

§ Law in Context

SUSAN HAACK

Evidence Matters

Science, Proof,
and Truth in the Law

CAMBRIDGE

EVIDENCE MATTERS

Is truth in the law just plain truth—or something *sui generis*? Is a trial a search for truth? Do adversarial procedures and exclusionary rules of evidence enable, or impede, the accurate determination of factual issues? Can degrees of proof be identified with mathematical probabilities? What role can statistical evidence properly play? How can courts best handle the scientific testimony on which cases sometimes turn? How are they to distinguish reliable scientific testimony from unreliable hokum? The dozen interdisciplinary essays collected here explore a whole nexus of such questions about science, proof, and truth in the law.

With her characteristic clarity and verve, in these essays Susan Haack brings her original and distinctive work in theory of knowledge and philosophy of science to bear on real-life legal issues. She includes detailed analyses of a wide variety of cases and lucid summaries of relevant scientific work, of the many roles of the scientific peer-review system, and of relevant legal developments.

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. She is the author of numerous highly acclaimed books, among them *Evidence and Inquiry* and *Defending Science—Within Reason*, and of many articles in legal, philosophical, and scientific journals. Haack is one of a tiny number of living philosophers included in Peter J. King, *100 Philosophers: The Life and Work of the World's Greatest Thinkers* (2004); and she appeared on the *Sunday Independent's* list of the ten most important women philosophers of all time (2005).

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(continued after Index)

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University of Miami



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32 Avenue of the Americas, New York, NY 10013-2473, USA

Cambridge University Press is part of the University of Cambridge.

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www.cambridge.org

Information on this title: www.cambridge.org/9781107698345

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First published 2014

Printed in the United States of America

A catalog record for this publication is available from the British Library.

Library of Congress Cataloging in Publication data

Haack, Susan, author.

Evidence matters : science, proof, and truth in the law / Susan Haack.

pages cm – (Law in context)

Includes bibliographical references and index.

ISBN 978-1-107-03996-4 (hardback) – ISBN 978-1-107-69834-5 (paperback)

1. Evidence (Law) 2. Admissible evidence. 3. Science and law. I. Title.

K2261.H32 2014

347'.06-dc23 2013048953

ISBN 978-1-107-03996-4 Hardback

ISBN 978-1-107-69834-5 Paperback

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Until lately the best thing I was able to think of in favor of civilization . . . was that it made possible the artist, the poet, the philosopher, and the man of science. . . . Now I believe that . . . the chief worth of civilization is that it makes the means of living more complex, that it calls for great and combined intellectual efforts, instead of simple, uncoordinated ones. . . . Because more complex and intense intellectual efforts mean a fuller and richer life.

—Oliver Wendell Holmes (1900)

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Acknowledgments

“Epistemology and the Law of Evidence: Problems and Projects”—the most recent of these essays—is based on a talk given at a 2012 workshop on legal epistemology organized by Rachel Herdy in the law faculty at the Universidade Federal do Rio de Janeiro, Brazil. It was also presented, in an abridged form and under the title “Problems and Projects in the Theory (and Practice) of Evidence Law,” as an after-dinner speech at the 2013 conference of the Canadian Institute for the Administration of Justice.

“Epistemology Legalized: Or, Truth, Justice, and the American Way” was my Olin Lecture in Jurisprudence at the Notre Dame Law School, and appeared in the *American Journal of Jurisprudence* 49 (2004): 43–61.

“Legal Probabilism: An Epistemological Dissent” was first presented in 2011, at a workshop on standards of proof and scientific evidence organized by Jordi Ferrer Beltrán and his colleagues in the faculty of law at the University of Girona, Spain; and was one of the series of lectures I gave the following year in the faculty of law at the Universidad Externado de Colombia in Bogotá. It appeared, in Spanish translation by María José Viana and Carlos Bernal, in Carmen Vázquez, ed., *Estándares de prueba y prueba científica: Ensayos de epistemología jurídica* (Barcelona: Marcial Pons, 2013), 65–98.

