwell, J. (2015). Educating jurors about forensic evidence: Using an expert witness and judicial instructions to mitigate the impact of invalid forensic

science testimony. *Journal of Forensic Sciences*, 60(6), 1523-1528.

<https://doi.org/10.1111/1556-4029.12832>

Edmond, G. (2016). Legal versus non-legal approaches to forensic science evidence.

The International Journal of Evidence & Proof, 20(1), 3–28.

<https://doi.org/10.1177/1365712715613470>

Edmond, G. (2022). Latent justice? A review of adversarial challenges to fingerprint evidence. *Science & Justice*, 62(1), 21–29.

<https://doi.org/10.1016/j.scijus.2021.10.006>

Edmond, G., & Roach, K. (2011). A contextual approach to the admissibility of the state's forensic science and medical evidence. *University of Toronto Law Journal*, 61(3),

343-409. <https://doi.org/10.1353/tlj.2011.0025>

Edmond, G., & Roberts, A. (2011). Procedural fairness, the criminal trial and forensic science and medicine. *The Sydney Law Review*, 33(3), 359–394.

Edmond, G., & Roque, M. S. (2012). The Cool Crucible: Forensic Science and the Frailty of the Criminal Trial. *Current Issues in Criminal Justice*, 24(1), 51–68.

<https://doi.org/10.1080/10345329.2012.12035944>

Edmond, G., Biber, K., Kemp, R., & Porter, G. (2009). Law's Looking Glass: Expert Identification Evidence Derived from Photographic and Video Images.

Current Issues in Criminal Justice, 20(3), 337–377.

<https://doi.org/10.1080/10345329.2009.12035817>

Edmond, G., Cole, S., Cunliffe, E., & Roberts, A. (2013). Admissibility compared:

The reception of incriminating expert evidence (i.e., forensic science) in four adversarial jurisdictions. *University of Denver Criminal Law Review*, 3, 31–68.

- Eldridge, H. (2019). Juror comprehension of forensic expert testimony: A literature review and gap analysis. *Forensic Science International: Synergy*, 1, 24–34.
<https://doi.org/10.1016/j.fsisyn.2019.03.001>
- Elgohary, H. M., Darwish, S. M., & Elkaffas, S. M. (2022). Improving uncertainty in chain of custody for image forensics investigation applications. *IEEE Access*, 10, 14669–14679. <https://doi.org/10.1109/access.2022.3147809>
- Elliott, A. C., & Woodward, W. A. (2007). *Statistical analysis quick reference guidebook: With SPSS examples*. Sage.
<https://doi.org/10.4135/9781412985949>
- Elo, A. E. (1967). The proposed new USCF rating system: applications: Its development, theory, and applications. *Chess Life*, 22, 242–247. https://uscf1-nyc1.aodhosting.com/CL-AND-CR-ALL/CL-ALL/1967/1967_08.pdf
- Elwork, A., Sales, B. D., & Alfini, J. J. (1977). Juridic decisions: In ignorance of the law or in light of it? *Law and Human Behavior*, 1(2), 163–189.
<https://doi.org/10.1007/bf01053437>
- Ely, S. F., & Gill, J. R. (2023). Forensic pathology: Overview. In S. F. Ely & J. R. Gill (Eds.), *Principles of forensic pathology* (pp. 1–9). Elsevier.
<https://doi.org/10.1016/b978-0-323-91796-4.00012-x>
- Epstein, J. (2019). The testifying forensic discipline expert—A primer. *Wiley Interdisciplinary Reviews: Forensic Science*, 1(1), e1320.
<https://doi.org/10.1002/wfs2.1320>
- Expert Working Group for Human Factors in Handwriting Examination. (2020). *Forensic handwriting examination and human factors: Improving the practice through a systems approach* (NISTIR 8282). National Institute of Standards and Technology. <https://doi.org/10.6028/NIST.IR.8282>

- Faigman, D. L. (2012). The *Daubert* revolution and the birth of modernity: Managing scientific evidence in the age of science. *UC Davis Law Review*, 46(3), 893-930.
- Fakhouri, H. N., AlSharaiah, M. A., Al Hwaitat, A. K., Alkalaileh, M., & Dweikat, F. F. (2024, February). Overview of challenges faced by digital forensic. In *2024 2nd International Conference on Cyber Resilience (ICCR)* (pp. 1-8). IEEE.
<https://doi.org/10.1109/iccr61006.2024.10532850>
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G* Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41(4), 1149–1160.
<https://doi.org/10.3758/BRM.41.4.1149>
- Fazel, S., & Baillargeon, J. (2011). The health of prisoners. *The Lancet*, 377(9769), 956–965. [https://doi.org/10.1016/S0140-6736\(10\)61053-7](https://doi.org/10.1016/S0140-6736(10)61053-7)
- Feldon, D. F. (2016). The development of expertise in scientific research. In R. A. Scott, M. C. Buchmann, & S. M. Kosslyn (Eds.), *Emerging trends in the social and behavioral sciences*. Wiley.
<https://doi.org/10.1002/9781118900772.etrds0411>
- Fellows, C. S., Leith, P., & Ury, J. (2012). Assessing BAILII in 2012. *Legal Information Management*, 12(3), 158–164.
<https://doi.org/10.1017/s1472669612000412>
- Ferreira, P. A., & Wingrove, T. (2024). Expert witness training history and professional experience exert separable impacts on expert credibility perceptions. *Journal of Forensic Psychology Research and Practice*, 24(4), 524-540.
<https://doi.org/10.1080/24732850.2023.2181121>
- Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). Sage.

- Findley, K. A. (2012). Adversarial inquisitions: rethinking the search for the truth. *New York Law School Law Review*, 56, 911-941.
https://digitalcommons.nyls.edu/nyls_law_review/vol56/iss3/4/
- Flick, C., Smith, O. K. H., & Schweitzer, K. (2022). Influence of expert degree and scientific validity of testimony on mock jurors' perceptions of credibility. *Applied Cognitive Psychology*, 36(3), 494–507.
<https://doi.org/10.1002/acp.3935>
- Folkerth, R. D., Sampson, B. A., & Graham, J. K. (2025). Forensic pathology. *The New England Journal of Medicine*, 393(1), 62–71.
<https://doi.org/10.1056/NEJMra2406208>
- Forensic Science Regulator (2020). *Legal obligations* (Issue 8. FSR-I-400) UK Government <https://www.gov.uk/government/publications/legal-obligations-issue-8>
- Forrest, A. (2019). Forensic odontology in DVI: Current practice and recent advances. *Forensic Sciences Research*, 4(4), 316–330.
<https://doi.org/10.1080/20961790.2019.1678710>
- Fournier, L. R. (2016). The *Daubert* guidelines: Usefulness, utilization, and suggestions for improving quality control. *Journal of Applied Research in Memory and Cognition*, 5, 308-313. <https://doi.org/10.1016/j.jarmac.2016.06.012>
- Francese, S., & King, R. S. P. (Eds.). (2024). *Driving forensic innovation in the 21st century: Crossing the valley of death*. Springer Cham.
<https://doi.org/10.1007/978-3-031-56556-4>
- Frankel, M. (1975). The search for truth: An imperial view. *University of Pennsylvania Law Review*, 123(5), 1031–1059.
<https://doi.org/10.2307/3311524>

- Freckelton, I. (2011). Causality and the law. *Information Knowledge Systems Management, 10*(1-4), 373-395. <https://doi.org/10.3233/IKS-2012-0202>
- Freckelton, I. R., Reddy, P., & Selby, H. (2001). *Australian magistrates' perspectives on expert evidence: a comparative study*. Australian Institute of Judicial Administration Incorporated.
- Freeman, N. J., & Punzo, D. L. D. (2001). Effects of DNA and eyewitness evidence on juror decisions. *Psi Chi Journal of Psychological Research, 6*(3), 109–117. <https://doi.org/10.24839/1089-4136.jn6.3.109>
- Friedman, R. D. (2002). Squeezing *Daubert* out of the picture. *Seton Hall Law Review, 33*, 1047–1098.
- Garg, A. (2024). A dynamic theory of prosecutorial roles in adversarial trials. *Asian Journal of Law and Society, 11*(2), 152-177. <https://doi.org/10.1017/als.2024.12>
- Garrett, B. L. & Mitchell, G. (2017). The proficiency of experts. *University of Pennsylvania Law Review, 166*, 901-960. https://scholarship.law.upenn.edu/penn_law_review/vol166/iss4/3
- Garrett, B. L., & Neufeld, P. J. (2009). Invalid forensic science testimony and wrongful convictions. *Virginia Law Review, 95*(1), 1–97.
- Garrett, B. L., Crozier, W. E., Modjadidi, K., Liu, A. J., Kafadar, K., Yaffe, J., & Dodson, C. S. (2023). Sensitizing jurors to eyewitness confidence using “reason-based” judicial instructions. *Journal of Applied Research in Memory and Cognition, 12*(1), 141–157. <https://doi.org/10.1037/mac0000035>
- Gatowski, S. I., Dobbin, S. A., Richardson, J. T., Ginsburg, G. P., Merlino, M. L., & Dahir, V. (2001). Asking the gatekeepers: A national survey of judges on

- judging expert evidence in a post-*Daubert* world. *Law and Human Behavior*, 25, 433–458. <https://doi.org/10.1023/a:1012899030937>
- Ghatak, S., Muthukumaran, R. B., & Nachimuthu, S. K. (2013). A simple method of genomic DNA extraction from human samples for PCR–RFLP analysis. *Journal of Biomolecular Techniques*, 24(4), 224–231. <https://doi.org/10.7171/jbt.13-2404-001>
- Giannelli, P. C. (2010). Fallout from the NAS forensic science report. *Criminal Justice*, 25(3), 53–59.
- Gianvanni, E., & Sharman, S. J. (2015). Psychologists as expert witnesses in Australian courtrooms. *Psychiatry, Psychology and Law*, 22(6), 920–926. <https://doi.org/10.1080/13218719.2015.1019334>
- Griffin, L. (2015). Forensic evidence and the Court of Appeal for England and Wales. *British Journal of American Legal Studies*, 4(2), 619–650. <https://doi.org/10.1037/h0024833>
- Gigerenzer, G., & Gaissmaier, W. (2011). Heuristic decision making. *Annual Review of Psychology*, 62(1), 451–482. <https://doi.org/10.1146/annurev-psych-120709-145346>
- Gilson, C. C. (2010). *The admissibility of expert evidence in criminal proceedings in England and Wales* (Law Commission Consultation Paper No. 190) [Preprint]. <https://doi.org/10.2139/ssrn.1629148>
- Gobet, F. (2016). *Understanding expertise*. Macmillan Education UK. <https://doi.org/10.1007/978-1-137-57196-0>
- Goodman-Delahunty, J., & Hewson, L. (2010). *Improving jury understanding and use of DNA evidence* [Technical and Background Paper Series 36]. Australian Institute of Criminology.

- Goodman-Delahunty, J., Cossins, A., & O'Brien, K. (2011). A comparison of expert evidence and judicial directions to counter misconceptions in child sexual abuse trials. *Australian and New Zealand Journal of Criminology*, 44(2), 196–217. <https://doi.org/10.1177/0004865811405140>
- Goodman-Delahunty, J., & Wakabayashi, K. (2012). Adversarial forensic science experts: An empirical study of jury deliberation. *Current Issues in Criminal Justice*, 24(1), 85–103. <https://doi.org/10.1080/10345329.2012.12035946>
- Gould, J. W., & Barsky, A. E. (2004). *Clinicians in court*. Routledge.
- Goymer, A. (2014, February 4). *The importance of forensic science to the courts* [Oral presentation transcript]. Forensic Science Regulator, Quality Managers Conference, Birmingham, UK. <https://www.gov.uk/government/publications/his-honor-judge-andrew-goymer-oral-transcript>.
- Griffin, L. (2015). Forensic evidence and the Court of Appeal for England and Wales. *British Journal of American Legal Studies*, 4(2), 619–650.
- Grisso, T. (2003). *Evaluating competencies: Forensic assessments and instruments* (2nd ed.). Springer. <https://doi.org/10.2307/1143476>
- Grønnerød, C., Grøndahl, P., & Stridbeck, U. (2016). Forensic psychiatric experts under the legal microscope. *Legal and Criminological Psychology*, 21(1), 15–24. <https://doi.org/10.1111/lcrp.12037>
- Groscup, J. L., Penrod, S. D., Studebaker, C. A., Huss, M. T., & O'Neil, K. M. (2002). The effects of Daubert on the admissibility of expert testimony in state and federal criminal cases. *Psychology, Public Policy, and Law*, 8(4), 339–372. <https://doi.org/10.1037/1076-8971.8.4.339>
- Growns, B., Towler, A., Dunn, J. D., Salerno, J. M., Schweitzer, N. J., & Dror, I. E. (2022). Statistical feature training improves fingerprint-matching accuracy in

- novices and professional fingerprint examiners. *Cognitive Research: Principles and Implications*, 7, 60 <https://doi.org/10.1186/s41235-022-00413-6>
- Guarnera, L. A., Murrie, D. C., & Boccaccini, M. T. (2017). Why do forensic experts disagree? Sources of unreliability and bias in forensic psychology evaluations. *Translational Issues in Psychological Science*, 3(2), 143–152. <https://doi.org/10.1037/tps0000114>
- Guarnera, L., Giudice, O., Livatino, S., Paratore, A. B., Salici, A., & Battiato, S. (2023). Assessing forensic ballistics three-dimensionally through graphical reconstruction and immersive VR observation. *Multimedia Tools and Applications*, 82, 20655–20681. <https://doi.org/10.1007/s11042-022-14037-x>
- Guthrie, C., Rachlinski, J. J., & Wistrich, A. J. (2001). Inside the judicial mind. *Cornell Law Review*, 86(4), 777–830. <https://doi.org/10.2139/ssrn.257634>
- Hamer, D., & Edmond, G. (2019). Forensic science evidence, wrongful convictions and adversarial process. *University of Queensland Law Journal*, 38(2), 185–210.
- Hamm, R. M. (1988). Clinical intuition and clinical analysis: Expertise and the cognitive continuum. *Professional judgment: A reader in clinical decision making* (pp. 78–105). Cambridge University Press.
- Hammond, K. R. & Center for Research on Judgment and Policy, University of Colorado. (1981). *Principles of organization in intuitive and analytical cognition* (Report No. 231). <https://apps.dtic.mil/sti/pdfs/ADA096570.pdf>
- Hammond, K. R. (1988). Judgment and decision making in dynamic tasks. *Information and Decision Technologies*, 14(1), 3–14. <https://doi.org/10.21236/ada199907>

- Hammond, K. R. (2000). *Human judgment and social policy: Irreducible uncertainty, inevitable error, unavoidable injustice*. Oxford University Press.
<https://doi.org/10.1093/oso/9780195097344.001.0001>
- Hammond, K. R., Hamm, R. M., Grassia, J., & Pearson, T. (1987). Direct comparison of the efficacy of intuitive and analytical cognition in expert judgment. *IEEE Transactions on Systems, Man, and Cybernetics*, 17(5), 753–770.
<https://doi.org/10.1109/tsmc.1987.6499282>
- Hans, V. P., & Saks, M. J. (2018). Improving judge and jury evaluation of scientific evidence. *Daedalus*, 147, 164–180. https://doi.org/10.1162/daed_a_00527
- Hargis, A. B., & Patranella, J. R. (2010). Rethinking review: The increasing need for a practical standard of review on *Daubert* issues in place of *Joiner*. *South Texas Law Review*, 52, 409-424.
- Hastie, R., Penrod, S. D., & Pennington, N. (1983). *Inside the jury*. Harvard University Press. <https://doi.org/10.4159/harvard.9780674865945>
- Heilbrun, K., Marczyk, G., & DeMatteo, D. (2002). *Forensic mental health assessment: A casebook*. Oxford University Press.
<https://doi.org/10.1093/med:psych/9780199941551.001.0001>
- Helm, R. K. (2021). Evaluating witness testimony: Juror knowledge, false memory, and the utility of evidence-based directions. *The International Journal of Evidence & Proof*, 25(4), 264–285.
<https://doi.org/10.1177/13657127211031018>
- Himes, S., & Brandner, J. (2021). Online survey. In T. K. Shackelford & V. A. Weekes-Shackelford (Eds.), *Encyclopedia of evolutionary psychological science* (pp. 5579–5582). Springer. https://doi.org/10.1007/978-3-319-19650-3_1849

- Hirst, M. (2015). The expert witness and the criminal courts. *BJPsych Advances*, 21(5), 304–306. <https://doi.org/10.1192/apt.bp.115.014662>
- Hodgkinson, T., & James, M. (1990). *Expert evidence: Law and practice*. Sweet & Maxwell.
- Holobinko, A. (2012). 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. *Forensic Science International*, 222(1–3), 394.e1–394.e13. <https://doi.org/10.1016/j.forsciint.2012.06.001>
- Horan, J., & Goodman-Delahunty, J. (2020). Expert evidence to counteract jury misconceptions about consent in sexual assault cases: cases: Failures and lessons learned. *University of New South Wales Law Review*, 43(2), 707–737. <https://doi.org/10.53637/fdbi9255>
- Horsman, G. (2019). Tool testing and reliability issues in the field of digital forensics. *Digital Investigation*, 28, 163–175. <https://doi.org/10.1016/j.diin.2019.01.009>
- Horsman, G. (2023). The importance of digital evidence strategies. *WIREs Forensic Science*, 6(1), e1507. <https://doi.org/10.1002/wfs2.1507>
- House of Commons Science and Technology Committee. (2005). *Forensic science on trial: Seventh report of session 2004–05* (HC 96-I). The Stationery Office. <https://publications.parliament.uk/pa/cm200405/cmselect/cmsctech/96/96i.pdf>
- Hughes, N., & Karabiyik, U. (2020). Towards reliable digital forensics investigations through measurement science. *Wiley Interdisciplinary Reviews: Forensic Science*, 2(4), e1367. <https://doi.org/10.1002/wfs2.1367>
- Imrankhan, M., Viji, M., Sathishkumar, R., Gnanaprakash, T., Roshan, R. K., & Saravanan, G. (2024, December). Blockchain-based digital forensic data for

unbreakable trust and security. In *2024 International Conference on System, Computation, Automation and Networking (ICSCAN)* (pp. 1–6). Institute of Electrical and Electronics Engineers.

<https://doi.org/10.1109/icscan62807.2024.10894341>

Ireland, J., & Beaumont, J. (2015). Admitting scientific expert evidence in the UK: Reliability challenges and the need for revised criteria—Proposing an abridged *Daubert*. *The Journal of Forensic Practice*, 17, 3–12. <https://doi.org/10.1108/JFP-03-2014-0008>

Islam, M. K., Rastegarnia, A., & Sanei, S. (2020). Signal artifacts and techniques for artifacts and noise removal. In M. A. R. Ahad & M. U. Ahmed (Eds.), *Signal processing techniques for computational health informatics* (Intelligent Systems Reference Library, Vol. 192, pp. 23–79). Springer.

https://doi.org/10.1007/978-3-030-54932-9_2

Ivković, S. K. & Hans, V. P. (2003). Jurors' evaluations of expert testimony: Judging the messenger and the message. *Law & Social Inquiry*, 28(2), 441–482.

<https://doi.org/10.1111/j.1747-4469.2003.tb00198.x>

Jackson, J. (2009). Finding the best epistemic fit for international criminal tribunals:

Beyond the adversarial–inquisitorial dichotomy. *Journal of International Criminal Justice*, 7(1), 17–39. <https://doi.org/10.1093/jicj/mqp008>

Jackson, J. D. (2016). Responses to Salduz: procedural tradition, change and the need for effective defence. *The Modern Law Review*, 79(6), 987–1018.

<https://doi.org/10.1111/1468-2230.12227>

Jackson, R., & Roesch, R. (Eds.). (2016). *Learning forensic assessment: Research and practice* (2nd ed.). Routledge.

- Jhangiani, R. S., Chiang, I. C. A., Cuttler, C., & Leighton, D. C. (2019). *Research methods in psychology*. Kwantlen Polytechnic University.
- Jiménez, F. (2024). On legal expertise. *American Journal of Jurisprudence*, 69, 149-162.
<https://doi.org/10.1093/ajj/auae017>
- Johan, J. L. (2024). *Developing and testing a checklist to improve scientific reasoning in complex decision tasks* [Doctoral dissertation, University of New South Wales].
<https://doi.org/10.26190/unsworks/30672>
- Johan, J. L. (2024). *Developing and testing a checklist to improve scientific reasoning in complex decision tasks* (Doctoral dissertation, University of New South Wales (Australia)). <https://doi.org/10.26190/unsworks/30672>
- Jones, A. C., Repke, A., Batastini, A. B., Sacco, D., Dahlen, E. R., & Mohn, R. S. (2023). The power of presentation: How attire, cosmetics, and posture impact the source credibility of women expert witnesses. *Journal of Forensic Sciences*, 68(3), 962-971.
- Jones, G. M., & Winster, S. G. (2022). An insight into digital forensics: History, frameworks, types and tools. In M. M. Ghonge, S. Pramanik, R. Mangrulkar, & D.-N. Le (Eds.), *Cyber security and digital forensics: Challenges and future trends* (pp. 105–125). Wiley.
<https://doi.org/10.1002/9781119795667.ch6>
- Judiciary of England and Wales. (2023). Expert evidence (Section 7). In *Criminal Practice Directions 2023* (pp. 67–72). <https://www.judiciary.uk/wp-content/uploads/2023/04/Criminal-Practice-Directions-2023.pdf>
- Jung, J., Concannon, C., & Shroff, R. (2017). Simple rules for complex decisions. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2919024>
- Kahneman, D. (2011). *Thinking, fast and slow*. Allen Lane.

- Kaplan, J., Ling, S., & Cuellar, M. (2020). Public beliefs about the accuracy and importance of forensic evidence in the United States. *Science & Justice*, 60(3), 263–272. <https://doi.org/10.1016/j.scijus.2020.01.001>
- Kassin, S. M., Drizin, S. A., Grisso, T., Gudjonsson, G. H., Leo, R. A., & Redlich, A. D. (2010). Police-induced confessions: Risk factors and recommendations. *Law and Human Behavior*, 34(1), 3–38. <https://doi.org/10.1007/s10979-009-9188-6>
- Kassin, S. M., Dror, I. E., & Kukucka, J. (2013). The forensic confirmation bias: Problems, perspectives, and proposed solutions. *Journal of Applied Research in Memory and Cognition*, 2(1), 42–52. <https://doi.org/10.1016/j.jarmac.2013.01.001>
- Katz, J. (1992). “The fallacy of the impartial expert” revisited. *Journal of the American Academy of Psychiatry and the Law Online*, 20(2), 141-152.
- Kävrestad, J. (2020). *Fundamentals of digital forensics*. Springer International Publishing. <https://doi.org/10.1007/978-3-030-38954-3>
- Kaye, D. H. (2018). How Daubert and its progeny have failed criminalistics evidence and a few things the judiciary could do about it. *Fordham Law Review*, 86, 1639. <https://ir.lawnet.fordham.edu/flr/vol86/iss4/7>
- Kazaure, A. A., Jantan, A., & Yusoff, M. N. (2023). Digital forensics investigation approaches in mitigating cybercrimes: A review. *Journal of Information Science Theory and Practice*, 11(4), 14-39.
- Keating, L. A., & Walker, B. W. (2025). Lay theories of expertise: A mixed-methods exploration. *Journal of Management Studies*. Advance online publication. <https://doi.org/10.1111/joms.13188>

- Khan, A. A., Shaikh, A. A., & Laghari, A. A. (2023). IoT with multimedia investigation: A secure process of digital forensics chain-of-custody using blockchain hyperledger sawtooth. *Arabian Journal for Science and Engineering*, 48(8), 10173-10188. <https://doi.org/10.1007/s13369-022-07555-1>
- Kim, C. (2016). Adversarial bias, litigation, and the *Daubert* test: An economic approach. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2760819>
- Koehler, J. J. (2011). If the shoe fits they might acquit: The value of forensic science testimony. *Journal of Empirical Legal Studies*, 8, 21–48. <https://doi.org/10.1111/j.1740-1461.2011.01225.x>
- Koehler, J. J. (2013). Proficiency tests to estimate error rates in the forensic sciences. *Law, Probability and Risk*, 12(1), 89–98. <https://doi.org/10.1093/lpr/mgs013>
- Koehler, J. J., Mnookin, J. L., Cole, S. A., Dror, I. E., Risinger, D. M., Siegel, J., Fisher, B. A. J., Houk, M., Inman, K., Kaye, D. H., Langenburg, G., Stoney, D. A., & Rudin, N. (2011). The need for a research culture in the forensic sciences. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.1755722>
- Koehler, J. J., Schweitzer, N. J., Saks, M. J., & McQuiston, D. E. (2016). Science, technology, or the expert witness: What influences jurors judgments about forensic science testimony? *Psychology, Public Policy, and Law*, 22(4), 401-413. <https://doi.org/10.1037/law0000103>
- Komar, D. A., & Buikstra, J. E. (2008). *Forensic anthropology: Contemporary theory and practice*. Oxford University Press.
- Koppl, R. (2010). Organization economics explains many forensic science errors. *Journal of Institutional Economics*, 6(1), 71–81.

