

2013

# A Match Made on Earth: Getting Real about Science and the Law

Susan Haack

*University of Miami School of Law*, [shaack@law.miami.edu](mailto:shaack@law.miami.edu)

Follow this and additional works at: [https://repository.law.miami.edu/fac\\_articles](https://repository.law.miami.edu/fac_articles)



Part of the [Evidence Commons](#), and the [Law and Society Commons](#)

---

## Recommended Citation

Susan Haack, *A Match Made on Earth: Getting Real about Science and the Law*, 36 *Dalhousie L.J.* 39 (2013).

This Article is brought to you for free and open access by the Faculty and Deans at University of Miami School of Law Institutional Repository. It has been accepted for inclusion in Articles by an authorized administrator of University of Miami School of Law Institutional Repository. For more information, please contact [library@law.miami.edu](mailto:library@law.miami.edu).

*Modern legal systems increasingly depend on scientific testimony; but they also need somehow to ensure, so far as possible, that fact-finders aren't misled by highly speculative, poorly-conducted, or dishonestly-presented science. The Critical Common-sensist understanding of science that the author has developed in *Defending Science* and elsewhere sheds some light on why these interactions between law and science have proven so problematic. But Ms. Acharya's approach to these difficult issues rests on a flawed conception of the supposed "scientific method," and an idea of legal "legitimacy" too weak to bear the weight she places on it; and her claim that the author "idealizes" science is based on serious misunderstandings.*

*Les systèmes judiciaires modernes s'en remettent de plus en plus aux témoignages de scientifiques; cependant, ils doivent également s'assurer, dans la mesure du possible, que les juges de faits ne sont pas induits en erreur par des données scientifiques hautement spéculatives, obtenues à l'aide de méthodes incorrectes ou présentées de façon pernicieuse. La description critique de la science, fondée sur le gros bon sens, élaborée par l'auteur dans l'article intitulé « *Defending Science* » (À la défense de la science) explique jusqu'à un certain point pourquoi les interactions entre le droit et la science sont si problématiques. Par contre, la façon qu'a Mme Acharya d'aborder ces problèmes complexes repose sur une conception erronée de la prétendue « méthode scientifique » et sur une idée de la « légitimité légale » trop faible pour supporter le poids qu'elle lui impose. En outre, sa prétention que l'auteure idéalise la science repose sur de graves malentendus.*

---

\* Susan Haack is Distinguished Professor in the Humanities, Cooper Senior Scholar in Arts and Sciences, Professor of Philosophy and Professor of Law at the University of Miami. Her books include *Philosophy of Logics*; *Deviant Logic*, *Fuzzy Logic: Beyond the Formalism*; *Manifesto of a Passionate Moderate: Unfashionable Essays*; *Evidence and Inquiry*; *Defending Science—Within Reason: Between Scientism and Cynicism*; and *Putting Philosophy to Work: Inquiry and Its Place in Culture*. Her many articles have appeared in philosophical, legal, scientific, literary, and general-interest journals. She is presently working on a book on evidence, truth, and proof in the law, under contract with Cambridge University Press.

\*\* © 2012 Susan Haack. All rights reserved.

*A dog is content to turn around three times before lying down, but a man would have to invent a rationalization of it. These explanations are often fantastic and rationalistic in the highest degree. There is not a single human institution which has not originated in hit or miss fashion, but nevertheless, every one of these institutions is justified by some rationalizing argument as the best possible ...*

—Percy Bridgman<sup>1</sup>

However just its laws, and however scrupulous its adherence to procedure, without reasonably sound fact-finding a legal system is little more than a cruel farce.<sup>2</sup> And when factual questions relevant to the determination of a case are scientific—e.g., what the probability is that a match between the defendant’s DNA and the DNA found at the crime scene is random, or what the relative risk of a certain disease or disorder is among those exposed to an allegedly toxic substance compared to those not so exposed, etc., etc.—only the appropriate science can provide the legal system with the answers it needs. So it’s no wonder that, in both criminal cases and civil, modern law increasingly relies on scientific testimony of one kind and another.

But the work on which scientific testimony is based may be anywhere from brilliant through competent to barely adequate, banal, poorly conducted, biased, or even outright fabricated; scientific claims may fall anywhere on a continuum from strongly warranted through weakly warranted to wholly *unwarranted* by the evidence; and expert scientific testimony may be informed by strong science or by weak, and may be complete and candid about possible sources of uncertainty or selectively chosen to support one side of a case and presented with undue dogmatism. So it’s no wonder, either, that modern legal systems recognize the need to ensure that, so far as possible, fact-finders aren’t misled by badly conducted, highly speculative, or dishonestly presented scientific testimony.

1. Percy W. Bridgman, “The Struggle for Intellectual Integrity” in *Reflections of a Physicist* (New York: Philosophical Library, 1955) 361 at 368.

2. A point I made briefly in Susan Haack, “Epistemology Legalized: Or, Truth, Justice, and the American Way” (2004) 49 *Am J Juris* 43; reprinted in Susan Haack, *Evidence and Inquiry*, 2d ed (Amherst, NY: Prometheus Books, 2009) at 361. This is also a prominent theme in the work of Ronald J. Allen, most recently in “Rationality and the Taming of Complexity” in Michael Pardo, ed, *Meador Lectures on Rationality*, University of Alabama School of Law (2010–2011) 69; and in Ronald J. Allen, “El desafío conceptual de la prueba pericial” in Mónica María Bustamente Rúa, ed, *Derecho probatorio contemporáneo: Prueba científica y técnicas forenses* (Medellín, Colombia: Universidad de Medellín, 2012) 215.

Over the last decade or so, I have done a good deal of work on issues concerning scientific testimony,<sup>3</sup> some of which, along with an article by Professors Edmonds and Roach, Ms. Acharya uses as foil as she presents her approach to “Law’s Treatment of Science.”<sup>4</sup> Ms. Acharya is very concerned about the danger of “idealizing” science, which she sees as a threat to what she calls “the legitimacy of the legal system”; and she maintains that what Edmonds, Roach, and I have written encourages such idealization.

