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Haack on Legal Proof

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LA PRUEBA LEGAL SEGÚN HAACK

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Abstract: *In this paper I discuss Susan Haack's illuminating discussion and constructive critique of the current confusion regarding the standards of proof employed in the law, focusing especially on mathematical probability rather than warranted belief interpretations of those standards. At the end, I question Haack's claim that statistical evidence is relevant not only for establishing the existence of a causal process but also, although usually insufficient by itself, for proving actual causation in a specific case.*

Keywords: *legal proof, epistemology, warranted belief, probability, statistics*

Resumen: *En este artículo me centro en la iluminadora discusión y en la crítica constructiva que Susan Haack desarrolla respecto a la confusión actual sobre los estándares de prueba empleados en la ley, centrándome especialmente en la probabilidad matemática, más que en las interpretaciones de creencia garantizada de esos estándares. Al final cuestiono la afirmación de Haack de que la evidencia estadística es relevante no solo para establecer la existencia de un proceso causal, sino también, aunque habitualmente sea insuficiente por sí misma, para proporcional una causación real en un caso específico.*

Palabras clave: *prueba legal, epistemología, creencia garantizada, probabilidad, estadística.*

In a recent monograph, Susan Haack describes and constructively comments on the considerable confusion that exists in legal doctrine and practice in the United States regarding scientific evidence and proof of facts more generally¹.

¹ Susan HAACK, *Evidence Matters: Science, Proof, and Truth in the Law*, Cambridge, Cambridge University Press, 2014.

The issues upon which I will focus are the proper standards for adequate proof in a legal proceeding of the truth of some fact and the proper methodology for applying those standards. While Haack's discussion focuses on the current situation in the United States, her arguments apply generally, and, given the intended audience for this publication, I will include some discussion of the situation in civil law jurisdictions and in common law jurisdictions other than the United States.

There has been little discussion or elaboration of the proper standards of proof in civil law jurisdictions. The relevant code provisions, if any, merely state the need for the judge(s) to be convinced regarding the truth of the facts at issue, based on all the evidence in the case, without specifying any required degree of conviction and usually not distinguishing between criminal and civil liability. In France, it is stated that the judge must have an "intime conviction", i.e., an inner, personal, subjective belief in the truth of the facts at issue. The German courts have stated that a degree of conviction is required that silences doubt for all practical purposes without completely eliminating them. Insofar as the standard is discussed in the legal doctrine, it is often assumed to require a virtual certainty in civil as well as criminal cases, but doubts have been cast on this being true as a matter of actual practice, especially in civil cases. In any event, there is agreement that what is required is a belief by the judge(s) in the truth of the facts at issue, based on all the evidence in the case. A mere mathematical or statistical probability, no matter how high, will not suffice².

In common law jurisdictions, there is a clear distinction between the standard of proof in criminal cases, which requires proof "beyond a reasonable doubt", and the lower standard applied in civil cases, which is usually stated as proof by the "preponderance [or greater weight] of the evidence" in the United States and by the "balance of probability" in the English Commonwealth. Sometimes an intermediate "clear and convincing" evidence standard is used. Both the balance of probability standard and the preponderance standard, which is often rephrased or interpreted as a "more probable/likely than not" standard, are often interpreted by academics, and sometimes by judges, as merely requiring a greater than 50 per cent probability, which in turn is often interpreted as a mere mathematical or statistical probability³.

As Haack explains, legal adjudication is supposed to determine the truth regarding the propositions and facts at issue in the particular case, subject to the constraints of limited resources and time⁴. Literal interpretations of the

² Richard W WRIGHT, "Proving Causation: Probability versus Belief", in Richard GOLDBERG (ed.), *Perspectives on Causation*, Oxford, Hart Publishing, 2011, pp. 195, 197–199.

³ Susan HAACK, *op. cit.*, pp. 16–18, 50–54; John LEUBSDORF, "The Surprising History of the Preponderance Standard of Civil Proof", in *Florida Law Review* 57 (2015) 1569, 1571–1576.

⁴ Susan HAACK, *op. cit.*, pp. 55–56.

phrases “preponderance [or greater weight] of the evidence” and, even more so, “more likely than not” and “balance of probability”, do not require a determination regarding the truth of the facts at issue⁵. However, Haack notes, references in jury instructions to “more probable/likely than not” are generally stated as “more probable/likely than not *true*”, and almost all of the preponderance or greater weight jury instructions in the United States contain references to persuasion, conviction, belief and/or truth⁶. She also observes that probability language is ambiguous: it is often used, even today, to refer to degrees of belief rather than mathematical or statistical probability⁷.