“Irreconcilable Differences? The Troubled Marriage of Science and Law” has proved especially popular since it was first presented at a 2007 meeting in Bretton Woods, New Hampshire, organized by David Michaels and his colleagues at the Project on Scientific Knowledge and Public Policy (SKAPP). In 2008 it was presented in the faculty of law at the University of Alicante, Spain, and at Amherst College; in 2010 it was the basis of my talk at a joint conference of the School of Medicine and the College of Law at Florida International University; in 2011 it was presented in the department of philosophy at the University of Western Ontario, Canada, and in the faculty of law at the Pontifical Catholic University of Rio de Janeiro (PUC-Rio); in 2012 it was

presented at the Universidad Externado de Colombia; and in 2013 a modified version was given at the VI Congreso internacional de derecho procesal in Cartagena, Colombia. This essay was first published in *Law & Contemporary Problems* 72, no.1 (2009): 1–24; and also appeared, in Spanish translation by Orión Vargas, in *Proceso judicial y cultura*, ed. Mónica Bustamente Ruaz (Medellín, Colombia: Universidad de Medellín, 2013), 109–96.

“Trial and Error: Two Confusions in *Daubert*”—the earliest of these essays—was first presented at the 2003 SKAPP meeting in Coronado, California, and later at law school colloquia at the University of Montana (2003), George Mason University, the University of Pennsylvania, University College London (2004), and the University of Florida (2005). It was first published (under the title “Trial and Error: The Supreme Court’s Philosophy of Science”) in the *American Journal of Public Health* 95 (2005): S66–73; was reprinted in the *International Barristers Quarterly* 41, no.2 (2006): 376–91; and also appeared, in Italian translation by Giovanni Tuzet, in *Ars Interpretandi: Annuario I ermaneutica guiridica* 11 (2006): 303–25.

“Federal Philosophy of Science: A Deconstruction—and a Reconstruction,” written at the invitation of the then editor-in-chief, appeared in the *NYU Journal of Law & Liberty* 5, no.2 (2010): 394–435. This paper is based on a shorter talk entitled “Popper on Trial: A Brief History of a Big Muddle,” given at a 2009 conference on Popper organized by the Max Weber Program at the European University Institute in Fiesole, Italy. It was first presented in its full form, in the same year, at the China University of Politics and Law in Beijing; then in 2010 in the faculty of law at the University of Girona and at a colloquium of the Center for Conceptual and Historical Foundations of Science at the University of Chicago; and in 2011 at PUC-Rio.

“Peer Review and Publication: Lessons for Lawyers” grew out of a shorter talk I gave at a 2006 meeting of the National Institute of Justice in Tampa, Florida; and appeared in the *Stetson Law Review* 36, no.3 (2007): 789–819—after which it served as the basis for an invited presentation on the same subject at the Committee on Science, Technology, and Law at the National Academies of Science (2008).

“What’s Wrong with Litigation-Driven Science?” was first presented at the 2006 SKAPP meeting in New York; and was published (with the subtitle “An Essay in Legal Epistemology”) in the *Seton Hall Law Review* 38, no.3 (2008): 1053–83.

“Proving Causation: The Weight of Combined Evidence,” written at the invitation of the editors, first appeared (under the title “Proving Causation: The Holism of Warrant and the Atomism of *Daubert*”) in the *Journal of Biomedical and Health Law* IV, no.2 (2008): 253–89. It was presented in the

School of Law at the University of Minnesota and at a conference organized by the department of mathematics at Iowa State University (2009); in the faculties of law at the University of Girona and at Universidad de Caldas, Colombia, and as the keynote lecture at the annual meeting of the Society of University Neurosurgeons (2010); and at PUC-Rio (2011).

“Correlation and Causation: The ‘Bradford Hill Criteria’ in Epidemiological, Legal, and Epistemological Perspective” was first presented at a 2012 workshop on causation in mass torts organized by Diego Papayannis in the faculty of law at the University of Girona and, later the same year, was aired to an audience of public-health professionals at the Fundação Oswaldo Cruz in Rio de Janeiro. It appears here for the first time.

“Risky Business: Statistical Proof of Specific Causation,” written in 2010 at the invitation of Jordi Ferrer Beltrán, will appear, in Spanish translation by Nicola Muffato, in Diego Papayannis, ed., *Causalidad y atribución de responsabilidad* (Barcelona: Marcial Pons, forthcoming). It has been presented in legal colloquia at Uppsala University (Sweden), the University of Girona, the University of British Columbia, and Wayne State University (2011); in the law faculties at the Universidad Externado de Colombia and the University of Medellín (2012); and in the law faculty at the Jagiellonian University in Kraków, Poland (2013). It appears here for the first time in English.