Whatever the case may be with Edmonds and Roach (who will, I assume, take care of themselves), in my case this couldn’t be more wrong. At first, I was just baffled that anyone could misunderstand me as thoroughly as Ms. Acharya has done. But then I realized that her reading of my work is skewed by a very narrow view of science and its methods and an even narrower view of law and its legitimacy—superficial understandings that, among other things, assume sharp distinctions where, really, there are important continuities; and that this problem is compounded by the fact that she is apparently not aware that the couple of papers of mine she refers to are part of a much larger, and intimately integrated, body of work.

So in what follows I will do my best to straighten things out: first looking briefly at U.S. law on scientific testimony; next pointing out some of the most serious problems with Ms. Acharya’s conceptions of science and of law; then sketching my own approach to these matters, which I believe is both far more plausible and far more helpful; after that, taking the opportunity to correct some of Ms. Acharya’s worst misunderstandings of my position; and finally, commenting very briefly on what seem to be

---

3. Susan Haack, “An Epistemologist in the Bramble Bush: At the Supreme Court with Mr. Joiner” (2001) 26:2 J Health Pol 217. “Trials and Tribulations: Science in the Law” (2003) 132 Daedalus 54. *Defending Science—Within Reason: Between Scientism and Cynicism* (Amherst, NY: Prometheus Books, 2003) at ch 9. “Truth and Justice, Inquiry and Advocacy, Science and Law” (2004) 17:1 Ratio Juris 15; reprinted in Haack, *Putting Philosophy to Work: Inquiry and Its Place in Culture* (Amherst, NY: Prometheus Books, 2008) at 147-160. “Trial and Error: The Supreme Court’s Philosophy of Science” (2005) 95 Am J Public Health 66; reprinted in *Putting Philosophy to Work* at 161-178. “Scientific Secrecy and ‘Spin’: The Sad, Sleazy Saga of the Trials of Remune” (2006) 69:3 Law & Contemp Probs 47; reprinted in *Putting Philosophy to Work* at 129-146. “Peer Review and Publication: Lessons for Lawyers” (2007) 36:3 Stetson L Rev 789. “What’s Wrong with Litigation-Driven Science? An Essay in Legal Epistemology” (2008) 38:3 Seton Hall L Rev 1053. “Proving Causation: The Holism of Warrant and the Atomism of *Daubert*” (2008) IV:2 Journal of Biomedical and Health Law 253. “Of Truth, in Science and in Law” (2008) 73:2 Brook L Rev 985. “Irreconcilable Differences: The Uneasy Marriage of Science and Law” (2009) 72:1 Law & Contemp Probs 1. “Federal Philosophy of Science: A Deconstruction—And a Reconstruction” (2010) 5:2 NYU J L & Liberty 394. “Técnicas forenses, ciencia impulsada por la litigios, y el problema de los incentivos perversos: lecciones a partir de la saga *Ramirez*,” in Bustamante, *Derecho probatorio contemporáneo* (note 2), 333-345 [English version available from the author].

4. Nayha Acharya, “Law’s Treatment of Science: From Idealization to Understanding,” this volume, 1-38. Page references in parentheses in my text are all to this article.

interesting differences between the Canadian and the U.S. experience with scientific testimony.

### 1. *Getting started*

In the U.S., the leading case on scientific testimony is the Supreme Court's landmark ruling in *Daubert v Merrell Dow Pharmaceuticals*<sup>5</sup>—the first case in its history in which it ruled on the standard of admissibility of such evidence. The issue before the Court was whether Federal Rule of Evidence [FRE] 702 (1975), according to which expert testimony is admissible if it is relevant and not otherwise legally excluded, had superseded the *Frye* Rule (1923), according to which novel scientific testimony is admissible only if it is “sufficiently established to be generally accepted in the field to which it belongs.”<sup>6</sup> It had, the Court ruled; but federal judges still had the responsibility to screen proffered expert testimony both for relevance *and for reliability*.<sup>7</sup>

In screening for reliability, Justice Blackmun continued (now writing only for the majority), courts should look, not to conclusions, but to methodology, to determine whether supposedly scientific testimony is *really* science; i.e., arrived at by the “scientific method.” And then, sketching a quasi-Popperian account of science and its method, he offered a “flexible list” of indicia to which courts might look in determining whether proffered scientific testimony is reliable enough to be admitted: a list that begins, “can [the content of the testimony] be, and has it been, tested?”<sup>8</sup>

Since 1993, not only has *Daubert* been adopted by the majority of states in the U.S., but its influence has also spread to Colombia,<sup>9</sup> Italy,<sup>10</sup> Mexico,<sup>11</sup> England and Wales<sup>12</sup> and, as Ms. Acharya reports, Canada.<sup>13</sup>

5. *Daubert v Merrell Dow Pharmaceuticals Inc.*, 509 US 579 (1993).

6. *Frye v United States*, 293 F 1013 (DC 1923).

7. *Daubert*, *supra* note 5 at 588, 592.

8. *Ibid* at 593-595 (these indicia are now known as the “*Daubert* factors”).

9. Regla 422, Ley 906 de 2004, Código de Procedimiento Penal colombiano (listing indicia strongly reminiscent of the *Daubert* factors, satisfaction of at least one of which is required for admissibility of new scientific evidence and scientific publications).

10. Italian *Corte de Cassazione* (Cass Pen Sez IV, 13 dicembre 2010) (acknowledging and amplifying ideas from *Daubert*).

11. Tesis 1a. CXXXVII/2006, First Chamber, Mex Sup Ct, SJFG, 9th Epoch, Vol XXV, March 2007, 258 (arguing that admissible scientific testimony must be both relevant and reliable [“fidedigna”], and listing indicia of reliability familiar from *Daubert*).

12. The Law Commission, *Expert Evidence in Criminal Proceedings in England and Wales*, (London: The Stationery Office, 2011) urged that there be a “statutory reliability test” providing that experts’ opinion evidence is admissible only if it is “sufficiently reliable to be admitted,” and that trial judges be provided with “a single list of generic factors to help them apply the reliability test.”

13. Acharya, “Law’s Treatment of Science,” *supra* note 4, Part I, citing *R v JLI*, [2000] 2 SCR 600.

This is itself evidence that the need to manage scientific testimony more effectively is felt wherever the law calls on science.

