

Inroads into the Ultimate Issue Rule? Structural Elements of Communication between Experts and Fact-Finders

The Journal of Criminal Law

2022, Vol. 86(4) 223–240

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DOI: 10.1177/00220183211073640

journals.sagepub.com/home/clj**Kyriakos N. Kotsoglou**

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Abstract

One of the most persistent questions in criminal evidence relates to the use of (unchallenged) expert evidence. What does it mean to accept or reject (unchallenged) expert evidence? To what extent can, and should, an expert enter jurisprudential territory? Is the traditional model of trial by jury viable in our complex world? In order to clarify these pressing questions, we will examine the evidential structure underpinning expert witness testimony. We will show that what we usually and, at the cost of oversimplification, call ‘evidence’, comprises three distinct questions: (i) What does the data show? (ii) What should we believe? (iii) What should we do? From this insight, a number of corollaries fall into place. *First*, although decisions have to be informed through reasoned inferential procedures, they cannot be *reduced* to scientific propositions. As a result, fact-finders do not need to cede their decision-making prerogative as some proponents of expert-driven decision-making suggest. *Secondly*, criminal liability is not a scientific conclusion. Rather, so our argument, it is an individualistic normative construction that involves an inferential leap which is not warranted by any scientific (i.e. general) proposition. For the rectitude of the criminal verdict (or indeed any legal decision) does not map logically onto the possible treatment of scientific findings, that is, acceptance/rejection. *Thirdly*, our clarification of this evidential structure, which we call coherent decisionalism, provides a conceptual framework to understand and stabilise case law on expert witness testimony.

Keywords

Fact-finding, expert evidence, decision-making prerogative, unchallenged evidence, scientism, values, coherent decisionalism

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Do not think I am saying anything against science: I am only saying what its job is.

C.S. Lewis

I. Introduction

A. Law and Complexity

It is widely acknowledged that the successful operation of the criminal justice system depends on the ability of professional judges, juries and panels of magistrates¹ to make accurate decisions by identifying particular acts and circumstances as instantiations of abstract legal concepts.² The same ability facilitates a coherent management of the great multitude of cases ‘emerging day by day’.³ Most importantly, it enables the criminal justice system to treat like cases alike and different cases differently, which is a basic feature of (procedural) justice.⁴

Once we realise that (criminal) courts have grown increasingly dependent upon scientific methods of judicial decision support and that our modern technological world places additional strain on the abovementioned ability, we face the following problem: *How* can the system of criminal adjudication manage to cope with complexity? How do legal orders try to remedy the apparent informational deficiencies in criminal proceedings – and how *should* they do so? For fact-finders operate over an extremely wide range of socio-economic activities that characterise modern societies. The technological progress of our age, where e.g. an affordable smartphone easily outperforms the computational capacities of NASA’s Voyager 1 and 2 of the late 1970s by many orders of magnitude,⁵ reinforces the pressure on the question of decisional competence: Who should have the *decision-making prerogative*⁶ whenever we are dealing with evidence requiring knowledge that ordinary people do not usually possess, and why? The ‘creeping scientization of factual inquiry’⁷ as well as the compartmentalization of human knowledge place the ‘good old way’, according to which experts act merely as ‘helpers of the court’,⁸ increasingly in doubt. The importance of filling abstract legal terms with valid (i.e. reliable) empirical content, in conjunction with technological and informational complexity, thus threaten to radically transform the traditional decision-making process. The latter has despite all its institutional adaptations immunised itself against criticism as a ‘perfectly legitimate model of fact-finding’.⁹ Perhaps traditional fact-finders are mere luxuries, one might think, and science should supply all the facts that guide our action.¹⁰ After all, one of the central tenets of modern legal orders, the Rationalist Tradition, lies in the pursuit of rationality and accuracy (factual rectitude) of fact-finding in adjudication.¹¹

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1. Hereinafter we will use the generic term ‘fact-finder’.
 2. See e.g. HLA Hart, *The Concept of Law* (Clarendon Press, Oxford 1961) 124; RJ Allen, A Note to My Philosophical Friends About Expertise and Legal Systems, in: 28 *Humana.Mente: J. Phil. Stud* (2015) 71–86 (72), stresses that rights without accurate decision-making are meaningless.
 3. JB Thayer, *A Preliminary Treatise on Evidence at the Common Law* (Little, Brown, Boston 1898) 269.
 4. The House of Lords’ Science and Technology Select Committee in its latest report (Forensic science and the criminal justice system: a blueprint for change, *3rd Report of Session 2017–19*, HL Paper 333, para 124) stresses that ‘[t]here is a need for consistent interpretation by judges and lawyers of what the evidence means in a specific case to ensure the fair and consistent application of the law.’
 5. See: https://www.nasa.gov/mission_pages/voyager/multimedia/vgrmemory.html (last accessed 4 January 2022).
 6. For a discussion of this term in relation to scientific evidence, see e.g. A Biedermann and KN Kotsoglou, Decisional Dimensions in Expert Witness Testimony – A Structural Analysis, in: 9 *Front. Psychol.* (2018), Article 2073, doi.org/10.3389/fpsyg.2018.02073.
 7. MR Damaska, *Evidence Law Adrift* (Yale University Press, New Haven 1997). 151.
 8. JB Thayer, *Select Cases on Evidence at the Common Law* (Cambridge 1892) 665.
 9. P Roberts, Does Article 6 of the European Convention on Human Rights Require Reasoned Verdicts in Criminal Trials? In: 21 *Int. Rev. Vict.* (2015) 139–160 (229).
 10. For a critical introduction to these issues see M Midgley, *Science and Poetry* (Routledge, New York 2001) 22 et passim.
 11. The “Rationalist Tradition” was first described in W Twining, ‘The Rationalist Tradition of Legal Scholarship’ in E Campbell and L Waller (eds), *Well and Truly Tried: Essays on Evidence in Honour of Sir Richard Eggleston* (Law Books, Sydney, 1982) 211–249. This is a view of adjudication that, according to Twining, the vast majority of leading Anglo-American scholars has “either explicitly or implicitly adopted”, W. Twining, Identification and Misidentification in Legal Processes: Redefining the Problem”, in: Twining (ed.), *Rethinking Evidence* (Blackwell, Oxford 1994) 153–178 (160).

The conceptual, doctrinal and procedural framework underpinning communication among fact-finders and experts –i.e. the main topic of this article– is not new or idiosyncratic to jurisprudence but echoes wider discussions as regards the role of experts in political and moral decisions, a problem which with the ongoing pandemic became of pivotal importance. For example, politicians are at pains to stress that they are ‘following the science’.¹² We will not discuss, of course, the wider political phenomena. It is worth noting, however, that enabling smooth communication among experts and decision-makers has wide and deep ramifications as it concerns the extent to which expert evidence can pre-empt decisions. As one prominent philosopher of science asked: ‘Should the sciences be given the run of our education institutions and of society as a whole’?¹³ We should also ask: Are fact-finders bound –and in what way– by expert evidence? What does it mean to accept or reject (unchallenged) expert evidence? That is, under which circumstances can unchallenged expert evidence inexorably pre-empt a criminal verdict/legal decision without usurping the jury’s function?

Unless and until these intricate questions are convincingly answered, courts will lack the conceptual framework and vocabulary to justify whichever outcome they reach. More work needs to be done on the ramifying doctrinal web of connections between expert evidence and legal decisions. In order to clarify these important questions, we will examine the conceptual structure underpinning expert witness testimony. We will investigate the way in which the criminal process in England and Wales deals with complexity (section *I.B*), and show that what is usually (and at the cost of oversimplification) called ‘evidence’, comprises three distinct questions:

- (i) What does the data tell us?
- (ii) What should we believe?
- (iii) What should we do?

We shall argue (section *II.A*) that fact-finders are not obliged to treat these three questions as an indivisible methodological package allegedly to be answered by one and the same person. From this insight, a number of corollaries will fall into place. It becomes clear, *first*, that criminal liability is not a scientific conclusion, but a normative construction which refers (only) to the defendant. For a verdict on guilt involves an inferential leap. The latter is backed, but not warranted by any scientific (i.e. general) proposition. *Secondly*, fact-finders do not need to cede their decision-making prerogative as some proponents of expert-driven decision-making suggest (section *III.B*). Expert witnesses who spuriously opine on ultimate issues go far beyond what can be logically warranted by the underlying methodology (section *III.A*), a deficiency that is widely known and tolerated at the same time. *Thirdly*, aspiring to a technocratic future in which expertise permeates all aspects of the criminal process poses a threat not only to the fundamental values of the criminal justice system. It also obfuscates methodological principles of reliable expert (scientific) evidence (*II.B*), that is mistaking science and technology as the solution rather than as the problem to be apprehended in the first place. Our clarification of this evidential structure will allow us, *finally*, to provide the conceptual framework required to understand and stabilise case law on expert witness testimony.