- Koppl, R. (2015). The rule of experts. In P. J. Boettke & C. J. Coyne (Eds.), *The Oxford handbook of Austrian economics* (pp. 343–363). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199811762.013.15>
- Kotsoglou, K. N., & Biedermann, A. (2022). Inroads into the ultimate issue rule? Structural elements of communication between experts and fact-finders. *The Journal of Criminal Law*, 86(4), 223–240. <https://doi.org/10.1177/00220183211073640>
- Kovera, M. B., & McAuliff, B. D. (2000). The effects of peer review and evidence quality on judge evaluations of psychological science: Are judges effective gatekeepers? *Journal of Applied Psychology*, 85(4), 574–586. <https://doi.org/10.1037/0021-9010.85.4.574>
- Krane, D. E., Ford, S., Gilder, J. R., Inman, K., Jamieson, A., Koppl, R., Kornfield, I. L., Michael Risinger, D., Rudin, N., Taylor, M. S., & Thompson, W. C. (2008). Sequential unmasking: A means of minimizing observer effects in forensic DNA interpretation. *Journal of Forensic Sciences*, 53(4), 1006–1007. <https://doi.org/10.1111/j.1556-4029.2008.00787.x>
- Krauss, D. A., & Sales, B. D. (2001). The effects of clinical and scientific expert testimony on juror decision making in capital sentencing. *Psychology, Public Policy, and Law*, 7(2), 267–310. <https://doi.org/10.1037//1076-8971.7.2.267>
- Kukucka, J., & Kassin, S. M. (2014). Do confessions taint perceptions of handwriting evidence? An empirical test of the forensic confirmation bias. *Law and Human Behavior*, 38(3), 256–270. <https://doi.org/10.1037/lhb0000066>
- LaBat, D. E., Goldfarb, D., Evans, J. R., Compo, N. S., Koolmees, C. J., LaPorte, G., & Lothridge, K. (2023). Improving juror assessments of forensic testimony and its effects on decision-making and evidence evaluation. *Law and Human Behavior*, 47(5), 566–578. <https://doi.org/10.1037/lhb0000539>

- Landsman, S. (1984). *The adversary system: A description and defense* (AEI studies in legal policy, Issue 390). American Enterprise Institute for Public Policy Research.
- The Law Commission. (2011). *Expert evidence in criminal proceedings in England and Wales* (Law Com No 325; HC 829). The Stationery Office.
<https://assets.publishing.service.gov.uk/media/5a7cc0c0e5274a38e575689b/0829.pdf>
- Leith, P., & Fellows, C. (2010). Enabling free online access to UK law reports: The copyright problem. *International Journal of Law and Information Technology*, 18(1), 72–93. <https://doi.org/10.1093/ijlit/eap001>
- Leventhal, G. S. (1980). What should be done with equity theory? In K. J. Gergen, M. S. Greenberg, & R. H. Willis (Eds.), *Social exchange: Advances in theory and research* (pp. 27–55). Springer. https://doi.org/10.1007/978-1-4613-3087-5_2
- Levett, L. M., & Kovera, M. B. (2008). The effectiveness of opposing expert witnesses for educating jurors about unreliable expert evidence. *Law and Human Behavior*, 32(4), 363–374. <https://doi.org/10.1007/s10979-007-9113-9>
- Lieberman, J. D., Carrell, C. A., Miethe, T. D., & Krauss, D. A. (2008). Gold versus platinum: Do jurors recognize the superiority and limitations of DNA evidence compared to other types of forensic evidence? *Psychology, Public Policy, and Law*, 14(1), 27–62. <https://doi.org/10.1037/1076-8971.14.1.27>
- Ling, S., Kaplan, J., & Berryessa, C. M. (2021). The importance of forensic evidence for decisions on criminal guilt. *Science & Justice*, 61(2), 142–149.
<https://doi.org/10.1016/j.scijus.2020.11.004>

- Macedo Júnior, R.P. (2023). Education: Legal. In M. Sellers & S. Kirste (Eds.), *Encyclopedia of the philosophy of law and social philosophy* (pp. 846–850). Springer.
https://doi.org/10.1007/978-94-007-6519-1_519
- Maculan, E., & Gil Gil, A. (2020). The rationale and purposes of criminal law and punishment in transitional contexts. *Oxford Journal of Legal Studies*, 40(2), 132-157. <https://doi.org/10.1093/ojls/gqz033>
- Maeder, E. M., Ewanation, L. A., & Monnink, J. (2017). Jurors' perceptions of evidence: The relative influence of DNA and eyewitness testimony when presented by opposing parties. *Journal of Police and Criminal Psychology*, 32(1), 33–42. <https://doi.org/10.1007/s11896-016-9194-9>
- Manikam, V., Rajamanickam, R., Dahlan, N. K., & Dahlan, N. K. (2025). Importance and reliability of ear print analysis as evidence. *Journal of Posthumanism*, 5(3) 296-304. <https://doi.org/10.63332/joph.v5i3.736>
- Martire, K. A., Ballantyne, K. N., Bali, A., Edmond, G., Kemp, R. I., & Found, B. (2019). Forensic science evidence: Naive estimates of false positive error rates and reliability. *Forensic Science International*, 302, 109877.
<https://doi.org/10.1016/j.forsciint.2019.109877>
- Martire, K. A., Neal, T. M., Gobet, F., Chin, J. M., Berengut, J. F., & Edmond, G. (2025). Psychological insights for judging expertise and implications for adversarial legal contexts. *Nature Reviews Psychology*, 4, 264-276. <https://doi.org/10.1038/s44159-025-00430-4>
- Maturana, F., & Tacconi, S. (2013). A machine learning-based triage methodology for automated categorization of digital media. *Digital Investigation*, 10(2), 193-204.
<https://doi.org/10.1016/j.diin.2013.01.001>

- McCarthy Wilcox, A., & NicDaeid, N. (2018). Jurors' perceptions of forensic science expert witnesses: Experience, qualifications, testimony style and credibility. *Forensic Science International*, 291, 100–108. <https://doi.org/10.1016/j.forsciint.2018.07.030>
- McCartney, C., & Amoako, E. N. (2019). Accreditation of forensic science service providers. *Journal of Forensic and Legal Medicine*, 65, 143-145. <https://doi.org/10.1016/j.jflm.2019.04.004>
- McClellan, E. (1997). Sharpening the focus on *Daubert's* distinction between scientific and nonscientific expert testimony. *San Diego Law Review*, 34, 1719–1786.
- McCroskey, J. C. (1966). Scales for the measurement of ethos. *Speech Monographs*, 33(1), 65–72. <https://doi.org/10.1080/03637756609375482>
- McEwan, J. (2011). From adversarialism to managerialism: criminal justice in transition. *Legal Studies*, 31(4), 519-546. <https://doi.org/10.1111/j.1748-121x.2011.00201.x>
- McHugh, M. L. (2013). The chi-square test of independence. *Biochemia Medica*, 23(2), 143–149. <https://doi.org/10.11613/bm.2013.018>
- McPhee, K. C. (2012). *Juror perceptions of forensic evidence* [Unpublished undergraduate honours thesis, University of Calgary].
- McQuiston–Surrett, D., & Saks, M. J. (2009). The testimony of forensic identification science: What expert witnesses say and what factfinders hear. *Law and Human Behavior*, 33, 436–453. <https://doi.org/10.1007/s10979-008-9169-1>
- Mehta, C. R., & Patel, N. R. (1983). A network algorithm for performing Fisher's exact test in $r \times c$ contingency tables. *Journal of the American Statistical*

Association, 78(382), 427-434.

<https://doi.org/10.1080/01621459.1983.10477989>

Meijerman, L., Thean, A., & Maat, G. (2005). Earprints in forensic investigations.

Forensic Science, Medicine, and Pathology, 1(4), 247–256.

<https://doi.org/10.1385/fsmp:1:4:247>

Meintjes-Van der Walt, L. (2001). Cross-examination of expert witnesses. *De Rebus*, (396), 22-25.

Melchionda, F., Pesaresi, M., Alessandrini, F., Onofri, V., & Turchi, C. (2025).

Developmental validation of a multiplex qPCR assay for simultaneous quantification of nuclear and mitochondrial DNA. *Forensic Science International: Genetics*, 74, 103164.

<https://doi.org/10.1016/j.fsigen.2024.103164>

Meuwly, D. (2009). Fingerprint. In S. Z. Li & A. K. Jain (Eds.), *Encyclopedia of biometrics* (pp. 528–535). Springer. https://doi.org/10.1007/978-0-387-73003-5_181

Miehe, S. (2022). Expert characteristics and the impact it has on credibility in the eyes of the jury. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.4783006>

Miller, L. W. (1987). Cross-examination of expert witnesses: Dispelling the aura of reliability. *University of Miami Law Review*, 42(4), 1073-1099.

Ministry of Justice. (2014). *Criminal Procedure Rules: Part 33—Expert evidence* (as in force 6 October 2014). [legislation.gov.uk](https://www.justice.gov.uk/legislation.gov.uk).

<https://www.justice.gov.uk/courts/procedure-rules/criminal/docs/crim-procrules-2014-part-33.pdf>

Ministry of Justice. (2025, March 27). *Criminal court statistics quarterly: October to December 2024*. GOV.UK.

<https://www.gov.uk/government/statistics/criminal-court-statistics-quarterly-october-to-december-2024>

- Mohsin, D. K. (2024). The significance of forensic and scientific evidence and their admissibility in criminal law. *SSRN Electronic Journal*. Available at SSRN 4960559. <https://doi.org/10.2139/ssrn.4960559>
- Mondak, J. J. (1990). Perceived legitimacy of Supreme Court decisions: Three functions of source credibility. *Political Behavior*, 12, 363-384. <https://doi.org/10.1007/bf00992794>
- Mopas, M. (2007). Examining the 'CSI effect' through an ANT lens. *Crime, Media, Culture: An International Journal*, 3(1), 110-117. <https://doi.org/10.1177/1741659007074455>
- Morgan, R. M. (2017). Conceptualising forensic science and forensic reconstruction. Part I: a conceptual model. *Science & Justice*, 57(6), 455-459. <https://doi.org/10.1016/j.scijus.2017.06.002>
- Morrison, G. S. (2018). Admissibility of forensic voice comparison testimony in England and Wales. *Criminal Law Review*, 2018(1), 20-33.
- Murrie, D. C., & Boccaccini, M. T. (2015). Adversarial allegiance among expert witnesses. *Annual Review of Law and Social Science*, 11(1), 37-55. <https://doi.org/10.1146/annurev-lawsocsci-120814-121714>
- Murrie, D. C., Boccaccini, M. T., Guarnera, L. A., & Rufino, K. A. (2013). Are forensic experts biased by the side that retained them? *Psychological Science*, 24(10), 1889-1897. <https://doi.org/10.1177/0956797613481812>
- National Research Council. (2009). *Strengthening forensic science in the United States: A path forward*. National Academies Press. <https://doi.org/10.21428/cb6ab371.b2d683d2>

- Neal, T. M. (2009). Expert witness preparation: What does the literature tell us. *The Jury Expert*, 21(2), 44–52.
- Neal, T. M. S., Slobogin, C., Saks, M. J., Faigman, D. L., & Geisinger, K. F. (2019). Psychological assessments in legal contexts: Are courts keeping “junk science” out of the courtroom? *Psychological Science in the Public Interest*, 20(3), 135–164. <https://doi.org/10.1177%2F1529100619888860>
- Neha, Gupta, P., Khan, I. R., & Alam, M. (2023). Digital and IoT forensic: Recent trends, methods and challenges. In R. Jain, C. M. Travieso, & S. Kumar (Eds.), *Cybersecurity and evolutionary data engineering* (ICCEDE 2022) (Lecture Notes in Electrical Engineering, Vol. 1073, pp. 59–68). Springer. https://doi.org/10.1007/978-981-99-5080-5_6
- Nelufule, N., Masango, M., & Singano, T. (2024). *The future of digital forensic investigations: Keeping the pace with technological advancements*. In 2024 47th MIPRO ICT and Electronics Convention (MIPRO) (pp. 1843–1848). IEEE. <https://doi.org/10.1109/mipro60963.2024.10569461>
- Neuert, J., & Hoeckel, C. A. (2013). The impact of personality traits and problem structures on management decision-making outcomes. *Journal of Modern Accounting and Auditing*, 9(3), 79–96. <https://doi.org/10.1504/jbm.2013.141216>
- Nicholson, A. S., Yarbrough, A. M., & Penrod, S. D. (2014). Jury decision making and eyewitness testimony. In G. Bruinsma & D. Weisburd (Eds.), *Encyclopedia of criminology and criminal justice* (pp. 2727–2735). Springer. https://doi.org/10.1007/978-1-4614-5690-2_670
- Nivette, A., Nägel, C., & Stan, A. (2024). The use of experimental vignettes in studying police procedural justice: A systematic review. *Journal of*

- Experimental Criminology*, 20(1), 151–186. <https://doi.org/10.1007/s11292-022-09529-7>
- Norris, R. J., Bonventre, C. L., Redlich, A. D., Acker, J. R., & Lowe, C. (2017). Preventing wrongful convictions: an analysis of state investigation reforms. *Criminal Justice Policy Review*, 30(4), 597–626. <https://doi.org/10.1177/0887403416687359>
- Notley, R. G. (2011). Expert witnesses criticised. *Clinical Risk*, 17(1), 1–2. <https://doi.org/10.1258/cr.2010.010033>
- O'Brian, W. E. (2003). Court scrutiny of expert evidence: Recent decisions highlight the tensions. *The International Journal of Evidence & Proof*, 7(3), 172–184. <https://doi.org/10.1177/136571270300700302>
- O'Neill Shermer, L., Rose, K. C., & Hoffman, A. (2011). Perceptions and credibility: Understanding the nuances of eyewitness testimony. *Journal of Contemporary Criminal Justice*, 27(2), 183–203. <https://doi.org/10.1177/1043986211405886>
- Ormerod, D. (2017). Sounding out expert voice identification. *Expert evidence and scientific proof in criminal trials* (pp. 283–302). Routledge. <https://doi.org/10.4324/9781315094205-9>
- Osborne, J. W. (2010). Data cleaning basics: Best practices in dealing with extreme scores. *Newborn and Infant Nursing Reviews*, 10(1), 37–43. <https://doi.org/10.1053/j.nainr.2009.12.009>
- Paas, F., Renkl, A., & Sweller, J. (2004). Cognitive load theory: Instructional implications of the interaction between information structures and cognitive architecture. *Instructional Science*, 32(1–2), 1–8. <https://doi.org/10.1023/b:truc.0000021806.17516.d0>

- Pallivalappil, A. S., & Jagadeesha, S. N. (2022). Procedures for digital forensics and incident response including data-integrity constraints on solid-state drives (SSD): A literature review. *International Journal of Case Studies in Business, IT, and Education*, 6(1), 328–350.
<https://doi.org/10.47992/ijcsbe.2581.6942.0167>
- Pearson, E. S., Pearson, K. & Hartley, H. O. (1958). *Biometrika tables for statisticians* (Vol. 1). Cambridge University Press.
- Pearson, J. M., Law, J. R., Skene, J. A. G., Beskind, D. H., Vidmar, N., Ball, D. A., Malekpour, A., Carter, R. M., & Skene, J. P. (2018). Modelling the effects of crime type and evidence on judgments about guilt. *Nature Human Behaviour*, 2(11), 856–866. <https://doi.org/10.1038/s41562-018-0451-z>
- Peña, M. M., Stoiloff, S., Sparacino, M., & Schreiber Compo, N. (2024). The effects of cognitive bias, examiner expertise, and stimulus material on forensic evidence analysis. *Journal of Forensic Sciences*, 69(5), 1740–1757.
<https://doi.org/10.1111/1556-4029.15565>
- Perillo, J. T., Perillo, A. D., Despodova, N. M., & Kovera, M. B. (2021). Testing the waters: An investigation of the impact of hot tubbing on experts from referral through testimony. *Law and Human Behavior*, 45(3), 229–242.
<https://doi.org/10.1037/lhb0000446>
- Perumal, S. (2009). Digital forensic model based on Malaysian investigation process. *International Journal of Computer Science and Network Security*, 9(8), 38-44.
- Petty, R. E., & Cacioppo, J. T. (1986). *Communication and persuasion: Central and peripheral routes to attitude change*. Springer. https://doi.org/10.1007/978-1-4612-4964-1_6

- Polanyi, M. (1962). Tacit knowing: Its bearing on some problems of philosophy. *Reviews of Modern Physics*, 34(4), 601-616.
<https://doi.org/10.1103/revmodphys.34.601>
- Pollitt, M. (2010). A history of digital forensics. In K. P. Chow & S. Shenoi (Eds.), *Advances in Digital Forensics VI: Digital Forensics 2010* (IFIP Advances in Information and Communication Technology, Vol. 337, pp. 3–15). Springer.
https://doi.org/10.1007/978-3-642-15506-2_1
- President's Council of Advisors on Science and Technology. (2016). *Forensic science in criminal courts: Ensuring scientific validity of feature-comparison methods*. Executive Office of the President of the United States.
https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_forensic_science_report_final.pdf
- Prestwich, G. D. (2012). From classroom to courtroom: Can academics be effective expert witnesses? *Materials Today*, 15(9), 406–409. [https://doi.org/10.1016/S1369-7021\(12\)70167-0](https://doi.org/10.1016/S1369-7021(12)70167-0)
- Quick, D., & Choo, K. K. R. (2018). Digital forensic intelligence: Data subsets and Open Source Intelligence (DFINT+ OSINT): A timely and cohesive mix. *Future Generation Computer Systems*, 78, 558-567.
<https://doi.org/10.1016/j.future.2016.12.032>
- Raghavan, S. (2013). Digital forensic research: Current state of the art. *CSI Transactions on ICT*, 1(1), 91–114. <https://doi.org/10.1007/s40012-012-0008-7>
- Rajeev, A., & Raviraj, P. (2023). An insightful analysis of digital forensics effects on networks and multimedia applications. *SN Computer Science*, 4(2), 186-194.
<https://doi.org/10.1007/s42979-022-01599-8>

- Rathnayaka, G., Gonawala, S., Dananjana, P., Arambawela, J., Senarathne, A., & Siriwardena, D. (2024, December). A BERT-based approach to keyword search for digital evidence analysis. In *2024 6th International Conference on Advancements in Computing (ICAC)* (pp. 258–263). IEEE.
<https://doi.org/10.1109/icac64487.2024.10851073>
- Redmayne, M. (2001). *Expert evidence and criminal justice*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780198267805.003.0005>
- Reedy, P. (2023). Interpol review of digital evidence for 2019–2022. *Forensic Science International: Synergy*, 6, 100313.
<https://doi.org/10.1016/j.fsisyn.2022.100313>
- Reesu, G. V., & Brown, N. L. (2016). Inconsistency in opinions of forensic odontologists when considering bite mark evidence. *Forensic Science International*, 266, 263–270. <https://doi.org/10.1016/j.forsciint.2016.06.002>
- Reinhard, M. A., & Sporer, S. L. (2008). Verbal and nonverbal behaviour as a basis for credibility attribution: The impact of task involvement and cognitive capacity. *Journal of Experimental Social Psychology*, 44(3), 477–488.
<https://doi.org/10.1016/j.jesp.2007.07.012>
- Reinhard, M. A., & Sporer, S. L. (2010). Content versus source-cue information as a basis for credibility judgments. *Social Psychology*, 41(2), 93–104.
<https://doi.org/10.1027/1864-9335/a000014>
- Rezaee, Z., Elmore, R. C., & Spiceland, D. (2004). Endowed chairs in accounting worldwide. *Accounting Education*, 13(1), 29–50. <https://doi.org/10.1080/0963928042000174483>
- Rix, K. (2021) Expert evidence: Frequently asked questions. *Journal of Forensic and Legal Medicine*, 77, 102106. <https://doi.org/10.1016/j.jflm.2020.102106>

- Rix, K. J. B. (2015). When is an expert not an expert? Question time for expert psychiatric witnesses. *BJPsych Advances*, 21(5), 295–303.
<https://doi.org/10.1192/apt.bp.115.014464>
- Roberts, P. (2013). Renegotiating forensic cultures: Between law, science and criminal justice. *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*, 44(1), 47–59. <https://doi.org/10.1016/j.shpsc.2012.09.010>
- Roberts, P., & Zuckerman, A. (2010). *Criminal evidence*. Oxford University Press.
- Roberts, P., & O'Brian, W. (2014). Scientific evidence in criminal prosecutions. In G. Bruinsma & D. Weisburd (Eds.), *Encyclopedia of criminology and criminal justice* (pp. 4701–4715). Springer. https://doi.org/10.1007/978-1-4614-5690-2_229
- Roberts, S. (2017). Fresh evidence and factual innocence in the Criminal Division of the Court of Appeal. *The Journal of Criminal Law*, 81(4), 303–327.
<https://doi.org/10.1177/0022018317713567>
- Roth, A. (2010). Safety in numbers—Deciding when DNA alone is enough to convict. *New York University Law Review*, 85, 101–153.
- Roux, C., Talbot-Wright, B., Robertson, J., Crispino, F., & Ribaux, O. (2015). The end of the (forensic science) world as we know it? The example of trace evidence. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 370(1674), 20140260. <https://doi.org/10.1098/rstb.2014.0260>
- Royal College of Psychiatrists. (n.d.). *Forensic psychiatry*.
<https://www.rcpsych.ac.uk/become-a-psychiatrist/choose-psychiatry/what-is-psychiatry/types-of-psychiatrist/forensic-psychiatry>
- Royal Society, Royal Society of Edinburgh, Judicial College, Judicial Institute, & Judicial Studies Board for Northern Ireland (2020). *Forensic DNA analysis: A primer for*

- courts. The Royal Society. <https://royalsociety.org/~media/about-us/programmes/science-and-law/royal-society-forensic-dna-analysis-primer-for-courts.pdf>
- Ryle, G. (1946). I.—Knowing how and knowing that: The presidential address. *Proceedings of the Aristotelian Society*, 46, 1–16. <https://doi.org/10.1093/aristotelian/46.1.1>
- Sadoski, M., & Paivio, A. (n.d.). A dual coding theoretical model of reading. *Theoretical Models and Processes of Reading*, 5, 1329–1362.
- Saks, M. J., & Faigman, D. L. (2005). Expert evidence after *Daubert*. *Annual Review of Law and Social Science*, 1, 105–130. <https://doi.org/10.1146/annurev.lawsocsci.1.041604.115907>
- Saks, M. J., & Faigman, D. L. (2008). Failed forensics: How forensic science lost its way and how it might yet find it. *Annual Review of Law and Social Science*, 4, 149–171. <https://doi.org/10.1146/annurev.lawsocsci.4.110707.172303>
- Saks, M. J., & Koehler, J. J. (2005). The coming paradigm shift in forensic identification science. *Science*, 309(5736), 892–895. <https://doi.org/10.1126/science.1111565>
- Saks, M. J., & Koehler, J. J. (2008). The individualization fallacy in forensic science evidence. *Vanderbilt Law Review*, 61, 199–219.
- Saks, M. J., & Spellman, B. A. (2016). *The psychological foundations of evidence law*. New York University Press. <https://doi.org/10.18574/nyu/9780814783887.001.0001>
- Sala, G., & Gobet, F. (2017). Does far transfer exist? Negative evidence from chess, music, and working memory training. *Current Directions in Psychological Science*, 26(6), 515–520. <https://doi.org/10.1177/0963721417712760>