But, as the subsequent U.S. legal history suggests, *Daubert* fell far short of resolving the problems posed by scientific evidence. The U.S. Supreme Court has twice returned to questions about the admissibility of expert testimony: in *Joiner* (1997), where, ruling that the standard of review for decisions on the admissibility of such testimony remained abuse of discretion, it quietly jettisoned *Daubert*'s key distinction between the methodology an expert uses and the conclusions he reaches<sup>14</sup>; and in *Kumho Tire* (1999), where, ruling that *Daubert* applied to *all* expert testimony, it acknowledged that what really matters isn't whether such testimony is scientific but whether, scientific or not, it is reliable.<sup>15</sup> In 2000 FRE 702 was revised to make explicit the reliability requirement that, according to *Daubert*, had been implicit all along—and, indeed, to beef up this requirement somewhat.<sup>16</sup> Some courts have made the experiment of appointing their own experts, with somewhat mixed results<sup>17</sup>; efforts have been made to educate judges on some scientific matters—again, with somewhat mixed results<sup>18</sup>; and new editions of the federal *Reference Manual on Scientific Evidence* have grown fatter.<sup>19</sup> In 2009, the Supreme Court ruled in *Melendez-Diaz* that defendants have a constitutional right to have the forensic scientists responsible for evidence against them testify in court and be cross-examined<sup>20</sup>; and the same year the National Research Council weighed in with recommendations on how to strengthen forensic science.<sup>21</sup>

---

14. *General Electric Company v Joiner*, 522 US 136 (1997).

15. *Kumho Tire Company Ltd v Carmichael*, 525 US 137 (1999).

16. The original FRE 702, ratified in 1975, read: "if scientific, technical or other specialized knowledge will assist the finder of fact to understand the evidence or to determine a fact at issue, a witness qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise." The 2000 version added at the end "..., if (1) the testimony is based on sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case."

17. *Defending Science*, *supra* note 3 at 247.

18. *Ibid* at 249.

19. Federal Judicial Center, *Reference Manual on Scientific Evidence*; (Washington, DC: Federal Justice Center, 1994); 2d ed (New York: Lexis Publishing, 2000); 3d ed (Washington, DC: National Academies Press, 2011) (the first edition ran to 637 pages, the second to 639 pages, but the third edition is much heftier, at 1,018 pages).

20. *Melendez-Diaz v Massachusetts*, 557 US 305 (2009) 129 S Ct 2527.

21. National Research Council (US), *Strengthening Forensic Science in the United States: A Path Forward* (Washington, DC: National Academies Press, 2009).

## 2. *Clearing the ground*

Ms. Acharya's approach to the very difficult questions posed by scientific testimony stresses that both science and the law are "able to produce legitimate outcomes through adherence to procedure" (p. 7). Unfortunately, this badly misrepresents both science and law: thinking in terms of "legitimate outcomes" is already misleading, and thinking in terms of "legitimate outcomes arrived at by following procedure" even more so.

Surprisingly, perhaps—despite acknowledging (her note 19) that she has no expertise in "scientific method and falsification"—Ms. Acharya makes bold claims about science and its method. Science, she writes, "is understood as inquiry aiming at empirical truth" (p. 7). But aiming at truths about empirical reality isn't enough; there must be some distinctive characteristic that makes inquiry scientific (p. 7). This distinguishing characteristic, she continues—on the authority of the *Oxford English Dictionary*—is the scientific method, which is a matter of "systematic observation, measurement, and experiment, and the formulation, testing, and modification of hypotheses" (pp. 7-8). This understanding of scientific method, she tells us, "arises out of a concept called 'Falsification'" which constitutes "the conventional concept of how science does and ought to progress." "Falsification," she continues, "is therefore sometimes referred to as the philosophy of science" (p. 8). Gosh.

This falsificationist philosophy, Ms. Acharya claims (p. 8), displaced "Newton's concept of induction," which was unable to acknowledge either unobservable phenomena or the uncertainty of science<sup>22</sup>; and "gave rise to the particular methodologies that are currently taught and generally accepted in the scientific community as the scientific method" (p. 9). Adherence to this method, "including the validity of experimental design," is "internally governed through peer review" (p. 9).<sup>23</sup> The legitimacy of

22. Ms. Acharya's description runs together two quite different ideas commonly described as "inductivist": (i) that scientific theories are *arrived at* by induction from observations; (ii) that scientific theories, however arrived at, can be *confirmed* inductively. Neither form of inductivism is, as she says, inherently incapable of acknowledging unobservable entities; nor is either form inherently incapable of acknowledging uncertainty—indeed, the latter form is intended as an account of what makes scientific theories, despite their uncertainty, better or worse supported by evidence.

23. Ms. Acharya cites John Ziman, *Real Science* (Cambridge: Cambridge University Press, 2000) at 226, on the role of testing in science, and at 42-43, on peer review. Ziman does speak of the testing of scientific hypotheses, but his account of what this involves is not Popperian, but Bayesian; and neither his brief description of peer review nor the index of his book makes any reference to experimental design. [On the design of experiments, see *Defending Science*, *supra* note 3 at 102 *et seq*; for examples of badly-designed studies that have passed peer review at prestigious journals, see "Peer-Review and Publication," *supra* note 3 at 802 *et seq*.]

science, according to Ms. Acharya, consists simply in faithful adherence to the procedures prescribed by the scientific method, so characterized.

The dichotomy with which this account begins—*either* science is nothing but the desire to discover empirical truths, *or else* it is simply a matter of following prescribed procedures—is false. Moreover, there are obvious difficulties with the *OED*'s account of scientific method: astronomers, epidemiologists, and sociologists, for example, don't (can't) routinely go in for conducting experiments; penicillin wasn't discovered by "systematic observation," and neither was the structure of DNA; etc.; etc. On top of which, the *OED*'s reference to observation is incompatible with Popper's insistence that scientists' observations can play no epistemological role whatsoever—a scientific theory is falsified, he tells us, when a basic statement incompatible with it is accepted; but the acceptance of a basic statement, he continues, is purely a matter of convention, in no way justified, or justifiable, by observation.<sup>24</sup> Moreover, the *OED*'s reference to the modification of theories in the light of evidence is in tension with Popper's animadversions against adapting a falsified theory rather than dropping it and starting again.<sup>25</sup> Finally, Ms. Acharya is so far from clear about the relation between a philosopher's articulating an account of the (supposed) scientific method and scientists' using that method that she often writes in such a way as to invite the objection that, if the methods that supposedly constitute science really did grow out of Popper's work, there could have been no scientists before 1934—leaving Copernicus, Galileo, Newton, Boyle, Darwin, Einstein, etc., etc., out in the cold!