B. The Ultimate Issue Rule

As outlined above, modern legal orders find themselves constantly running up against new areas requiring scientific, technical, or other specialised knowledge. To cope with this permanent challenge, legal orders employ a centuries-old, simple strategy. As Saunders J. remarked already in the 16th century, ‘it is an honourable and commendable thing in our law that if matters arise in our law which concern

12. Nickson et al, Decision Making in a Crisis. *Institute for Government* (online available: <https://www.instituteforgovernment.org.uk/sites/default/files/publications/decision-making-crisis.pdf>, September 1, 2020, last accessed: 4 January, 2022).

13. P Feyerabend, *Against Method*, 4th ed., 2010, p. 127.

other sciences or faculties, we commonly apply for the aid of that science or faculty which it concerns'.¹⁴ The criminal process thus *tracks* reliable information by turning to those who possess an extensive body of knowledge or set of skills, commonly referred to as experts. The latter will assist fact-finders in their task of making reasoned decisions in the face of uncertainty. According to traditional evidence law doctrine, experts will present fact-finders with physical rules or general principles and *help* them apply the domain-specific general knowledge to the evidence introduced in the case.¹⁵ The term 'help' is doing the conceptual heavy lifting here – in more ways than one.¹⁶ In one of the leading cases in England and Wales, Lawton LJ stressed that expert evidence is admissible to provide the court with scientific information which is likely to be outside of the experience of a judge or jury, *if and only if* fact-finders cannot form their own conclusions without help.¹⁷ In any other case the opinion of an expert (on non-scientific matters) is *unnecessary* and usurps the function of the fact-finder in a criminal trial.¹⁸

The expert witness is, therefore, bound to testify only *within* his or her area of expertise.¹⁹ Any step *outside* that strictly circumscribed area constitutes a procedurally forbidden invasion of the province of the fact-finder. This may sound trivial but is both important and incomplete. It is important because it *confines* an expert witness within a specific field of expertise.²⁰ It is, however, incomplete insofar as it does not provide a sufficiently explicit account of *a)* what constitutes a *field of expertise*, *b)* what exactly it means to provide 'help'. In criminal adjudication, information is to be transferred, but both the rules for the transmission of information as well as the boundaries thereof are not clear. Divergent views about these issues lead, knowingly, to territorial disputes and accusations of trespassing on both sides.

According to common law, it is the duty of the fact-finder to decide whether the elements of the offence have been proved to the requisite standard of proof. Experts ought to steer away from opining let alone deciding on *ultimate issues*, such as 'substantial impairment', 'dishonesty', 'reasonableness' etc. The trial with expert witnesses, judges around the world stress, must not become trial by experts;²¹ legal orders unexceptionally authorise 'lay decision-makers'²² to resolve questions of criminal liability. The fact-finders' *decision-making prerogative*, i.e. the conceptual core of the ruling in *Turner* is, however, not undisputed.²³ Already in 1968, Lord Parker CJ conceded that 'with the advance of science more and more inroads have been made into the old common law principles'.²⁴

On the one hand, therefore, we have legal authorities watering down the primacy of the jury. For example, in *Davies* it was held that the expert witness could admissibly testify as to whether the defendant was unfit to drive through drink.²⁵ In *Stockwell* Lord Taylor remarked that the expert witnesses could give

14. *Buckley v Rice Thomas* (1554).

15. See already Learned Hand, Historical and Practical Considerations regarding Expert Testimony, in: 15 *Harvard Law Review* (1901), p. 50.

16. See P Roberts / A Zuckermann, *Criminal Evidence* (Univ. Press, Oxford 2010) pp. 486–490, for more discussion.

17. *R v Turner* [1975] 61 Cr. App. R. 67. According to the Runciman Royal Commission's Crown Court Study, nearly 30–40 percent of all cases on indictment in England and Wales include expert evidence. See Michael Zander and Paul Henderson, *Crown Court Study* RCCJ Research Study No 19 (HMSO, 1993) p. 84–85. For data on the scope of expert evidence in the U.S. see e.g. Samuel R. Gross, Expert Evidence, in: *Wis.L.Rev* (1991), pp. 1113–1232 (1118–1120).

18. *R v Davies* [1962] 3 All E.R. 97.

19. This is the main component of the *Turner* rule that experts may only give evidence on topics 'outside the experience and knowledge of a judge or jury'. See M Redmayne, *Expert Evidence and Criminal Justice* (University Press, Oxford 2001) 140–197.

20. According to the Criminal Procedure Rules (E + W, Rule 19.2.1.a.ii) an expert must help the court to achieve the overriding objective by giving opinion which is within the expert's area or areas of expertise.

21. *People v. Collins*, Crim. No. 11176. In Bank. Mar. 11, 1968, (per Sullivan, J.).

22. This term is used by Redmayne, *Expert Evidence* (n. 19) 4.

23. The ultimate issue rule was abolished in civil cases by s. 3 Civil Evidence Act 1972. Its status in criminal cases is still unsettled: Although abolition was proposed by the Criminal Law Revision Committee (11th report para 63), the proposal never reached the statute books.

24. *DPP v A & BC Chewing Gum Ltd* [1968] 1 Q.B. 159.

25. *R v Davies* [1962] 3 All E.R. 97.

their opinion on issues such as (facial) identification as long as the judge instructs the jury that they were not bound to accept the opinion.²⁶ In *Brennan*, finally, it was held that '[w]here there simply is no rational or proper basis for departing from uncontradicted and unchallenged expert evidence then juries may not do so'.²⁷ At this very moment, Rationalism shows its teeth: Once we allow the expert witness to express an opinion on ultimate issues, how could we possibly justify a genuine dissent between experts and lay-people in a world driven by rationality?²⁸ In effect, expert testimony becomes outcome-determining, especially in cases where expert witness testimony is uncontradicted. This puts the ultimate issue rule and the understanding of the fact-finder as the ultimate arbiter of fact on their head. The name for this shift in responsibility is *deference*²⁹ and echoes the old Benthamian aspiration to 'take the business out of the hands of instinct'³⁰ in favour of a (more) rational approach to evidence.

On the other hand, courts routinely reiterate that experts should not usurp fact-finders' territory. To provide a few examples, in *Doheny* and *Adams*³¹ the Court of Appeal (E + W) stressed that a scientist 'should not overstep the line which separates his province from that of the jury'. In *Golds*³² the UK Supreme Court reaffirmed that even in cases involving unchallenged expert evidence, the 'trial is by jury and not by expert', adding for good measure that the jury would need 'some identified reason' for not accepting expert evidence. Recently, the Court of Appeal in *Jones*³³ reiterated that expert evidence must be 'confined to purely scientific questions, leaving open any issue as to the surrounding facts', stressing that in that particular case it was 'unwise' for the experts to opine on whether it was 'realistic' for the appellant to offer an innocent explanation about the presence of 'his' DNA at the crime scene.

The area of tension outlined above is created by two, as Davis LJ in *Brennan* put it, 'relevant but potentially conflicting principles': a) that in criminal trials cases are decided by juries, not by experts, and b) that juries must base their conclusion on the evidence.³⁴ The lack of clarity about how to properly balance these two principles creates pressing problems in communication among experts and fact-finders. Experts are asked to restrict themselves to questions regarding the probability of the evidence.³⁵ But how many questions are there to be answered? Most importantly: who is, and who should be, authorised to answer each of these questions?

II. Assessment of Evidence

A. The Three Questions

We saw above that according to mainstream doctrine, expert evidence invokes scientific, technical or other specialist knowledge lying *beyond* the general competence and ordinary common-sense experience

26. *R v. Stockwell* (1993) Cr. App.R. 260.

27. *R v Brennan* [2014] EWCA Crim 2387, para 44. In that case there was (uncontradicted) expert evidence of mental disorder which is one of the elements of the partial defence of diminished responsibility in England and Wales.

28. Courts have made clear that they are willing to turn a blind eye when it comes to norms or rules that confer legal power or competence, in the interests of securing rational decisions. In *DPP v. A & B C Chewing Gum* [1968] 1 QB 159; [1967] 3 WLR 493; [1967] 2 All ER 504, Lord Parker noted that '[A]lthough technically the final question 'Do you think he was suffering from diminished responsibility?' is strictly inadmissible, it is allowed time and again without objection'.