- Sanders, J. (2009). Science, law, and the expert witness. *Law and Contemporary Problems*, 72, 63–90. <https://www.jstor.org/stable/40647166>
- Sangero, B. (2021). Safety in forensic science. *Ohio State Law Journal Online*, 82, 221–234. <http://hdl.handle.net/1811/93279>
- Sapir, G. I. (2007, February). Qualifying the expert witness: A practical voir dire. *Forensic Magazine*, 4(1), 30, 32–36, 38–39. <https://www.chm.uri.edu/forensics/courses/Appendix - forensic science & expert witness/Voir Dire.pdf>
- Schauer, F., & Spellman, B. A. (2013). Is expert evidence really different? *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2210397>
- Schneider, E. M. (2009). The changing shape of federal civil pretrial practice: The disparate impact on civil rights and employment discrimination cases. *University of Pennsylvania Law Review*, 158, 517–570.
- Scobie, C., Semmler, C., & Proeve, M. (2019). Considering forensic science: Individual differences, opposing expert testimony and juror decision making. *Psychology, Crime & Law*, 25(1), 23–49. <https://doi.org/10.1080/1068316x.2018.1488976>
- Selim, A., & Ali, İ. (2024). The role of digital forensic analysis in modern investigations. *Journal of Emerging Computer Technologies*, 4(1), 1–5. <https://doi.org/10.57020/ject.1445625>
- Sharma, S., & Nath Mukherjee, B. (2024). *Law and emerging issues*. Routledge. <https://doi.org/10.4324/9781003428213>
- Shorter, L., Cobain R., & Maidland, G. (2022). Experts, who needs them? Judicial inconsistency in instruction, admission and interpretation of forensic expertise. *Medicine, Science and the Law*, 62(4), 256–260. <https://doi.org/10.1177/00258024221111916>

- Shuman, D. W., Whitaker, E., & Champagne, A. (1993). An empirical examination of the use of expert witnesses in the courts—Part II: A three-city study. *Jurimetrics*, 34, 193–208.
- Shuttleworth, M. (2021). *Descriptive research design*. Explorable.
<https://explorable.com/descriptive-research-design>
- Simon, D. (2019). On juror decision making: An empathic inquiry. *Annual Review of Law and Social Science*, 15, 415–435. <https://doi.org/10.1146/annurev-lawsocsci-101518-042658>
- Simon, H. A. (1990). Bounded rationality. In J. Eatwell, M. Milgate, & P. Newman (Eds.), *Utility and probability* (pp. 15–18). Palgrave Macmillan..
https://doi.org/10.1007/978-1-349-20568-4_5
- Simon-Kerr, J. (2021). Credibility in an age of algorithms. *Rutgers University Law Review*, 74, 111–159.
- Sjerps, M. J., & Berger, C. E. H. (2012). How clear is transparent? Reporting expert reasoning in legal cases. *Law, Probability & Risk*, 11(4), 317–329.
<https://doi.org/10.1093/lpr/mgs017>
- Skipanes, M., Pratama, N., Porter, K., & Demartini, G. (2025, April 1). Fast synthetic data generation for case-specific entity extraction in criminal investigations. In *Proceedings of the Digital Forensics Doctoral Symposium (DFDS '25)* (pp. 1–8). Association for Computing Machinery.
<https://doi.org/10.1145/3712716.3712719>
- Slesnick, F. (1998). *Science on trial—The clash of medical evidence and the law in the breast implant case* [Review of the book *Science on trial*, by M. Angell]. *Journal of Forensic Economics*, 11(3), 271–273.
<https://doi.org/10.5085/jfe.11.3.271>

- Smalarz, L., Madon, S., Yang, Y., Gyll, M., & Buck, S. (2016). The perfect match: Do criminal stereotypes bias forensic evidence analysis? *Law and Human Behavior*, 40(4), 420–429. <https://doi.org/10.1037/lhb0000190>
- Smit, N. M., Morgan, R. M., & Lagnado, D. A. (2017). A systematic analysis of misleading evidence in unsafe rulings in England and Wales. *CrimRxiv*. <https://doi.org/10.21428/cb6ab371.f62d8498>
- Smith, L. L., Bull, R., & Holliday, R. (2011). Understanding juror perceptions of forensic evidence: Investigating the impact of case context on perceptions of forensic evidence strength. *Journal of Forensic Sciences*, 56(2), 409-414. <https://doi.org/10.1111/j.1556-4029.2010.01671.x>
- Smith, L. L., & Bull, R. (2012). Identifying and measuring juror pre-trial bias for forensic evidence: Development and validation of the Forensic Evidence Evaluation Bias Scale. *Psychology, Crime & Law*, 18(9), 797-815. <https://doi.org/10.1080/1068316x.2011.561800>
- Smith, M., & Miller, S. (2021). The rise of biometric identification: Fingerprints and applied ethics. In E. Mordini & D. Tzovaras (Eds.), *Biometric identification, law and ethics* (pp. 1–19). Springer.. https://doi.org/10.1007/978-3-030-90256-8_1
- Smith, V. L. (1991). Impact of pretrial instruction on jurors' information processing and decision making. *Journal of Applied Psychology*, 76(2), 220–228. <https://doi.org/10.1037//0021-9010.76.2.220>
- Snowdon, P. (2004). Knowing how and knowing that: A distinction reconsidered. *Proceedings of the Aristotelian Society*, 104(1), 1–29. <https://doi.org/10.1111/j.0309-7013.2004.00079.x>

- Solomon, D. (2019, April 10). Insight: What makes a great expert witness? Look for the four C's. *Bloomberg Law*. <https://news.bloomberglaw.com/us-law-week/insight-what-makes-a-great-expert-witness-look-for-the-four-cs>
- Son, J., Kim, Y. W., Oh, D. B., & Kim, K. (2022). Forensic analysis of instant messengers: Decrypt Signal, Wickr, and Threema. *Forensic Science International: Digital Investigation*, 40, 301347. <https://doi.org/10.1016/j.fsidi.2022.301347>
- Spellman, B. A., & Tenney, E. R. (2010). Credible testimony in and out of court. *Psychonomic Bulletin & Review*, 17(2), 168–173. <https://doi.org/10.3758/pbr.17.2.168>
- Spinney, L. (2010). The fine print: A single incriminating fingerprint can land someone in jail, but there is little empirical basis for such decisions. *Nature*, 464(7287), 344–347. <https://doi.org/10.1038/464344a>
- Stanley, J., & Williamson, T. (2001). Knowing how. *The Journal of Philosophy*, 98(8), 411–444. <https://doi.org/10.2307/2678403>
- Stebay, N., Hosch, H. M., Culhane, S. E., & McWethy, A. (2006). The impact on juror verdicts of judicial instruction to disregard inadmissible evidence: A meta-analysis. *Law and Human Behavior*, 30(4), 469–492. <https://doi.org/10.1007/s10979-006-9039-7>
- Stern, H. S., Cuellar, M., & Kaye, D. (2019). Reliability and validity of forensic science evidence. *Significance*, 16(2), 21–24. <https://doi.org/10.1111/j.1740-9713.2019.01250.x>
- Sternthal, B., Dholakia, R., & Leavitt, C. (1978). The persuasive effect of source credibility: Tests of cognitive response. *Journal of Consumer Research*, 4(4), 252–260. <https://doi.org/10.1086/208704>

- Stevenage, S. V., & Bennett, A. (2017). A biased opinion: Demonstration of cognitive bias on a fingerprint matching task through knowledge of DNA test results. *Forensic Science International*, 276, 93–106.
<https://doi.org/10.1016/j.forsciint.2017.04.009>
- Stockdale, M., & Jackson, A. (2016). Expert evidence in criminal proceedings. *The Journal of Criminal Law*, 80(5), 344–363.
<https://doi.org/10.1177/0022018316668448>
- Summers, K., & Wyler, H. (2022). Impact of in-depth information and multimedia presentation on mock jurors' comprehension of mitochondrial DNA evidence. *Forensic Science International: Mind and Law*, 3, 100072.
<https://doi.org/10.1016/j.fsimpl.2022.100072>
- Sunde, N. (2022). Strategies for safeguarding examiner objectivity and evidence reliability during digital forensic investigations. *Forensic Science International: Digital Investigation*, 40, 301317.
<https://doi.org/10.1016/j.fsidi.2021.301317>
- Sushma, Arora, N., Kumar, J., & Ahuja, A. (2024). Digital financial inclusion: Evidence from India. In N. Mansour, S. Baral, & V. Garg (Eds.), *E-financial strategies for advancing sustainable development: Fostering financial inclusion and alleviating poverty* (pp. 317–337). Springer, Cham.
https://doi.org/10.1007/978-3-031-67523-2_19
- Szczyrbak, M. (2022). Interacting with the expert witness: Courtroom epistemics under a discourse analyst's lens. In V. Guillén-Nieto & D. Stein (Eds.), *Language as evidence: Doing forensic linguistics* (pp. 105–130). Palgrave Macmillan. https://doi.org/10.1007/978-3-030-84330-4_5

- Tabachnick, B. G., & Fidell, L. S. (2014) *Using multivariate statistics* (6th ed.). Pearson.
- Teing, Y. Y., Dehghantanha, A., Choo, K. K. R., Dargahi, T., & Conti, M. (2017). Forensic investigation of cooperative storage cloud service: Symform as a case study. *Journal of Forensic Sciences*, 62(3), 641-654.
<https://doi.org/10.1111/1556-4029.13271>
- The Crown Prosecution Service. (2019, October 9). *Expert evidence*
<https://www.cps.gov.uk/legal-guidance/expert-evidence>
- Thompson, M. B., Tangen, J. M., & McCarthy, D. J. (2014). Human matching performance of genuine crime scene latent fingerprints. *Law and Human Behavior*, 38(1), 84–93. <https://doi.org/10.1037/lhb0000051>
- Thompson, W. C. (2023). Shifting decision thresholds can undermine the probative value and legal utility of forensic pattern-matching evidence. *Proceedings of the National Academy of Sciences*, 120(41), e2301844120.
<https://doi.org/10.1073/pnas.2301844120>
- Thompson, W. C., & Newman, E. J. (2015). Lay understanding of forensic statistics: Evaluation of random match probabilities, likelihood ratios, and verbal equivalents. *Law and Human Behavior*, 39(4), 332–349.
<https://doi.org/10.1037/lhb0000134>
- Thompson, W. C., & Scurich, N. (2019). How cross-examination on subjectivity and bias affects jurors' evaluations of forensic science evidence. *Journal of Forensic Sciences*, 64(5), 1379–1388. <https://doi.org/10.1111/1556-4029.14031>

- Tilstone, W. J. (2014). Scientific basis of the forensic process. In G. Bruinsma & D. Weisburd (Eds.), *Encyclopedia of criminology and criminal justice* (pp. 4672–4682). Springer. https://doi.org/10.1007/978-1-4614-5690-2_381
- Tottenham, M. (2021). *The Reliable Expert Witness*. Clarus Press Limited.
- Ulery, B. T., Hicklin, R. A., Buscaglia, J., & Roberts, M. A. (2011). Accuracy and reliability of forensic latent fingerprint decisions. *Proceedings of the National Academy of Sciences*, 108(19), 7733–7738. <https://doi.org/10.1073/pnas.1018707108>
- Ulery, B. T., Hicklin, R. A., Roberts, M. A., & Buscaglia, J. (2014). Measuring what latent fingerprint examiners consider sufficient information for individualization determinations. *PLoS ONE*, 9(11), e110179. <https://doi.org/10.1371/journal.pone.0110179>
- Vaerenbergh, L. V. (2010). Writing and translation in expert–non-expert communication: Methods, guidelines and quality assessment. *SYNAPS—A Journal of Professional Communication*, 24, 13–24.
- Van den Broeck, J., Argeseanu Cunningham, S., Eeckels, R., & Herbst, K. (2005). Data cleaning: detecting, diagnosing, and editing data abnormalities. *PLoS Medicine*, 2(10), e267. <https://doi.org/10.1371/journal.pmed.0020267>
- Vidmar, N. (1995). *Medical malpractice and the American jury*. University of Michigan Press. <https://doi.org/10.3998/mpub.14611>
- Vidmar, N. (2005). Expert evidence, the adversary system, and the jury. *American Journal of Public Health*, 95(S1), S137-S143. <https://doi.org/10.2105/ajph.2004.044677>
- Vidmar, N., & Diamond, S. S. (2001). Juries and expert evidence. *Brooklyn Law Review*, 66(4), 1121–1180.

- Villavicencio-Queijeiro, A., Loyzance, C., García-Castillo, Z., Suzuri-Hernández, J., Castillo-Alanís, A., López-Olvera, P., & López-Escobedo, F. (2021). Development of an instrument for assessing the quality of forensic evidence and expert testimony from three feature-comparison methods: DNA, voice, and fingerprint analysis. *Journal of Forensic Sciences*, 67(1), 217–228. <https://doi.org/10.1111/1556-4029.14898>
- Visser, J. M., & Kruger, U. (2018). Revisiting admissibility: a review of the challenges in judicial evaluation of expert scientific evidence. *South African Journal of Criminal Justice*, 31(1), 1-25.
- Vogelsang, M. D., Palmeri, T. J., & Busey, T. A. (2017). Holistic processing of fingerprints by expert forensic examiners. *Cognitive Research: Principles and Implications*, 2(1), 15. <https://doi.org/10.1186/s41235-017-0051-x>
- Wall, W. J. (2009). *Forensic science in court: The role of the expert witness*. John Wiley & Sons.
- Ward, T. (2020). Explaining and trusting expert evidence: What is a “sufficiently reliable scientific basis”? *The International Journal of Evidence & Proof*, 24(3), 233–254. <https://doi.org/10.1177/1365712720927622>
- Warner, R. M. (2008). *Applied statistics: From bivariate through multivariate techniques*. SAGE Publications.
- Weathered, L., Wright, K., & Chaseling, J. (2020). Dealing with DNA evidence in the courtroom: A plain English review of current issues with identification, mixture and activity level evidence. *The Wrongful Conviction Law Review*, 1, 59-73. <https://doi.org/10.29173/wclawr9>

- Weschler, H. J., Kehn, A., Wise, R. A., & Cramer, R. J. (2015) Attorney beliefs concerning scientific evidence and expert witness credibility. *International Journal of Law and Psychiatry*, 41, 58–66. <https://doi.org/10.1016/j.ijlp.2015.03.008>
- West, M. L., Lawson, V. Z., & Grose-Fifer, J. (2014). The effect of electrophysiological neuroscientific deception detection evidence on juror judgments in a criminal trial. *Basic and Applied Social Psychology*, 36(2), 133–144. <https://doi.org/10.1080/01973533.2014.881288>
- White, A. R., & Lyons, W. (1982). Gilbert Ryle: an introduction to his philosophy. *The Philosophical Quarterly*, 32(126), 88-89. <https://doi.org/10.2307/2219006>
- Whitman, G., & Koppl, R. (2010). Rational bias in forensic science. *Law, Probability and Risk*, 9(1), 69–90. <https://doi.org/10.1093/lpr/mgp028>
- Wilcox, A. M., & NicDaeid, N. (2018). Jurors perceptions of forensic science expert witnesses: experience, qualifications, testimony style and credibility. *Forensic Science International*, 291, 100–108. <https://doi.org/10.1016/j.forsciint.2018.07.030>
- Williams, K. E. G., & Saks, M. J. (2015). Why don't the gatekeepers guard the gates? Comments prompted by Edmond. *Adelaide Law Review*, 36(1), 109.
- Wilson-Kovacs, D., Helm, R., Growns, B., & Redfern, L. (2023). Digital evidence in defence practice: Prevalence, challenges and expertise. *The International Journal of Evidence & Proof*, 27(3), 235–253. <https://doi.org/10.1177/13657127231171620>
- Wise, J. (2004). Under the microscope: Legal challenges to fingerprints and DNA as methods of forensic identification. *International Review of Law, Computers & Technology*, 18(3), 425-434. <https://doi.org/10.1080/1360086042000313049>

- Woollacott, C., Goray, M., van Oorschot, R. A. H., & Taylor, D. (2025). The transfer, prevalence, persistence, and recovery of DNA from body areas in forensic science: A review. *Forensic Sciences*, 5(1), 9.
<https://doi.org/10.3390/forensicsci5010009>
- Wüllenweber, S., & Giles, S. (2021). The effectiveness of forensic evidence in the investigation of volume crime scenes. *Science & Justice*, 61(5), 542–554.
<https://doi.org/10.1016/j.scijus.2021.06.008>
- Yacoby, Y., Green, B., Griffin, C. L., & Doshi-Velez, F. (2022, August 29). “If it didn’t happen, why would I change my decision? ”: How judges respond to counterfactual explanations for the Public Safety Assessment (Arizona Legal Studies Discussion Paper No. 22-19) [Preprint].
<https://doi.org/10.2139/ssrn.4203996>
- Yoon, Y. H., & Karabiyik, U. (2020). Forensic analysis of fitbit versa 2 data on android. *Electronics*, 9(9), 1431. <https://doi.org/10.3390/electronics9091431>
- Younan, M., & Martire, K. A. (2021). Likeability and expert persuasion: Dislikeability reduces the perceived persuasiveness of expert evidence. *Frontiers in Psychology*, 12, 785677.
<https://doi.org/10.3389/fpsyg.2021.785677>
- Young, G., & Goodman-Delahunty, J. (2021). Revisiting *Daubert*: Judicial gatekeeping and expert ethics in court. *Psychological Injury and Law*, 14(4), 304–315. <https://doi.org/10.1007/s12207-021-09428-8>
- Zareen, M. S., Aslam, B., Tahir, S., Rasheed, I., & Khan, F. (2024). Unveiling the dynamic landscape of digital forensics: the endless pursuit. *Computers*, 13(12), 333. <https://doi.org/10.3390/computers13120333>

Zulfiqar, M., Asif, A., Wusqa, U. T., Azam, H., Rani, A., Ullah, M. A., & Majeed, S. (2024). Forensic fingerprinting through the ages: A critical evaluation of techniques from traditional powdering to digital scanning. *International Journal of Multidisciplinary Research and Publications*, 7(6), 190–196..

Bibliography

- Alketbi, S. K. (2024). DNA contamination in crime scene investigations: Common errors, best practices, and insights from a survey study. *Biomedical Journal of Scientific & Technical Research*, 58(5), 50970–50982.
<https://doi.org/10.26717/BJSTR.2024.58.009223>
- Allen, R. J. (2003). Expertise and the Supreme Court: What is the problem. *Seton Hall Law Review*, 1-13. <https://doi.org/10.2139/ssrn.4979243>
- Alter, A. L., & Oppenheimer, D. M. (2009). Uniting the tribes of fluency to form a metacognitive nation. *Personality and social psychology review*, 13(3), 219-235.
<https://doi.org/10.1177/1088868309341564>
- American Bar Association, Section of Litigation, Special Committee on Jury Comprehension. (1990). *Jury comprehension in complex cases: Report of the Special Committee of the American Bar Association Section of Litigation*. American Bar Association.
- Anderson, B. L., & Winawer, J. (2005). Image segmentation and lightness perception. *Nature*, 434(7029), 79–83. <https://doi.org/10.1038/nature03271>
- Anderson, C. A., Lepper, M. R., & Ross, L. (1980). Perseverance of social theories: The role of explanation in the persistence of discredited information. *Journal of Personality and Social Psychology*, 39(6), 1037-1049.
<https://doi.org/10.1037/h0077720>
- Arshad, H., Jantan, A., & Omolara, E. (2019). Evidence collection and forensics on social networks: Research challenges and directions. *Digital Investigation*, 28, 126–138. <https://doi.org/10.1016/j.diin.2019.02.001>
- Ask, K., & Granhag, P. A. (2005). Motivational sources of confirmation bias in criminal investigations: The need for cognitive closure. *Journal of*

Investigative Psychology and Offender Profiling, 2(1), 43-63.

<https://doi.org/10.1002/jip.19>

Ayhan, H. Ö. (2011). Non-probability sampling survey methods. In M. Lovric (Ed.)

International encyclopedia of statistical science (pp. 979-982). Springer.

https://doi.org/10.1007/978-3-642-04898-2_41

Bach, M. (2005, May 22). *Lilac Chaser*. Michael's Visual Phenomena and Optical

Illusions. *Michael Bach's Optical Illusions*.

Balding, D. J., & Donnelly, P. (1995). Inference in forensic identification. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 158(1), 21-40.

<https://doi.org/10.2307/2983402>

Balhareth, A. A. S., Jamesh, M., Zabarah, G. A., Almotlaq, M. M., Alabaaltahin, M.

A. M., Al Jaarah, A. H. A., Aldawsari, A. G. A., Almastaneer, K. A. M.,

Alyami, S. M., & Al Yami, A. S. H. (2024). The role of forensic medicine in modern criminal justice: A review of current practices and innovations.

Journal of Ecohumanism, 3(7), 2699–2707.

<https://doi.org/10.62754/joe.v3i7.4669>

Bandes, S. A. (2016). Remorse and demeanor in the courtroom: Cognitive science and the evaluation of contrition. *Hunter, Roberts, Young, Dixon, The Integrity of the Criminal Process (2016 Forthcoming)*.

<https://doi.org/10.2139/ssrn.2363326>

Beecher-Monas, E. (1998). Blinded by science: How judges avoid the science in scientific evidence. *Temple Law Review*, 71, 55–123.

Behson, S. J., & Koppl, R. (2013). Using procedural justice to understand, explain, and prevent decision-making errors in forensic sciences. *Organization*

Management Journal, 10(2), 99–109.

<https://doi.org/10.1080/15416518.2013.801743>

Berger, C. E. H., Buckleton, J., Champod, C., Evett, I. W., & Jackson, G. (2011).

Expressing evaluative opinions: A position statement. *Science & Justice*, 51(1), 1–2. <https://doi.org/10.1016/j.scijus.2011.01.002>

Berger, L. L. (2013). A revised view of the judicial hunch. *Legal Communication & Rhetoric: Journal of the Association of Legal Writing Directors / Association of Legal Writing Directors*, 10, 1–25.

Berglund, W. (2002). An expert witness can make or break a case. *National Underwriter/Life & Health Financial Services*, 106(44), 26–27.

Bilalić, M., McLeod, P., & Gobet, F. (2010). The mechanism of the Einstellung (set) effect: A pervasive source of cognitive bias. *Current Directions in Psychological Science*, 19(2), 111–115.

<https://doi.org/10.1177/0963721410363571>

Bornstein, B. H. (1999). The ecological validity of jury simulations: Is the jury still out? *Law and Human Behavior*, 23(1), 75–91.

<https://doi.org/10.1023/a:1022326807441>

Bower, K. M. (2003, August). When to use Fisher's exact test. *Six Sigma Forum Magazine*, 2(4), 35–37.

Boyatzis, R. E. (1998). *Transforming qualitative information: Thematic analysis and code development*. Sage Publications.

Boyd, C., & Forster, P. (2004). Time and date issues in forensic computing—a case study. *Digital Investigation*, 1(1), 18–22.