An understanding of each of the standards of proof as referring to required warranted degrees of belief, as argued by Haack⁸, is supported by John Leubsdorf’s recent study of all of the available historical sources in the United States and England. Leubsdorf reports that, prior to the nineteenth century, judges did not employ either the preponderance standard or the balance of probability standard in jury instructions, although academics and, to a lesser extent, judicial opinions began referring to the preponderance or greater weight of the evidence toward the end of the eighteenth century. Judges told jurors a lot about the issues and evidence, but said little about any standard for appraising the evidence. However, when judges did express or intimate a standard, it was that jurors should follow their consciences and decide for a party when satisfied that the party’s assertions were correct⁹. Instructions requiring juries to base their findings on the preponderance or greater weight of the evidence did not appear in jury instructions in the United States until the middle of the nineteenth century and apparently were rarely if ever employed in England. Instead, the balance of probability standard started to be employed in jury instructions in England toward the end of the nineteenth century and rapidly increased in use during the first quarter of the twentieth century, while references in judicial opinions to the preponderance standard have continued to this day¹⁰.

Leubsdorf was unable to find any sources to explain the shift to the balance of probability standard in England¹¹. However, both it and the preponderance standard were developed in an environment in which whatever instructions did exist often referred to a required belief by the jury in the truth of the facts at issue¹², and, even more so than now, “probability” was often used to refer

⁵ *Ibid.*, pp. 62–63; John LEUBSDORF, *op. cit.*, pp. 1571–76

⁶ Susan HAACK, *op. cit.*, pp. 18, 52–54; see. e.g., text at notes 15–16 below.

⁷ *Ibid.*, pp. 56–58, 286–287.

⁸ See text at notes 18–20 below.

⁹ John LEUBSDORF, *op. cit.*, pp. 1583–1591.

¹⁰ *Ibid.*, pp. 1570–1571, 1607–1614.

¹¹ *Ibid.*, pp. 1611–1612.

¹² *Ibid.*, pp. 1588–1591, 1602, 1606, 1608–1609, 1615.

to a degree of belief warranted by the evidence rather than to a mathematical or statistical probability¹³. For example, in an influential statement in his *An Essay Concerning Human Understanding*, John Locke employed probability language to refer to varying degrees of belief based on the preponderance of the evidence:

Experience and Testimonies clashing, infinitely vary the Degrees of Probability... The Difficulty is, when Testimonies contradict common Experience, and the Reports of History and Witnesses clash with the ordinary Course of Nature, or with one another; there it is, where Diligence, Attention, and Exactness is required to form a right Judgment, and to proportion the *Assent* to the different Evidence and Probability of the Thing, which rises and falls according as those two Foundations of Credibility, *viz.* Common Observation in like Cases, and particular testimonies in that particular Instance, favour or contradict it... This only may be said in general, that as the Arguments and Proofs, *pro* and *con*, upon due Examination, nicely weighing every particular Circumstance, shall to any one appear, upon the whole *Matter*, in a greater or less Degree to preponderate on either Side, so they are fitted to produce in the Mind such different Entertainment, as we call *Belief*, *Conjecture*, *Guess*, *Doubt*, *Wavering*, *Distrust*, *Disbelief*, &c¹⁴.

There thus is good reason to believe that, contrary to common interpretations today of the balance of probability standard as requiring only a mathematical or statistical probability, it was originally meant to have the same meaning and effect as the preponderance standard, with both being understood as referring to a required minimal degree of belief based on and warranted by the evidence. Modern jury instructions in the United States continue to focus on required degrees of belief and to treat the various phrasings of the ordinary standard of proof in civil cases as interchangeable. For example, the two major sets of model federal jury instructions state, in part:

“Establish by a preponderance of the evidence” means evidence which, as a whole, shows that the fact sought to be proved is more probable than not. In other words, a preponderance of the evidence means such evidence as, when considered and compared with the evidence opposed to it, has more convincing force, and produces in your minds belief that what is sought to be proved is more likely true than not true¹⁵.

¹³ *Ibid.*, pp. 1595–1599.