And Ms. Acharya is also mistaken in supposing that Popper's account is generally, or even widely, accepted. Regrettably, there are still some scientists (not to mention a few law professors)<sup>26</sup> who have picked up "scraps of half-remembered Popperism"<sup>27</sup>; which seems to have been how a garbled version of Popper's ideas found its way into Justice Blackmun's dicta in *Daubert*.<sup>28</sup> However, Popper's philosophy of science is very far

---

24. *The Logic of Scientific Discovery*, *supra* note 22 at 105 ("... a basic statement cannot be justified by [experiences, i.e., observations]—no more than by thumping the table.")

25. *Ibid* at 82, urging that we decide that "in the case of a threat to our system, we will not save it by any kind of conventionalist stratagem."

26. See, e.g., David Faigman, "To Have and Have Not: Assessing the Value of Social Science to Law as Science and Policy" (1989) 38 Emory LJ 1005 at 1015-1018. Michael Green, "Expert Witnesses and Sufficiency of Evidence in Toxic Substance Litigation: The Legacy of Agent Orange and Bendectin Litigation" (1992) 86 NW UL Rev 643 at 645 (both are criticized in "Federal Philosophy of Science," *supra* note 3 at 417 and 419).

27. David Stove, "The Jazz Age in the Philosophy of Science" in David Stove & Roger Kimball, eds, *Against the Idols of the Age* (New Brunswick, NJ: Transaction Publishers) 3 at 8.

28. "Federal Philosophy of Science," *supra* note 3 at 410-417.



from being, as Ms. Acharya supposes, the currently-received view *either* in the scientific community *or* in philosophy of science. The commentator who observed that *Daubert* “replaced a legal anachronism [the *Frye* Rule] by a philosophical anachronism [Popper’s philosophy of science]”<sup>29</sup>—though not exactly right about *Frye*<sup>30</sup>—was spot on about the present standing of Popper’s views on the demarcation of science, scientific method, etc.

More importantly, Popper’s philosophy of science is completely broken-backed. On his account, not only could no scientific theory ever be shown to be true, or probably true, or reliable, and not only could there never be evidence supporting any scientific theory, but also—since his conventionalist account provides no reason to believe that accepted basic statements are true—no scientific theory could ever be shown to be false, or probably false, or unreliable, either. If Popper were right, the whole of (so-called) “scientific knowledge” would be nothing but a mesh of unwarranted, and unwarrantable, conjectures, in no way anchored in the world. In short, when you read the fine print, Popper’s falsificationism turns out to be nothing but a thinly-disguised form of skepticism.<sup>31</sup>

And in any case, the idea of scientific inquiry as simply a matter of following prescribed procedures is neither plausible nor helpful. It is not plausible: despite what Bridgman shrewdly described as the “ballyhoo” philosophers of science have made about scientific method,<sup>32</sup> the fact is that serious scientific work is complex, creative, and messy, with an improvisational, “just do it” character impossible to capture in a set of prescribed procedures. And it is no more helpful than it is plausible: in particular, it tells us nothing about such crucial questions as “how is scientific inquiry connected to the world?” or “what distinguishes good, solid, honest, thorough scientific inquiry from bad, flimsy, dishonest, partial, or skimpy work?”

29. Ronald J Allen, “Expertise and the *Daubert* Decision” (1994) 84 J Crim L & Criminology 1157 at 1164 (citing Christopher Kamper, “Paradigms Talking Past Each Other: Expert Testimony and Problems of Translation” (1993) [unpublished, archived at J Crim L & Criminology]).

30. The *Frye* Rule remains the law in a number of states, including New York, California, Pennsylvania, and Florida—though recent developments suggest that Florida is quietly moving somewhat closer to *Daubert*. See *Ramirez v State*, 810 So 2d 836 (2001), where the Florida Supreme Court conducted what looked remarkably like a *Daubert* inquiry to determine whether knife-mark identification evidence was, as *Frye* requires, “sufficiently established to be generally accepted in the field to which it belongs”; leading Prof Michael Saks, in a lecture organized by the Miami-Dade Public Defender’s Office, to describe Florida as a “*Fryebert*” state.

31. I am not, of course, asking you to accept this on my say-so; but refer you to “Federal Philosophy of Science,” *supra* note 3 at 399-410, where the argument is made in great detail—and with lavish quotations from Popper, showing that his position really is as radically negative as I say here.

32. Percy W Bridgman, “On ‘Scientific Method’” in *Reflections of a Physicist*, *supra* note 1 at 81.

\*

While Ms. Acharya writes at some length about the supposed method of science, she says relatively little about her conception of “legitimacy” (of the legal system, of adjudicative decisions), except that it too is a matter of adherence to procedure; and so far as I can tell she offers almost no argument for this claim except that, by faithfully following procedure, we arrive at “legal facts” (pp. 13, 16). Certainly the law places a good deal of weight on procedure<sup>33</sup>; certainly, also, a defendant convicted [acquitted] as a result of properly-conducted legal procedure *is* guilty [not guilty] in the eyes of the legal system concerned. But Ms. Acharya asks her very weak concept of legitimacy to carry far more weight than it can bear. For the argument about legal facts applies to every legal system; so the claim must be that the legitimacy of any legal system consists in faithful adherence to its own procedures—presumably (since legal systems are always evolving) in faithful adherence to its own procedures at the time in question. But this can’t possibly be sufficient for legitimacy, at least in any ordinary sense of the word.