29. See *JS Miller/RJ Allen*, The Common Law Theory of Experts: Deference or Education? In: 87 *Northwestern University Law Review* 1131 (1993) 1131–1147.

30. J Bowring (ed.), *The works of Jeremy Bentham* (Thoemmes, Bristol 1995) (orig. 1827), Vol. 6, 216.

31. *R v Alan James Doheny; R v Gary Adams* [1997] 1 Cr. App. R. 369 (375).

32. *Golds* [2016] UKSC 61, at [51].

33. *R v Jones (William Francis)* [2020] EWCA Crim 1021, at [38]. See also KN Kotsoglou, C McCartney. To the exclusion of all others? DNA profile and transfer mechanics. In: 25 *The International Journal of Evidence & Proof* (2021) 135–140.

34. *Brennan* [2014] EWCA Crim 2387, at [43].

35. *R v Deen*, CACD 21 Dec 1993.

of fact-finders.³⁶ Admissibility is thus predicated on the necessity of admitting a piece of evidence through questions such as: Is this a ‘specialised’ area?³⁷ Yet the test outlined above raises further intricacies, for the very term ‘evidence’ is widely conceived in a rather uncritical way – as if it were entirely clear what the term means. This could be a result of the orthodox approach, where the *subject* of evidence is reduced to the *law* of evidence, especially the rules of admissibility.³⁸

Evidence, however, is a complex subject. As Twining has noted, ‘the rules of evidence are only one small part of the subject of evidence and proof’.³⁹ More elements thus need to be factored into our (doctrinal) analysis. Such a move would be valuable especially for intersections with forensic science whose theoretical foundations remain, regrettably, in ‘an impoverished state’.⁴⁰ We shall argue in this section that the mainstream approach to the demarcation line between the duties of the jury and those of the expert witness falls short of a conceptual structure comprising two interrelated, albeit discrete steps: an inferential step (which can be further analysed), and a *decisional* one. This distinction is well recognised in other disciplines; for example, the statistician Richard Royall highlighted the following three questions in relation to evidence:⁴¹

What does the data tell us? [Q_1]

What should I believe? [Q_2]

What should I do? [Q_3]

In order to illustrate the bite of this tripartite analysis and, in particular, its bite for evidential purposes, consider a digression to a generic medical example.⁴² Assume that *A* visits her physician for a routine check-up. Blood analyses reveal high levels of a tumour marker. This information answers question Q_1 in the form of a mainly factual report of findings. Naturally, both *A* and her physician will be interested in a medical assessment – thus referring to Q_2 . It becomes clear that answering Q_2 (‘What should I believe?’) requires more than the factual (scientific) data, i.e. more than the answer to Q_1 . We would need to place raw data into context, possibly conduct further analysis, and elaborate a well-balanced assessment. For a diagnosis of, say, lung cancer is possible yet far from inevitable. Given that a sharp and pointed diagnosis is the exception rather than the rule, a clinical diagnosis is a practical exercise in reasoning under uncertainty.⁴³ For the sake of simplicity, assume that the data support D_1 (lung cancer) over D_2 (bronchitis) or D_3 (false alarm). The main question to be answered next is *practical* in nature and relates to decision-making: what is the appropriate treatment? The answer to this third question is informed by, but cannot be reduced to inferential reasoning only. Further, suppose that there are at

36. See e.g. *R v Turner* [1981] QB 834. The same holds true for the recent ENFSI Guideline for Evaluative Reporting in Forensic Science: [1.3] ‘Forensic practitioners will not report on matters *outside* their own area of expertise’.

37. See *R v Bonython* [1984] 38 SASR 45, where King CJ set down the test for the admissibility of expert evidence. The test has been cited with approval by the Court of Appeal in England and Wales. See e.g. *R v Harris* [2005] EWCA Crim 1980 at [270]; *R v Luttrell* [2004] EWCA Crim 1344, para 32; see also Criminal Practice Direction 19A.1 (E+W).

38. W Twining, *Hot Air in the Redwoods, A Sequel to The Wind in the Willows* In: 86 *Mich. L. Rev.* (1988) 1534.

39. W Twining, ‘Identification and Misidentification in Legal Processes: Redefining the Problem’ in Twining (ed), *Rethinking Evidence* (Blackwell, Oxford 1994) 153–178 (155).

40. Redmayne, *Expert Evidence* (n. 19) 37.

41. R Royall, *Statistical Evidence: A Likelihood Paradigm* (Chapman and Hall: CRC, 1997) 4 - paraphrased.

42. We should emphasise that the sole purpose at this juncture is to point out the conceptual distinctions implied by the three questions. The suggestion is not that reasoning and decision-making at trial is akin to a medical investigation and decision-making. See also D Menashe, ‘Is Judicial Proof of Facts a Form of Scientific Explanation? A Preliminary Investigation of ‘Clinical’ Legal Method’ in: 12 *International Journal of Evidence & Proof* (2008) 32–52.

43. A differential diagnosis is provided, followed by the systematic confirmation or elimination of various competing hypotheses. See JM Guilleyardo, ‘Probability and Uncertainty in Clinical Forensic Medicine’ in: 28(2) *Proc (Bayl Univ Med Cent)* (2015) 247–249.

least n ways to treat lung cancer: surgery, chemotherapy or receiving palliative care etc. What should A do, given her inferred medical condition (lung cancer)?

The physician cannot take for granted that a patient would be willing to accept painful treatment with a high chance of periprocedural death for some additional months of life.⁴⁴ It is a fact of life that people place varying importance on outcomes resulting from different options. For example, the physician would need to find out whether the patient values independence and quality of life more than survival at any cost. Thus, in order to answer the *practical question* (Q_3), we need more than the available data (Q_1) and more than our degree of belief in a particular hypothesis (Q_2).⁴⁵ Causal relationships which empirical/natural sciences seek to investigate, do not inform us sufficiently about *decisional* issues, i.e. what we should do. As Einstein put it pithily ‘Science without religion⁴⁶ is lame; religion without science is blind’.⁴⁷ Note that any choice of action requires the input of (personal, societal or otherwise) values, and will reflect *value judgments* –commonly called utilities or losses– attached to the various possible outcomes.

Let us now clarify what exactly we argue for. We do *not* submit that in a rationality-driven world, scientific facts should not *guide* our lives. Ordinarily, scientific facts are generated using a methodologically controlled and, so is the hope, reliable process. What we *are* saying is that scientific/forensic propositions, being *general* in nature, cannot fully determine our course of action in the context of the individual case. Scientific explanations aspire to provide a *general* account of a given system under study. However, adopting scientific methods in legal adjudication not merely to educate fact-finders, but to replace them, is awry. For the objective of fact-finders is not to provide any kind of *general* explanation of a domain under study, but to ascribe liability to an individual’s actions or omissions by rendering a verdict. It is the *particular* defendant and the *particular* legal dispute that fact-finders have to resolve. Treating criminal cases in a general scientific way neglects the insight that each case is a unique historical fact.⁴⁸ Individual cases can be answered –even philosophers of science are at pains to stress– only with recourse to *external* values.⁴⁹ Values are neither scientific nor unscientific, and thinking otherwise amounts to confusing scientific issues with moral issues. Any effort to sidestep the thorny question of values entirely by focusing merely on ‘pure facts’ is not only intellectually reckless but also suspicious. For such a move advances certain ideology-laden values over others without even having to argue for them.⁵⁰

The prevalence of values in decision-making processes became (once again) obvious when the former shifted radically in the years after the end of WWII. Up to that point, the medical profession had adopted an authoritarian position: ‘physicians know best’. Call this the *deference model*⁵¹ where physicians would answer all three questions (Q_{1-3}). They would not only provide a medical assessment, but also make a decision – on behalf of their patient.⁵² After the revelations of experimentation from the Nuremberg

44. See Sullivan et al., ‘Understanding Patients’ Values and Preferences Regarding Early Stage Lung Cancer Treatment Decision Making’ In: 131 *Lung Cancer* (2019) 45–57.

45. See also E Sober, *Evidence and Evolution. The Logic Behind the Science* (University Press, Cambridge 2012) 7.

46. Albert Einstein, *Ideas and Opinions* (Crown Publishers, New York 1956) 46. Many thanks go to Professor Tony Ward for this valuable hint. We strongly suspect that Einstein did not reduce religion to superstition and miracles. He hinted on what we here call Q_3 as a category which is distinct from a theoretical inquiry.