¹⁴ JOHN LOCKE, *An Essay Concerning Human Understanding*, vol. 2, London, 17th ed., 1775, pp. 282–283.

¹⁵ Kevin F. O'MALLEY ET AL., *3 Federal Jury Practice and Instructions—Civil*, 6th ed., St Paul, Thomson/West, 2006, § 104.01; see State Bar of Nevada, *Nevada Pattern Jury Instructions—Civil*, Charlottesville, Michie, 1986, § 3.00.1 (“The term ‘preponderance of the evidence’ means such evidence as, when weighed with that opposed to it, has more convincing force, and from which it appears that the greater probability of truth lies therein.”).

To establish a fact by a preponderance of the evidence means to prove that the fact is more likely true than not true. A preponderance of the evidence means the greater weight of the evidence. It refers to the quality and persuasiveness of the evidence, not to the number of witnesses or documents... So long as you find that the scales tip, however slightly, in favor of the party with [the] burden of proof—that what the party claims is more likely true than not true—then that element will have been proved by a preponderance of evidence¹⁶.

As the second instruction illustrates, the usually required degree of belief in a civil case is a minimal threshold belief, as compared with the stronger degrees of belief required by the “clear and convincing evidence” and “beyond a reasonable doubt” standard¹⁷. However, Haack emphasizes, a mere subjective belief regarding the facts, no matter how strong, is insufficient. What is required, epistemologically and legally, is a belief in the truth of the alleged facts that is *justified or warranted* to the required degree by the available evidence. Jury instructions require that the jury’s determination be based solely on, and at least implicitly justified by, the evidence in the case¹⁸. The objective nature of the legally required degree of belief is evidenced by the power and duty of judges to rule as a matter of law for one of the parties, rather than leaving assessment of the facts to the jury, if but only if a contrary conclusion could not reasonably be supported even if all the conflicting evidence were viewed in favor of the other party¹⁹. Significantly, references to the preponderance standard occurred initially in this context, prior to its use in jury instructions²⁰.

But what criteria should be used by judges or juries to assess whether the evidence in a case reasonably could or should be found sufficient to warrant a required degree of belief about some asserted proposition or fact? Haack’s answer to this basic epistemological question provides the foundation for all of her analyses. She describes her account as being “evidentialist, experientialist, gradational, foundherentist, quasi-holistic, and worldly”²¹. It is “evidentialist” because it assumes that whether, and, if so, to what degree, a person is justified in believing in something depends on how good his evidence, including

¹⁶ Leonard B. SAND ET AL., *4 Modern Federal Jury Instructions—Civil*, New York, Matthew Bender & Co., 2018, ¶ 73.03.

¹⁷ See also, e.g., *Livanovich v. Livanovitch*, 131 A. 799, 800 (Vermont 1926) (“If ... you are more inclined to believe from the evidence that he did so deliver the bonds... even though your belief is only *the slightest degree* greater than that he did not, your verdict should be for the plaintiff.”); John LEUBSDORF, *op. cit.*, p. 1595 (“The preponderance of the evidence standards... tells the trier to decide for [a] party if the evidence moves the trier’s belief just a bit beyond the point of suspense.”)

¹⁸ Susan HAACK, *op. cit.*, pp. 17–18, 52–56.

¹⁹ *Ibid.*, pp. 54–55.

²⁰ John LEUBSDORF, *op. cit.*, pp. 1599–1601.

²¹ Susan HAACK, *op. cit.*, p. 12.

both his experiential evidence and his background beliefs or reasons, is. It is “experientalist” because it takes the evidence with respect to empirical claims to include a subject’s sensory experience. It is “gradational” because it considers the quality of evidence (and hence of epistemic justification) to be a matter of degree; it may be stronger or weaker. It is “foundherentist” because it is intermediate between the two traditional rival epistemological theories, foundationalism and coherentism²². Unlike coherentism but like some forms of foundationalism, it provides a role for experiential evidence as well as for reasons. Unlike foundationalism, which assumes that support for beliefs is linear and asymmetric, but like coherentism, it relies upon relations of mutual support among beliefs. It is “wordly” because it depends on relevant facts about the real world²³. It is “quasi-holistic” because “it is neither atomistic (as foundationalist theories usually are), nor fully holistic (as coherentist theories usually are). The evidence relevant to a claim is usually complex and ramifying, but not everything is relevant to everything”²⁴.