<https://doi.org/10.1016/j.diin.2004.01.002>

- Broeders, A. P. A. (2006). Of earprints, fingerprints, scent dogs, cot deaths and cognitive contamination—a brief look at the present state of play in the forensic arena. *Forensic Science International*, 159(2–3), 148–157.
<https://doi.org/10.1016/j.forsciint.2004.11.028>
- Brown, J. B. (2009). Brown, J. B. (2009). Choosing the right type of rotation in PCA and EFA. *JALT Testing & Evaluation SIG Newsletter*, 13(3), 20–25.
- Bruckmaier, G., Krauss, S., Binder, K., Hilbert, S., & Brunner, M. (2021). Tversky and Kahneman’s cognitive illusions: who can solve them, and why? *Frontiers in psychology*, 12, 584689. <https://doi.org/10.3389/fpsyg.2021.584689>
- Budowle, B., & Van Daal, A. (2008). Forensically relevant SNP classes. *Biotechniques*, 44(5), 603–610. <https://doi.org/10.2144/000112806>
- Bunn, I., & Geis, G. (2005). *A Trial of Witches: a seventeenth century witchcraft prosecution*. Routledge. <https://doi.org/10.4324/9780203992982>
- Carr, S., Piasecki, E., Tully, G., & Wilson, T. J. (2016). Opening the Scientific Expert’s Black Box. *The Journal of Criminal Law*, 80(5), 364–386.
<https://doi.org/10.1177/0022018316669220>
- Gregory, R. L., Carraher, R. G., & Thurston, J. B. (1968). *Optical Illusions and the Visual Arts*. Leonardo, 1(1), 90. <https://doi.org/10.2307/1571913>
- Changizi, M. A., & Hall, W. G. (2001). Thirst modulates a perception. *Perception*, 30(12), 1489–1497. <https://doi.org/10.1068/p3266>
- Chappelle, W., & Rosengren, K. (2001). Maintaining composure and credibility as an expert witness during cross-examination. *Journal of Forensic Psychology Practice*, 1(3), 55–72. https://doi.org/10.1300/j158v01n03_03

- Charman, S. D. (2013). The forensic confirmation bias: A problem of evidence integration, not just evidence evaluation. *Journal of Applied Research in Memory and Cognition*, 2(1), 56–58. <https://doi.org/10.1016/j.jarmac.2013.01.010>
- Charman, S., Douglass, A., & Mook, A. (2019). Cognitive bias in legal decision making. In N. Brewer & A. B. Douglass (Eds.), *Psychological science and the law* (pp. 30–53) Guildford Press.
- Chase, W. G., & Ericsson, K. A. (1982). Skill and working memory. In G. H. Bower (Ed.), *Psychology of learning and motivation* (Vol. 16, pp. 1–58). Academic Press. [https://doi.org/10.1016/s0079-7421\(08\)60546-0](https://doi.org/10.1016/s0079-7421(08)60546-0)
- Chase, W. G., & Simon, H. A. (1973). Perception in chess. *Cognitive psychology*, 4(1), 55–81. [https://doi.org/10.1016/0010-0285\(73\)90004-2](https://doi.org/10.1016/0010-0285(73)90004-2)
- Chi, M. T. H. (2006). Two approaches to the study of experts' characteristics. In K. A. Ericsson, N. Charness, P. J. Feltovich, & R. R. Hoffman (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 21–30). Cambridge University Press. <https://doi.org/10.2277/0521600812>
- Chi, M. T., Glaser, R., & Farr, M. J. (2014). *The nature of expertise*. Psychology Press. <https://doi.org/10.4324/9781315799681>
- Chlistunoff, M. M. (2015). Expert testimony and the quest for reliability: The case for a methodology questionnaire. *Texas Law Review*, 94(5), 1055–1078. https://texaslawreview.org/expert_testimony_quest_reliability/
- Churchill Jr, G. A. (1979). A paradigm for developing better measures of marketing constructs. *Journal of marketing research*, 16(1), 64–73. <https://doi.org/10.1177/002224377901600110>
- Clancy, D., & Bull, R. (2015). The effect on mock–juror decision–making of power–of–speech within eyewitness testimony and types of scientific evidence.

Psychiatry, Psychology and Law, 22(3), 425–435.

<https://doi.org/10.1080/13218719.2014.960029>

Clark, L. A., & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment*, 7(3), 309–319.

<https://doi.org/10.1037/1040-3590.7.3.309>

Cochran, W. G. (1954). Some methods for strengthening the common chi-square test. *Biometrics*, 10, 417–451. <https://doi.org/10.2307/3001616>

Cole, S.A. (2014). Forensic science and miscarriages of justice. In G. Bruinsma, & D. Weisburd (Eds.) *Encyclopedia of criminology and criminal justice* (pp. 1763–1773). Springer. https://doi.org/10.1007/978-1-4614-5690-2_233

Cooper, S. L. (2016). Forensic science identification evidence: Tensions between law and science. *The Journal of Philosophy, Science & Law*, 16(2), 1–35.

<https://doi.org/10.5840/jpsl20161622>

Corbetta, M., & Shulman, G. L. (2002). Control of goal-directed and stimulus-driven attention in the brain. *Nature reviews neuroscience*, 3(3), 201–215.

<https://doi.org/10.1038/nrn755>

Cordeiro, C., Machás, A., & Neves, M. M. (2009). A case study of a customer satisfaction problem: Bootstrap and imputation techniques. In V. Esposito Vinzi, W. W. Chin, J. Henseler, & H. Wang (Eds.), *Handbook of partial least squares: Concepts, methods and applications* (pp. 279–287). Springer.

https://doi.org/10.1007/978-3-540-32827-8_13

Costantini, F., De Stefani, M. A., & Galvan, F. (2019). The “quality of information” challenges in IoT forensics: An introduction. *Jusletter IT*.

https://www.jusletter-it.weblaw.ch/issues/2019/IRIS/the--quality-of-info_f568308fd3.html

- Costello, A. B., & Osborne, J. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research, and Evaluation*, 10(1) 7. <https://doi.org/10.7275/jyj1-4868>
- Craig, L. A., & Expert Witness Advisory Group (2021). Psychologists as expert witnesses: Survey results from the expert witness advisory group (EWAG). *Journal of Forensic Practice*, 23(2), 77-89. <https://doi.org/10.1108/JFP-11-2020-0048>
- Creswell, J. W., & Báez, J. C. (2020). *30 essential skills for the qualitative researcher* (2nd ed.). Sage Publications. <https://doi.org/10.3138/cjpe.75739>
- Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. Sage Publications.
- Criminal Cases Review Commission. (2025). *Case library*. <https://ccrc.gov.uk/case-library/>
- Criminal Procedure Rule Committee & Ministry of Justice. (2025, April 7). *Announcements from the Criminal Procedure Rule Committee*. GOV.UK. <https://www.gov.uk/guidance/announcements-from-the-criminal-procedure-rule-committee>
- Crown Prosecution Service & Association of Chief Police Officers (2010, May) *Disclosure: Experts' evidence, case management and unused material (Guidance booklet for experts)*. <https://www.cps.gov.uk/legal-guidance/expert-guidance-disclosure-unused-material-and-case-management>
- Crown Prosecution Service. (n.d.). Expert evidence. <https://www.cps.gov.uk/legal-guidance/expert-evidence>

- Crown Prosecution Service. (2019, October 9). *Expert evidence*. Prosecution Guidance. <https://www.cps.gov.uk/legal-guidance/expert-evidence>
- Curley, L. J., Munro, J., & Dror, I. E. (2022). Cognitive and human factors in legal layperson decision making: Sources of bias in juror decision making. *Medicine, Science and the Law*, 62(3), 206-215.
<https://doi.org/10.1177/00258024221080655>
- Curley, S. P., Yates, J. F., & Abrams, R. A. (1986). Psychological sources of ambiguity avoidance. *Organizational Behavior and Human Decision Processes*, 38(2), 230-256.
[https://doi.org/10.1016/0749-5978\(86\)90018-x](https://doi.org/10.1016/0749-5978(86)90018-x)
- Daniels, S., & Martin, J. (1995). *Civil juries and the politics of reform*. Northwestern University Press.
- Daubert v. Merrill Johns Pharmaceuticals, Inc. 509 U.S. 579 (U.S. Court of Appeals, 9th Cir. 1993). <https://supreme.justia.com/cases/federal/us/509/579/case.pdf>
- De Neys, W. (2006). Automatic–heuristic and executive–analytic processing during reasoning: Chronometric and dual-task considerations. *Quarterly Journal of Experimental Psychology*, 59(6), 1070-1100.
<https://doi.org/10.1080/02724980543000123>
- De Neys, W., & Pennycook, G. (2019). Logic, fast and slow: Advances in dual-process theorizing. *Current Directions in Psychological Science*, 28(5), 503-509. <https://doi.org/10.1177/0963721419855658>
- De Winnaar, K., & Scholtz, F. (2020). Entrepreneurial decision-making: new conceptual perspectives. *Management Decision*, 58(7), 1283-1300.
<https://doi.org/10.1108/md-11-2017-1152>
- DeGroot, A. D. (1966). Perception and memory versus thought. In B. Kleinmuntz (Ed.), *Problem solving: Research, methods, and theory* (pp. 19–50). Wiley.

- Derwin, A. (2018). The judicial admission of flawed expert opinion evidence informing wrongful convictions. *Western Journal of Legal Studies*, 8(2), 1–32. <https://ojs.lib.uwo.ca/index.php/uwojls/article/view/5724>
- Desimone, R., & Duncan, J. (1995). Neural mechanisms of selective visual attention. *Annual Review of Neuroscience*, 18(1), 193–222. <https://doi.org/10.1146/annurev.ne.18.030195.001205>
- Deslauriers-Varin, N., & Fortin, F. (2021). Improving Efficiency and Understanding of Criminal Investigations: Toward an Evidence-Based Approach. *Journal of Police and Criminal Psychology*, 36(4), 635–638. <https://doi.org/10.1007/s11896-021-09491-6>
- Dhami, S., & Sunstein, C. R. (2022). *Bounded rationality: heuristics, judgment, and public policy*. MIT Press. <https://doi.org/10.7551/mitpress/14401.001.0001>
- Diamond, S. S. (2003). Truth, justice, and the jury. *Harvard Journal of Law & Public Policy*, 26, 143–158.
- Diamond, S. S., & Vidmar, N. (2001). Jury room ruminations on forbidden topics. *Virginia Law Review*, 87, 1857–1876. <https://doi.org/10.2307/1073907>
- Dror, I. E., Champod, C., Langenburg, G., Charlton, D., Hunt, H., & Rosenthal, R. (2011). Cognitive issues in fingerprint analysis: Inter-and intra-expert consistency and the effect of a ‘target’ comparison. *Forensic Science International*, 208(1-3), 10-17. <https://doi.org/10.1016/j.forsciint.2010.10.013>
- Dror, I. E., McCormack, B. M., & Epstein, J. (2015). Cognitive bias and its impact on expert witnesses and the court. *Judges' Journal*, 54, 8–12.
- Dror, I. E., Pascual-Leone, A., & Ramachandran, V. (2011). The paradox of human expertise: Why experts get it wrong. In R. Kapur (Ed.), *The paradoxical brain*

(pp. 177–191). Cambridge University Press.

<https://doi.org/10.1017/CBO9780511978098.011>

Dror, I. E., Peron, A. E., Hind, S. L., & Charlton, D. (2005). When emotions get the better of us: the effect of contextual top-down processing on matching fingerprints. *Applied Cognitive Psychology: The Official Journal of the Society for Applied Research in Memory and Cognition*, 19(6), 799-809.

<https://doi.org/10.1002/acp.1130>

Dror, I., & Rosenthal, R. (2008). Meta-analytically quantifying the reliability and bias ability of forensic experts. *Journal of Forensic Sciences*, 53(4), 900–903.

<https://doi.org/10.1111/j.1556-4029.2008.00762.x>

Du, Y. (2022). The effect of neuro-evidence on jurors' decision making. *Rutgers Journal of Law & Public Policy*, 20, 174–190.

Dusi, G. (2024). Reliabilist epistemology meets bounded rationality. *Synthese*, 203(4), 115. <https://doi.org/10.1007/s11229-024-04525-y>

Duxbury, N. (2008). *The nature and authority of precedent*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511818684>

Dvoskin, J. A., & Guy, L. S. (2008). On being an expert witness: It's not about you. *Psychiatry, Psychology and Law*, 15(2), 202-212.

<https://doi.org/10.1080/13218710802014451>

Dwyer, D. M. (2007). Expert evidence in the English civil Courts, 1550–1800. *The Journal of Legal History*, 28(1), 93–118.

<https://doi.org/10.1080/01440360701237855>

Dwyer, D. M. (2008). *The judicial assessment of expert evidence*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511575136>

- Edgcumbe, D. R. (2019). *Confirmation bias in decision making for fingerprints, DNA and eyewitness evidence cannot be explained by cognitive style or thinking dispositions*. Preprints. OSF Preprints. <https://doi.org/10.31234/osf.io/59tzd>
- Edmond, G. (2002). Constructing miscarriages of justice: Misunderstanding scientific evidence in high profile criminal appeals. *Oxford Journal of Legal Studies*, 22(1), 53–89. <https://doi.org/10.1093/ojls/22.1.53>
- Edmond, G. (2012). Advice for the courts? Sufficiently reliable assistance with forensic science and medicine (Part 2). *The International Journal of Evidence & Proof*, 16(3), 263–297. <https://doi.org/10.1350/ijep.2012.16.3.405>
- Edmond, G. (2014). The admissibility of forensic science and medicine evidence under the Uniform Evidence Law. *Criminal Law Journal*, 38(3), 136–158.
- Edmond, G. (2015). Forensic science evidence and the conditions for rational (jury) evaluation. *Melbourne University Law Review*, 39(1), 77–127.
- Edmond, G., & Martire, K. A. (2019). Just cognition: scientific research on bias and some implications for legal procedure and decision-making. *The Modern Law Review*, 82(4), 633–664. <https://doi.org/10.1111/1468-2230.12424>
- Edmond, G., Found, B., Martire, K., Ballantyne, K., Hamer, D., Searston, R., ... & Roberts, A. (2016). Model forensic science. *Australian Journal of Forensic Sciences*, 48(5), 496–537. <https://doi.org/10.1080/00450618.2015.1128969>
- Edmond, G., Martire, K., & Roque, M. S. (2017). Expert reports and the forensic sciences. *University of New South Wales Law Journal*, 40(2), 590–637. <https://doi.org/10.53637/IPWZ9949>
- Edmond, G., Tangen, J. M., Searston, R. A., & Dror, I. E. (2015) Contextual bias and cross-contamination in the forensic sciences: The corrosive implications for

- investigations, plea bargains, trials and appeals. *Law, Probability and Risk*, 14(1), 1–25. <https://doi.org/10.1093/lpr/mgu018>
- Edmond, G., Thompson, M. B., & Tangen, J. M. (2014). A guide to interpreting forensic testimony: scientific approaches to fingerprint evidence. *Law, Probability and Risk*, 13(1), 1-25. <https://doi.org/10.1093/lpr/mgt011>
- Edmond, G., Towler, A., Grows, B., Ribeiro, G., Found, B., White, D., Ballantyne, K., Searston, R. A., Thompson, M. B., Tangen, J., Kemp, R., Martire, K., & Hamer, D. (2017). *Thinking forensics: Cognitive science for forensic practitioners*. *Science & Justice*, 57(2), 144–154. <https://doi.org/10.1016/j.scijus.2016.11.005>
- Edwards, H. T. (2019). *Ten years after the National Academy of Sciences' landmark report on strengthening forensic science in the United States: A path forward—Where are we?* NYU School of Law Public Law Research Paper, (19–23). <https://doi.org/10.2139/ssrn.3379373>
- Eisner, E. W. (1991). *The enlightened eye: Qualitative inquiry and the enhancement of educational practice*. Macmillan Publishing Company.
- Elliott, V. (2018). Thinking about the coding process in qualitative data analysis. *The Qualitative Report*, 23(11), 2850–2861. <https://doi.org/10.46743/2160-3715/2018.3560>
- Ericsson, K. A., & Charness, N. (1994). Expert performance: Its structure and acquisition. *American Psychologist*, 49(8), 725. <https://doi.org/10.1037/0003-066X.49.8.725>
- Ericsson, K. A., & Chase, W. G. (1982). Exceptional memory: Extraordinary feats of memory can be matched or surpassed by people with average memories that have been improved by training. *American Scientist*, 70(6), 607–615.

- Ericsson, K. A., & Lehmann, A. C. (1996). Expert and exceptional performance: Evidence of maximal adaptation to task constraints. *Annual Review of Psychology*, 47(1), 273–305. <https://doi.org/10.1146/annurev.psych.47.1.273>
- Ericsson, K. A. (2006). The influence of experience and deliberate practice on the development of superior expert performance. In K. A. Ericsson, N. Charness, P. J. Feltovich, & R. R. Hoffman (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 685–705). Cambridge University Press. <https://doi.org/10.1017/CBO9780511816796.038>
- Ericsson, K. A., Hoffman, R. R., & Kozbelt, A. (Eds.). (2018). *The Cambridge handbook of expertise and expert performance*. Cambridge University Press.
- Ericsson, K. A., Krampe, R. T., & Tesch–Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 100(3), 363. <https://doi.org/10.1037/0033-295X.100.3.363>
- Evett, I. W., Berger, C. E. H., Buckleton, J. S., Champod, C., & Jackson, G. (2017). Finding the way forward for forensic science in the US—A commentary on the PCAST report. *Forensic Science International*, 278, 16–23. <https://doi.org/10.1016/j.forsciint.2017.06.018>
- Faigman, D. L., Monahan, J., & Slobogin, C. (2014). Group to individual (G2i) inference in scientific expert testimony. *The University of Chicago Law Review*, 81(2), 417–480.
- Fairlie, M. A. (2018). The Unlikely Prospect of Non-adversarial Trials at the International Criminal Court. *Journal of International Criminal Justice*, 16(2), 295–313. <https://doi.org/10.1108/JFP-11-2020-0048>
- Feigenson, N. (2009). Emotional influences on judgments of legal blame: How they happen, whether they should, and what to do about it. In B. H. Bornstein & R.

- L. Wiener (Eds.), *Emotion and the law: Psychological perspectives* (pp. 45–96). Springer. https://doi.org/10.1007/978-0-387-89556-1_3
- Feldman, B. (2000). *The Nobel Prize: A history of genius, controversy, and prestige*. Arcade Publishing.
- Feltovich, P. J., Prietula, M. J., & Ericsson, K. A. (2006). Studies of expertise from psychological perspectives. In K. A. Ericsson, N. Charness, P. J. Feltovich, & R. R. Hoffman (Eds.), *The Cambridge Handbook of Expertise and Expert Performance*, (pp. 41–68). Cambridge University Press.
<https://doi.org/10.1017/CBO9780511816796.004>
- Fenton, N., Jamieson, A., Gomes, S., & Neil, M. (2020). On the limitations of probabilistic claims about the probative value of mixed DNA profile evidence. [Preprint]. arXiv. <https://doi.org/10.48550/arXiv.2009.08850>
- Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International Journal of Qualitative Methods*, 5(1), 80–92.
<https://doi.org/10.1177/160940690600500107>
- Ferreira, P. A., & Wingrove, T. (2024). Expert Witness Training History and Professional Experience Exert Separable Impacts on Expert Credibility Perceptions. *Journal of Forensic Psychology Research and Practice*, 24(4), 524-540.
<https://doi.org/10.1080/24732850.2023.2181121>
- Field, A. (2013). *Discovering statistics using IBM SPSS statistics* (4th ed.). SAGE Publications.
- Field, A. (2016). *Discovering statistics using IBM SPSS statistics* (5th ed.). SAGE Publications.

- Finch, H. (2005). Comparison of the performance of nonparametric and parametric MANOVA test statistics when assumptions are violated. *Methodology*, 1(1), 27-38. <https://doi.org/10.1027/1614-1881.1.1.27>
- Findlay, M., & Grix, J. (2003). Challenging forensic evidence? Observations on the use of DNA in certain criminal trials. *Current Issues in Criminal Justice*, 14(3), 269–282. <https://doi.org/10.1080/10345329.2003.12036267>
- Findley, K. A., & Scott, M. S. (2006). Multiple dimensions of tunnel vision in criminal cases. *Wisconsin Law Review*, 2006(2), 291–397.
- Forensic Science Regulator. (2020). *Expert report guidance FSR–G–200 Issue 4*. UK Home Office.
- Gabel, J. D. (2014). Realising reliability in forensic science from the ground up. *Journal of Criminal Law & Criminology*, 104(2), 283–322.
- Gelfert, A. (2011). Expertise, argumentation, and the end of inquiry. *Argumentation*, 25(3), 297-312. <https://doi.org/10.1007/s10503-011-9218-7>
- Giannelli, P. C., & Friedman, S. (2010). The National Academy of Sciences report: A challenge to forensic science. *Criminal Justice*, 24(4), 4–9.
- Gibbs, M. S., Sigal, J., Adams, B., & Grossman, B. (1989). Cross-examination of the expert witness: Do hostile tactics affect impressions of a simulated jury?. *Behavioral Sciences & the Law*, 7(2), 275–281. <https://doi.org/10.1002/bsl.2370070211>
- Gojkovich, K. L., Reitz, N. L., Monstrola, V. N., Campbell, M. M., & Rivardo, M. G. (2019). Effects of Dress and Speech Style on Credibility of Co-Witness and Misinformation Acceptance. *North American Journal of Psychology*, 21(4), 707-707.