Consider this, from a press report about the then-upcoming trial of Gu Kailai for the murder of British businessman Neil Heywood, summarizing key elements of current Chinese criminal procedure: “[d]efense lawyers are typically given far less time to prepare than prosecutors, and only limited access to evidence...and even [to] their own clients”; and they “are not allowed to put their own witnesses on the stand, or to cross-examine prosecution witnesses.”<sup>34</sup> True, the report also observes that, as a rule, criminal trials “are designed to confer legitimacy on decisions taken in secret by Communist Party officials”; but the point being made is obviously *not* that decisions taken by the Party behind closed doors really are made legitimate by such legal proceedings, but that the purpose of the trial is to confer *the appearance of* legitimacy. For (assuming the report is accurate) these procedures are neither fair nor reasonably likely to lead to factually sound verdicts; and so it is grossly implausible to suppose that faithfully following such procedures is sufficient for the legitimacy of the decision reached in this case, or of the Chinese criminal justice system more generally. Or consider the principle of traditional Sharia law giving the testimony of a man twice the weight of the testimony of a woman<sup>35</sup>; or the Pakistani law requiring four male, Muslim eye-witnesses to prove

33. As I said in “Irreconcilable Differences,” *supra* note 3 at 14.

34. Jeremy Page & Brian Speigle, “On Eve of Chinese Trial, Son Speaks,” *Wall Street Journal* (9 August 2012) A6.

35. Hunt Janin & André Kahlmeyer, *Islamic Law: The Sharia from Muhammad’s Time to the Present* (Jefferson, NC: McFarland & Company, 2007) at 32.

a charge of rape<sup>36</sup>; or, for that matter, the medieval practice of trial by ordeal.<sup>37</sup> By my lights, faithfully following such procedures is manifestly insufficient to make a legal system legitimate.

And in any case, Ms. Acharya's conception of what makes a legal decision or system legitimate implies that what threatens legitimacy is violations of procedure. So how, exactly, is idealizing science supposed to be the threat? Some have suggested *changes* to procedure to handle scientific evidence better; and some of these proponents of procedural changes *may*, for all I know, have been motivated by idealized conceptions of science. But, so far as I'm aware, no one has ever suggested that an appropriate reaction to the difficulties of handling such evidence is to *violate* procedure. When I noticed Ms. Acharya's frequent references to "the legal system" (as if there were only one), and her use of words like "compromise" (pp. 16, 29, 33) to include changes as well as violations of procedure, I wondered briefly if she could possibly be taking current Canadian evidentiary procedure to be ideal, incapable of improvement in any respect—but no, surely she can't be thinking *that*. In any case, since the philosophy-of-science cogs of her argument don't engage with the legal-theory wheels, it's no wonder that when Ms. Acharya turns, in the final section of her paper, to the recommendations of the Goudge report,<sup>38</sup> neither her pseudo-Popperian philosophy of science<sup>39</sup> nor her weak understanding of legal legitimacy plays any substantive role.

### 3. *Getting real*

As I have argued, the habit of using "science," "scientific," etc., as generic terms of epistemic praise makes it only too easy to forget (as Justice Blackmun apparently did) that not all, and not only, scientists are good, honest, thorough inquirers. And it is always better, rather than dismissing flimsy work as "pseudo-science," to say what, specifically, is wrong with it. So, eschewing that honorific usage, and setting aside the distracting

36. "Islam and Rape," Editorial, *Wall Street Journal* (3 August 2006) A6. (The law was repealed the following year.)

37. See Robert Bartlett, *Trial by Fire and Water: The Medieval Judicial Ordeal* (Oxford: Clarendon Press, 1986).

38. Ontario, Inquiry into Pediatric Forensic Pathology in Ontario, *Report of the Inquiry into Pediatric Forensic Pathology in Ontario* (Toronto: Queen's Printer, 2008) (Chair, Stephen T Goudge).

39. Ms. Acharya does, however, say over and over (pp 5, 7, 33, 34, 36) that courts shouldn't rely inappropriately on "scientific constructs" in handling the testimony of non-scientific experts. But her description of the *Daubert* factors as "scientific constructs" is itself tendentious: the first (can the testimony be, and has it been, tested?) is a vague allusion to a half-understood Popperian philosophy of science; the second (known or potential error rate) is commonsensical, but sadly lacking in specificity; the third (peer review and publication) is an over-optimistic gesture towards the peer-review system; and the last (acceptance in the field) is a nod to *Frye*.

question of the “demarcation” of science, my Critical-Common-sensist account begins with the thought that scientific inquiry is continuous with everyday empirical inquiry: that, as Thomas Huxley once put it, “the man of science simply uses with scrupulous exactness the methods which we all...use carelessly.”<sup>40</sup>

If the “scientific method” is supposed to be a method used by *all* scientists and *only* by scientists, and explaining the success of scientific inquiry, then there is no such thing. Rather, we have the underlying structure of activities and inferences common to all serious empirical inquiry: make informed guesses about what might explain a puzzling phenomenon, figure out their consequences, seek out evidence, see how well those consequences stand up, and then use your judgment whether to stick with your conjecture, modify it, or drop it and start again. And then we have the overlay of “helps” to inquiry that scientists have gradually developed over hundreds of years: instruments of observation; models and metaphors; intellectual tools—from Arabic numerals through the calculus and statistical techniques to computer programs; and the internal social arrangements that enable the sharing of evidence and keep most scientists, most of the time, at least reasonably honest.

The underlying structure, which is found in all empirical inquiry, is not used only by scientists; and the special helps, which are constantly evolving and often local to a particular scientific field, are not used by all scientists. But the combination begins to suggest how the sciences have amplified our unaided human imaginative powers, extended our unaided evidential reach, and improved our ability to assess where evidence points, and how strongly.<sup>41</sup> Interlocking with my account of the structure of evidence, the determinants of evidential quality, the way experiential evidence anchors empirical claims in the world, and how the sharing of evidence affects warrant,<sup>42</sup> this helps explain how the sciences have been able to achieve so much.