47. Quoted in J Gleick, *Genius* (Abacus, 1994) 376.

48. In the words of LH Hoffmann, ‘Similar Facts after Boardman’ in: 91 *L.Q.R.* (1975) 204: ‘the slightest movement of the kaleidoscope of facts creates a new pattern which must be examined afresh’.

49. TS Kuhn, *The Structure of Scientific Revolutions*, 3rd ed. (University Press, Chicago 1996) 110.

50. See Austin L Hughes, ‘The Folly of Scientism’ in: 37 *The New Atlantis* (2012) 32–50.

51. On the notion of deference in the legal context, see Miller/Allen (n. 29).

52. The 1847 Code of Medical Ethics of the American Medical Association called explicitly for the prompt and implicit ‘obedience of a patient to the prescriptions of his physician’ and forbade consideration of the patients’ ‘own crude opinions’. We should note that paternalism is embodied already in the Oath of Hippocrates where doctors were obliged to assume complete responsibility for their patients.

trials,⁵³ physicians could no longer cast themselves as wise healers who could retain the decision-monopoly by keeping the lay public at arm's length.⁵⁴ It became increasingly clear, thus, that dealing with evidence comprised two discrete operations: an inferential one (given the data, what should we believe?) and a decisional/therapeutic one (What should we do?). There is no intrinsically valid or scientific reason to treat these questions in a wholesale manner where just one person answers all of them. Lacking a well-defined list of objective (universal) values or an erga omnes valid hierarchy of choices, the patient is the only person who can decide⁵⁵ whether the cure is better than the disease. Experts will merely enable us to make an informed decision. Let us call this approach the *education model*.⁵⁶

We are now in a position to review the main problem around expert witness testimony in criminal adjudication. Experts are –almost by definition– invited to answer questions within their technical area of expertise, by which we mean, primarily, the factual reporting of observations (Q_1 in our notation). While this is a truism, it is intensively debated whether, and if so to what extent, experts should express beliefs about target propositions (Q_2). Forensic practitioners routinely individualise, so to speak, forensic traces and materials.⁵⁷ At the same time, from a rigorously epistemic point of view, it is clear that expert witnesses cannot and hence should not give direct opinions regarding, for example, the source of a fingerprint. Instead, they should focus on the findings (observations of similarities and differences between compared items) and their probative value, that is, the extent to which these findings support one proposition (e.g., common source) as compared to a particular alternative proposition (e.g., different source).⁵⁸ Conversely, it is widely acknowledged –but often ignored– that experts have *no special competence* at the *decisional* stage of the process (Q_3).⁵⁹ Notwithstanding the merits of decision-theory, there is no such thing as a *decisionist*, for the simple reason that reasonable minds may differ with regard to practical decisions.⁶⁰ As the political scientist David Runciman observes '[i]f there were such a thing as the university of life, that's where [...] epistocrats would want political decision-makers to get their higher degrees. But since there is no such university, they often have to make do with cruder tests of competence'.⁶¹

Remember that in order to make a judgment under uncertainty, one needs the input of *values* (see section II.A). What is more, decisions can only be conceived teleologically, in relation to pursuing a well-defined objective when the consequences of one's choice are uncertain. Deferring to the expert would amount to implementing the expert's personal values⁶² rather than those of the fact-finder or of the

53. See the pioneering principles pertinent to research on human beings in the obiter dicta in *US v. Karl Brandt et al.* ("Medical Case"), 1946–47.

54. Nowadays, physicians will only enable patients and families understand the different options including any significant long term physical or other anticipated recovery implications. Even when a health care agent is empowered to make decisions regarding someone's medical care, e.g. fill the Do-Not-Attempt-CPR form, it is the patient himself who has authorised them.

55. For an analogous argument in the context of assisted dying, see David Caruso/Alex Biedermann/Joëlle Vuille/Danielle Gilby, 'In Support of a Decisional Paradigm for Assisted Dying' In: 43 *Criminal Law Journal* (2019) 254–273.

56. Again, on the notion of education (as compared to deference, supra note 57) in legal applications, see Miller/Allen (Fn. 37).

57. For more analysis see Simon A Cole, 'Individualization is dead, long live individualization!' In: 13 *Law, Probability and Risk* (2014) 117–150.

58. C Champod/ C Lennard/ P Margot and M Stoilovic, *Fingerprints and Other Ridge Skin Impressions*, 2nd Ed. (CRC Press, Boca Raton 2016) Chapter 2.

59. S Cole/ A Biedermann, 'How Can a Forensic Result be a "Decision"?' A Critical Analysis of Ongoing Reforms of Forensic Reporting Formats for Federal Examiners' In: 57 *Houston Law Review* (2020) 551–592.

60. In fact, reasonable people may differ already with regard to what they see in front of them. For more discussion see Dan M Kahan/David A Hoffman/Donald Braman, 'Whose Eyes Are You Going to Believe? Scott v. Harris And the Perils of Cognitive Illiberalism' in: 122 *Harvard Law Review* (2009) 837–906.

61. D Runciman, *How Democracy Ends* (Profile, London 2018) 181–182.

62. A separate question is whether these values are accessible, let alone articulable by the scientist.

legal order.⁶³ But why would the fact-finder's values be preferable to those of the expert? *First*, from a doctrinal point of view, the person authorised to render a criminal verdict is the fact-finder, not the expert witness. It is the lawful and procedurally prescribed role of fact-finders to take the science-based opinions of experts and then assess the evidence as a whole by weighing the various legal factors and by applying legal tests in order to arrive at the appropriate (reasonable) decision. Simply put, there are no special legal requirements other than some general cognitive capacities in order to be called for jury service. *Secondly*, the question about values itself implies a misunderstanding: fact-finders will indeed use their own personal values, but only to the extent that these values do not contradict the overarching operating values of the legal order which they are entrusted to uphold. In a fictional example, a fact-finder could be a security-obsessed reactionary. He would still have the legal duty to preserve the defendant's default status (presumed innocence), unless the latter's guilt is sufficiently proven. For these are the values of the legal order. Thus, in this context, the terms 'personal' or 'subjective' do not mean arbitrary.

Fact-finders are *not* given unbridled discretion to make factual determinations since decision-making in criminal adjudication is not an anything-goes activity; on the contrary, it is rule-governed. One of those rules is the standard of proof which, from a decision-theoretical point of view, reflects the respective legal order's trade-off between competing objectives. Mainstream arguments which invoke the Blackstone-ratio⁶⁴ and the well-known dictum in *In Re Winship* –stressing the 'fundamental value [...] of our society that it is far worse to convict an innocent man than to let a guilty man go free'⁶⁵– illustrate this point. Fact-finders operate on normatively structured stakes rather than blind chance. As we will argue in the next section, the conceptual confusion around expert witness testimony and, hence, the uneasy relationship between forensic science and criminal adjudication is a direct result of the problematic attempt to unite Q_{1-3} in a single methodological account.

B. Decisions are not Scientific Findings

Following our argument so far, experts are competent to report and interpret data (Q_1) which assist fact-finders in shaping their opinions about competing propositions (Q_2). However, experts are not particularly well qualified to deal with questions of type Q_3 which, in our case, are questions of *justice* that are replete with non-science considerations. As Paul Roberts explains: 'The overriding objective of criminal proceedings is doing justice; and whilst epistemic considerations are vital ingredients in the mix – we want to convict the guilty, and only them, of the right offence(s) – epistemology is not the proof of the pudding'.⁶⁶

Being an expert in an area does not guarantee that one will be more competent to say what the cut-off probability for accepting a proposition is, or what the meaning of ordinary words (e.g. *substantial* impairment) is. As Evett noted, '[i]t is important to realise that this kind of opinion is a manifestation of a largely psychological process – it owes nothing to scientific proof and it cannot be substantiated by logic. This does not make it bad, or unreliable, but it is not based in science.'⁶⁷ Remember that the function of any scientific explanation is to establish *symmetry* across all members of a target system –presuming that

63. A Biedermann/S Bozza/F Taroni, 'Decision Theoretic Properties of Forensic Identification: Underlying Logic and Argumentative Implications' In: 177 *Forensic Science International* (2008) 120–132.

64. Though commentators often invoke the Blackstone-ratio to justify weighing of potential losses in a singular case (i.e., relative losses), Blackstone's ratio rather seems to refer to a ratio of errors across many distinct cases (e.g., David H Kaye, 'Clarifying the Burden of Persuasion: what Bayesian Decision Rules Do and Do Not Do' 3 *Int'l J. Evidence & Proof* (1999) 1–28 (5)).