“Nothing Fancy: Some Simple Truths about Truth in the Law” was written in 2010 at the invitation of Jorge Cerdio and Germán Sucar in the department of law at the Instituto Tecnológico Autónoma de México (ITAM), for inclusion in a three-volume series entitled *Verdad y Derecho* to be published by Marcial Pons, where it will appear in Spanish translation by Ramón Ortega García. In 2012 it was presented in the School of Law at the University of San Francisco and in the law faculties at the University of Girona and the University of Medellín; and in 2013 it was presented at the Osgoode Law School at York University in Toronto and in the philosophy department at Universität Paderborn, Germany. It appears here for the first time in English.



This book has been a decade in the making; and a great many people have helped me in a great variety of ways. I am grateful to all those who invited me to participate in relevant events and publications, especially to David Michaels and the other organizers of SKAPP and to Jordi Ferrer Beltrán and his colleagues in legal philosophy at the University of Girona; to the audiences at the many fora and in the many countries where I have presented these papers over the years, and to the army of correspondents who, as always, also offered helpful comments and suggestions; to the students in my Law School class on scientific evidence, for their good questions; to my faculty assistant,

Beth Hanson, for capable and good-natured help of many kinds; to Pamela Lucken and all the other skilled and patient staff in the University of Miami Law Library who helped me find relevant material, check references, and get citations in the proper form; to Mark Migotti, who made ever-helpful comments on innumerable drafts; and to Howard Burdick, but for whom . . . well, but for whom.

Introduction: A Pragmatist Perspective on Science, Proof, and Truth in the Law

To be master of any branch of knowledge, you must master those which lie next to it

—Oliver Wendell Holmes¹

Is truth in the law just plain truth—or is it something *sui generis*? Is a trial a search for truth—or is it something more, or something less, than that? Do the adversarial procedures of common-law systems promote factually sound verdicts? Do legal rules excluding relevant testimony enable the accurate determination of factual issues, or impede it? What bearing, if any, does the mathematical calculus of probabilities have on the degrees and standards of proof invoked in the law? What role can statistical evidence appropriately play in legal proof? How do the argument and counter-argument of adversarial proceedings differ from what scientists do as they seek out, sift, and weigh evidence? How can courts best handle the scientific testimony on which they now so often rely, and how are they to distinguish genuine science from pretenders—or reliable scientific testimony from unreliable hokum?

The dozen interdisciplinary essays collected here take up a whole nexus of such questions about science, proof, and truth in the law, bringing my work in epistemology and philosophy of science (and, from time to time, my work in philosophy of logic and language, metaphysics, etc.) to bear both on general questions about legal standards of proof and the relative merits of common-law and civil-law approaches to the handling of evidence, and on specific questions about the role of scientific testimony in legal proceedings. A key theme of my epistemology is that the structure of evidence can be understood by analogy with a crossword puzzle; and, just as this would lead you to expect, the

¹ Oliver Wendell Holmes, “The Profession of the Law” (1886), in Sheldon Novick, ed., *Collected Works of Justice Holmes* (Chicago: University of Chicago Press, 1995), vol. 3, 471–73, 472.

arguments of these essays ramify, interlock, and loop up and back. The first three essays focus on evidence, evidentiary procedures, proof, and probability; the next five turn to the role of scientific testimony and legal efforts to domesticate it; then in the next three essays I look specifically at causation evidence in toxic tort litigation; and in the last piece I explore questions about truth in the law and its relation to truth in the sciences.

All of these essays are imbued with the spirit of the classical pragmatist tradition—influenced, that is, not only by Oliver Wendell Holmes’s writings on the law, but also by the classical pragmatists’ thinking about inquiry generally, and about scientific inquiry in particular. My understanding of the evolution of legal concepts and legal systems, for example, and my stress on the limits of formalism, align with Holmes’s. My objective conception of truth is in the spirit of C. S. Peirce’s observation that “truth is SO, whether you or I or anybody thinks it is so or not”; my distinction between genuine inquiry and advocacy research runs parallel to his distinction between real inquiry and sham reasoning; and my crossword analogy is inspired in part by his critique of Descartes’s metaphor of a chain of reasons. In my conception of scientific inquiry as a human enterprise, thoroughly fallible but nevertheless capable of real advance, there are echoes not only of Peirce, but also of the other classical pragmatists. And my conceptions of law, morality, and the relations between them are shaped, in part, by William James’s and John Dewey’s ethical writings.

Unlike the usual fare of analytic legal philosophy—often preoccupied with its own internecine disputes, and operating at a sometimes dizzyingly high level of generality and abstraction—this work of mine is prompted by real-life legal issues: by disputes that have arisen in court, by debates over the desirability of this or that rule or procedure, and so on. The rules, procedures, cases, etc., come largely from US law; but most of the issues they raise are of much more than parochial interest, and so too, I believe, are the benefits of a sound philosophical approach to understanding and resolving them.