- Golan, T., & Golan, T. (2004). *Laws of men and laws of nature: The history of scientific expert testimony in England and America*. Harvard University Press.
<https://doi.org/10.4159/9780674037694>
- Goldman, A. I. (2001). Experts: Which ones should you trust?. *Philosophy and Phenomenological Research*, 63(1), 85-110. <https://doi.org/10.1111/j.1933-1592.2001.tb00093.x>
- Gorsuch, R. L. (1990). Common factor analysis versus component analysis: Some well and little known facts. *Multivariate Behavioral Research*, 25(1), 33-39.
https://doi.org/10.1207/s15327906mbr2501_3
- Götz, O., Liehr-Gobbers, K., & Krafft, M. (2009). Evaluation of structural equation models using the partial least squares (PLS) approach. In *Handbook of partial least squares: Concepts, methods and applications* (pp. 691-711). Berlin, Heidelberg: Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-540-32827-8_30
- Gravett, W. H. (2017). The myth of rationality: cognitive biases and heuristics in judicial decision-making. *South African Law Journal*, 134(1), 53-79.
<https://doi.org/10.10520/EJC-657e3d8de>
- Greene, E., & Bornstein, B. (2000). Precious little guidance: Jury instruction on damage awards. *Psychology, Public Policy, and Law*, 6(3), 743.
<https://doi.org/10.1037/1076-8971.6.3.743>
- Greene, E., & Ellis, L. (2007). Decision making, in criminal justice. In D. Carson, R. Milne, F. Pakes, K. Shalev, & A. Shawyer (Eds.), *Applying psychology to criminal justice* (pp. 183–200). Wiley.
<https://doi.org/10.1002/9780470713068.ch11>

- Gregory, R. L., & Heard, P. (1979). Border locking and the Café Wall illusion. *Perception*, 8(4), 365–380. <https://doi.org/10.1068/p080365>
- Gross, S. R. (1991). Expert evidence. *Wisconsin Law Review*, 1991, 1113–1232.
- Growns, B., & Neal, T. M. (2022). Forensic science decision-making: Expertise lends both skills and vulnerabilities. *Journal of Applied Research in Memory and Cognition*, 11(4), 526–534.
- Hafdahl, R., Edwards, C. P., & Miller, M. K. (2021). Social cognitive processes of jurors. *Washburn Law Journal*, 61, 305–330.
- Halsbury's Laws of England. (2022, July 15). *Evidence of opinion or belief generally inadmissible* (para. 580). In *Halsbury's Laws of England: Criminal procedure* (Vols. 27–28). LexisNexis.
<https://www.lexisnexis.co.uk/legal/commentary/halsburys-laws-of-england/criminal-procedure/evidence-of-opinion-or-belief-generally-inadmissible-01>
- Halsbury's Laws of England. (2022, July 14). *Proof of facts upon which expert opinion is based* (para. 585). In *Halsbury's Laws of England: Criminal procedure* (Vols. 27–28). LexisNexis.
<https://www.lexisnexis.co.uk/legal/commentary/halsburys-laws-of-england/criminal-procedure/proof-of-facts-upon-which-expert-opinion-is-based-01>
- Hammond, K. R., Stewart, T. R., Brehmer, B., & Steinmann, D. O. (1975). Social judgment theory. In M. W. Kaplan (Ed.), *Human judgment and decision processes* (pp. 271–312). Academic Press. <https://doi.org/10.1016/B978-0-12-397250-7.50016-7>

- Hans, V. P., Kaye, D. H., Dann, B. M., Farley, E. J., & Albertson, S. (2011). Science in the jury box: Jurors' comprehension of mitochondrial DNA evidence. *Law and Human Behavior*, 35(1), 60–71. <https://doi.org/10.1007/s10979-010-9222-8>
- Hargittai, I. (2002). *The road to Stockholm: Nobel Prizes, science, and scientists*. Chemical Heritage Foundation.
- Hatano, G., & Inagaki, K. (1986). Two courses of expertise. In H. W. Stevenson, H. Azuma, & K. Hakuta (Eds.), *Child development and education in Japan* (pp. 262–272). W. H. Freeman.
- Hayes, N. (1997). Theory-led thematic analysis: Social identification in small companies. In N. Hayes (Ed.), *Doing qualitative analysis in psychology* (pp. 93–114). Psychology Press/Erlbaum (UK) Taylor & Francis.
- Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modelling in international marketing. In *New challenges to international marketing* (Vol. 20, pp. 277-319). Emerald Group Publishing Limited. [https://doi.org/10.1108/S1474-7979\(2009\)0000020014](https://doi.org/10.1108/S1474-7979(2009)0000020014)
- Hicklin, R. A., Ulery, B. T., Ausdemore, M., & Buscaglia, J. (2020). Why do latent fingerprint examiners differ in their conclusions?. *Forensic Science International*, 316, 110542. <https://doi.org/10.1016/j.forsciint.2020.110542>
- Hicks, T., Buckleton, J., Castella, V., Evett, I., & Jackson, G. (2022). A logical framework for forensic DNA interpretation. *Genes*, 13(6), 957. <https://doi.org/10.3390/genes13060957>
- Himes, S., & Brandner, J. (2021). Online survey. In T. K. Shackelford & V. A. Weekes-Shackelford (Eds.), *Encyclopedia of evolutionary psychological*

- science* (pp. 5579–5582). Springer. https://doi.org/10.1007/978-3-319-19650-3_1849
- Hoffman, R. R. (1998). How can expertise be defined? Implications of research from cognitive psychology. In *Exploring expertise* (pp. 81–100). Palgrave Macmillan, London. https://doi.org/10.1007/978-1-349-13693-3_4
- Holloway, I., & Todres, L. (2003). The status of method: flexibility, consistency and coherence. *Qualitative Research*, 3(3), 345–357.
<https://doi.org/10.1177/1468794103033004>
- Holyoak, K. J. (1991). Symbolic connectionism: Toward third-generation theories of expertise. In K. A. Ericsson & J. Smith (Eds.), *Toward a general theory of expertise: Prospects and limits* (pp. 301–335). Cambridge University Press.
- Horsman, G. (2023). The importance of digital evidence strategies. *WIREs Forensic Science*, 6(1). e1507. <https://doi.org/10.1002/wfs2.1507>
- Hortal, A. (2023). Review of *Bounded rationality: Heuristics, judgment, and public policy*, by S. Dhimi & C. R. Sunstein. *Behavioural Public Policy*, 1–7.
<https://doi.org/10.1017/bpp.2023.29>
- House of Commons Library. (n.d.). *Court statistics for England and Wales*. UK Parliament. Parliament. <https://commonslibrary.parliament.uk>
- House of Lords Science and Technology Select Committee. (2019). *Forensic science and the criminal justice system: A blueprint for change* (3rd Report of Session 2017–19). UK Parliament.
<https://publications.parliament.uk/pa/ld201719/ldselect/ldsctech/333/333.pdf>
- Howes, L. M. (2015). Towards coherent co-presentation of expert evidence in criminal trials: Experiences of communication between forensic scientists and legal practitioners. *Criminal Law Journal*, 39(5), 252–271.

- Howes, L. M., Julian, R., Kelty, S. F., Kemp, N., & Kirkbride, K. P. (2014). The readability of expert reports for non–scientist report–users: Reports of DNA analysis. *Forensic Science International*, 237, 7–18.
<https://doi.org/10.1016/j.forsciint.2014.01.007>
- Hughes, M. G., Griffith, J. A., Zeni, T. A., Arsenault, M. L., Cooper, O. D., Johnson, G., ... & Mumford, M. D. (2014). Discrediting in a message board forum: The effects of social support and attacks on expertise and trustworthiness. *Journal of Computer-Mediated Communication*, 19(3), 325-341.
<https://doi.org/10.1111/jcc4.12077>
- Humphreys, P. (1986). Causation in the social sciences: An overview. *Synthese*, 68, 1–12. <https://doi.org/10.1007/BF00413963>
- Iannece, V. P. (2015). Breaking bad science: Due process as a vehicle for postconviction relief when convictions are based on unreliable scientific evidence. *St. John's Law Review*, 89(1), 195–230.
https://scholarship.law.stjohns.edu/lawreview/vol89/iss1/6/?utm_source=chatgpt.com
- Inwinkelried, E. J. (2017). The best insurance against miscarriages of justice caused by junk science: An admissibility test that is scientifically and legally sound. *Albany Law Review*, 81, 851–880. <https://doi.org/10.2139/ssrn.3035644>
- Inbar, Y., Cone, J., & Gilovich, T. (2010). People's intuitions about intuitive insight and intuitive choice. *Journal of Personality and Social Psychology*, 99(2), 232–247. <https://ecommons.cornell.edu/handle/1813/12730>
- Innocence Project. (2021). DNA exonerations in the United States.
<https://innocenceproject.org/dna-exonerations-in-the-united-states>

- Ireland, J., & Beaumont, J. (2015). Admitting scientific expert evidence in the UK: Reliability challenges and the need for revised criteria—Proposing an abridged Daubert. *Journal of Forensic Practice*, 17(1), 3–12.
<https://doi.org/10.1108/JFP-03-2014-0008>
- Jackson, A. R., & Jackson, J. M. (2008). *Forensic science*. Pearson Education.
- Jackson, G., Kaye, D. H., Neumann, C., Ranadive, A., & Reyna, V. F. (2015). *Communicating the results of forensic science examinations: Technical Report for NIST Award (70NANB12H014)*. Social Science Research Network.
<https://papers.ssrn.com/sol3/Delivery.cfm?abstractid=2690899>
- Jacobson, J. (2013). *By mistakes we learn? A review of criminal appeals against sentence*. Centre for Justice Innovation.
<https://www.transformjustice.org.uk/publication/by-mistakes-we-learn/>
- Jayaprakash, P. T. (2013). Practical relevance of pattern uniqueness in forensic science. *Forensic Science International*, 231(1-3), 403-e1–403.e16.
<https://doi.org/10.1016/j.forsciint.2013.05.028>
- Jeanguenat, A. M., Budowle, B., & Dror, I. E. (2017). Strengthening forensic DNA decision making through a better understanding of the influence of cognitive bias. *Science & Justice*, 57(6), 415-420.
<https://doi.org/10.1016/j.scijus.2017.07.005>
- Jensen, P. J. (2002). Frye versus Daubert: Practically the same. *Minnesota Law Review*, 87, 1579–1600.
- Johnson, H. M., & Seifert, C. M. (1994). Sources of the continued influence effect: When misinformation in memory affects later inferences. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 20(6), 1420–1436. <https://doi.org/10.1037/0278-7393.20.6.1420>

Jones, A. W. (2023). Who are the most highly cited forensic scientists in the United States?.

Journal of Forensic Sciences, 68(3), 723-730. <https://doi.org/10.1111/1556-4029.15231>

Jones, B. D. (1999). Bounded rationality. *Annual Review of Political Science*, 2(1), 297-321.

Judicial Office International Team. (n.d.). *The judicial system of England and Wales:*

A visitor's guide. <https://www.judiciary.gov.uk/wp-content/uploads/2016/05/international-visitors-guide-10a.pdf>

Judiciary of England and Wales. (2023). Expert evidence (Section 7) within the

Criminal Practice Directions 2023 (pp. 67-72). <https://www.judiciary.uk/wp-content/uploads/2023/04/Criminal-Practice-Directions-2023.pdf>

Kadane, J. B., & Koehler, J. J. (2018). Certainty & uncertainty in reporting

fingerprint evidence. *Daedalus*, 147(4), 119-134.

https://doi.org/10.1162/DAED_a_00524

Kahneman, D. & Tversky, A. (1979). Prospect theory: An analysis of decision under

risk. *Econometrica*, 47(2), 363-391. <https://doi.org/10.2307/1914185>

Kahneman, D., & Klein, G. (2009). Conditions for intuitive expertise: a failure to

disagree. *American Psychologist*, 64(6), 515.

<https://doi.org/10.1037/a0016755>

Kahneman, D., Sibony, O., & Sunstein, C. R. (2021). *Noise: A flaw in human*

judgment. Hachette UK.

Kapsa, M. M., & Meyer, C. B. (1998). Scientific experts: Making their testimony more

reliable. *California Western Law Review*, 35, 313–340.

Karadag, N., & Sahin, M. D. (2016). Analysis of the difficulty and discrimination

indices of multiple-choice questions according to cognitive levels in an open

- and distance learning context. *Turkish Online Journal of Educational Technology*, 15(4), 16–24.
- Keeney, R. L., & Raiffa, H. (1993). *Decisions with multiple objectives: preferences and value trade-offs*. Cambridge university press. <https://doi.org/10.1017/CBO9781139174084>
- Kelly, H., Bright, J. A., Buckleton, J. S., & Curran, J. M. (2014). A comparison of statistical models for the analysis of complex forensic DNA profiles. *Science & Justice*, 54(1), 66–70. <https://doi.org/10.1016/j.scijus.2013.07.003>
- Kessler, G. C. (2010). *Judges' awareness, understanding, and application of digital evidence* [Doctoral dissertation, Nova Southeastern University]. NSUWorks.
- Khan, A., Hughes, J., Valentine, D., Ruis, L., Sachan, K., Radhakrishnan, A., Grefenstette, E., Bowman, S. R., Rocktäschel, T., & Perez, E. (2024). *Debating with more persuasive LLMs leads to more truthful answers*. *arXiv*. <https://doi.org/10.48550/arXiv.2402.06782>
- Kirk, P. L. (1963). The ontogeny of criminalistics. *Journal of Criminal Law, Criminology & Police Science*, 54, 235–238.
- Klayman, J. (1995). Varieties of confirmation bias. In J. Busemeyer, R. Hastie, & D. L. Medin (Eds.), *Psychology of learning and motivation* (Vol. 32, pp. 385–418). Academic Press.
- Koehler, J. J. (2018). How trial judges should think about forensic science evidence. *Judicature*, 102, 28. [https://doi.org/10.1016/S0079-7421\(08\)60315-1](https://doi.org/10.1016/S0079-7421(08)60315-1)
- Koppl, R., & Cowan, E. J. (2010). A battle of forensic experts is not a race to the bottom. *Review of Political Economy*, 22(2), 235–262. <https://doi.org/10.1080/09538251003665644>

- Köpsén, S., & Nyström, S. (2012). Learning in practice for becoming a professional forensic expert. *Forensic Science International*, 222(1-3), 208-215.
<https://doi.org/10.1016/j.forsciint.2012.05.026>
- Kukucka, J., & Dror, I. E. (2023). Kukucka, J., & Dror, I. E. (2023). Human factors in forensic science: Psychological causes of bias and error. *Journal of Applied Research in Memory and Cognition*, 12(1), 1–10.
<https://doi.org/10.1016/j.jarmac.2017.09.001>
- Kukucka, J., Kassin, S. M., Zapf, P. A., & Dror, I. E. (2017). Cognitive bias and blindness: A global survey of forensic science examiners. *Journal of Applied Research in Memory and Cognition*, 6(4), 452-459.
<https://doi.org/10.1016/j.jarmac.2017.09.001>
- Kwan, Q. Y. (1977). *Inference of identity of source* [Doctoral dissertation, University of California].
- Laerd Statistics. (2020). *Pearson's product moment correlation*. Statistical tutorials and software guides. <https://statistics.laerd.com/statistical-guides/pearson-correlation-coefficient-statistical-guide.php>
- Laerd Statistics. (2018). *Two-way MANOVA in SPSS Statistics*.
<https://statistics.laerd.com/spss-tutorials/two-way-manova-using-spss-statistics.php>
- Lamont, M. (2009). *How professors think: Inside the curious world of academic judgment*. Harvard University Press. <https://doi.org/10.4159/9780674054158>
- Lamport Common, M., & Miller, P. M. (2007). Folk psychology and the law: Why behavioral science needs to replace folk psychology. *Revista Brasileira de Estudos Políticos*, 96, 7–30. <https://doi.org/10.9732/34>
- Lander, E. S., & PCAST Working Group. (2016). *Forensic science in criminal courts: Ensuring scientific validity of feature-comparison methods*.

President's Council of Advisors on Science and Technology.

https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_forensic_science_report_final.pdf

Langbein, J. H. (2003). *The origins of adversary criminal trial*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780199287239.001.0001>

Leith, P. (2007). BAILII—Towards a National Law Library? *Legal Information Management*, 7(1), 42–45. <https://doi.org/10.1017/S1472669606001113>

Levanon, L., & Tully, G. (2025). Fingerprint analysis and reporting in legal trials: a critical re-evaluation. *Criminal Law Forum*, 36(1), 1–32. <https://doi.org/10.1007/s10609-025-09497-3>

Li, E. (2024). The Many Cultural Manifestations of Convictions Through Pleas in Greater China: An International Perspective. In *Criminal Case Dispositions through Pleas in Greater China: Conception, Operation and Contradiction* (pp. 253–277). Singapore: Springer Nature Singapore. https://doi.org/10.1007/978-981-97-1856-6_11

Ligertwood, A. (2011). Can DNA evidence alone convict an accused? *The Sydney Law Review*, 33(3), 487–514.

Lord, C. G., Ross, L., & Lepper, M. R. (1979). Biased assimilation and attitude polarization: The effects of prior theories on subsequently considered evidence. *Journal of Personality and Social Psychology*, 37(11), 2098. <https://doi.org/10.1037/0022-3514.37.11.2098>

Lynch, M. (2013). Science, truth, and forensic cultures: The exceptional legal status of DNA evidence. *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*, 44(1), 60–70. <https://doi.org/10.1016/j.shpsc.2012.09.008>

- MacCoun, R. J. (1989). Experimental research on jury decision-making. *Science*, 244(4908), 1046-1050. <https://doi.org/10.1126/science.244.4908.1046>
- Macedo Júnior, R.P. (2023). Education: Legal. In: M. Sellers, S. Kirste (eds) *Encyclopedia of the Philosophy of Law and Social Philosophy* https://doi.org/10.1007/978-94-007-6730-0_519-1
- Malek, H. M., Auburn, J., Bagshaw, R., Day, D., Dwyer, D. M., Falkowski, D., & Whale, S. (Eds.). (2013). *Phipson on evidence* (18th ed.). Sweet & Maxwell.
- Márquez, M. C., Fernández, Ó. G., Herrera, M. R. P., & Gutiérrez, J. A. L. (2017). The importance of ensuring quality and minimising the risks of contamination in genetics forensic analysis. *Spanish Journal of Legal Medicine*, 43(1), 20–25. <https://doi.org/10.1016/j.remle.2016.05.001>
- Marshall, E., & Boggis, E. (2016). The statistics tutor's quick guide to commonly used statistical tests. *Statstutor Community Project*, 1(57), 1-53. <https://www.statstutor.ac.uk/resources/uploaded/tutorsquickguidetostatistics.pdf>
- Martire, K. A., & Edmond, G. (2017). Rethinking expert opinion evidence. *Melbourne University Law Review*, 40(3), 967–998.
- Martire, K. A., Kemp, R. I., Sayle, M., & Newell, B. R. (2014). On the interpretation of likelihood ratios in forensic science evidence: Presentation formats and the weak evidence effect. *Forensic Science International*, 240, 61-68. <https://doi.org/10.1016/j.forsciint.2014.04.005>
- Maxwell, C. (2019). Preventing miscarriages of justice: the reliability of forensic evidence and the role of the trial judge as gatekeeper. *Australian Law Journal*, 93(8), 642–654.

- McArdle, D., & DeMartini, A. L. (2024). Litigation and liability in concussion research and collaboration. *Sport, Ethics and Philosophy*, 18(3-4), 338-357. <https://doi.org/10.1080/17511321.2024.2361909>
- McGurk, H., & MacDonald, J. (1976). Hearing lips and seeing voices. *Nature*, 264(5588), 746–748. <https://doi.org/10.1038/264746a0>
- Meazell, E. H. (2009). Scientific avoidance: Toward more principled judicial review of legislative science. *Indiana Law Journal*, 84, 239–276.
- Meehl, P. E. (1954). *Clinical versus statistical prediction: A theoretical analysis and a review of the evidence*. University of Minnesota Press. <https://doi.org/10.1037/11281-000>
- Melton, G. B., Petrila, J., Poythress, N. G., Slobogin, C., Otto, R. K., & Mossman, D. (1998). *Psychological evaluations for the courts: A handbook for mental health professionals and lawyers*. Guilford Press.
- Meuwly, D. (2006). Forensic individualisation from biometric data. *Science & Justice*, 46(4), 205-213. [https://doi.org/10.1016/S1355-0306\(06\)71600-8](https://doi.org/10.1016/S1355-0306(06)71600-8)
- Mieg, H. A. (2001). *The social psychology of expertise: Case studies in research, professional domains, and expert roles*. Psychology Press.
- Miller, C. M. (2023). A survey of prosecutors and investigators using digital evidence: A starting point. *Forensic Science International: Synergy*, 6, 100296. <https://doi.org/10.1016/j.fsisyn.2022.100296>
- Milroy, C. M. (2017). A brief history of the expert witness. *Academic Forensic Pathology*, 7(4), 516–526. <https://doi.org/10.23907/2017.044>
- Ministry of Justice. (2025, March 27). *Criminal court statistics quarterly: October to December 2024*. GOV.UK. <https://www.gov.uk/government/statistics>

- Moore, S. (2009, April 18). Damaged DNA evidence shrinks serial killer case. *The New York Times*.
- Morgan, R. M., & Bull, P. A. (2007). The philosophy, nature and practice of forensic sediment analysis. *Progress in Physical Geography*, 31(1), 43–58.
<https://doi.org/10.1177/0309133307073881>
- Neal, T. M., & Brodsky, S. L. (2008). Expert witness credibility as a function of eye contact behavior and gender. *Criminal Justice and Behavior*, 35(12), 1515-1526.
<https://doi.org/10.1177/0093854808325405>
- Neuberger, L. (2015, January 29). “Judge not, that ye be not judged”: Judging judicial decision-making. *FA Mann Lecture*, 29.
https://www.supremecourt.uk/uploads/speech_150129_782eb16593.pdf
- Newsom, J. T. (2023). *Multivariate analysis of variance*. Portland State University.
https://web.pdx.edu/~newsomj/mvclass/ho_manova.pdf
- Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology*, 2(2), 175-220.
<https://doi.org/10.1037/1089-2680.2.2.175>
- Niedenthal, P. M., Halberstadt, J. B., Margolin, J., & Innes-Ker, Å. H. (2000). Emotional state and the detection of change in facial expression of emotion. *European Journal of Social Psychology*, 30(2), 211–222.
[https://doi.org/10.1002/\(SICI\)1099-0992\(200003/04\)30:2](https://doi.org/10.1002/(SICI)1099-0992(200003/04)30:2)
- Nir, E., & Liu, S. (2021). What do the gatekeepers see? Perceptions and evaluations of scientific evidence among state court judges. *Criminology, Criminal Justice, Law & Society*, 22(1), 1–20.
<https://ccjls.scholasticahq.com/article/21975-what-do-the-gatekeepers-see-perceptions-and-evaluations-of-scientific-evidence-among-state-court-judges>

- Norman, G. R., Rosenthal, D., Brooks, L. R., Allen, S. W., & Muzzin, L. J. (1989). The development of expertise in dermatology. *Archives of Dermatology*, 125(8), 1063–1068. <https://doi.org/10.1001/archderm.1989.01670200039005>
- Nsiah Amoako, E., & McCartney, C. (2021). The UK Forensic Science Regulator: Fit for purpose?. *Wiley Interdisciplinary Reviews: Forensic Science*, 3(6), e1415. <https://doi.org/10.1002/wfs2.1415>
- Olaborede, A., & Meintjes-Van der Walt, L. (2020). Cognitive bias affecting decision-making in the legal process. *Obiter*, 41(4), 806-830. <https://doi.org/10.17159/obiter.v41i4.10489>
- Olivier, M. S. (2015, August). Towards a digital forensic science. In 2015 *Information Security for South Africa (ISSA)* (pp. 1–8). Institute of Electrical and Electronics Engineers. <https://doi.org/10.1109/ISSA.2015.7335077>
- Olson, C. L. (1976). On choosing a test statistic in multivariate analysis of variance. *Psychological Bulletin*, 83(4), 579. <https://doi.org/10.1037/0033-2909.83.4.579>
- Origgi, G. (2024). Authority, legitimacy, and the expert-layman problem. In M. Fricker & J. Lackey (Eds.), *Expertise: Philosophical perspectives* (pp. 31-43). Oxford University Press. <https://doi.org/10.1093/oso/9780198877301.003.0003>
- Ormerod, D. (2002) Sounding out expert voice identification. *Criminal Law Review*, (October), 771-790.
- Parrott, C. T., Neal, T. M. S., Wilson, J. K., & Brodsky, S. L. (2015). Differences in expert witness knowledge: Do mock jurors notice and does it matter? *Journal of the American Academy of Psychiatry and the Law*, 43(1), 69–81.

- Patel, P., Zuhour, L., & McDermott, A. (2021). Introduction to DNA in the Criminal Justice System. *Voices of Forensic Science*, 1(1), 29–45.
- Peer, E., & Gamliel, E. (2013). Heuristics and biases in judicial decisions. *Court Review*, 49(4), 114–121.
- Pennington, N., & Hastie, R. (1986). Evidence evaluation in complex decision making. *Journal of Personality and Social Psychology*, 51(2), 242.
<https://doi.org/10.1037/0022-3514.51.2.242>
- Perju-Dumbravă, D., Apan, R. D., Rebeleanu, C., & Radu, C. C. (2021). Correlation of the legislative situation regarding the forensic expertise carried out by the expert recommended by the parties. *Fiat Iustitia*, 15(2), 93–105.
- Phillips, W. J., Fletcher, J. M., Marks, A. D., & Hine, D. W. (2016). Thinking styles and decision making: A meta-analysis. *Psychological Bulletin*, 142(3), 260.
<https://doi.org/10.1037/bul0000027>
- Piperides, C., Allen, R. J., Dhami, M. K., Flessner, A., Hastie, R., Koehler, J. J., Lempert, R. O., Schulz, J., & Wagner, G. (2006). Group report: What is the role of heuristics in litigation? In G. Gigerenzer & C. Engel (Eds.), *Heuristics and the law* (pp. 343–377). MIT Press. <https://doi.org/10.7551/mitpress/3488.003.0019>
- Pizzi, W. T. (2000). *Trials without truth: Why our system of criminal trials has become an expensive failure and what we need to do to rebuild it*. New York University Press. <https://doi.org/10.18574/nyu/9780814768709.001.0001>
- Plous, S. (1993). *The psychology of judgment and decision making*. McGraw-Hill.
- Polanyi, M. (1962). Tacit knowing: Its bearing on some problems of philosophy. *Reviews of Modern Physics*, 34(4), 601.
<https://doi.org/10.1103/RevModPhys.34.601>
- Pollock, F. (1922). *Essays in the law* (p. 275). Macmillan and Co.