65. *In re Winship*, 397 U.S. 358 (1970) (Harlan J., concurring) at 372.

66. P Roberts, 'Making sense of forensic science evidence' in Roberts/Stockdale (eds), *Forensic Science Evidence and Expert Witness Testimony: Reliability Through Reform?* (Edward Elgar Publishing, Cheltenham 2018) 27–70 (45).

67. IW Evett et al., 'DNA Profiling: A Discussion of Issues Relating to the Reporting of Very Small Match Probabilities' In: *Criminal Law Review* (2000) 347–348 (344).

events occur in consistent patterns.⁶⁸ Scientific models thus need to remain general, but rationality comes at a cost. Models cannot refer directly to individual cases. As Wesley C. Salmon observed, ‘God would be unable to construct an inductive-statistical explanation of any physical event [...] not as a limitation of His power but as a reflection of His omniscience’.⁶⁹

Scientific findings eliminate, one might be tempted to think, the need for case-by-case decisions. Yet, from Aristotle who observed that it is ‘foolish to [...] demand from a lawyer scientific proofs’,⁷⁰ to modern forensic scientists who are at pains to understand why the idea ‘of a frequency being attached to an outcome for a single event is ridiculous’,⁷¹ scholars have continuously rejected bogus claims of generality when it comes to (legal) *decisions*. Legal decisions need to rely on scientific findings, but the two are different. Interpreting and applying a statute by issuing an individual norm culminates to a judicial *decision*, not a logical *conclusion*. While the fact-finder may have (good) reasons for what in his or her opinion is the ‘right’ decision, from the point of view of the law there can only be a set of equally reasonable decisions. The norm in question that needs to be instantiated is simply a ‘frame’ within various possibilities/decisions are given.⁷² The verdict is valid exclusively with regard to the individual case: but it is important to emphasise that the verdict is not generalisable. As the legendary Justice Antonin Scalia put it: Statistical evidence ‘is worlds away from “significant proof”’.⁷³

The guidance that legal rules or expert witnesses can provide in a particular case is limited. The dynamic process of increasing or decreasing the generality of legal rules inevitably runs, at some point, into an impasse. This insight is crucial because the notion of rational choice treats the possible choices faced by fact-finders in criminal adjudication as though they could be axiomatised in scientific terms. Empirical models do not yield decisions about individual cases, only assertions (conclusions) about reference classes. Treating *decisions* as if they are indistinguishable from *scientifically valid conclusions* does not offer a viable solution to real-life problems, but merely adds to the uncertainty. Forensic and other experts cannot deliver what is unduly expected from them –algorithmic decisions– because systems of criminal justice do not deal with empirical problems in the abstract, but with the particular problems of individuals. After all, informed decisions *are* individualised decisions for the case at hand, tailored to legal values including legal standards. While experts help fact-finders answer diagnostic problems (Q_{1-2}), experts ought to remain silent on decisional issues (Q_3).

To be clear, the notion of ‘individual decision’ does not mean that the decision maker could proceed in an arbitrary way. Members of the court are supposed to form a ‘disinterested forum’⁷⁴ entrusted to make informed decisions and implement societal values of the respective legal order. The gap between (logical) *conclusions* and (reasoned) *decisions* can only be filled by a ‘type jump’,⁷⁵ *an act of will* which is not the necessary outcome of an (axiomatised) reasoning process. Decisions are based on a leap of faith comprising strong decisional elements.⁷⁶

68. National Research Council, Committee on Identifying the Needs of the Forensic Sciences Community, *Strengthening Forensic Science in the United States: A Path Forward*, 2009, p. 112.

69. WC Salmon, ‘Comments on ‘Hempel’s Ambiguity’ by J. A. Coffa’ in: 28 *Synthese* (1974) 165–169 (165).

70. Aristotle, Nic. Ethics, i3, 1094b.

71. D Lucy, *Introduction to Statistics for Forensic Scientists* (Wiley, New York 2006) 5. For further discussion on the misinterpretation of relative frequency as a probability, see Alex Biedermann and Joëlle Vuille, ‘The Decisional Nature of Probability and Plausibility Assessments in Juridical Evidence and Proof’ in: 16 *International Commentary on Evidence* (2018) 1–30.

72. H Kelsen, *Reine Rechtslehre*, 1. ed., (Leipzig and Vienna: Deuticke, 1934) para 36.

73. *Wal-Mart Stores, Inc. v. Dukes et al.*, 564 U.S. 338 (2011), Opinion (Scalia), p. 14.

74. RJ Allen, ‘Burdens of Proof’ in: 13 *Law, Probability and Risk* (2014) 195–219 (196).

75. Stephen E Toulmin, *The Uses of Argument* (Univ. Press, Cambridge 2003) 150.

76. See e.g. *DA Stoney*, ‘What Made us Ever Think we Could Individualize Using Statistics?’ In: *J. Foren. Sci. Soc.* 31, pp. 197–199 (198), and *Saks/Koehler*, The Individualization Fallacy in Forensic Science Evidence, in: 61 *Vand.L.Rev.* (2008) 199–219 (219).

A decisional question, i.e. a question of justice, thus cannot be answered by making recourse *solely* to inference and empirical observations. The reason for this is not because Q_3 is a deep, impenetrable mystery (it isn't), but because the question itself is not a scientific one.⁷⁷ This was well understood already 2300 years ago, when Aristotle remarked that what needs to be done on a *particular occasion* by a reasonable agent depends on unique circumstances, i.e. it is highly context-sensitive.⁷⁸ Since circumstances vary strongly from one occasion to another, there is no possibility of stating a set of rules, however precise, that could collectively solve every practical problem.⁷⁹ The immense number of possibilities that would need to be considered in order to find a practical solution makes predefined decision recipes analytically intractable. Any attempt to write a comprehensive list of rules intended as a 'complete guide to decision-making' stumbles over the 'the impossibility of foreseeing all possible combinations of circumstances that the future may bring'.⁸⁰ Any attempt to eliminate discretion thus ends –and herein lies the irony: *predictably*– in analysis paralysis.

This has a place in folklore already since Aesop who reminded us that a 'whole bag of tricks' (e.g., statistical analysis) and computations will not resolve the problem of decidability.⁸¹ Decision-making is about practical reason (reasonableness) as much as it is about knowledge of the world. Criminal adjudication is vernacular through and through, and that is exactly its strength. The common law system of criminal adjudication with its heavy reliance on laypeople and common sense is perfectly legitimate, for it reflects practical wisdom.⁸² On the contrary, *analysis* is by design not aimed at predetermined *individual* outcomes, i.e. it does not yield decisions which necessitate decisions/verdicts. As decision theorists put it with characteristic verve, decision theory 'does *not* eliminate the need for you to make judgments and to express preferences; anyone who so claims is a charlatan'.⁸³

While expert witnesses can understand particular problems within their respective area of expertise legal values let alone decision-making including the problem of individualisation related to forensic evidence is demonstrably not one of them. Note that courts are already at pains to stress that a question of justice 'is not a single issue matter'.⁸⁴ A decision must be based on all of the (scientific and non-scientific) evidence in the case. For example any answer experts give to the issue of diminished responsibility or substantial impairment (Q_3) is merely an opinion which cannot be backed by logic alone. Instead, it is a manifestation of a 'largely psychological process'.⁸⁵ Practically, experts should even be expected to be in a *less* informed position than fact-finders, because only the latter oversee the case as a whole. As Fraser and Williams remind to persistent forensic practitioners: '[t]he combination and weighting of different kinds of evidence to decide guilt or innocence [...] is a question for the jury and is certainly outside the province of the scientist'.⁸⁶

77. See R Monk, *Wittgenstein's forgotten lesson*, in: Prospect July 20, 1999, for more discussion on that point.

78. Aristotle, *Nicomachean Ethics*, 1104a7–10.

79. This difficulty is also encountered by one of the competing visions of AI which is based on the idea of having experts write a different program for each problem, an approach now increasingly outpaced by deep learning approaches (e.g. Terrence J Sejnowski, *The Deep Learning Revolution*, The MIT Press 2018, p. 3).

80. HLA Hart, 'Jhering's Heaven of Concepts and Analytical Jurisprudence' in *Essays in Jurisprudence and Philosophy* (University Press, Oxford 1984) 265–277 (270).

81. According to Aesop's fable a fox had 'a whole bag of tricks' in order to escape her enemies whereas the cat had only one but could 'generally manage with that'. When the hounds came towards them, the cat immediately climbed up a tree and escaped. The poor fox instead started analysing which way would be the best. In the process of analysing the different ways of escaping she was caught by the hounds.