But at the same time my Critical Common-sensism fully acknowledges that, like all human enterprises, scientific inquiry is fallible, imperfect, incomplete, and sometimes corrupt, and that its progress is ragged and uneven; in short, that there is bad science as well as good. Indeed, part of

---

40. Susan Haack, “Puzzling Out Science” in *Manifesto of a Passionate Moderate: Unfashionable Essays* (Chicago: University of Chicago Press, 1998) 90 at 96-97. *Defending Science*, *supra* note 3 at ch 4. (Ms. Acharya cites this book, but only one chapter [9] seems to play any role in her discussion.) My source for the quotation from Huxley is JW Grove, *In Defence of Science: Science, Technology and Politics in Modern Society* (Toronto: University of Toronto Press, 1989) at 13.

41. *Defending Science*, *supra* note 3 at ch 4.

42. *Evidence and Inquiry*, *supra* note 2 at ch 4. *Defending Science*, *supra* note 3 at ch 3.

my argument has long been that, while the “technical” helps to scientific inquiry—the instruments, the computer programs, etc.—have grown better and better over time, the “social” helps to honesty and evidence-sharing have not; and that, as the scientific enterprise gets ever larger and ever more expensive—and, I added, as the lucrative expert-witness business booms—these mechanisms are coming under severe strain.<sup>43</sup>

\*

As I wrote in a recent piece on varieties of (metaphysical) realism,<sup>44</sup> a legal system can be appraised on a whole variety of dimensions: e.g., as more efficient, rather than slow and clumsy; more economical, rather than saddled with wasteful transaction costs; more civilized, rather than riddled with arbitrary rules or barbaric penalties; fairer, rather than one-sided or biased; more rational—or, better, epistemologically sounder—rather than relying on evidentiary procedures bearing no relation to the truth of the matter. The word that comes to my mind here is (not “legitimate” but) “decent”: a legal system is more decent the better it does on all these dimensions—which, obviously enough, needn’t yield a linear ordering of better and worse systems, nor identify a uniquely best system. In the present context, the relevant dimension is the last on my list, epistemological soundness.<sup>45</sup> A regime of evidentiary rules and procedures is epistemologically sounder, I would say, to the extent that it ensures that legal verdicts are factually correct—which, again, guarantees neither a linear ordering nor a unique epistemologically-soundest system.

For this reason, I’m disinclined to opine about whether adversarial or inquisitorial approaches are better. But in a 2004 article I offered a reply to C. S. Peirce’s criticism of U.S. legal procedure, that an adversarial process is inherently ill-suited to discovering the truth: first that, given the constraints of time and resources inevitable in the legal context, adversarial procedure *can* (on certain assumptions) be a good-enough way of arriving at factually sound verdicts; and second, that what a fact-finder is asked to determine at trial is not whether the defendant committed the

43. See, e.g., Susan Haack, “Science as Social? Yes and No” in *Manifesto of a Passionate Moderate*, *supra* note 40 at 109.

44. Susan Haack, “The World According to Innocent Realism: The One and the Many, the Real and the Imaginary, the Natural and the Social,” forthcoming in English in Werner Gephhardt, ed, *The New Realism* (Frankfurt am Main: Klostermann, 2013), and in German translation in Markus Gabriel, ed, *Der Neue Realismus* (Berlin: Suhrkamp, 2013). The concluding section (on philosophy of law) develops some ideas sketched in “Nothing Fancy: Some Simple Truths about Truth in the Law,” forthcoming in Spanish translation in Jorge Cerdio, ed, *Verdad y Derecho* (Barcelona: Marcial Pons). [English version available from the author.]

45. Of course, this is not to say that epistemological soundness is the only, or always the first, concern.

crime, but whether the proposition that he did has been established to the required degree of proof by the admissible evidence presented. And in the same article I argued, against Jeremy Bentham, that exclusionary rules of evidence may also (again, on certain assumptions) be part of such a good-enough way of arriving at factually sound verdicts.<sup>46</sup>

But the fact that exclusionary rules of evidence don't *necessarily* pull against what I have called the epistemological soundness of an evidentiary regime doesn't by itself justify *any* and *every* such rule. And in the series of articles mentioned earlier, I argued that *Daubert* is in many ways flawed. As I already mentioned, Justice Blackmun's dicta about scientific method relied on a confused philosophy of science<sup>47</sup> that, not surprisingly, federal judges seem to have had more than a little difficulty understanding.<sup>48</sup> Moreover, his suggestion that courts look to whether proffered scientific testimony has been subjected to "peer-review and publication" is not only over-optimistic about how good a quality-control mechanism pre-publication peer review really is, but also so thoroughly ambiguous that it offers courts no real guidance<sup>49</sup>; and the new concept of "evidentiary reliability" he crafted created the illusion that scientific truths can be brought into being by legal decisions.<sup>50</sup> And, though it contains an element of truth, the new "*Daubert* factor" Judge Kozinski added when the case came back on remand to the Ninth Circuit—that litigation-driven science is inherently less likely to be reliable than science not undertaken to bolster a litigant's case—failed to recognize either that marketing-driven science may also be skewed, or that a good deal of university science is now funded by drug companies and such; and specifically *exempted* the forensic sciences, where the problem of "motivational bias," a.k.a. wishful thinking, is especially severe.<sup>51</sup>

Why has it proven so difficult to manage scientific testimony effectively? In part, I have argued, because there are deep tensions between science and the culture of (at least U.S.) law. First, because of the

---

46. "Epistemology Legalized," *supra* note 2 at 368-370 (Peirce), 374-377 (Bentham) in *Evidence and Inquiry*, 2d ed.

47. "Trial and Error," *supra* note 3 (arguing *inter alia* that Justice Blackmun's ruling in *Daubert* ran together two incompatible philosophies of science, Karl Popper's deductivism and Carl Hempel's inductivism, and confused "reliable" and "scientific").

48. "Federal Philosophy of Science," *supra* note 3 at 417-427.

49. "Peer-Review and Publication," *supra* note 3.

50. "Of Truth, in Science and in Law," *supra* note 3.