The specific details of Haack’s foundherentist theory, which support all of these adjectives, combine consideration of three factors. The warrant for a particular belief is a matter of degree and depends on consideration of: (1) how supportive the evidence is of the belief, i.e., how well the body of evidence (experiential evidence and background beliefs) fits together with the conclusion in a coherent explanatory account; (2) how secure the background beliefs and reasons are, independent of the belief in question; and (3) how comprehensive the (relevant) evidence is²⁵. The focus is not, as literal interpretations of the preponderance, greater weight and more likely than not standards of proof would suggest, on which party has presented better evidence in quantity or quality or has a better story. The party without the burden of proof on some issue need not present any evidence on that issue. What is required, and all that is required, is that the party with the burden of proof have produced evidence sufficient to warrant the required degree of belief in the truth of its claim²⁶.

²² For discussion of foundationalism, coherentism and other epistemological theories, see David A. TRUNCELLITO, “Epistemology”, in *Internet Encyclopedia of Philosophy*, <https://www.iep.utm.edu/epistemo/#SH2d>.

²³ Susan HAACK, *op. cit.*, pp. 12–13, 15.

²⁴ *Ibid.*, p. 15.

²⁵ *Ibid.*, pp. 14–15, 60–61, 218–19, 222–26. Haack uses an analogy with a crossword puzzle to illustrate the application of her three factors. *Ibid.*, pp. 13–14, 60–61. The clues are the analog of the experiential evidence, and the already filled-in entries are the analog of the background beliefs that serve as reasons for our other beliefs. She anticipates an objection that the second factor may be thought to be circular: “The independent security requirement applies only to the reasons for a belief, not to the experiential evidence that ultimately grounds our beliefs about the world; and this experiential evidence consists of events, not propositions, and so neither has nor stands in need of justification.” *Ibid.*, pp. 14–15.

²⁶ *Ibid.*, pp. 21, 60 and note 73, 62 and note 80.

As Haack explains, the references in the great majority of jury instructions in the United States to persuasion, conviction or belief in the truth of the facts at issue in the particular case, based on evidence specific to that case, are inconsistent with a standard of proof based on mathematical probability²⁷. Given the multi-dimensional nature of the factors to be considered in determining the warrant for a particular belief and the non-numerical gradational rather than numerically linear nature of the resulting degrees of warrant, mathematical probability theory could neither serve by itself as a theory of warrant nor serve as a way of computing degrees of warrant under some other theory²⁸. She further notes, as others have²⁹, the failure of degrees of belief to adhere to the axioms of mathematical probability theory, including the negation and conjunction axioms:

[Negation] The mathematical probability of (p and not- p) must add up to 1; but when there is no evidence, or only very weak evidence, either way, neither p nor not- p is warranted to any degree.

[Conjunction] The mathematical probability of (p & q) [if they are independent events] is the product of the probability of p and the probability of q —which, unless both have a probability of 1, is always less than either; but combined evidence may warrant a claim to a higher degree than any of its components alone would do³⁰.

The conjunction issue is especially problematic for a mathematical probability theory of legal proof, which assumes that something is proven if its probability is greater than 0.5. In legal practice, as stated in jury instructions, the claim as a whole is proven if the relevant standard of proof is satisfied as applied separately to each required element of the case. Under mathematical probability theory, however, one must combine by multiplication the probability for each required element to get the probability for the case as a whole. In order to get a probability greater than 0.5 for the case as a whole, the probability of each required element must be much higher than 0.5, and increasingly higher the more elements that have to be proved. E.g., if p and q each independently have a probability of 0.6, the probability of (p & q) is only 0.36³¹.

The mathematical probabilists' assumption that the standard of proof in a civil action merely requires a greater than 0.5 mathematical probability leads to further paradoxes. A major one is illustrated by Jonathan Cohen's famous

²⁷ *Ibid.*, pp. 18, 59–64, 76–77, 286–287, 291.

²⁸ *Ibid.*, pp. 14, 19, 47–48, 61–62, 286–287.

²⁹ Initially, L. Jonathan COHEN, *The Provable and the Probable*, Oxford, Clarendon Press, 1977, pp. 49–120.

³⁰ Susan HAACK, *op. cit.*, p. 62; see *ibid.*, pp. 62–64, 208–38, 287.