- Puri, M. L. and Sen, P. K. (1971). Puri, M. L., & Sen, P. K. (1971). *Nonparametric methods in multivariate analysis*. Wiley. <https://doi.org/10.1146/annurev-lawsocsci-110615-085032>
- Rachlinski, J. J., & Wistrich, A. J. (2017). Judging the judiciary by the numbers: Empirical research on judges. *Annual Review of Law and Social Science*, 13(1), 203-229. <https://doi.org/10.1146/annurev-lawsocsci-110615-085032>
- Randerson, J., & Coghlan, A. (2004). Forensic evidence stands accused. *New Scientist*, 181(2432), 6-7.
- Rassin, E. (2018). Reducing tunnel vision with a pen-and-paper tool for the weighting of criminal evidence. *Journal of Investigative Psychology and Offender Profiling*, 15(2), 227-233. <https://doi.org/10.1002/jip.1504>
- Repke, A. (2021). *The power of presentation: How attire, cosmetics, and posture impact the source credibility of the female expert witness* [Doctoral dissertation, The University of Southern Mississippi]. The Aquila Digital Community. <https://aquila.usm.edu/dissertations/1796/>
- Ribeiro, G., Tangen, J. M., & McKimmie, B. M. (2019). Beliefs about error rates and human judgment in forensic science. *Forensic Science International*, 297, 138–147. <https://doi.org/10.1016/j.forsciint.2019.01.034>
- Ringnalda, A. (2014). Procedural Tradition and the Convergence of Criminal Procedure Systems: The Case of the Investigation and Disclosure of Evidence in Scotland. *The American Journal of Comparative Law*, 62(4), 1133-1166. <https://doi.org/10.5131/AJCL.2014.0032>
- Risinger, D. M., Saks, M. J., Thompson, W. C., & Rosenthal, R. (2002). The Daubert/Kumho implications of observer effects in forensic science: Hidden

- problems of expectation and suggestion. *California Law Review*, 90(1), 1-56.
<https://doi.org/10.2307/3481305>
- Roach, K. (2009). Forensic science and miscarriages of justice: Some lessons from comparative experience. *Jurimetrics Journal*, 50(1), 67–92.
- Robertson, B., Vignaux, G. A., & Berger, C. E. (2016). *Interpreting evidence: evaluating forensic science in the Courtroom*. John Wiley & Sons.
<https://doi.org/10.1002/9781118492475>
- Rossi, F. F. (1991). Introduction. In F. F. Rossi (Ed.), *Expert witnesses* (pp. 3–10). American Bar Association.
- Rosson, M. B. (1985). Role of experience in editing. In D. A. Norman & S. W. Draper (Eds.), *User centered system design: New perspectives on human-computer interaction* (pp. 45–50). North-Holland.
- Russell, D. W. (2002). In search of underlying dimensions: The use (and abuse) of factor analysis in Personality and Social Psychology Bulletin. *Personality and Social Psychology Bulletin*, 28(12), 1629-1646.
<https://doi.org/10.1177/014616702237645>
- Saks, M. J. (2007). Remediating forensic science. *Jurimetrics*, 48, 119-124.
- Saks, M. J., & Kidd, R. F. (1980). Human information processing and adjudication: Trial by heuristics. *Law & Society Review*, 15(1), 123-160.
<https://doi.org/10.2307/3053225>
- Sallavaci, O., & George, C. (2013). Procedural aspects of the new regime for the admissibility of expert evidence: what the digital forensic expert needs to know. *International Journal of Electronic Security and Digital Forensics*, 5(3–4), 161–171. <https://doi.org/10.1504/IJESDF.2013.058645>

- Samuels, R., Stich, S., & Bishop, M. (2002). Ending the rationality wars: How to make disputes about human rationality disappear. In R. Elio (Ed.), *Common sense, reasoning, and rationality* (pp. 236–268). Oxford University Press.
<https://doi.org/10.1093/0195147669.003.0011>
- Samuelson, W., & Zeckhauser, R. (1988). Status quo bias in decision making. *Journal of Risk and Uncertainty*, 1, 7–59.
<https://doi.org/10.1007/BF00055564>
- San Pietro, D., & Kammrath, B. W. (2019). Forensic science: A forensic scientists' perspective. *GPSolo*, 36, 64–68.
- Sanders, J. (1993). Jury deliberation in a complex case: Havner v. Merrell Dow Pharmaceuticals. *Justice System Journal*, 16(2), 45-67.
<https://doi.org/10.1080/23277556.1993.10871171>
- Sangero, B., & Halpert, M. (2007). Why a conviction should not be based on a single piece of evidence: A proposal for reform. *Jurimetrics*, 48, 43–94.
- Sanna, L. J., Schwarz, N., & Stocker, S. L. (2002). When debiasing backfires: accessible content and accessibility experiences in debiasing hindsight. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 28(3), 497-502. <https://doi.org/10.1037/0278-7393.28.3.497>
- Saunders, J. W. (2001). Experts in court: A view from the bench. *Canadian Psychology/Psychologie canadienne*, 42(2), 109-118.
<https://doi.org/10.1037/h0086885>
- Savage, L. J. (1972). *The foundations of statistics*. Courier Corporation.
- Schmidt, H. H., Norman, G. G., & Boshuizen, H. H. (1990). A cognitive perspective on medical expertise: theory and implications. *Academic Medicine*, 65(10), 611–621. <https://doi.org/10.1097/00001888-199010000-00001>

- Schmitt, N. (1996). Uses and abuses of coefficient alpha. *Psychological Assessment*, 8(4), 350. <https://doi.org/10.1037/1040-3590.8.4.350>
- Schweitzer, K., Burd, K. A., & Nuñez, N. (2024). Legal and extralegal factors that affect jurors' decisions. In M. K. Dhami & R. J. Allen (Eds.), *The Cambridge handbook of psychology and legal decision-making* (pp. 365–384). Cambridge University Press.
- Searston, R. A., Thompson, M. B., Robson, S. G., & Tangen, J. M. (2025). Beyond minutiae: inferring missing details from global structure in fingerprints. *Cognitive Research: Principles and Implications*, 10(1), 1-14. <https://doi.org/10.1186/s41235-025-00610-z>
- Seckinger, J. H. (1991). Presenting expert testimony. *American Journal of Trial Advocacy*, 15, 215–230.
- Selim, A., & Ali, İ. (2024). The Role of Digital Forensic Analysis in Modern Investigations. *Journal of Emerging Computer Technologies*, 4(1), 1–5. <https://doi.org/10.57020/ject.1445625>
- Selvin, M., & Picus, L. A. (1987). *The debate over jury performance*. RAND Corporation.
- Servick, K. (2016, April 27). Reversing the legacy of junk science in the courtroom. *Science*. <https://doi.org/10.1126/science.aaf4158>
- Shaklee, H., & Fischhoff, B. (1982). Strategies of information search in causal analysis. *Memory & Cognition*, 10(6), 520–530. <https://doi.org/10.3758/BF03202434>
- Shanteau, J. (1988). Psychological characteristics and strategies of expert decision makers. *Acta psychologica*, 68(1–3), 203–215. [https://doi.org/10.1016/0001-6918\(88\)90056-X](https://doi.org/10.1016/0001-6918(88)90056-X)

- Sharp, L. (1995). Cognitive heuristics and law: An interdisciplinary approach to better judicial decision-making. *Bulletin of the Australian Society of Legal Philosophy*, 20, 71–85.
- Sjerps, M. J., & Berger, C. E. H. (2012). How clear is transparent? Reporting expert reasoning in legal cases. *Law, Probability and Risk*, 11(4), 317–329.
<https://doi.org/10.1093/lpr/mgs012>
- Shellow, J. M. (2003). The limits of cross-examination. *Seton Hall Law Review*, 34, 317–340.
- Shepard, R. N. (1990). *Mind sights: Original visual illusions, ambiguities, and other anomalies, with a commentary on the play of mind in perception and art*. WH Freeman/Times Books/Henry Holt & Co.
- Shiyuan, H. (2017). Cognitive biases that lead to wrongful convictions: Illustrated by twenty-three erroneous Chinese cases. *California Western Law Review*, 54, 103–130.
- Shuman, D. W., & Champagne, A. (1997). Removing the people from the legal process: The rhetoric and research on judicial selection and juries. *Psychology, Public Policy, and Law*, 3(2-3), 242.
<https://doi.org/10.1037/1076-8971.3.2-3.242>
- Shuman, D. W., & Greenberg, S. A. (1998). The role of ethical norms in the admissibility of expert testimony. *Judges' Journal*, 37(1), 4–10.
- Shuman, D. W., & Greenberg, S. A. (2003). The expert witness, the adversary system, and the voice of reason: Reconciling impartiality and advocacy. *Professional Psychology: Research and Practice*, 34(3), 219–224. <https://doi.org/10.1037/0735-7028.34.3.219>
- Shuman, D. W., & Sales, B. D. (1998). The admissibility of expert testimony based upon clinical judgment and scientific research. *Psychology, Public Policy, and Law*, 4(4), 1226–1252. <https://doi.org/10.1037/1076-8971.4.4.1226>

- Simon, K., & Smith, J. H. (2024) The impact on the reporting of forensic findings in criminal proceedings. *Pakistan Journal of Life and Social Sciences*, 22(2), 15485–15492. <https://doi.org/10.57239/PJLSS-2024-22.2.001123>
- Skolnik, T. (2023). Two criminal justice systems. *University of British Columbia Law Review*, 56, 285–310.
- Skovholt, T., Hanson, M., Jennings, L., & Grier, T. (2004). A brief history of expertise. In *Master therapists: Exploring expertise in therapy and counseling* (pp. 1–15). Allyn & Bacon.
- Slesnick, F. (1998). Science On Trial – The Clash of Medical Evidence and the Law in the Breast Implant Case. *Journal of Forensic Economics*, 11(3), 271–273. <https://doi.org/10.5085/jfe.11.3.271>
- Smith, M., & Miller, S. (2021). The rise of biometric identification: Fingerprints and applied ethics. In *Biometric identification, law and ethics* (pp. 1–19). Springer. https://doi.org/10.1007/978-3-030-90256-8_1
- Smith, T., & Odgers, S. (2010). Determining “probative value” for the purposes of section 137 in the uniform evidence law. *Criminal Law Journal*, 34(5), 292–305. <https://doi.org/10.3316/AGISPT.20105218>
- Sonnentag, S. (1998). Expertise in professional software design: A process study. *Journal of Applied Psychology*, 83(5), 703. <https://doi.org/10.1037/0021-9010.83.5.703>
- Spencer, J. R. (1992). Court experts and expert witnesses: Have we a lesson to learn from the French? *Current Legal Problems*, 45(2), 213–236. https://doi.org/10.1093/clp/45.Part_2.213
- Spigelman, J. J. (2011). Truth and the law. *Bar News: The Journal of the NSW Bar Association*, (Winter), 99–113. <https://doi.org/10.2139/ssrn.4666114>

- Sternthal, B., Phillips, L. W., & Dholakia, R. (1978). The persuasive effect of scarce credibility: a situational analysis. *Public Opinion Quarterly*, 42(3), 285-314.
<https://doi.org/10.1086/268454>
- Stewart, C. R. (2018). *Experts, trust, and authority* [Doctoral dissertation, Fordham University]. Fordham Research Commons.
<https://research.library.fordham.edu/dissertations/AAI10813494/>
- Stridbeck, U., Grøndahl, P., & Grønnerød, C. (2016). Expert for whom? Court–appointed versus party–appointed experts. *Psychiatry, Psychology and Law*, 23(2), 246–255. <https://doi.org/10.1080/13218719.2015.1052334>
- Sundar, S. S., Xu, Q., & Oeldorf-Hirsch, A. (2009). Authority vs. peer: How interface cues influence users. In *CHI'09 extended abstracts on human factors in computing systems* (pp. 4231-4236). Association for Computing Machinery.
<https://doi.org/10.1145/1520340.1520645>
- Sunde, N. (2017). *Non-technical sources of errors when handling digital evidence within a criminal investigation* [Master's thesis, Norwegian Police University College & Norwegian University of Science and Technology]. NTNU Open.
<https://ntnuopen.ntnu.no/ntnu-xmlui/handle/11250/2472259>
- Sunde, N., & Dror, I. E. (2019). Cognitive and human factors in digital forensics: Problems, challenges, and the way forward. *Digital Investigation*, 29, 101-108. <https://doi.org/10.1016/j.diin.2019.03.011>
- Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2007). *Using multivariate statistics* (5th ed.). Pearson.
- Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2013). *Using multivariate statistics* (6th ed.). Pearson.

- Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, 48(6), 1273–1296. <https://doi.org/10.1007/s11165-016-9602-2>
- Tangen, J. M., Thompson, M. B., & McCarthy, D. J. (2011). Identifying fingerprint expertise. *Psychological Science*, 22(8), 995–997. <https://doi.org/10.1177/0956797611414729>
- Tapper, C. (2007). *Cross and Tapper on evidence* (11th ed.). Oxford University Press.
- Taslitz, A. E. (2012). Trying not to be like Sisyphus: Can defense counsel overcome pervasive status quo bias in the criminal justice system? *Texas Tech Law Review*, 45(2), 315–372.
- Teddlie, C., & Tashakkori, A. (2010). Overview of contemporary issues in mixed methods research. In A. Tashakkori & C. Teddlie (Eds.), *SAGE handbook of mixed methods in social & behavioral research* (2nd ed., Vol. 2, pp. 1–44). SAGE Publications. <https://doi.org/10.4135/9781506335193.n1>
- Teichman, D., Zamir, E., & Ritov, I. (2023). Biases in legal decision-making: Comparing prosecutors, defense attorneys, law students, and laypersons. *Journal of Empirical Legal Studies*, 20(4), 852–894. <https://doi.org/10.1111/jels.12365>
- Thompson, V. A., Elqayam, S., & Ackerman, R. (2021). Reasoning, rationality, and metacognition. In M. Knauff & W. Spohn (Eds.), *The handbook of rationality* (pp. 517–526). MIT Press. <https://doi.org/10.7551/mitpress/11252.003.0054>
- Thompson, W. C. (2009). Painting the target around the matching profile: The Texas sharpshooter fallacy in forensic DNA interpretation. *Law, Probability & Risk*, 8(3), 257–276. <https://doi.org/10.1093/lpr/mgp013>

- Van der Valk, A. (2017). Source expertise as a factor of social influence. *Afficio Undergraduate Journal*. <https://library2.smu.ca/handle/01/28209>
- Von Neumann, J., & Morgenstern, O. (2007). *Theory of games and economic behavior* (60th anniversary commemorative ed). Princeton University Press. <https://doi.org/10.1515/9781400829460>
- Vorms, M., & Lagnado, D. (2019). Coherence and credibility in the story-model of jurors' decision-making: Does mental simulation really drive the evaluation of the evidence? In L. Magnani, T. Bertolotti, & M. Casadio (Eds.), *Model-based reasoning in science and technology: Inferential models for logic, language, cognition and computation* (pp. 103–119). Springer. https://doi.org/10.1007/978-3-030-32722-4_7
- Walia, M., Joshi, B., Kaur, J., Sodhi, G. S., & Verma, K. (2024). A comprehensive review of small particle reagent efficacy in developing latent fingerprints immersed in water: An empirical analysis. *Research Journal of Pharmacy and Technology*, 17(8), 4110–4116. <https://doi.org/10.52711/0974-360X.2024.00637>
- Wason, P. C., & Johnson-Laird, P. N. (1972). *Psychology of reasoning: Structure and content*. Harvard University Press.
- Weiss, D. J., & Shanteau, J. (2012). Decloaking the privileged expert. *Journal of Management & Organization*, 18(3), 300–310. <https://doi.org/10.5172/jmo.2012.18.3.300>
- Weiss, D. J., & Shanteau, J. (2014). Who's the best? A relativistic view of expertise. *Applied Cognitive Psychology*, 28(4), 447–457. <https://doi.org/10.1002/acp.3015>

- Widodo, A. M., Biyanto, T. R., Pappachan, P., & Colace, F. (2024). Recent advances in digital forensics and cybercrime investigation. In M. Khosrow-Pour (Ed.), *Digital forensics and cyber crime investigation* (pp. 42–69). CRC Press.
- Wirzberger, M. (2019). *Load-inducing factors in instructional design: Process-related advances in theory and assessment* [Doctoral dissertation, Universität Koblenz-Landau].
- Wistrich, A. J., Rachlinski, J. J., & Guthrie, C. (2014). Heart versus head: Do judges follow the law or follow their feelings? *Texas Law Review*, 93, 855–884.
- Wolman, J. L. (1979). *Opinion change as a function of information and expert influence* [Doctoral dissertation, The Ohio State University].
- Zamir, E., & Teichman, D. (2018). *Behavioral law and economics*. Oxford University Press. <https://doi.org/10.1093/oso/9780190901349.001.0001>
- Zwick, R. (1985). Nonparametric one-way multivariate analysis of variance: A computational approach based on the Pillai-Bartlett trace. *Psychological Bulletin*, 97(1), 148–153. <https://doi.org/10.1037/0033-2909.97.1.148>

Appendices

Appendix 1

List of Conferences Attended

Deonaran, M. (June 2025) *Admissibility of expert forensic witnesses: Survey of legal professionals and laypeople*. Research presented at The European Society for Empirical Legal Studies. Toulouse, France.

Deonaran, M. (June 2025) *Effect of Communication mode of Testimony and Domain of Forensic Expertise on Lay credibility Assessments*. Research presented at Middlesex University Postgraduate Summer Conference.

Deonaran, M. (December 2023). *Admissibility of Forensic Experts and Evidence in Criminal Cases in England and Wales*. Research presented at Middlesex University Psychology Annual Research Showcase Event.

Deonaran, M. (March 2023). *Examining Public and Legal Professional Views of the Criteria for Qualifying Credible Expert Forensic Witnesses*. Presented at Research Symposium: Empowering Communities through Knowledge Sharing, Middlesex University Mauritius.

Deonaran, M. (July 2022). *Legal Professionals and Lay views on the Criteria for qualifying Expert Forensic Witnesses* presented at Law and Society Association (Law, Society & Psychological Science) Summer Research Series, Lisbon, Spain.

Deonaran, M. (June 2022). *Examining Legal Professionals and Lay views on the Credibility of Expert Forensic Witnesses* presented at Research presented at Middlesex University Psychology Annual Research Showcase Event.

Deonaran, M. (December 2021). *Admissibility of Forensic and Expert Evidence in the England and Wales Criminal Court of Appeal* Research presented at Middlesex University Psychology Annual Research Showcase Event.

Deonaran, M. (June 2021). *Appeal Court assessment of General Admissibility of Expert Forensic Evidence*. Research presented at Middlesex University Research Students' Summer Conference.

Deonaran, M. (June 2020). *How do the Appeal Courts in England and Wales assess Fresh expert evidence?* Paper presented at the Law and Society Association CRN 54 (Law, Society & Psychological Science) Summer Research Series.

Appendix 2

Ethics Approval



Psychology REC

The Burroughs
Hendon
London NW4 4BT

Main Switchboard: 0208 411

5000 02/05/2019

APPLICATION NUMBER: 4780

Dear Mandeep Dhami

Re your application title: Appeal Court Challenges and Responses to Forensic Scientific Practices and Evidence

Co-investigators/collaborators: Mr Mahensingh Deonaran

Thank you for submitting your application. I can confirm that your application has been given approval from the date of this letter by the Psychology REC.

Although your application has been approved, the reviewers of your application may have made some useful comments on your application. Please look at your online application again to check whether the reviewers have added any comments for you to look at.

Also, please note the following:

1. Please ensure that you contact your supervisor/research ethics committee (REC) if any changes are made to the research project which could affect your ethics approval. There is an Amendment sub-form on MORE that can be completed and submitted to your REC for further review.
2. You must notify your supervisor/REC if there is a breach in data protection management or any issues that arise that may lead to a health and safety concern or conflict of interests.
3. If you require more time to complete your research, i.e., beyond the date specified in your application, please complete the Extension sub-form on MORE and submit it to your REC for review.
4. Please quote the application number in any correspondence.
5. It is important that you retain this document as evidence of research ethics approval, as it may be required for submission to external bodies (e.g., NHS, grant awarding bodies) or as part of your research report, dissemination (e.g., journal articles) and data management plan.
6. Also, please forward any other information that would be helpful in enhancing our application form and procedures - please contact MOREsupport@mdx.ac.uk to provide feedback.

Good luck with your research.

Yours sincerely

Chair

Psychology REC



02/06/2021

APPLICATION NUMBER: 16196

Dear Mahensingh Deonaran and all collaborators/co-investigators

Re your application title: Quantitative-expert forensic witness criteria

Supervisor: Mandeep Dhami, Yvan Russell **Co-**
investigators/collaborators:

Thank you for submitting your application. I can confirm that your application has been given APPROVAL from the date of this letter by the Psychology REC.

The following documents have been reviewed and approved as part of this research ethics application:

Document Type	File Name	Date	Version
Participant Recruitment Information	Recruitment message for participants in survey	11/05/2021	1
Aims, objectives and hypotheses	Project Outline Template V1	17/05/2021	1
Debriefing Sheet	Debriefing	17/05/2021	1
Resubmission Response to Feedback Summary	Resubmission Feedback Summary 16196	02/06/2021	1
Methods and data	Research proposal	02/06/2021	1
Methods and data	Research Procedure Template V1	02/06/2021	1
Participant Recruitment Information	Information_consent_statement_V2	02/06/2021	1
Materials	Qualtrics survey v1	02/06/2021	1
Materials	Survey V3	02/06/2021	1
Materials	Demographic questions	02/06/2021	1
Revised documents as part of resubmission	Survey V3	02/06/2021	1
Revised documents as part of resubmission	Demographic questions	02/06/2021	1
Revised documents as part of resubmission	Information_consent_statement_V2	02/06/2021	1
Revised documents as part of resubmission	Research proposal	02/06/2021	1
Revised documents as part of resubmission	Research Procedure Template V1	02/06/2021	1
Revised documents as part of resubmission	Qualtrics survey v1	02/06/2021	1

Although your application has been approved, the reviewers of your application may have made some useful comments on your application. Please look at your online application again to check whether the reviewers have added any comments for you to look at.

01/03/2023

APPLICATION NUMBER: 24376

Dear Mahensingh Deonaran and all collaborators/co-investigators

Re your application title: Quant - experts cognitive modes of expression

Supervisor: Mandeep Dhami, Yvan Russell

Co-investigators/collaborators:

Thank you for submitting your application. I can confirm that your application has been given APPROVAL from the date of this letter by the Psychology REC.