51. *Daubert v Merrell Dow Pharmaceuticals Inc.*, 43 F 3d 1311, 1317 (9th Cir 1995). See also "What's Wrong with Litigation-Driven Science?"; "Técnicas forenses, ciencia impulsada por los litigios y el problema de los incentivos perversos," *supra* note 3.

strongly adversarial character of the U.S. legal culture<sup>52</sup>—in tension with the investigative nature of science—the experts produced by the parties to a case are often, in a sense, marginal, i.e., more confident than the majority of their peers, one way or the other, on still-contested scientific issues (and are likely to become *more* confident if they testify repeatedly); as a result of which the legal system sometimes generates artificial scientific certainty, and sometimes artificial scientific *uncertainty*. Second, because of the law's concern for promptness and finality—in tension with the fallibilism of the sciences, their openness to revision—it often asks science for answers when no well-warranted answers are yet available, and may fail to adapt appropriately when scientific inquiry advances. Third, because of its stress on formal procedures—in tension with the pragmatic, improvisational approach of the sciences—scientific subtleties sometimes congeal into bright-line legal rules.<sup>53</sup> And so on, I continued, through a whole list of the tensions that make it hard for courts to get the best information science has to offer.<sup>54</sup>

In this context I noted that in the U.S. recent legal responses to these tensions have included small compromises of adversarialism, in the experiments with court-appointed experts,<sup>55</sup> and small compromises of the concern for finality, in jurisdictions that extended statutes of limitations in response to the possibility that DNA evidence will eventually solve cold cases.<sup>56</sup> It is unrealistic to expect to find a simple panacea, I argued, let alone a legal form of words that will magically enable judges to discriminate

52. As this phrase suggests, I am referring here to legal cultures, not simply to legal procedures; and I see adversarialism, in this sense, as most usefully construed as a matter of degree—the US legal culture being, probably, more strongly adversarial than that of other common-law countries.

53. For example, some courts have treated evidence of more than doubled risk as a test for admissibility of specific causation evidence in toxic-tort cases, and some of these have even claimed (falsely) that “California law requires,” or that “Washington law requires” this. See Susan Haack, “Asuntos arriesgados: sobre la prueba estadística de la causación específica,” in Diego Papayannis, ed, *Causación y la atribución de responsabilidad* (Barcelona: Marcial Pons, forthcoming in 2013). [English version available from the author.]

54. “Truth and Justice, Inquiry and Advocacy, Science and Law” and “Irreconcilable Differences,” *supra* note 3.

55. Courts had the power to appoint their own experts long before *Daubert*, but have used it somewhat more often since 1993, and especially since *Joiner*. Federal Rule of Evidence 706 (1975) explicitly gave federal judges the power to do this; but courts have also appointed their own experts under FRE 10(a) on “Preliminary Questions,” under Federal Rule of Civil Procedure 53 (allowing the appointment of “special masters”), and under their “inherent power” as articulated in *Ex parte Peterson*, 253 US 300 (1920). There is a useful summary in Laura E Ellsworth, “Court-Appointed Experts in State and Federal Courts: From Hens-Teeth to High Priests,” (2000) 71 Pennsylvania Bar Association Quarterly 172-179; and a useful discussion in *Reilly v United States*, 682 F Supp 150, 152-155 (DRI), *aff’d* in part, *rev’d* in part, 863 F 2d 149 (1st Cir 1998).

56. “Irreconcilable Differences,” *supra* note 3 at 19. For more details, see Scott Akehurst-Moore, “An Appropriate Balance?—A Survey and Critique of State and Federal Indictment and Tolling Statutes” (2006) 6 J High Tech L 213.

sound science from unsound on questions where reasonable scientists in the field still disagree. However, I continued, there might be something to be learned by looking at how legal systems in other technologically-advanced countries handle scientific testimony—bearing in mind, of course, that not only their legal procedures but also their regulatory arrangements, their health-care provisions, etc., may be significantly different in relevant ways.<sup>57</sup>

#### 4. *Setting the record straight*

I'm tempted to say, adapting a famous observation of Bishop Berkeley's, that Ms. Acharya "has kicked up a dust, and then complains that *I* cannot see!"<sup>58</sup> For by now it should be apparent that, because her reading of my work has been, in both senses, so partial, Ms. Acharya ascribes to me ideas about science and about the law that I have never endorsed, and in many cases have explicitly rejected.

*On science:* Obviously, the idea that I "idealize" science is way off the mark. Apparently Ms. Acharya didn't register that a crucial theme of *Defending Science*—signaled by my sub-title, "*Between Scientism and Cynicism*," and articulated unmistakably plainly in the first two pages of the first chapter<sup>59</sup>—is a critique of scientism, i.e., of exaggerated deference to science. I have urged that we eschew the honorific use of "science" and its cognates; and argued that, for all its success, science is not inherently more valuable than, say, art or literature.<sup>60</sup> Moreover, the account of science I have sketched here and developed in detail elsewhere is pervasively fallibilist and—in the sense in which the word exactly contrasts with "idealistic"—realistic. No one who idealized science would say, as I have, that "science is neither sacred nor a confidence trick"<sup>61</sup>; or write, as I have, of the erosion of scientific integrity<sup>62</sup>; or acknowledge, as I have, that "like all human enterprises, science is...fallible and imperfect. At best its progress is ragged, uneven, and unpredictable; moreover, much

---

57. "Irreconcilable Differences," *supra* note 3 at 23.

58. George Berkeley, *A Treatise Concerning the Principles of Human Knowledge* in *The Empiricists* (New York: Anchor Books, Doubleday, 1990) 135 at 137: the difficulties that have amused philosophers "are entirely owing to ourselves—that we have first raised a dust, and then complain, we cannot see."

59. *Defending Science*, *supra* note 3 at 17-18.

60. *Ibid* at 229.

61. "Puzzling Out Science," *supra* note 40 at 94. The phrase is echoed in the title of chapter 1 of *Defending Science*, *supra* note 3: "Neither Scared nor a Confidence Trick."

62. Susan Haack, "The Integrity of Science: What It Means, Why It Matters" in *Ética e Investigação nas Ciências da Vida—Actas do 10º Seminário do CNECV* (2006) 9; reprinted in *Putting Philosophy to Work*, *supra* note 3 at 103-127.



scientific work is unimaginative or banal, some is weak or careless, and some outright corrupt.”<sup>63</sup>

And of course I never say, as Ms. Acharya suggests, that science is “a better inquiry into factual accuracy than law” (p. 28). Indeed, now that I think about it, I find I really don’t know what this claim *means*. Yes, there are some questions that can be answered only by scientific work in the laboratory or the field; but there are others better tackled by questioning witnesses, etc. Moreover, even with respect to one, specific legal system over a specified period, it is enormously difficult to figure out even approximately what the rate of false convictions is.<sup>64</sup> And in any case, the success of the sciences isn’t a matter of their getting the right answers most of the time, but of the gradual construction of a body of well-warranted theory—and the attendant growth of a vastly larger trash-heap of ideas that didn’t work out.