³¹ *Ibid.*, p. 63.

gatecrasher hypothetical, in which only 499 of 1000 attendees at an event had tickets, but all those with tickets surrendered them upon entry, and there is no means of identifying who paid for their tickets once they have been surrendered. Each of the 1000 attendees can be found guilty of gatecrashing by applying the mathematical probabilists' standard of proof, even though there is no specific proof regarding any attendee and it is clearly not true that all of them were gatecrashers³².

Almost all mathematical probabilists agree that this result is unjust or at least improper. Many of them attempt to avoid the result in the gatecrasher scenario and similar real and hypothetical situations by, e.g., assuming, contrary to the actual or assumed facts, that there was missing evidence that, if taken into account using Bayes's Theorem to adjust initial probabilities in the light of additional evidence, would reduce the mathematical probability below 50 per cent³³. As Haack states, they use Bayes's Theorem in an attempt to avoid the conjunction paradox and supposedly pay attention to degrees of belief. She examines book-length attempts to demonstrate the application of Bayes's Theorem to two famous cases and finds that neither attempt delivers on its promise but rather is a confusing application of bewildering mathematical probability analysis to varying assumed degrees of belief that are actually assigned objective probabilities, while ignoring the inapplicability of mathematical probability theory to the formulation and assessment of beliefs. She then helpfully employs her foundherentist theory to illustrate how it provides a much more comprehensible, enlightening and plausible analysis of the evidence in each case.³⁴

Even if the mathematical probabilists' use of Bayes's Theorem (which itself is a valid mathematical formula) were valid, it would not avoid the paradoxical results of applying mathematical probability theory to actual or supposed degrees of belief. For example, in the gatecrasher hypothetical, assume that only one of the thousand spectators purchased a ticket, the ticket collector identifies X as the one who entered with a ticket, and there is a 98 per cent degree of confidence in the ticket collector's testimony. Using the naked statistic that 99.9 per cent of the spectators were gatecrashers as the initial base rate in Bayes's Theorem, the revised probability that X was a gatecrasher, even after taking into account the ticket seller's case-specific identification testimony, would still be over 95 per cent. The mathematical probabilists are forced to conclude that X almost surely was a gatecrasher, and indeed should be held criminally liable under their interpretation of the "beyond a reasonable doubt" standard as well as civilly liable under the

³² L. Jonathan COHEN, *op. cit.*, p. 75.

³³ See Richard W WRIGHT, "Causation, Responsibility, Risk, Probability, Naked Statistics, and Proof: Pruning the Bramble Bush by Clarifying the Concepts", in *Iowa Law Review* 73 (1988) 1001, 1055–1061.

³⁴ Susan HAACK, *op. cit.*, pp. 64–77.

preponderance standard, despite the ticket seller's highly credible testimony that X was not a gatecrasher³⁵.

Some of the mathematical probabilists claim to have resolved or refuted the paradoxes created by their mathematical probability based theories of proof. However, as Haack discusses, they have not done so. Instead, as is illustrated by their reactions to the gatecrasher hypothetical, they have engaged in evasion, obfuscation and convoluted arguments³⁶. Others believe that the tension between the warranted belief and probability theories of proof can be and has been resolved by the view that the jury must indeed be convinced, but convinced only that a claim was more probable than not in a mathematical or statistical probability sense³⁷. As Leubsdorf notes, "that view is not really a compromise because it reduces to almost nothing the role of the jury's belief"³⁸.

Nevertheless, unacknowledged policy considerations or, much more likely, courts' confusion regarding the proper meaning of the legal standards of proof have led them erroneously to employ mathematical probability interpretations of those standards in some categories of cases in which proper proof is impossible. Haack describes and criticizes the development of the doubling the risk criterion for proving specific causation in the toxic tort cases³⁹. In these cases, as in the medical malpractice cases involving negligent diagnosis or delayed treatment⁴⁰, it is generally impossible to prove specific causation in the proper way, by sufficient proof of instantiation of the relevant causal processes by concrete evidence in the particular case⁴¹, due to a lack of scientific knowledge regarding the details of the relevant causal process as well as a general inability to obtain needed case-specific information. As a matter of policy or, much more often, due to confusion regarding the standards of proof, courts have erroneously treated a mere abstract, class-based, greater than 50 per cent statistical probability as proof of actual causation in a specific case, despite the lack of any case-specific evidence of causation other than exposure to the harmful substance, based on a statistical probability interpretation of the "more likely than not" version of the preponderance of the evidence standard of proof⁴².