The following documents have been reviewed and approved as part of this research ethics application:

Document Type	File Name	Date	Version
Aims, objectives and hypotheses	Project Outline Template	24/01/2023	1
Further details	Data Protection Checklist	24/01/2023	1
Materials	Information_consent_statement	25/01/2023	1
Debriefing Sheet	Debriefing form	25/01/2023	1
Participant Recruitment Information	Invitation to participate	30/01/2023	1
Materials	Demographic questions	30/01/2023	1
Materials	Stimuli - Criminal court cases	30/01/2023	1
Materials	Stimuli - Criminal court cases with manipulations highlighted	30/01/2023	1
Materials	Credibility measures	30/01/2023	1
Materials	Qualtrics Survey in PDF format	30/01/2023	1
Materials	Qualtrics Pilot test inclusive of manipulation checks	30/01/2023	1
Methods and data	Research Procedure Template V2	08/02/2023	2

Appendix 3

Study 1. Coding Scheme

Table 5.1

Overview of Coding Scheme Development

Amendment	Coding scheme	Composition amendment	Basis for development
	Scheme 1 devised by Dhami 2019 101 items	-	Need to code for Fingerprint and DNA evidence
1	Scheme 2 (Adapted) 120 items	Code changed: from Yes = 1, No = 2 to Yes = 1, No = 0	Need to code for Fingerprint, DNA and Digital forensic evidence Added to make coding more intelligible
2	-	Code added for digital evidence to items 19-29	Need to code for Digital evidence
3	-	Items 33-40: Digital evidence included Option to provide annotations	Need to code for Digital evidence To clarify which legal professional expressed concern
4	-	Items 41: Code 41b added and option for annotation	To clarify who raised concerns about inadmissible evidence being presented
5	-	Items 58-59, 70-75, 78, 80-86, 89-90, 97-99: option for annotation added	To clarify the Courts concerns about the forensic evidence
6	-	Item 102 added for Digital evidence	Need to code for any problems with Digital evidence being presented at the appeal hearing
7	-	Items 103-116 added for Digital evidence	Need to code for Digital evidence being presented during the Investigative stage
8	-	Items 117-120 added in evidentiary stage	Need to code for General standards of Admissibility legislation
9	-	Item 121-26 added in evidentiary stage	Need to code for Fresh evidence on appeal legislation

Table 5.2*Adapted Coding Scheme*

SAMPLE DESCRIPTION	
1. Case	Add text
2. Date of appeal hearing	Enter all dates as numerical using six-digit format (e.g., 280219), if day is unavailable then use four-digit (e.g., 000219)
3. Date of original trial/conviction	6-or 4-digit
4. Keywords found in case	Fingerprint = 1 DNA = 2 Digital = 3 Forensic = 4 Expert = 5 Fingerprint & DNA = 6 Forensic & Expert = 7 Other combined = 8 Fingerprint & DNA & Digital = 9 Fingerprint & Digital = 10 DNA & Digital = 11
5. Decision <i>Provide quote if short, otherwise summarise</i>	Dismissed/refused = 1 Granted/allowed/retrial/quashed = 2 Combined = 3
6. Number of pages	Add number
DEFENDANT DEMOGRAPHICS (code as 99 if not stated and cannot be inferred)	
7. Defendant's gender?	Male = 1 Female = 2
8. Defendant's age (at time of offence)?	Add number
9. Defendant's nationality (at time of offence)?	British = 1 Other = 2
10. Defendant's employment status (at time of offence)?	Employed = 1 Retired = 2 Student = 3 Unemployed = 4 Other = 5
11. Defendant's education level (at time of offence)?	Less than university = 1 University = 2 Other (e.g., professional training) = 3
12. Defendant's relationship status (at time of offence)?	Married = 1 Relationship = 2 Single = 3
13. Did defendant have any children (at time of offence)?	Yes = 1 No = 0
14. Was defendant homeless (at time of offence)?	Yes = 1 No = 0
APPEAL CASE/HEARING FACTORS (code as 99 if not stated and cannot be inferred)	
15. When was appeal initiated? (e.g., post-trial, post-conviction, post-sentence, other)	Post-trial = 1 Post-conviction = 2 Post-sentence = 3 Other = 4

16. Who is appellant? (e.g., prosecution, defence, other)	Defence = 1 Prosecution = 2 Other = 3
17. What is appeal against? (e.g., conviction, sentence, both, other)	Conviction = 1 Sentence = 2 Both = 3 Other = 4
18. What are the grounds/reason(s) for appeal? <i>Provide quote if short, otherwise summarise</i>	Add text
19. Was fresh evidence presented at appeal? 19b. If yes, was it Fingerprint/DNA/Digital evidence? 19c. If no, what was it?	Q19: Yes = 1, No = 0 Q19b: Fingerprint = 1, DNA = 2, Digital = 3 Q19c: Add text
20. Were new techniques used to re-examine old evidence at appeal?	Yes = 1 No = 0
21. Were new Fingerprint/DNA/Digital experts consulted by defence after original trial?	Yes = 1 No = 0
22. Were new Fingerprint/DNA/Digital experts consulted by prosecution after original trial?	Yes = 1 No = 0
23. Did new prosecution Fingerprint/DNA/Digital experts present evidence at appeal hearing?	Yes = 1 No = 0
24. Did new defence Fingerprint/DNA/Digital experts present evidence at appeal hearing?	Yes = 1 No = 0
25. Was concern expressed at appeal hearing about qualifications, knowledge, skills or experience of any new prosecution Fingerprint/DNA/Digital expert(s)? 25b. If yes, which prosecution expert(s)?	Yes = 1 No = 0 Q25b: DNA = 1, Fingerprint = 2, Digital = 3, DNA and FP = 4, FP and Digital = 5, DNA and Digital = 6, DNA, FP and Digital = 7 Annotations:
26. Was any concern expressed at appeal hearing about qualifications, knowledge, skills or experience of any new defence Fingerprint/DNA/Digital expert(s)? 26b. If yes, which defence expert(s)?	Yes = 1 No = 0 Q26b: DNA = 1, Fingerprint = 2, Digital = 3, DNA and FP = 4, FP and Digital = 5, DNA and Digital = 6, DNA, FP and Digital = 7 Annotations:
27. Did prosecution and defence Fingerprint/DNA/Digital expert conclusions disagree at appeal hearing?	Yes = 1 No = 0
28. What were the main areas of disagreement between prosecution and defence Fingerprint/DNA/Digital experts at appeal hearing? <i>Provide quote if short, otherwise summarise</i>	Add text
29. Did Fingerprint/DNA/Digital expert express his/her confidence in conclusion at appeal hearing? 29b. If yes, how? <i>Provide quote if short, otherwise summarise</i>	Q29: Yes = 1, No = 0 Q29b: Add text
30. Were any new probabilities of Fingerprint/DNA match mentioned at appeal hearing?	Yes = 1 No = 0
31. For DNA evidence, were any new contamination/error rates presented at appeal hearing?	Yes = 1 No = 0
32. For Fingerprint evidence, were any (new) points of dissimilarity between sample and print presented at appeal hearing? 32b. If yes, how many?	Q32: Yes = 1, No = 0 Q32b: Add number
33. Did Appeal Court raise concerns about prosecution or defence team misunderstanding fingerprint/DNA/Digital evidence? 33b. If yes, who raised it?	Q33: Yes = 1, No = 0 Q33b: Add text
34. Did Appeal Court raise concerns about jury at original trial misunderstanding or having difficulty	Q34: Yes = 1, No = 0 Q34b: Add text

understanding fingerprint/DNA/Digital evidence? 34b. If yes, who raised it?	
35. Did Appeal Court raise concerns about judge at original trial misunderstanding fingerprint/DNA/Digital evidence? 35b. If yes, who raised it?	Q35: Yes = 1, No = 0 Q35b: Add text
36. Did Appeal Court raise concerns about application of either wrong case law at original trial or ignoring right case law? If yes, who raised it?	Q36: Yes = 1, No = 0 Q36b: Add text
37. Did Appeal Court raise concerns about errors in judge's summing up of case at original trial? 37b. If yes, who raised it?	Q37: Yes = 1, No = 0 Q37b: Add text
38. Did Appeal Court raise concerns about judge's instructions confusing jury at original trial? 38b. If yes, who raised it?	Q38: Yes = 1, No = 0 Q38b: Add text
39. Did Appeal Court raise concerns about how fingerprint/DNA/Digital evidence was presented at original trial? 39b. If yes, who raised it?	Q39: Yes = 1, No = 0 Q39b: Add text
40. Did Appeal Court raise concerns that weight of fingerprint/DNA/Digital evidence was overstated in Court by either prosecution/defence/judge at original trial? 40b. If yes, who raised it?	Q40: Yes = 1, No = 0 Q40b: Add text
41. Did Appeal Court raise concerns about inadmissible evidence being presented at original trial? 41b. If yes, who raised it?	Q41: Yes = 1, No = 0 Q41b: Add text
42. Did Appeal Court refer to any existing case law? 42b. If yes, which?	Q42a: Yes = 1, No = 0 Q42b: Add text
43. Name of appeal judge(s)	Add text
44. Name of lawyer(s) in appeal hearing, including who they represent	Add text
ORIGINAL CASE/TRIAL CHARACTERISTICS (code as 99 if not stated and cannot be inferred)	
45. Date of crime (first date)	6-or 4-digit
46. Was defendant immediately treated as a suspect? 46b. If no, then how was defendant immediately treated?	Q46: Yes = 1, No = 0 Q46b: text
47. Were there other suspects (arrests)?	Yes = 1 No = 0
48. Did the defendant plead guilty or was he/she convicted at trial? 48b. If convicted, then was the jury verdict unanimous or other?	Q48: Yes = 1, No = 0 Q48b: Unanimous = 1, Other = 2
49. Was this the first trial?	Yes = 1 No = 0
50. What offence(s) was defendant convicted of/plead guilty to?	Add text
51. Was there circumstantial evidence in the case? 51b. If yes, what? 51c. Was DNA, Fingerprint or digital evidence involved?	Q51: Yes = 1, No = 0 Q51b: Add text. Q51c: DNA = 1, Fingerprint = 2, Digital = 3, DNA and Fingerprint = 4, Fingerprint and Digital = 5, DNA and Digital = 6, All three = 7
52. Was there any other evidence in the case? 52b. If yes, what?	Q52: Yes = 1, No = 0 Q52b: Add text
53. Did defendant provide an alibi for whereabouts at time of crime? 53b. If yes, was it corroborated?	Q53: Yes = 1, No = 0 Q53b: Yes = 1, No = 0
54. What was the defendant's original sentence?	Add text

55. Was case originally tried in Crown Court or magistrates' Court?	Crown = 1 Magistrates = 2
56. Name of judge(s) in original trial	Add text
57. Name of lawyer(s) in original trial	Add text
INVESTIGATIVE STAGE (code as 99 if not stated and cannot be inferred)	
COLLECTION	
58. Was concern expressed at original trial or appeal about there being a chance of contamination of Fingerprint/DNA evidence prior to sample collection from the crime scene?	Yes = 1 No = 0 Annotations:
59. For DNA evidence, was concern expressed at original trial or about where the DNA came from? 59b. If yes, where?	Q59. Yes = 1, No = 0 Q59b. Add text. Annotations:
60. Was concern expressed at original trial or appeal about there being potential for evidence tampering/planting?	Yes = 1 No = 0
61. Was there over a week delay between crime being committed and collection of Fingerprint/DNA or Digital evidence from crime scene?	Yes = 1 No = 0
62. How many Fingerprint/DNA samples were taken from crime scene?	Add number (or if multiple but no specific number then code as more than 1 = 2)
63. Was only one method used to collect the sample(s) or multiple methods?	1 = 1 More than 1 = 2
64. Was concern expressed at original trial or appeal about the method(s) used to collect the sample?	Yes = 1 No = 0
65. Was the Fingerprint/DNA sample or Digital evidence in question considered by either the prosecution or defence experts to be partial or ambiguous?	Yes = 1 No = 0
66. Were evidence requests made according to the legal rules?	Yes = 1 No = 0
67. Was concern expressed at original trial or appeal about broken chain of custody i.e., who was looking after the Fingerprint/DNA sample(s) or Digital evidence after they were collected?	Yes = 1 No = 0
ANALYSIS	
68. How much experience did the prosecution forensic examiner have?	Add number or text
69. How much experience did the defence examiner have?	Add number or text
70. Was concern expressed at original trial or appeal about the methods of Fingerprint/DNA/Digital analysis used? 70b. If yes, which analytic method?	Yes = 1 No = 0 Q70b: DNA = 1, Fingerprint = 2, Digital = 3, DNA and FP = 4, FP and Digital = 5, DNA and Digital = 6, DNA, FP and Digital = 7 Annotations:
71. Was concern expressed at original trial or appeal about there being a chance of the Fingerprint/DNA samples being degraded?	Yes = 1 No = 0 Annotations:
72. Did analysis involve 'cold' match from a database or comparison against a suspect?	Yes = 1 No = 0 Annotations:
73. Did initial examination of sample lead to conclusion that origin could not be determined?	Yes = 1 No = 0 Annotations:
74. Did initial examination of sample lead to conclusion that sample originated from defendant?	Yes = 1 No = 0 Annotations:

75. Was sample re-examined? 75b. If yes, did re-examination change initial conclusion?	Q75. Yes = 1, No = 0 Q75b. Yes = 1, No = 0 Annotations:
76. Was Fingerprint/DNA/Digital examiner opinion/conclusion verified by another examiner?	Yes = 1 No = 0
77. For Fingerprint examination, how many points of similarity were found (if any)?	Add number
78. Was Fingerprint/DNA/Digital evidence destroyed before trial?	Yes = 1 No = 0 Annotations:
79. Was concern expressed at original trial or appeal about the quality of notes taken/report of the Fingerprint/DNA/Digital examiner?	Yes = 1 No = 0
EVIDENTIARY STAGE (code as 99 if not stated and cannot be inferred)	
EXPERT TESTIMONY	
80. Did (main) prosecution Fingerprint/DNA/Digital expert present evidence at original trial?	Yes = 1 No = 0 Evidence presented by prosecution only = 3 Annotations:
81. Was concern expressed at original trial or appeal about the qualifications, knowledge, skills or experience of prosecution Fingerprint/DNA/Digital expert(s)? 81b. If yes, which prosecution expert(s)?	Yes = 1 No = 0 Q81b: DNA = 1, Fingerprint = 2, Digital = 3, DNA and FP = 4, FP and Digital = 5, DNA and Digital = 6, DNA, FP and Digital = 7 Annotations:
82. Was prosecution Fingerprint/DNA/Digital expert witness cross-examined by defence at original trial?	Yes = 1 No = 0 Annotations:
83. Did (main) defence Fingerprint/DNA/Digital expert present evidence at original trial?	Yes = 1 No = 0
84. Was concern expressed at original trial or appeal about the qualifications, knowledge, skills or experience of defence fingerprint/DNA/Digital expert(s)? 84b. If yes, which defence expert(s)?	Yes = 1 No = 0 Q84b: DNA = 1, Fingerprint = 2, Digital = 3, DNA and FP = 4, FP and Digital = 5, DNA and Digital = 6, DNA, FP and Digital = 7 Annotations:
85. Was defence Fingerprint/DNA/Digital expert witness cross-examined by prosecution at original trial?	Yes = 1 No = 0 Annotations:
86. Was there a disagreement in conclusions made by prosecution and defence Fingerprint/DNA/Digital experts at original trial?	Yes = 1 No = 0 Annotations:
87. Was concern expressed at original trial or appeal about quality of prosecution expert reports?	Yes = 1 No = 0
88. Was concern expressed at original trial or appeal about quality of defence expert reports?	Yes = 1 No = 0
89. Were probabilities of fingerprint/DNA match mentioned at original trial?	Yes = 1 No = 0 Annotations:
90. Did Fingerprint/DNA/Digital expert express his/her confidence in conclusion at original trial? 90b. If yes, how?	Q90. Yes = 1, No = 0 Q90b. Add text
91. For DNA evidence, were probabilities of match presented by prosecution expert at original trial?	Yes = 1 No = 0
92. For DNA evidence, were contamination/error rates presented at original trial?	Yes = 1 No = 0

93. For Fingerprint evidence, did the prosecution expert declare a match/individualisation at original trial?	Yes = 1 No = 0
94. For Fingerprint evidence, how many points of similarity between sample and print were presented at original trial?	Add number
95. For Fingerprint evidence, were any points of dissimilarity presented at original trial?	Yes = 1 No = 0
96. Did (prosecution or defence) Fingerprint/DNA/Digital experts try to explain any inconsistencies in evidence at original trial?	Yes = 1 No = 0
97. Was hearsay evidence presented at trial?	Yes = 1 No = 0 Annotations:
98. Was any bad character evidence presented at trial?	Yes = 1 No = 0 Annotations:
99. Did prosecution team fail to share relevant information with defence team before original trial?	Yes = 1 No = 0 Annotations:
JUDGE'S INSTRUCTIONS/JURY BEHAVIOR	
100. Were visual images used to present Fingerprint/DNA/Digital evidence at original trial?	Yes = 1 No = 0
101. How did judge instruct jury to deal with Fingerprint/DNA/Digital evidence? <i>Provide quote if short, otherwise summarise</i>	Add text
ADDITIONAL DIGITAL QUESTIONS	
APPEAL CASE/HEARING FACTORS (code as 99 if not stated and cannot be inferred)	
102. For Digital evidence, were any technical problems presented at the appeal hearing? 102b If yes, what? Provide a quote if short, otherwise summarise	Q102. Yes = 1, No = 0 Q102b. Add text
DIGITAL – INVESTIGATIVE STAGE (code as 99 if not stated and cannot be inferred)	
COLLECTION	
103. For Digital evidence, was concern expressed at original trial about problems securing the data?	Yes = 1 No = 0
104. For Digital evidence were there any concerns about data being missed during investigation?	Yes = 1 No = 0
105. For Digital evidence, was any data hidden over the network?	Yes = 1 No = 0
106. For Digital evidence was any data hidden inside storage areas to make them invisible to the system commands and programs?	Yes = 1 No = 0
107. For Digital evidence, was any data corrupted?	Yes = 1 No = 0
108. For Digital evidence, was there any residual data wiping?	Yes = 1 No = 0
109. For Digital evidence, was concern expressed at the original trial or appeal about data sources being damaged?	Yes = 1 No = 0
ANALYSIS	
110. For Digital evidence was any data encrypted?	Yes = 1 No = 0
111. For Digital evidence was any data hidden in a carrier file without modifying its outward appearance?	Yes = 1 No = 0

112. For Digital evidence, was any techniques used to obfuscate the source of the attack?	Yes = 1 No = 0
113. For Digital evidence, did the investigator have to analyse high volumes of data?	Yes = 1 No = 0
114. For Digital evidence, were the investigators restricted to analysing only recent data stored on volatile memory?	Yes = 1 No = 0
115. Were there any Co-defendants? 115b. If yes, how many?	Q115. Yes = 1, No = 0 Q115b. Add number
116. Where the case involved co-defendant/s, was there a mixed verdict? 116b. If yes, what were they?	Q116. Yes = 1, No = 0 Q116b. Add text
ADDITIONAL EVIDENTIARY STAGE QUESTION (code as 99 if not stated and cannot be inferred)	
117. Did the Courts make reference to the General Standards of Admissibility legislation?	Q117. Yes = 1, No = 0
118. Was any Forensic evidence presented at appeal? 118b If yes, which evidence? 118c Did the Appeal Court admit the evidence?	Q118. Yes = 1, No = 0 Q118b. Add text. Q118c. Yes = 1, No = 0
119. Was reference made to the scientific basis of any evidence presented at the original trial or appeal hearing? 119b. If yes, which evidence?	Q119. Yes = 1, No = 0 Q119b. Add text. Annotation:
120. Was concern expressed about the scientific reliability of any evidence presented at the original trial or appeal hearing? 120b if yes, which evidence?	Q120. Yes = 1, No = 0 Q120b. Add text. Annotation:
121. Did the Courts make reference to Fresh Evidence on Appeal legislation?	Q121. Yes = 1, No = 0
122. Was Fresh evidence presented? 122b If yes, which evidence and 122c Did the Appeal Court admit the evidence?	Q122. Yes = 1, No = 0 Q122b. Add text. Q122c. Yes = 1, No = 0
123. Was any reference made at the appeal about the relevance of the forensic evidence? 123b, If yes, which evidence? Did the Appeal Court assess the evidence to be relevant?	Q123: Yes = 1, No = 0 Q123b. Add text Q123c: Yes = 1, No = 0 Annotations:
124. Was any reference made at the appeal about the necessity of the forensic evidence? 124b, If yes, which evidence? Did the Appeal Court assess the evidence to be necessary?	Q124: Yes = 1, No = 0 Q124b. Add text Q124c: Yes = 1, No = 0 Annotations:
125. Was any reference made at the appeal about the competence, including the qualifications, knowledge, skills or experience, of any expert(s)? 125b, if yes, which expert? 125c Did the Appeal Court assess the expert as lacking the competence to provide evidence?	Q125: Yes = 1, No = 0 Q125b. Add text Q125c: Yes = 1, No = 0 Annotations:
126. Was any forensic evidence presented at the original trial hearing? 126b. If yes, which evidence?	Q126: Yes = 1, No = 0 Q126b. Add text
NOTES – PLEASE WRITE ANYTHING THAT YOU THINK IS IMPORTANT BUT WHICH IS NOT CODED ABOVE. THIS MAY INCLUDE QUOTES.	Compile all of these notes into one word document.

Appendix 4

Study 2. Online Questionnaire

Using the scale below, please rate how important each of the following criteria are when considering someone credible **EXPERT** forensic witness in court

Not at all important 0 1 2 3 4 5 6 7 8 9 10 Extremely important

1.	Witness has extensive practical experience (e.g., 15 years or more) within domain of expertise
2.	Witness has not received any training in being a court witness
3.	Witness has been subject to criticism in another court case (e.g., previous testimony unreliable, questioning credentials, etc.)
4.	Witness does not have any previous experience as an expert witness in court
5.	Witness has several peer-reviewed publications on the topic relevant to their testimony
6.	Witness has good presentation skills (e.g., uses clear language to explain things)
7.	Witness has formal qualifications and training (i.e., knowledge) in domain of expertise that is beyond which is known by the judge/jury
8.	Witness has professional appearance and demeanour
9.	Witness is not licensed or accredited with (or a member of) a professional body in the domain of expertise
10.	Witness can apply their expert knowledge to the legal question they have been asked
11.	Witness has been recommended to either the prosecution or defence by others in the criminal justice domain (e.g., police, lawyers, etc.)
12.	Witness has not attained a high status (e.g., Consultant, Professor, Chief, etc.) within their profession.
13.	Witness is independent to the parties in the legal proceedings (i.e., able to provide unbiased, impartial and objective evidence on the matters within their field of expertise)
14.	Witness is from a field that is not very well-established (e.g., forensic linguistics, ear print analysis, etc.)
15.	Witness has education, study, knowledge, or training which is relevant to their testimony
16.	Witness is capable of providing transparent testimony (e.g., reasoning process is clear)
17.	Witness cannot handle the pressure of intense cross-examination
18.	Witness has been assessed by an external body as being proficient in their domain or specialism
19.	Witness tends to work for a particular side/party (e.g., prosecution or defence)
20.	Witness is a holder of an endowed chair (i.e., position) in their speciality at a reputable university
21.	Witness can provide reliable evidence (e.g., it has a scientific basis, or the opinion evidence is based on validated laboratory techniques or technologies)
22.	Witness has previously provided testimony to higher tier courts (i.e., Crown court or Appeal courts)
23.	Using the text box below, please specify any other criteria or factors that are important when considering someone an expert forensic witness?

Appendix 5

Study 3. Stimuli

Instructions. Please read through the following criminal case, which includes testimony from two opposing forensic experts. You will then be asked a series of questions about the expert testimony from Mr. Knight.

1. On 3 October 2016, the defendant appeared at Manchester Crown Court before His Honour Judge Nuttall and a jury. He was charged with a conspiracy to supply several class A drugs.
2. The relevant facts are summarised. At 1020 on 9 December 2014, the defendant was a passenger in a car driven by his girlfriend. The car was stopped and searched by the police and a quantity of cocaine was found. In the possession of the defendant the police also found a Nokia phone and a BlackBerry phone, which the defendant admitted was his. Following those discoveries, the defendant was arrested.
3. The Nokia and the BlackBerry were sent for examination and analysis. On the Nokia there was found a text message which had been sent to the defendant, hours before the phone was seized by the police. This text message read as follows:
4. *"need to get this bill cleared, Lee, it's fucked me up and still outstanding, you know the crack. You're gonna have to get off someone else one way or the other, gone on for far too long and not a penny in."*
5. Examination of the BlackBerry established that it had only been used to send and receive emails. Retrieving those emails was difficult because an encryption software, "ATP" (Airtight Protection), had been added to the phone.

Mr. Staith's expert testimony on behalf of the defence

In his skeleton argument Mr. Lawson QC, representing council for defence, contended that there was an issue as to whether the prosecution's digital expert, Mr. Knight, could have reliably decrypted the phone. During direct questioning of his own expert witness, Mr. Lawson asked Mr. Staith whether in his opinion Mr. Knight had used a reliable technique to decrypt and access the emails on the mobile phone. Mr. Staith replied *"I disagree with the method used by Mr. Knight, and I question whether the process he used was proper and reliable. I found 26 emails on the BlackBerry device, three of which had been deleted, but it was not possible for me to read the emails because the encryption prevented access. For all the years I have been working in this field, I have never encountered this type of encryption. So, I think it's highly improbable anyone could decrypt this phone"*.

SCENARIO 1

Mr. Knight's expert testimony on behalf of the prosecution

Before cross-examining the opposing witness, Mr. Lawson told the Courts that in order to assess whether the prosecution witness (i.e., Mr. Knight) had used a reliable method for accessing the emails, it would be necessary for him to give a precise "step-by-step" description of the process that he used to access the emails.