The first essay included here, “Epistemology and the Law of Evidence: Problems and Projects,” sets the stage. I begin by explaining what I take epistemology to be, how I see it bearing on questions about evidence and evidentiary procedures in the law, and what pitfalls we need to avoid when we apply epistemological theory to legal practice. Next, I lay out my understanding of the differences between pseudo-inquiry and the real thing; of the nature and structure of evidence; and of the multiple determinants of evidential quality, and hence of degree of warrant—or, in legal terms, of proof. Then I can signal some of the ways this theoretical work can be applied in legal contexts:

to shed light on Peirce's critique of adversarialism, for example, and on Judge Kozinski's animadversions against "litigation-driven" science; to distinguish degrees of proof from mathematical probabilities, and at the same time explain what role statistical evidence can properly play; to understand the reasoning behind Jeremy Bentham's critique of exclusionary rules of evidence; to see how, when, and why a congeries of pieces of evidence may have greater weight than any of its components alone; and so on. Finally, as the title of this essay promises, I conclude with a list of "projects": i.e., of significant outstanding problems in legal epistemology; and with an argument that two-way traffic between legal practice and epistemological theory could greatly benefit not only legal thinking about evidence, but also the increasingly self-referential and narrowly-focused "niche" epistemology that, sadly, predominates today.

The second essay, "Epistemology Legalized: Or, Truth, Justice, and the American Way"—the earliest of the papers included here—focuses first on the adversarial character of US evidence law (evidence prepared and presented by the parties to a case, the witnesses for each side cross-examined by the attorneys for the other); and then on its reliance on exclusionary rules (rules limiting what evidence may be presented to a finder of fact). This essay explores two powerful epistemological criticisms of such an evidentiary régime: Peirce's, that the "hot and partisan debate" encouraged by adversarialism fosters a focus on victory rather than truth; and Bentham's, that rules limiting the admissibility of various kinds of testimony run contrary to the epistemological desideratum of comprehensiveness, the desirability of taking all the relevant evidence into account.

It can hardly be denied that the drawbacks Peirce and Bentham identified are real; nevertheless, I argue, neither Peirce's nor Bentham's critique is fatal to the idea that adversarialism and exclusionary rules *can* be a reasonable way to determine verdicts—given, that is, the inevitable limitations of time and resources. The real problem is that these common-law procedures can be defended only on certain assumptions, among them that resources are roughly equal on both sides; and that these assumptions are rarely true in practice—as I illustrate with some examples from the law governing scientific testimony, where prosecutors' resources are almost always greater than defenders', and manufacturer defendants' resources almost always greater than individual tort plaintiffs'.

In the introduction to "Epistemology Legalized" I note that epistemology should also help us make headway with some contested issues about degrees and standards of proof; and in the essay that follows, "Legal Probabilism: An Epistemological Dissent," I tackle some of these directly. The core argument is that probabilistic conceptions of degrees of proof and, in particular, the

subjective Bayesianism still dismayingly prevalent among evidence scholars, are fatally flawed. The first step is to show that degrees and standards of proof are best construed epistemologically, as degrees to which a conclusion must be warranted by the evidence presented for the party with the burden of proof to prevail—as the reasons for having standards of proof at all, as well as jury instructions on how to interpret such standards, reveal. The next step, calling on my foundherentist epistemology,² is to show that degrees of epistemic warrant simply don't conform to the axioms of the standard mathematical calculus of probabilities; from which it follows that degrees of proof cannot plausibly be construed probabilistically.

Still, this doesn't yet show how, in the particular, probabilistic approaches fail, or how, specifically, my approach succeeds; this is the purpose of the second half of the essay. I first show that Kadane and Schum's well-known subjective-Bayesian account of the evidence in the notorious trial of Sacco and Vanzetti (two Italian immigrants convicted of a 1920 robbery and murder) is seriously flawed; and that my foundherentist account can do significantly better. Then—to make clear that, though it isn't probabilistic, my account is perfectly capable of accommodating statistical and probabilistic evidence appropriately—I show that Finkelstein and Fairley's well-known subjective-Bayesian analysis of the case of Janet and Malcolm Collins (convicted of robbery largely on the basis of purely statistical evidence) is also seriously flawed; and that here too my approach does significantly better. I note in passing that my analysis also sheds some light on the role of DNA identification evidence—and so, like the previous essay, raises some issues specifically about scientific testimony.