³⁵ Richard W WRIGHT, "Pruning the Bramble Bush by Clarifying the Concepts", p. 1061 note 321.

³⁶ *Ibid.*, p. 1066 note 341; Susan HAACK, *op. cit.*, p. 67 and note 96.

³⁷ E.g., Sandy STEEL, *Proof of Causation in Tort Law*, Cambridge, Cambridge University Press, 2015, p. 101.

³⁸ John LEUBSDORF, *op. cit.*, p. 1604.

³⁹ Susan HAACK, *op. cit.*, pp. 270–288.

⁴⁰ Richard W WRIGHT, "Proving Causation: Probability versus Belief", pp. 216–219.

⁴¹ *Ibid.*, pp. 205–212.

⁴² *Ibid.*, pp. 215–219. A third doctrinal area in which the courts, due to the unavailability of sufficient case-specific evidence, have misinterpreted the standards of proof as requiring only

The courts usually recognize the fallacy of treating a mere class-based statistical probability, as in the gatecrasher scenario, as sufficient proof of what happened in any specific case⁴³. When judges or lay persons are asked in surveys to interpret the standards of proof as mathematical probabilities, they either refuse or state probabilities much greater than those assumed by the mathematical probabilists⁴⁴. However, over the last few decades many (but far from all) courts in the United States in toxic tort cases have treated a more than doubled statistical risk of suffering some disease or disorder due to exposure to some substance as sufficient, and perhaps necessary, to establish causation of that disease or disorder in a specific case (“specific causation”), assuming that it has been established that exposure to that substance is capable of causing that disease or disorder (“general causation”)⁴⁵. Haack devotes most of her recent book to illuminating and extremely useful discussion of the general causation issue. She criticizes the various criteria stated by the courts for establishing general causation, especially the criteria discussed and the atomized approach taken in Judge Kozinski’s opinion for the U.S. Court of Appeals for the Ninth Circuit in the *Daubert* case⁴⁶, and she persuasively argues for the use of a more holistic approach based on her foundherentist methodology⁴⁷.

Although Haack insists that degrees of belief should not and cannot be identified with or interpreted as mathematical probabilities and are not amenable to analysis in accordance with mathematical probability theory, and that statistical evidence is almost never by itself sufficient for a warranted belief regarding the facts in a specific case but rather requires supporting case-specific evidence, she argues that statistical evidence is always relevant not only with respect to general causation but also with respect to specific causation and can provide significant support for a warranted belief regarding identity or specific causation in a particular case depending on its magnitude, detail, accuracy and comprehensiveness⁴⁸. Applying her foundherentist methodology, she argues:

a greater than 50 percent statistical probability is the use of the *res ipsa loquitur* doctrine to permit proof of negligence as well as causation. *Ibid.*, pp. 219–220.

⁴³ *Ibid.*, pp. 201–204, 212–214; Richard W. WRIGHT, “Pruning the Bramble Bush by Clarifying the Concepts”, pp. 1050–1051.

⁴⁴ John LEUBSDORF, *op. cit.*, p. 1578; Richard W. WRIGHT, “Pruning the Bramble Bush by Clarifying the Concepts”, pp. 1065–1066 note 339.

⁴⁵ Susan HAACK, *op. cit.*, pp. 270–285.

⁴⁶ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 43 F.3d 1311 (9th Cir. 1995).

⁴⁷ Susan HAACK, *op. cit.*, ch. 5 (“Trial and Error: Two Confusions in *Daubert*”), ch. 6 (“Federal Philosophy of Science: A Deconstruction—and a Reconstruction”), ch. 7 (“Peer Review and Publication: Lessons for Lawyers”), ch. 8 (“What’s Wrong with Litigation-Driven Science?”), ch. 9 (“Proving Causation: The Weight of Combined Evidence”), ch. 10 (“Correlation and Causation: The ‘Bradford Hill Criteria’ in Epidemiological, Legal, and Epistemological Perspective”).

⁴⁸ *Ibid.*, pp. 18–20, 72, 74–75, 286–289.

Any increase in relative risk, however small, is supportive of the conclusion [regarding specific causation] to some degree. Why so? Because how supportive evidence is with respect to some conclusion depends on how well that evidence and that conclusion fit together in an explanatory story. And if D is commoner among people exposed to S than among people not exposed to S, it is possible that Mr. X is one of those who would not have developed D but for his exposure to S, and since his exposure to S might explain Mr. X's developing D, it supports the conclusion to some degree (a higher degree, the higher the relative risk)⁴⁹.