In his testimony for the prosecution, Mr. Knight responded: *"I felt it would be best to remove the chip from the BlackBerry and try putting it back in again. It's what we call the "chip-off, chip-on" technique. It's a bit of a delicate process because you can damage the chip and lose the data. So, what did I do next? [thinking aloud] hmmm...well if my memory serves me correctly, I then powered the BlackBerry on again, read the screen and extracted the data from the handset. Oh yes! and I photographed what was on the screen. Now I must stress that to access the emails, you would need to know the correct password because you wouldn't be able to tell just by looking at the handset that there was a sophisticated security package on it. It would only be when you're trying to use the phone that you would realise, you're locked out. I also followed the ACPO Guidance on how to examine digital devices. On another note, I'm not altogether sure whether data protected by ATP can be accessed by more than one phone, but I don't feel I can comment on whether, if someone lost the BlackBerry, whether it would still be possible to access the emails on it using another phone".*

SCENARIO 2

Mr. Knight's expert testimony on behalf of the prosecution

Before cross-examining the opposing witness, Mr. Lawson told the Courts that in order to assess whether the prosecution witness (i.e., Mr. Knight) had used a reliable method for accessing the emails, it would be necessary for him to give a precise "step-by-step" description of the process he used to access the emails.

In his testimony for the prosecution, Mr. Knight responded: *"I removed the chip from the BlackBerry and put it back on. This is what we call the "chip-off, chip-on" technique. This is an extremely delicate process because in my experience you run the risk of damaging the chip, which would lead to the data being lost. The BlackBerry was then powered back on in order to read what was on the screen before extracting the data from the handset and photographing what was on the screen. To gain access to the emails, one would need to know the correct password since the emails found on the BlackBerry had been sent and received by that BlackBerry. You would not be able to tell just by looking at the handset that there was a sophisticated security package on it. It would only be when you're trying to use the phone that you would realise that you're locked out. The ACPO Guidance, which represents the best practice to follow when examining digital devices, were adhered to throughout the process but I do not know whether data protected by ATP can be accessed by more than one phone. I cannot comment on whether, if someone lost the BlackBerry, whether it would still be possible to access the emails on it by using another phone".*

SCENARIO 3

Mr. Knight's expert testimony on behalf of the prosecution

Before cross-examining the opposing witness, Mr. Lawson told the Courts that in order to assess whether the prosecution witness (i.e., Mr. Knight) had used a reliable method for accessing the emails, it would be necessary for him to give a precise "step-by-step" description of the process he used to access the emails.

In his testimony for the prosecution, Mr. Knight responded: *"The chip from the BlackBerry was removed and put back on. In the industry this has been termed the "chip-off, chip-on" technique. This is an extremely delicate process because there is a risk that the chip could be damaged during the process which would lead to the data being lost. The BlackBerry was then powered back on to read what was on the screen before extracting the data from the handset and photographing what was on the screen. To gain access to the emails, one would need to know the correct password—the emails found on the BlackBerry had been sent and received by that BlackBerry. You would not be able to tell just by looking at the handset that there was a sophisticated security package on it. It would only be when trying to use the phone that you would realise that the phone is locked out. The ACPO Guidance, which represents the best practice to follow when examining digital devices, were adhered to throughout the process. As per the guidelines, any changes made to the data were recorded. I do not know whether data protected by ATP can be accessed by more than one phone. Consequently, it would be outside of my scope to comment on whether, if someone lost the BlackBerry, whether it would still be possible to access the emails on it by using another phone"*.

Instructions. Please read through the following Criminal case which includes testimony from two opposing forensic experts. You will then be asked a series of questions about the expert testimony from Dr. Linacre.

1. The defendant appeared at the Crown Court of Oxford on 13 February 2009 before His Honour Judge Eccles and a jury for conspiracy to commit arson.
2. The facts can be briefly summarised as follows. The sports pavilion at Queen's College, Oxford was set on fire. The incident involved incendiary devices with sparklers used to act as fuses.
3. It was common ground that the attacks were planned, and that the devices were planted by animal rights activists because the centre being built at Oxford University was for scientific research using live animals.
4. It was the Crown's case that the defendant had been responsible for the fires at Queen's college.

5. On the stalks of some of the matches a small quantity of DNA was found and analysed by LGC Forensics using LCN–DNA (Low Copy Number DNA) process for enhancing the amplified DNA. The Crown contended that the probability of obtaining the match between the profiles generated and the profile of the defendant, if in fact the DNA did not originate from him, was less than 1 in 1 billion.
6. A small quantity of DNA was also found on the caps of the bottles. This was subjected to both enhancement and the LCN–DNA process. Although this permitted the calculation of a match probability, it was common ground this was insufficient to link the defendant to the attack.
7. Upon the defendant's arrest, a search of his accommodation by officers found 14 or 15 packets of sparklers. One packet was missing two sparklers. Also found at his property were lists of companies and individuals linked to animal research.
8. At the commencement of the trial hearing, Dr. Daniel Krane, a scholar in biological science at Wright State University, was instructed by the defence to provide expert evidence on behalf of the defendant.
9. At trial, it was the defendant's case that the quantities of DNA were so low that a reliable DNA profile could not be obtained and therefore the LCN–DNA evidence should be excluded.
10. Providing expert evidence on behalf of the prosecution was Dr. Linacre, a forensic DNA analyst who had been a member of the Caddy review panel into LCN–DNA. Dr. Linacre explained in his evidence that during the Caddy review, he and his colleagues had carried out an extensive investigation of the LCN–DNA procedures.

Dr. Krane's expert testimony on behalf of the defence

During the direct questioning of Dr. Krane, Mr. Bryant–Heron representing Council for defence, asked him whether in his opinion a reliable DNA profile could have been obtained from the low quantities of DNA. Dr. Krane's response was as follows: *"The quantity of DNA recovered was below the threshold required. So, the results should be treated as inconclusive. To my knowledge LCN–DNA techniques have not been adequately validated at least in the US. Therefore, this type of evidence should be treated with great caution."*

The thrust of the evidence of Dr. Krane was that the LCN–DNA technique used for amplifying the DNA was flawed and overly subjective. He furthered that *"when dealing with such low levels of DNA, stochastic effects become very much more common, and this would lead to a significant number of dropouts from run to run. In such circumstances it would be difficult to establish whether something was a stutter or a genuine allele because the relevant peaks become very difficult to distinguish"*.

SCENARIO 1

Dr. Linacre's expert testimony on behalf of the prosecution

During cross-examination, Mr. Bryant-Heron submitted to Mr. Linacre that the DNA evidence should be excluded on the basis that the quantities of DNA were so low that no reliable DNA profile could be obtained. He then asked the expert to provide details of the LCN-DNA process and justification as to how the evidence was "*at all admissible*". In response, Mr. Linacre said: "*After I swabbed the stalks for some of the matches recovered from Queen's College, I extracted the DNA and suspended it in fluid. Although I tried to find out how much DNA was present, this was all in vain because the amount of DNA was well below the limit of detection for the apparatus that I was using. To overcome this, I carried out a series of conventional PCR profiles to amplify the DNA sample. After I completed the quantification test, I found each of the DNA samples had somewhere in the region of 15 human cells. I then carried out further amplifications in order for me to amplify the Short Tandem Repeat loci. Now if I'm not mistaken, I remember profiling the resulting amplifications twice. For the first one, I prepared a standard profile. Then, in each case, the product of the amplification was either enhanced, or another profile was prepared. I strongly feel this technique improved the results because it allowed me to detect more alleles and as a result, I was able to compare them to a reference profile taken from the defendant*".

SCENARIO 2

Dr. Linacre's expert testimony on behalf of the prosecution

During cross-examination, Mr. Bryant-Heron submitted to Dr. Linacre that the DNA evidence should be excluded on the basis that the quantities of DNA were so low that a reliable DNA profile could not be obtained. He then asked the expert to provide details of the LCN-DNA process and justification as to how the evidence was "*at all admissible*". In response, Dr. Linacre said: "*After the stalks of some of the matches around one of the devices recovered from Queen's College were swabbed, the DNA was extracted by conventional means. After it had been suspended in fluid, I tried to establish the amount of DNA present, but this was in vain because the amount of DNA present was below the limit of detection of the apparatus that I used. I then carried out a series of conventional PCR profiling in order to amplify the DNA sample. Following on from the quantification test, I found each sample contained no more than 100pg of DNA, equating to the DNA contained in about 15 human cells. Amplifications were carried out; two using the familiar SGM-Plus technique, which amplified the Short Tandem Repeat loci and two using a similar technique called Identifier, which amplified 15 STR loci. I then profiled the resulting amplifications twice. First a standard profile was prepared. Then, in each case, the product of the amplification was enhanced or and another profile prepared. This drastically improved the results because it allowed more alleles to be detected. I then compared them to a reference profile taken from the defendant*".

SCENARIO 3

Dr. Linacre's expert testimony on behalf of the prosecution

During cross-examination, Mr. Bryant-Heron submitted to Dr. Linacre that the DNA evidence should be excluded on the basis that the quantities of DNA were so low that a reliable DNA profile could not be obtained. He then asked the expert to provide details of the LCN-DNA process and justification as to how the evidence was "*at all admissible*". In response, Dr. Linacre said: "*After the stalks of some of the matches around one of the devices recovered from Queen's College were swabbed, the DNA was extracted by conventional means. It was then suspended in 60 microlitres of fluid. An attempt was made to quantify the amount of DNA present, but this proved unsuccessful because the amount of DNA present was below the limit of detection of the apparatus used. It revealed the concentration of DNA was no greater than 10 picograms per μl . A series of conventional PCR profiling analyses were then carried out, each involving a standard 28 cycle amplification of the DNA contained in 10 μl of fluid. The quantification test confirmed that each sample contained no more than 100pg of DNA, equating to the DNA contained in about 15 human cells. Four amplifications were carried out; two using the familiar SGM-Plus technique which amplifies 10 Short Tandem Repeat loci and two using a similar technique called Identifiler which amplifies 15 STR loci comprising the 10 STR loci amplified by SGM-Plus and five additional ones. The products of these four amplifications were then profiled twice. First a standard profile was prepared. Then, in each case, the product of the amplification was enhanced, or another profile prepared. This markedly improved the results in that significantly more alleles were detected. These were then compared to a reference profile derived from the defendant*".

Criminal Court Case stimuli with manipulations highlighted

DIGITAL CASE

Instructions. Please read through the following criminal case, which includes testimony from two opposing forensic experts. You will then be asked a series of questions about the expert testimony from Mr. Knight.

1. On 3 October 2016, the defendant appeared at the Crown Court of Manchester before His Honour Judge Nuttall and a jury. He was charged with a conspiracy to supply several class A drugs.
2. The relevant facts are summarised. At 1020 on 9 December 2014, the defendant was a passenger in a car driven by his girlfriend. The car was stopped and searched by the police and a quantity of cocaine was found. In the possession of the defendant the police also found a Nokia phone and a BlackBerry phone, which the defendant admitted was his. Following those discoveries, the defendant was arrested.
3. The Nokia and the BlackBerry were sent for examination and analysis. On the Nokia there was found a text message which had been sent to the defendant, hours before the phone was seized by the police. This text message read as follows:
4. *"need to get this bill cleared, Lee, it's fucked me up and still outstanding, you know the crack. You're gonna have to get off someone else one way or the other, gone on for far too long and not a penny in."*
5. Examination of the BlackBerry established that it had only been used to send and receive emails. Retrieving those emails was difficult because an encryption software, "ATP" (Airtight Protection), had been added to the phone.

Mr. Staith's expert testimony on behalf of the defence

In his skeleton argument Mr. Lawson QC, representing council for defence, contended that there was an issue as to whether the prosecution's digital expert, Mr. Knight, could have reliably decrypted the phone. During direct questioning of his own expert witness, Mr. Lawson asked Mr. Staith whether in his opinion Mr. Knight had used a reliable technique to decrypt and access the emails on the mobile phone. Mr. Staith replied: *"I disagree with the method used by Mr. Knight. I question whether the process he used was proper and reliable. I found 26 emails on the BlackBerry device, three of which had been deleted, but it was not possible for me to read the emails because the encryption prevented access. For all the years I have been working in this field, I have never encountered this type of encryption. So, I think it's highly improbable anyone could decrypt this phone."*

SCENARIO 1

Mr. Knight's expert testimony on behalf of the prosecution (Intuitive expression) 205 words

Before cross examining the opposing witness, Mr. Lawson, QC for defence told the Courts that in order to assess whether the trial prosecution expert (i.e., Mr. Knight) had used a reliable method for accessing the emails, it would be necessary for him to offer a precise "step-by-step" description of the process he used to access the emails.

In his testimony for the prosecution, Mr. Knight responded: *"I felt it would be best to remove the chip from the BlackBerry and try putting it back in again. It's what we call the "chip-off, chip-on" technique. It's a bit of a delicate process because you can damage the chip and loose the data. So, what did I do next? [thinking aloud] hmmm...well if my memory serves me correctly, I then powered the BlackBerry on again, read the screen and extracted the data from the handset. Oh yes! and I photographed what was on the screen. Now I must stress that to access the emails, you would need to know the correct password because you wouldn't be able to tell just by looking at the handset that there was a sophisticated security package on it. It would only be when you're trying to use the phone that you would realise, you're locked out. I also followed the ACPO Guidance on how to examine digital devices. On another note, I'm not altogether sure whether data protected by ATP can be accessed by more than one phone, but I don't feel I can comment on whether, if someone lost the BlackBerry, whether it would still be possible to access the emails on it using another phone"*.

SCENARIO 2

Mr. Knight's expert testimony on behalf of the prosecution (Quasi-rational expression) 211 words

Before cross examining the opposing witness, Mr. Lawson, QC for defence told the Courts that in order to assess whether the trial prosecution expert (i.e., Mr. Knight) had used a reliable method for accessing the emails, it would be necessary for him to offer a precise "step-by-step" description of the process he used to access the emails.

In his testimony for the prosecution, Mr. Knight responded: *"I removed the chip from the BlackBerry and put it back on. This is what we call the "chip-off, chip-on" technique. This is an extremely delicate process because in my experience you run the risk of damaging the chip, which would lead to the data being lost. The BlackBerry was then powered back on in order to read what was on the screen before extracting the data from the handset and photographing what was on the screen. To gain access to the emails, one would need to know the correct password since the emails found on the BlackBerry had been sent and received by that BlackBerry. You would not be able to tell just by looking at the handset that there was a sophisticated security package on it. It would only be when you're trying to use the phone that you would realise that you're locked out. The ACPO Guidance, which represents the best practice to follow when examining digital devices, were adhered to throughout the process but I do not know whether data protected by ATP can be accessed by more than one phone I*

cannot comment on whether, if someone lost the BlackBerry, whether it would still be possible to access the emails on it by using another phone”.

SCENARIO 3

Mr. Knight’s expert testimony on behalf of the prosecution (Analytical expression) 229 words

Before cross examining the opposing witness, Mr. Lawson, QC for defence told the Courts that in order to assess whether the trial prosecution expert (i.e., Mr. Knight) had used a reliable method for accessing the emails, it would be necessary for him to offer a precise “step-by-step” description of the process he used to access the emails.

In his testimony for the prosecution, Mr. Knight responded: *“The chip from the BlackBerry was removed and put back on. In the industry this has been termed the “chip-off, chip-on” technique. This is an extremely delicate process because there is a risk that the chip could be damaged during the process which would lead to the data being lost. The BlackBerry was then powered back on to read what was on the screen before extracting the data from the handset and photographing what was on the screen. To gain access to the emails, one would need to know the correct password—the emails found on the BlackBerry had been sent and received by that BlackBerry. You would not be able to tell just by looking at the handset that there was a sophisticated security package on it. It would only be when trying to use the phone that you would realise that the phone is locked out. The ACPO Guidance, which represents the best practice to follow when examining digital devices, were adhered to throughout the process. As per the guidelines, any changes made to the data were recorded. I do not know whether data protected by ATP can be accessed by more than one phone. Consequently, it would be outside of my scope to comment on whether, if someone lost the BlackBerry, whether it would still be possible to access the emails on it by using another phone”.*

DNA CASE

Instructions. Please read through the following Criminal case which includes testimony from two opposing forensic experts. You will then be asked a series of questions about the expert testimony from Dr. Linacre.

1. The defendant appeared at the Crown Court of Oxford on 13 February 2009 before His Honour Judge Eccles and a jury for conspiracy to commit arson.

2. The facts can be briefly summarised as follows. The sports pavilion at Queen's College, Oxford was set on fire. The incident involved incendiary devices with sparklers used to act as fuses.
3. It was common ground that the attacks were planned, and that the devices were planted by animal rights activists because the centre being built at Oxford University was for scientific research using live animals.
4. It was the Crown's case that the defendant had been responsible for the fires at Queen's college.
5. On the stalks of some of the matches a small quantity of DNA was found and analysed by LGC Forensics using LCN–DNA (Low Copy Number DNA) process for enhancing the amplified DNA. The Crown contended that the probability of obtaining the match between the profiles generated and the profile of the defendant, if in fact the DNA did not originate from him, was less than 1 in 1 billion.
6. A small quantity of DNA was also found on the caps of the bottles. This was subjected to both enhancement and the LCN–DNA process. Although this permitted the calculation of a match probability, it was common ground this was insufficient to link the defendant to the attack.
7. Upon the defendant's arrest, a search of his accommodation by officers found 14 or 15 packets of sparklers. One packet was missing two sparklers. Also found at his property were lists of companies and individuals linked to animal research.
8. At the commencement of the trial hearing, Dr. Daniel Krane, a scholar in biological science at Wright State University, was instructed by the defence to provide expert evidence on behalf of the defendant.
9. At trial, it was the defendant's case that the quantities of DNA were so low that a reliable DNA profile could not be obtained and therefore the LCN–DNA evidence should be excluded.
10. Providing expert evidence on behalf of the prosecution was Dr. Linacre, a forensic DNA analyst who had been a member of the Caddy review panel into LCN–DNA. Dr. Linacre explained in his evidence that during the Caddy review, he and his colleagues had carried out an extensive investigation of the LCN–DNA procedures.

Dr. Krane's expert testimony on behalf of the defence

During the direct questioning of Dr. Krane, Mr. Bryant–Heron representing Council for defence, asked him whether in his opinion a reliable DNA profile could have been obtained from the low quantities of DNA. Dr. Krane's response was as follows: *"The quantity of DNA recovered was below the threshold required. So, the results should be treated as inconclusive.*

To my knowledge LCN–DNA techniques have not been adequately validated at least in the US. Therefore, this type of evidence should be treated with great caution”.

The thrust of the evidence of Dr. Krane was that the LCN–DNA technique used for amplifying the DNA was flawed and overly subjective. He furthered that *“when dealing with such low levels of DNA, stochastic effects become very much more common, and this would lead to a significant number of dropouts from run to run. In such circumstances it would be difficult to establish whether something was a stutter or a genuine allele because the relevant peaks become very difficult to distinguish”.*

SCENARIO 1

Dr. Linacre’s expert testimony on behalf of the prosecution (intuitive expression) 186 words

During cross–examination, Mr. Bryant–Heron submitted to Mr. Linacre that the DNA evidence should be excluded on the basis that the quantities of DNA were so low that no reliable DNA profile could be obtained. He then asked the expert to provide details of the LCN–DNA process and justification as to how the evidence was “at all admissible”. In response, Mr. Linacre said: *“After I swabbed the stalks for some of the matches recovered from Queen’s College, I extracted the DNA and suspended it in fluid. Although I tried to find out how much DNA was present, this was all in vain because the amount of DNA was well below the limit of detection for the apparatus that I was using. To overcome this, I carried out a series of conventional PCR profiles to amplify the DNA sample. After I completed the quantification test, I found each of the DNA samples had somewhere in the region of 15 human cells. I then carried out further amplifications in order for me to amplify the Short Tandem Repeat loci. Now if I’m not mistaken, I remember profiling the resulting amplifications twice. For the first one, I prepared a standard profile. Then, in each case, the product of the amplification was either enhanced, or another profile was prepared. I strongly feel this technique improved the results because it allowed me to detect more alleles and as a result, I was able to compare them to a reference profile taken from the defendant”.*

SCENARIO 2

Dr. Linacre’s expert testimony on behalf of the prosecution (Quasi–rational expression) 193 words

During cross–examination, Mr. Bryant–Heron submitted to Dr. Linacre that the DNA evidence should be excluded on the basis that the quantities of DNA were so low that a reliable DNA profile could not be obtained. He then asked the expert to provide details of the

LCN–DNA process and justification as to how the evidence was “at all admissible”. In response, Dr. Linacre said: *“After the stalks of some of the matches around one of the devices recovered from Queen’s College were swabbed, the DNA was extracted by conventional means. After it had been suspended in fluid, I tried to establish the amount of DNA present, but this was in vain because the amount of DNA present was below the limit of detection of the apparatus that I used. I then carried out a series of conventional PCR profiling in order to amplify the DNA sample. Following on from the quantification test, I found each sample contained no more than 100pg of DNA, equating to the DNA contained in about 15 human cells. Amplifications were carried out; two using the familiar SGM–Plus technique, which amplified the Short Tandem Repeat loci and two using a similar technique called Identifier, which amplified 15 STR loci. I then profiled the resulting amplifications twice. First a standard profile was prepared. Then, in each case, the product of the amplification was enhanced or and another profile prepared. This drastically improved the results because it allowed more alleles to be detected. I then compared them to a reference profile taken from the defendant”.*

SCENARIO 3

Dr. Linacre’s expert testimony on behalf of the prosecution (Analytical expression) 228 words

During cross–examination, Mr. Bryant–Heron submitted to Dr. Linacre that the DNA evidence should be excluded on the basis that the quantities of DNA were so low that a reliable DNA profile could not be obtained. He then asked the expert to provide details of the LCN–DNA process and justification as to how the evidence was “at all admissible”. In response Dr. Linacre said: *“After the stalks of some of the matches around one of the devices recovered from Queen’s College were swabbed, the DNA was extracted by conventional means. It was then suspended in 60 microlitres of fluid. An attempt was made to quantify the amount of DNA present, but this proved unsuccessful because the amount of DNA present was below the limit of detection of the apparatus used. It revealed the concentration of DNA was no greater than 10 picograms per μl . A series of conventional PCR profiling analyses were then carried out, each involving a standard 28 cycle amplification of the DNA contained in 10 μl of fluid. The quantification test confirmed that each sample contained no more than 100pg of DNA, equating to the DNA contained in about 15 human cells. Four amplifications were carried out; two using the familiar SGM–Plus technique which amplifies 10 Short Tandem Repeat loci and two using a similar technique called Identifier which amplifies 15 STR loci comprising the 10 STR loci amplified by SGM–Plus and five additional ones. The products of these four amplifications were then profiled twice. First a standard profile was prepared. Then, in each case, the product of the amplification was enhanced, or another profile prepared. This markedly improved the results in that significantly more alleles were detected. These were then compared to a reference profile derived from the defendant”.*

Expert Witness Credibility Measures⁷

1. Using the 10–point scale below, please rate how likeable Mr. Knight (the prosecution expert) is.

	0	1	2	3	4	5	6	7	8	9	10	
Unlikeable												Likeable

2. Using the 10–point scale below, please rate how believable the testimony from Mr. Knight is.

	0	1	2	3	4	5	6	7	8	9	10	
Unbelievable												Believable

3. Using the 10–point scale below, please rate how trustworthy the testimony from Mr. Knight is.

	0	1	2	3	4	5	6	7	8	9	10	
Trustworthy												Untrustworthy

4. Using the 10–point scale below, please rate how knowledgeable Mr. Knight is.

	0	1	2	3	4	5	6	7	8	9	10	
Unknowledgeable												Knowledgeable

5. Using the 10–point scale below, please rate Mr. Knight's level of confidence in giving his testimony.

	0	1	2	3	4	5	6	7	8	9	10	
Confident												Unconfident

⁷ The same measure was used for the DNA vignette, except that the item referred specifically to Dr. Linacre.

6. Using the 10–point scale below, please rate the extent to which Mr. Knight’s opinion falls within the scope he can properly give (i.e., experts opinion being within his area of expertise).

	0	1	2	3	4	5	6	7	8	9	10	
Outside scope												Within scope

7. Using the 10–point scale below, please rate the extent to which Mr. Knight’s opinion is relevant to the forensic evidence of the case.

	0	1	2	3	4	5	6	7	8	9	10	
Relevant												Irrelevant