Ever since scientific witnesses began to appear in court on a regular basis, there have been complaints about them; as early as 1858 we find the US Supreme Court writing that “experience has shown that opposite opinions of persons professing to be experts may be obtained to any amount.”³ Still, even in Holmes's day, scientific testimony played a much smaller role than it does now. Nonetheless, the Holmesian insight that legal systems are local, social institutions needing constantly to adapt to new circumstances is very relevant to the papers that follow, which explore the ongoing efforts of the US legal system to devise better ways of handling the scientific testimony on which, in this technologically advanced age, it more and more relies.

² Susan Haack, *Evidence and Inquiry: Towards Reconstruction in Epistemology* (Oxford: Blackwell, 1993); expanded 2nd ed., *Evidence and Inquiry: A Pragmatist Reconstruction of Epistemology* (Amherst, NY: Prometheus Books, 2009).

³ *Winans v. N.Y. & Erie R.R. Co.*, 62 U.S. 88, 101 (1858).

The fourth piece here, “Irreconcilable Differences? The Troubled Marriage of Science and Law,” opens a clutch of essays on scientific testimony. It begins with a sketch of the many and various interactions of the law with science—legal regulation of hazardous scientific work, lawmakers’ and regulators’ reliance on scientific advice, the prosecution of scientists accused of fraudulently using federal research funds, constitutional cases involving the teaching of evolution in public high schools, “cultural heritage” cases involving ancient human remains, and courts’ increasing reliance on scientific evidence—and continues with a summary history of US law on expert testimony.

Because expert witnesses present scientific, technical, or other specialized knowledge not available to the average juror, they aren’t confined to testifying as to what they witnessed, but are allowed to give opinions. This special class of witnesses includes experts of every kind, including, e.g., specialists in automotive or even tire design, in accident reconstruction, in construction practices and standards, in computing, in the valuation of real estate or antiques or art, in forensic accounting, etc., etc., as well as practitioners of just about every scientific (and quasi-scientific) specialty imaginable. For a long time US law required only that an expert be qualified in his field. But in 1923 the very brief ruling in *Frye v. United States*—excluding proffered expert testimony as to the results of a primitive lie-detector test that Mr. Frye had taken—added a new requirement on the content of such testimony: that novel scientific testimony is admissible only if “the principle or discovery” on which it is based is “sufficiently established to have gained general acceptance in the particular field in which it belongs.”⁴ Gradually, over many decades, courts around the country began to rely on *Frye*, until eventually the “*Frye Rule*” was accepted in the majority of jurisdictions. (It remains the law today in a number of states, among them New York, California, and Pennsylvania.)

But in 1975 the Federal Rules of Evidence (FRE) were enacted; and FRE 702, providing that expert testimony was admissible provided that it was relevant and not otherwise excluded by law, made no mention either of *Frye* or of “general acceptance.” Had *Frye* been superseded, or not? The situation wasn’t clarified until 1993, when the US Supreme Court made its ruling in *Daubert v. Merrell Dow Pharmaceuticals*⁵—the first time in the history of the Court that it had ruled on the standard of admissibility of expert testimony.

The core argument of “Irreconcilable Differences” is that the difficulties in handling scientific testimony arise in part from tensions between the practices and values of science and the culture of the US legal system: e.g., between

⁴ *Frye v. United States*, 293 F. 1013, 1014 (D.C. Cir. 1923).

⁵ *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579 (1993) (“*Daubert III*”).

the investigative character of science and the adversarial culture of the law; between the open-endedness of scientific investigation and the legal concern for finality; between the atomistic tendencies of evidence law and the quasi-holism of warrant; between the informal, pragmatic character of scientific inquiry and the formal procedures of the law; and so on. These tensions reveal themselves both in the history of legal efforts to domesticate scientific testimony by rules of admissibility, and in recent small compromises of finality and modifications of adversarialism in dealing with such testimony—the latter representing a modest move in the direction of civil-law evidentiary procedures.