82. Midgley (n. 10), p. 11.

83. Irving H LaValle, *Fundamentals of Decision Analysis* (Holt, Rinehart, and Winston, Michigan 1978) 13 (italics as in original).

84. *Golds* [2016] UKSC 61, para 50.

85. Evett et al., 'DNA profiling: a discussion of issues relating to the reporting of very small match probabilities' In: *Crim.L.Rev.* (2000) 341–355 (344).

86. J Fraser/R 'Williams stress this point in: Introduction' in J Fraser/R Williams (eds), *Handbook of Forensic Science*, 29–56 (38).

C. The Decision-Making Prerogative

Our considerations so far do not mean that experts should be *excluded* from the pool of potential decision-makers. Nonetheless, they will not be *included* in their capacity as experts. Expertise is not a feature that applies to a person as such, but refers to certain areas of knowledge (Q_1). Decision-making, in the applied sense,⁸⁷ does not constitute such an area. This would imply that anything that scientists say, or think, is reliable because of the purported scientific character of their utterances or mindset. A legal order can make a *policy* choice regarding the institutional architecture of the criminal justice system without having to justify itself in a supposed Tribunal of Rationality.⁸⁸ ‘Expertise’ is an epistemic credential that refers to a well-defined empirical target system, not a person’s set of opinions as a whole. For example, a particular ethical view is not scientific just because it is held by the (vast) majority of scientists.⁸⁹

After all, a legal order does not only determine what types of behaviour are worthy of censuring and punishment; for it is much more than a *static* set of substantive rules. A legal order regulates itself by prescribing the generation and admissibility of evidence and, most importantly, by conferring legal authority to certain individuals to ascribe criminal liability. In the province of law only decisions issued by the *competent* authority are valid. Any other opinion as to the existence of an ultimate issue is insofar irrelevant as, say, expert witnesses are not authorised to make decisions.⁹⁰ By focusing exclusively on epistemic considerations, we neglect structural features of any legal order which lay out *who* decides *what* by following a certain procedure.

We can now go on to address two important questions:

- Who has the decision-making prerogative in modern legal orders?
- Who should have the decision-making prerogative? Laypeople or experts?

The *first* question can be answered briefly. Anglo-American legal systems unexceptionally confer decision-making authority to randomly chosen laypeople.⁹¹ Whereas it is the duty of an expert witness to provide information on technical matters so that fact-finders can form their own conclusions on issues within their area of expertise (Q_1), we need to be wary of securing the fact-finders’ decision-making prerogative (Q_3). As Lord Kerr in a judgment of the UK Privy Council explained, expert witnesses should be careful to recognise ‘the need to avoid supplanting the court’s role as the ultimate decision-maker on matters that are central to the outcome of the case’.⁹²

The *second* question is not a matter of law. From a normative point of view, there is, in principle, no reason why we should prefer laypeople over experts when it comes to practical decisions, including legal verdicts. In fact, the very distinction between decision-making-expert and layman is not meaningful. Claiming expertise on what one should do regarding unique historical events (Q_3) is rather a contradiction in terms. Furthermore, there are certain reasons why modern *democratic* legal orders make this specific policy choice.⁹³ Systems of criminal justice choose to decentralize decision-making processes and ensure that properties in the general population (experiences, perspectives, but also biases and prejudices) will

87. Though there is a large scientific field within the area of applied psychology, known as judgment and decision-making (e.g., Jonathan Baron, *Thinking and Deciding*, New York: Cambridge University Press, 4th Ed., 2008).

88. This term was used by Stephen Toulmin, *Return to Reason* (Harvard University Press, Cambridge 2001) 2.

89. See AL Hughes, ‘The Folly of Scientism’ in: 37 *The New Atlantis* (2012) 32–50, for more discussion.

90. See H Kelsen, *What is justice?* (Univ. of California Press, Berkeley 1957) 252.

91. *R v Twomey* [2009] 2 Cr App R 25, para 10, where Judge CJ observed that, ‘[i]n this country trial by jury is a hallowed principle of the administration of criminal justice. It is properly identified as a right’.

92. See *Pora v The Queen* [2015] UKPC 9.

93. See Runciman, *How Democracy Ends* (n. 61), p. 120–121.

also appear proportionately on decision-making bodies.⁹⁴ The appointment of members for decision-making bodies is, therefore, not haphazard. Aleatory selection and diversified decision-making as a means of assigning public responsibilities (equality by lot) is a feature of political systems already since ancient times.⁹⁵ It is with the *enfranchisement* of laypeople qua jury or magistrates that the system of criminal adjudication integrates diversity into organisational decision-making. Any criticism of this would have to be premised on the hypothesis that a group of educated people would make significantly better decisions than people selected in some unspecified way. In fact, empirical research shows the prevalence of cognitive biases which affect equally novices and experts in a given domain. As Bartels and Achen point out '[t]he historical record leaves little doubt that the educated, including the highly educated, have gone wrong in their moral and political thinking as often as everyone else.'⁹⁶

Current constitutional arrangements regarding the prerogative of decision-making – what courts call the 'primacy of the jury'⁹⁷ – are perfectly legitimate in a democratic society. This insight answers the *second* question. Our reliance on expertise does not break down or become invalid. It is merely confined to the conceptual stages of Q_1 , and partially Q_2 . The allocation of the decision-making prerogative is, intrinsically, a policy choice rather than a scientific mandate. Legal orders may choose freely whom they entrust with the important legal duty of deciding on the defendant's liability, without violating any logical or methodological principles of scientific inquiry.

To a large extent, these arguments follow from standard provisions in current legal orders in general, and England and Wales in particular. Yet both courts and expert witnesses continue to struggle with their mandate. The main reason for this, we shall argue in the next section, is the confusion about the logical relation between verdicts and scientific reports. Accepting or rejecting (unchallenged) expert evidence does not necessitate any legal decision.

III. Accepting and Rejecting Expert Evidence

A. The Logic of Inference

We can now go back to one of the main questions set out in section I, i.e. the meaning of accepting/rejecting the findings of expert witnesses especially when the latter are uncontradicted. Is it, the mainstream view asks, ever justified to compromise the rationality of criminal adjudication simply because the ultimate issue is always for the jury to decide?

As argued above, expert witnesses *inform* the fact-finder about matters within their area of expertise and help them evaluate the probative force of evidence (Q_1 , Q_2). A closer look at the microstructure of this process revealed several key features. The general form of expressing expert findings depends on the type of expertise and the needs of the mandating parties in the instant case.⁹⁸ Above all, expert witnesses are in a suitable position to report evidential findings by expressing themselves in terms of (the probability of observing) the evidence given at least two competing propositions. The need for balanced evaluative reporting requires experts to condition their assessment on at least a pair of mutually exclusive propositions which, usually, albeit not necessarily, reflect the parties' accounts of events. Experts

94. See WE Watson / K Kumar / LK Michaelsen, 'Cultural Diversity impact on interaction process and performance: Comparing homogenous and diverse task groups' in: 36 *Academy of Management Journal* (1993) 590–602, for empirical support to the claim that decisional outcomes are by and large better when more people are involved.

95. Aristotle, *Politics*, Book IV, 9, famously proposed that elections were inherently aristocratic while selection by lot was the democratic way of filling public offices (equality by lot).

96. CH Achen & Larry M Bartels, *Democracy for Realists. Why Elections Do Not Produce Responsive Government* (Princeton University Press 2016).

97. See e.g. *R v Blackman* [2017] EWCA Crim 190, para 43.

98. G Jackson/C Aitken/P Roberts, *Case Assessment and Interpretation of Expert Evidence* (Practitioner Guide No 4), Royal Statistical Society, para 2.23.

should, however, abstain from giving probability statements for (or opining on) the live procedural issues (i.e. the ultimate issues), *given* the evidence.

According to the ENFSI Guideline for Evaluative Reporting in Forensic Science, the abovementioned methodological requirement pertains to the logical core of expert witness testimony: ‘Evaluative reports should address the probability of the findings given the propositions and relevant background information and not the probability of the propositions given the findings and background information.’⁹⁹ In other words, forensic experts will inform the fact-finders about the probative value of the evidence and the extent to which the evidence provides evidential support with respect to a pair of contrastive propositions.