Haack acknowledges that “[u]nless the relative risk is *very* high, however, the degree of support such evidence gives the conclusion is very modest, for—since we lack any specific, detailed, explanatory story—the explanatory integration of evidence and conclusion is quite loose”⁵⁰. How high is very high? In a 2014 interview, she stated: “[I]f you can show that the risk if you’re exposed to this stuff is 200 times the risk if you’re not, then that’s pretty strong evidence of causation by itself”⁵¹.

I respectfully disagree. Although causally related statistical evidence is relevant and usually very helpful—but, as Haack explains, is not required⁵²—for proof of general causation (the capacity of some condition to cause a distinct condition), once general causation is established the statistics provide no support to a warranted conclusion regarding specific causation. While abstract class-based statistics are useful for predicting a result *ex ante*, or betting on a result *ex post*, they tell us nothing about what actually happened in a specific case. For example, if there are 95 blue marbles and 5 red marbles in a jar, one should bet that the next marble randomly drawn from the jar will be a blue marble, but no one will pay off on such a bet until they have specific evidence that the ball actually was blue.

This is especially true with respect to so-called “naked statistics”, unrelated to any causal generalization, such as the defendant’s proportion of taxis operated in a specific locale, bolts supplied to a manufacturer, or doses distributed of a generic drug, when some injury was caused by a non-specifically-identified taxi, defective bolt, or dose of a drug⁵³. Haack herself mentions an English case in which there was a very high statistical probability that a match of the defendant’s DNA with DNA found at the crime scene was not random, but it was clear that he could not have committed the crime since he was so handicapped by advanced Parkinson’s disease that he was physically

⁴⁹ *Ibid.*, p. 287–288

⁵⁰ *Ibid.*, p. 288.

⁵¹ https://www.academia.edu/23523493/EVIDENCE_MATTERS_Transcript_of_Robert_Talisses_podcast_interview_with_Susan_Haack_2016, p. 21.

⁵² Susan HAACK, *op. cit.*, p. 290.

⁵³ Richard W. WRIGHT, “Pruning the Bramble Bush by Clarifying the Concepts”, pp. 1050–1051, 1054–1064.

incapable of having committed it.⁵⁴ Recall also the gatecrasher hypothetical in which there was a 99.9 per cent statistical probability, reduced to just over 95 per cent by the use of Bayes's Theorem, that X was a gatecrasher, but the ticket collector testified that X was the sole ticketed entrant⁵⁵.

The same problem exists for causally related statistics, which report the frequency of complete instantiation of a partially instantiated causal law (a causal generalization). They are of no use in establishing which possibly applicable causal generalizations were actually instantiated in the particular situation because they provide no information on whether the abstract elements in the underlying causal laws that are not included in the causal generalization actually were instantiated on that occasion. The causally related statistic merely states that, on average or in the aggregate, X per cent of the time that the abstract elements specified in the causal generalization are instantiated, the unspecified abstract elements required to complete the underlying causal laws are also instantiated. It does not help us determine whether this particular occasion is one of the X per cent in which the underlying causal laws were fully instantiated, or instead is one of the 100-X per cent in which they were not.

As Haack acknowledges, we need a "specific, detailed, [filled in] explanatory story"⁵⁶. Only evidence specific to the particular occasion is capable of instantiating the conditions in the relevant causal laws and their generalizations. Since a causal generalization is not a complete specification of the underlying causal laws, proof of instantiation of even all of the antecedent conditions in the causal generalization provides only an aggregate class-based statistical probability that the underlying causal laws were completely instantiated and, thus, that the condition at issue actually was a cause of the relevant consequence. Nevertheless, the proven actual conditions in the specific situation may provide sufficient direct and circumstantial evidence regarding instantiation of the network of causal processes in the specific situation to warrant the formation of a belief, rather than a mere class-based statistical probability, that a specific causal generalization and its underlying causal laws were instantiated in the specific situation⁵⁷.

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⁵⁴ Susan HAACK, *op. cit.*, pp. 19, 76–77.

⁵⁵ See text at note 35 above.

⁵⁶ See text at note 50 above.

⁵⁷ Richard W. WRIGHT, "Proving Causation: Probability versus Belief", pp. 205–212.