Nor, by the way, as Ms. Acharya’s suggests (in her note 26), do I deny that there is such a thing as the scientific method *because Paul Feyerabend says so*; this is a baseless over-interpretation of a passing observation of mine that Feyerabend’s position, though wildly exaggerated, is not without a grain of truth.<sup>65</sup> As I happily acknowledged, the picture I offer in place of failed attempts to characterize the supposed “scientific method”—the underlying procedures of all empirical inquiry, and an overlay of evolving scientific “helps”—is close kin to (less developed, but suggestive) ideas found in Huxley, Dewey, Bridgman, Einstein, and others.<sup>66</sup>

*On law*: No, I don’t criticize attorneys because they try to find the best possible evidence for their side of a case (p. 19); in an adversarial system, this is what their role requires them to do.<sup>67</sup> Nor do I forget that the fact-finder at trial has a different role from the attorneys for each side (p. 18)—though I don’t agree that fact-finders’ task is to decide whether the defendant did it; rather, as I said earlier, the fact-finders’ job is to determine whether the factual propositions at issue have been established to the required degree by the (admissible) evidence presented. And no,

63. Susan Haack, “Six Signs of Scientism” (2011) III.1 Logos & Episteme 75 at 75-76. (First published, in both Spanish and Chinese translations, in 2010.)

64. But see Michael Risinger, “Innocents Convicted: An Empirically Justified Factual Wrongful Conviction Rate” (2007) 97:3 J Crim L & Criminology 761, assessing the rate of factually false convictions in capital rape-murder cases in the US in the 1980s.

65. “Irreconcilable Differences,” *supra* note 3 at 14.

66. For my critique of various efforts to articulate the scientific method, see *Defending Science*, *supra* note 3 at ch 2; acknowledgments to Bridgman, etc, can be found early in chapter 4. The passing remark about Feyerabend not being *entirely* off the wall is in “Irreconcilable Differences,” *supra* note 3 at 14.

67. “Irreconcilable Differences,” *supra* note 3 at 13.

I don't take adversarialism to be "*the* root cause" of the difficulties the U.S. legal system has with scientific evidence (p. 19, my emphasis). The sometimes carnivorously adversarial culture of U.S. law has, I believe, contributed to the problems; but the tension between this culture and the investigative character of science is only one of a whole list of tensions explored in "Irreconcilable Differences."<sup>68</sup>

And no, I don't suggest that part of the solution to the problems of handling scientific testimony in the common-law tradition is to move in the direction of an inquisitorial system; I simply note that *Daubert* itself shifts part of what used to be the responsibility of the jury to the judge, and that the (still relatively uncommon) use of court-appointed experts is a small compromise of adversarialism; and suggest that, given how difficult it has proven to be to manage scientific testimony well, it might be helpful to ask what we could learn from other jurisdictions' efforts—a suggestion that I was delighted to see recently taken up, very fruitfully, by Andrew Jurs.<sup>69</sup> Nor, as Ms. Acharya suggests (p. 20), do I dismiss critics of moves in the direction of inquisitorial procedures as "melodramatic"; this is yet another baseless over-interpretation, this time of a passing observation that an article suggesting that civil-law systems are one and all "undemocratic" was exaggerated.<sup>70</sup>

To prevent any confusion, it's probably also worth pointing out that *of course* nothing in my work suggests that it is desirable to run together "reliable enough to be admitted" and "reliable enough to meet the standard of proof"; or that scientific witnesses are competent to answer legal questions; or that indicia suitable for assessing the reliability of scientific evidence are necessarily also appropriate for assessing the reliability of other expert testimony. Indeed, I have written that Justice Breyer's observation in *Kumho Tire*, that what matters isn't whether expert testimony is scientific, but whether it is reliable, is exactly right; though I added that telling courts that they should use, all, or none of the *Daubert* factors, or such other indicia of reliability as seem appropriate, doesn't exactly give them much substantial guidance.<sup>71</sup>

68. *Ibid* at 15-21. Section 3 of Ms. Acharya's paper opens with a quotation from this article of mine; but my words are tendentiously edited: the sentence she quotes in part listed a whole raft of tensions, but Ms. Acharya's quotation stops short after the first on my list!

69. Andrew Jurs, "Balancing Legal Process with Scientific Expertise: Expert Witness Methodology in Five Nations and Suggestions for Reform of Post-*Daubert* Reliability Determinations" (2012) 95 Marq L Rev 1329. Canada is one of the nations included in this very detailed study. Given how thoroughly Ms. Acharya seems to have misunderstood what I had in mind, I was much relieved to see that Prof Jurs presents his very helpful study precisely as a response to my suggestion.

70. "Truth and Justice," *supra* note 3 at 156.

71. *Ibid* at 155.

5. *Looking ahead*

It's no fun being a straw woman, and no fun, either, defending myself against such serious misunderstandings; so let me conclude more positively, with some ideas about what seem to be interesting differences between the Canadian and the U.S. experience with scientific testimony. For one thing, unlike *Daubert*, which applies to all expert testimony, the Canadian version, I gather from Ms. Acharya's paper, may arguably be narrower in scope, applying (like *Frye*) only to novel scientific testimony. For another, while *Daubert*, *Joiner*, and *Kumho Tire* are all civil cases, the leading Canadian cases, I gather, are criminal. The explanation, I suspect, may lie in significant differences between U.S. and Canadian attitudes to, and practices regarding, the use of juries in civil trials, contingency fees, and the assignment of the costs of litigation between the parties. Perhaps this is something Ms. Acharya might care to explore.<sup>72</sup>

---

72. My thanks to Mark Migotti for helpful comments on a draft, to Ronald J Allen for helpful conversation, and to the staff at the University of Miami Law Library, especially Pamela Lucken, for help in finding relevant materials.