It is important to stress that this is not a jurisprudential bulwark to a supposedly rational practice, but a methodological requirement of evaluative reporting. This perspective is based on the understanding that experts do *not* control or directly address propositions – only the fact-finder does, using all the scientific and non-scientific evidence they have heard.¹⁰⁰ While this is a fundamental aspect that derives from the general character of all forensic science disciplines, it is widely ignored. All too often, experts are invited to answer question such as ‘could it be this?’, or ‘could it be that?’, with ‘this’ and ‘that’ referring to competing propositions regarding the nature of evidential material, or ways how the evidence came into place. As an example, consider the following questions and answers recorded in the Australian case *Fitzgerald*:¹⁰¹

‘A. It could have been blood, it could have been something other than blood.

Q. By ‘something else’ it could be saliva for example.

A. That’s possible, yes.

Q. It could be the transference of cells.

A. That’s possible, yes.’

As the U.S. Judge Learned Hand has already pointed out, the expert is ‘not telling of facts at all, but of uniform physical rules, natural laws, or general principles, which’, he added succinctly, ‘the jury must apply to the facts’.¹⁰² So the microstructure of evidential analysis for the fact-finder is quite the inverse. The ultimate question for fact-finders in criminal adjudication (in England and Wales) is whether the evidence is sufficiently probative to make them ‘feel sure’ that the accused is guilty. It becomes apparent that in this crude, uncontextualised form, any scientific conclusion is not operable. From this insight, a number of corollaries fall into place:

Firstly, fact-finders and expert witnesses are answering different questions using different methods. Any decision of the fact-finder about guilt given the totality of evidence admitted at trial is not *necessarily* disregarding any scientific conclusion of the expert witness about the probative force of the evidence regarding the propositions of interest. For example, a fact-finder who decides, after having heard all the evidence, that *Luca*, an Italian citizen, is not catholic, does not contradict (reliable) statistical data, according to which 99% of Italian citizens are catholic.¹⁰³ Similarly, the jury who despite unchallenged expert evidence on e.g. the existence of a mental disorder convict for murder (as opposed to voluntary manslaughter), have not *necessarily* rejected the (probabilistic) expert evidence. The question that the

99. ENFSI, Guideline for Evaluative Reporting in Forensic Science (2010), under 4.0 – Guidance notes.

100. This is reflected in the Crown Court Compendium (Dec 2019) section 10-14(c): The jury’s verdicts must be based on the evidence as a whole, of which the expert evidence and opinion only forms a part.

101. *Fitzgerald v. the Queen* [2014], HCA 28, para 23.

102. Hand, *Expert Testimony* (n. 16), p. 50. Note that one of the major philosophical insights in philosophy of science of the late 20th century was that statements of scientific theories were not ‘strictly speaking statements about the physical world. They are statements about theoretical constructs’, see RIG Hughes, ‘Models and Representation’ in: 64 *Philosophy of Science* (1997) S325–S336 (S325).

103. We stress that this is a generic example. We do not use it in any criminal justice context.

jury have to answer is not only wider than the expert evidence –the jury deals among other things with the question of *substantial* impairment; it is related to a specific individual, too. In other words, scientific findings refer to a reference class. On the contrary, legal decisions need to be individualistic. Whereas the expert does not have to decide anything, the fact-finders have to resolve a factual issue by making a judgment under uncertainty. Remember that after *Golds* the jury cannot reject an uncontradicted expert's opinion if there is no proper basis to do so.¹⁰⁴ This dictum, however, begs the question of what it means to *accept* expert evidence in the first place. As outlined above, the fact-finders' *decision* encompasses much more than scientific conclusions. Decisions (Q_3) ought to be based on available scientific findings (Q_{1-2}), but the two are different.¹⁰⁵ Acting 'rationally' means that the fact-finder needs to take information into account (Q_{1-2}). However, the rectitude of the criminal verdict or, more generally, any legal decision (Q_3), is not a function of the scientific findings. For example, it is possible to accept evidence regarding the correspondence between the DNA-profiles of recovered trace material and reference material from a defendant, and nevertheless decide that the evidence is insufficient to consider that the defendant *is* the source of the DNA trace.

Furthermore, it is a general principle of English law that words like 'substantially' or 'reasonable' are ordinary English words on which the fact-finders will decide 'based upon their own experience of ordinary life'.¹⁰⁶ For example, in *Ramchurn* the jury asked in retirement a specific question: what was the difference between 'trivial' and 'substantial [impairment]'. Thereupon the trial judge instructed them as follows – alluding to, what we call, the decision-making prerogative: 'Your own common sense will tell you what it means [...] *Parliament has left it to you* to say on the evidence was the mental responsibility impaired and if so, was it substantially impaired?'¹⁰⁷ Lord Hughes in *Golds* makes a similar point when he highlighted the principle of 'leaving an ordinary word alone'.¹⁰⁸

Despite the absence of a conceptual framework, the system of (criminal) adjudication acquired the institutional know-how in order to resolve social conflicts efficiently and intelligibly. By extensively employing *ordinary* words the legal order allows us to accommodate an infinite number of cases. E.g. the defence in *Charlene Sargeant* raised the point that the difference between loss of control and loss of temper is merely 'a matter of semantics'. The Court of Appeal (E + W) made clear, however, that precisely this was 'the central issue'.¹⁰⁹ Indeed, this goes to the heart of expert witness testimony, i.e. the extent of fact-finders' epistemic dependence on scientific findings. The meaning of legal terms is a question of *justice*, not the outcome of a scientifically valid, replicable method. Fact-finders will *decide* on these issues 'based upon their own experience of ordinary life'.¹¹⁰ This is a point often repeated but not always fully understood. The mere fact that the juries in *Golds*¹¹¹ and *Brennan*¹¹² were not convinced that there was '*substantial* impairment' of the defendant's mental abilities does not mean *necessarily* that they had previously rejected expert evidence. For they had to answer a slightly different question than the one put to forensic psychiatrists. The probabilistic structure of expert evidence does not map onto the latter's treatment by the jury.

Criminal verdicts are a function of the assessment of the evidence as a whole, not merely of the expert evidence. Arguing that scientific findings could ever pre-empt a decision, would belie their probabilistic

104. *Golds* [2016] UKSC 61 at [37].

105. As Justice Blackmun concisely put it in: *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993) (Blackmun J., Opinion) (at 591): 'evidence that the moon was full on a certain night will not assist the trier of fact in determining whether an individual was unusually likely to have behaved irrationally on that night.'

106. *R v Squelch* [2017] EWCA Crim 204, at [37].

107. *R v Ramchurn* [2010] EWCA Crim 194; [2010] 2 Cr App R 18 – emphasis added.

108. *Golds* [2016] UKSC 61, para 37. See also *Brutus v Cozens* [1973] AC 854.

109. *R v Sergeant (Charlene)* [2019] EWCA Crim 1088, para 32.

110. *R v Squelch* [2017] EWCA Crim 204, para 37.

111. *Golds* [2016] UKSC 61.

112. *Brennan* [2014] EWCA Crim 2387.

character. It is possible thus to accept expert evidence and still believe that the statistical proposition expressed in it does *not* apply to the particular case. The ramifying doctrinal web of connections between expert evidence and legal decision means that the threat of fact-finders usurping areas of expertise is only one side of the coin. Equally important is the possibility of experts usurping the realm of justice by acting as expert decision-makers.¹¹³ Guilt is not a (scientific) proposition, but a verdict which is the result of a decision made after considering all, i.e. both scientific and non-scientific, elements of the case.

B. Coherent Decisionalism

Scientific models including expert witnesses, place emphasis on generality to support the validity of their empirical claims. But criminal verdicts are *normative* ascriptions, not empirical claims. This applies to abstract concepts such as ‘fair’ or ‘reasonable’ but also to descriptive terms. For example, in *JF*¹¹⁴ the term ‘vagina’ was held to be used in the general sense of the female genitals, not in its strict anatomical (scientific) sense, so that it includes the vulva as well. As a result, a forensic expert (gynaecologist) cannot use his or her specialist knowledge about the anatomy of the female genitals in order to pre-empt the fact-finders’ factual determination, *even* on seemingly technical/descriptive matters such as the ultimate issue of penile penetration of a ‘vagina’ in a case of rape.¹¹⁵ Criminal trials about sexual offences are not exclusively interested in anatomical accuracy but are driven by policy considerations as well. In other words, legal adjudication is a different language game than empirical research and the meaning of a single term may vary according to the context.

At the core of the flawed approach mentioned above lies thus the idea of subsuming rationality and reasonableness into a single methodological unit. Ronald J. Allen stresses that there are only two possible solutions to the critical conceptual problem posed by expert testimony for legal systems: Either the necessary background information must be provided *or* fact finders must defer to the judgment of others.¹¹⁶ This is predicated, as outlined above, on the premise that questions Q_{1-3} are inseparable and can only be answered by one and the same person. However, a dualistic (all-or-nothing) approach according to which the fact-finder has to *either accept* the forensic report wholesale and at face-value¹¹⁷ *or reject* it, hinges on the inability of the mainstream view to recognise that the assessment of evidence can be broken down to a series of different questions and, consequently, to deal with Q_1 , Q_2 and Q_3 separately. The picture of the law of evidence that operates between education and deference conveys a broad perspective to the subject of evidence. It can be blended with elements of the microstructure of evidence processing as outlined above. Expert testimony will only fail to ‘fit easily into the common law model of the ideal trial’,¹¹⁸ if we treat Q_{1-3} as a *single methodological package*. Exposing the different layers, by contrast, embraces (persistent) courts’ jurisprudence and is consistent with certain methodological restrictions of rationality. This gain of synergy and consistency is predicated on the fact that law is equally dependent on reasonableness (practical judgment) and logicity (scientific knowledge).

In criminal adjudication we need an efficient division of labour. Experts will focus on the inferential limb of the evidence (Q_{1-2}) whereas fact-finders will exert the prerogative of decision-making (Q_3). This

113. See e.g. *Hussain* [2019] EWCA Crim 666, where all three forensic psychiatrists opined on the question of substantial impairment.

114. [2002] EWCA Crim 2936; see also s. 79(9) Sexual Offences Act 2003 (E + W). for more discussion see Lundy Langston, No Penetration—And It’s Still Rape, in: 26 *Pepp.L.Rev.* (1999) 1–36.

115. See section 1 SOA 2003 (E + W).

116. RJ Allen, ‘A Note to My Philosophical Friends About Expertise and Legal Systems’ in: 28 *Humana.Mente: J. Phil. Stud* (2015) 71–86 (80).

117. See P Roberts/A Zuckermann, *Criminal Evidence* (Univ. Press, Oxford 2010) 474, for more discussion.

118. *Miller/Allen*, Theory of Experts (n. 29), p. 1133.

operational arrangement is the essence of what we call *coherent decisionalism*, though we note that this is what the system of criminal adjudication already does.¹¹⁹

Mapping rationality (and therefore: reasonableness) onto logicity, Toulmin remarked, ‘did an injury to our common-sense ways of thought’ and led to a substantial loss of legitimacy for established decision-making processes.¹²⁰ Obviously, legal systems are overly reliant upon the notion of reasonableness. The call to extend scientific methods into decision-making processes, especially in criminal adjudication, does not come from science itself, but from a group of people who make the ‘somewhat wild suggestion’,¹²¹ that (forensic) sciences occupy the stage *alone*, and that they are the sole contributor to the resolution of practical questions. The disentanglement of practical reason (Q_3) and theoretical reason (Q_{1-2}) impinges, of course, on deep professional interests of those who believe, and want to make others believe, that their status as experts enables them to opine on questions outside their proper area of expertise. This illusion of omnipotence¹²² has led to the misguided attempt to reduce legal *decisions* to scientifically valid empirical findings (*conclusions*) and, ultimately, to a needless –and unhelpful– backlash against (valid) forensic science.

Legal orders have their own established routines for validating criminal charges, that is a normatively structured decision-making process under uncertainty. Note that the criminal process is not a proto-scientific-apparatus, but an advanced institutional tool designed for particular kinds of work in the social arena. Nor is it a ‘cheap substitute’¹²³ or a half-baked routine for folk-validation due to be replaced by the proper routines of experts. The invading tendency on behalf of forensic scientists – which, often, some jurors welcome with relief as it allows them to maintain the blurring of accountability– stumbles not only on the procedural architecture of common law systems (decision-making prerogative), but also on the structure of fundamental concepts. The idea that some scientifically validated (therefore: general) proposition could ever guarantee the factual and normative rectitude of a criminal verdict commits the fallacy of extending inferential steps based on assumptions that go beyond what can be logically warranted by the underlying procedure.¹²⁴ Disrupting the method of validation for criminal liability interferes with the procedural architecture of the legal order as an autonomous normative system. Treating legal issues as if they were scientific problems does not make decision-making processes more rational. On the contrary, it leads to the ‘McDonaldization’ of criminal justice systems.¹²⁵

IV. Conclusions

This article investigated some common assumptions underpinning the use of expert witness testimony, such as the view that experts can resolve questions of justice (*II.A*); that legal decisions are reducible to scientific conclusions (*II.B*); that fact-finders can/should shift their responsibility to make decisions (*II.C*). Throughout this paper we have argued that these views misconceive key features and concepts of currently valid decision-making processes in criminal adjudication. In essence, the necessity of informing fact-finders on technical issues does not authorise experts to interfere with the established routines for decision-making in criminal adjudication.

Dealing with cases ‘justly’ means, *inter alia*, that the defendant will be convicted for the right offence.¹²⁶ Now, the question is: Who is authorised to decide which offence is appropriate in view of

119. *R v Davies* [1962] 3 All E.R. 97.

120. Toulmin, *Return* (n. 88), p. 204.

121. Midgley (n. 10), p. 57.

122. E.g. P Atkins, ‘Science as truth’ In: 8 *History of the Human Sciences*, 97–102, asserts the ‘universal competence of science’.

123. See Midgley, *Science* (n. 10), p. 11, for more discussion.

124. For more discussion see A Biedermann et al., ‘Decision theoretic properties of forensic identification: underlying logic and argumentative implications’ in: 177 *Forensic Science International* (2008) 120–132.

125. This term was introduced by George Ritzer, *The McDonaldization of Society* (SAGE, 2000).

126. See CrimPR, Rule 1.1 (E + W).

the procedural architecture and the rights of the parties? This goes to the heart of the criminal process, the decision-making prerogative. Reducing legal decisions to scientific findings violates the fundamental principle that criminal trial is by jury, not by experts.

The role of the expert witnesses is to inform fact-finders and enable them to understand the evidence, draw their own conclusions, and make informed decisions. The rectitude of the criminal verdict (Q_3) does not map logically on the possible treatment of scientific findings (Q_{1-2}), that is acceptance/rejection. Expert witness testimony addresses the probability of the findings given the propositions of the parties; it is, therefore, not directly operable. Anything else would belie the probabilistic (general) character of expert evidence. Scientific/forensic propositions, being general in nature, cannot fully determine our course of action in the context of the individual case. Ignoring this essential feature of current procedural architecture would amount to the instalment of one-eyed specialists on both sides of the decision-making prerogative, that is fact-finders who do not understand the evidence and expert witnesses who do not understand the internal values and decision-making routines of their legal order. Identifying distinct questions and laying the groundwork for operable division of labour should enable thus smooth communication between fact-finders and expert witnesses.

The goal thus ought to be synergy and system integration, rather than institutional isolationism or conquest. The main subsystem, i.e. criminal adjudication, defines the activities of auxiliary forces, in particular forensic science, by specifying aspects such as the expert's duty to the court,¹²⁷ the way that experts will deliver their scientific input (i.e. not in their accustomed laboratory environment, but in a court room where people wear wigs and robes)¹²⁸ and, more importantly, the structure and content of the expert's report.¹²⁹ Experts should do what the court, but also methodological principles salient in scientific enquiry, ask them to do: address the probability of the findings given the propositions and relevant background information. Expert witnesses should at the same time remain silent on the probability of the propositions given the findings and background information. Opining, let alone deciding on questions of justice is not required or indeed permitted for forensic experts. At the same time, trial judges and jurors need to assume responsibility, draw their own conclusions and make informed decisions. We understand this to be the essence of coherent decisionalism. Shifting their responsibility to expert witnesses is not a viable option for fact-finders.

The rational system, William Twining observes, is one which uses reason 'so far as is feasible in determination of disputed questions of fact and law'.¹³⁰ So far as is feasible. Let us all think of these five words.

Acknowledgments

The authors would like to thank Paul Roberts and Tony Ward for valuable comments and suggestions. The authors gratefully acknowledge the support of the Swiss National Science Foundation through grant BSSG10_155809.

Declaration of Conflicting Interests

The authors declare that this paper was written in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

127. See CrimPR, Rule 19.2 (E + W).

128. See CrimPR, Rule 19.3 (E + W).

129. See CrimPR, Rule 19.4 (E + W).

130. Twining, *Tradition* (n. 11), p. 33.