The next essay, “Trial and Error: Two Confusions in *Daubert*,” turns specifically to the remarkable foray into philosophy of science in the Supreme Court’s *Daubert* ruling. As I said, the question before the *Daubert* Court was whether the old *Frye* Rule had been superseded, in federal courts, by FRE 702. It had, the Court ruled; nevertheless, courts still have an obligation to screen proffered expert testimony not only for relevance, *but also for reliability*. This, Justice Blackmun’s ruling continued, requires that they satisfy themselves that such evidence qualifies as *bona fide* “scientific . . . knowledge.”⁶ Calling on the philosophy of Karl Popper, and throwing in a quotation from Carl Hempel for good measure, Justice Blackmun suggests that the mark of the genuinely scientific is falsifiability or testability; and, in line with this, the first of the indicia of reliability on the “flexible list” he offers by way of guidance to federal judges—now known as the “*Daubert* factors”—is whether the work on which supposedly scientific testimony is based “can be (and has been) tested.”⁷

As the title of the essay suggests, these philosophical dicta of Justice Blackmun’s are confused, in more ways than one. Casting around for a criterion of genuinely scientific, and hence reliable, expert testimony, he runs together two incompatible philosophies of science: Popper’s falsificationism, and Hempel’s confirmationism. He apparently doesn’t realize that Popper’s philosophy of science is singularly ill-suited for the purpose to which he put it, since—emphatically denying that scientific theories can ever be shown to be true or even probable—Popper deliberately eschews the notion of reliability; nor does he seem aware that Hempel’s work provides neither a criterion of demarcation, nor any substantive help in assessing the reliability of complex scientific evidence. Moreover, when you think about it, it’s clear that Justice Blackmun’s approach was seriously misconceived from the get-go. He runs together “reliable” and “scientific”; but these are different not only in

⁶ *Id.*, 590.

⁷ *Id.*, 593.

meaning, but also in extension. Not all, and not only, scientific testimony is reliable.

Not surprisingly, in its subsequent rulings on expert testimony—in 1997, in *General Electric Co. v. Joiner*,⁸ reaffirming that the standard of appellate review for such evidentiary rulings is abuse of discretion, and in 1999, in *Kumho Tire Co. v. Carmichael*,⁹ holding that *Daubert* (but not necessarily those *Daubert* factors) applies to all expert testimony, not only to the scientific—the Supreme Court has quietly backed away from its earlier enthusiasm for philosophy of science. The result, however, has been to leave courts with wide discretion in screening expert testimony, but very limited guidance about how to do this.

Still, you have to wonder: where did the Supreme Court’s allusions to Popper’s philosophy of science come from, and what did federal courts make of the first *Daubert* factor, whether the proffered evidence “can be (and has been) tested”? The purpose of the next essay, “Federal Philosophy of Science: A Deconstruction—And a Reconstruction,” is not only to answer these questions, but also to show exactly why Popper’s falsificationism is so radically unsuited for the purpose to which Justice Blackmun put it; and to suggest a better understanding of science in its place.

I begin by presenting Popper’s falsificationist philosophy of science in sufficient detail to show that, his rhetoric about “objective scientific knowledge” notwithstanding, his approach is so profoundly and so pervasively negative as to amount, in effect, to a covert skepticism; and so couldn’t possibly provide a criterion of the reliability of scientific testimony. Next, I explain how Justice Blackmun misconstrues Popper’s ideas, and identify some sources of his misunderstandings in the amicus briefs in *Daubert*, in the then-recent literature in the law reviews, and in Popper’s own (very ambiguous) writings. Then I look in some detail at what federal courts have made of the Supreme Court’s allusions to Popper. And finally, in the “reconstructive” part of this essay, I argue that, ironically enough, the interpretation most federal courts have given the first *Daubert* factor gestures towards a better epistemology of science than the flawed Popperian philosophy of science from which it ostensibly derives, but from which, in fact, it deviates quite radically; and that the account of the structure and quality of the evidence with respect to scientific claims developed in my *Defending Science—Within Reason*¹⁰ provides the framework for understanding why.

⁸ Gen. Elec. Co. v. Joiner, 522 U.S. 136 (1997) (“Joiner III”).

⁹ Kumho Tire Co. v. Carmichael, 526 U.S. 137 (1999).

¹⁰ Susan Haack, *Defending Science—Within Reason: Between Scientism and Cynicism* (Amherst, NY: Prometheus Books, 2003).

Among the indicia of reliability on the *Daubert* Court's "flexible list," besides "falsifiability," was "peer review and publication."¹¹ But, as I point out in the next essay, "Peer Review and Publication: Lessons for Lawyers," "peer review" may refer either to the process of *pre-publication* peer review, or to the long-run scrutiny of the relevant scientific community *after* publication. Looking at the evolution of the pre-publication peer-review process that became standard practice at scientific journals after World War II—and at how the system presently operates—it becomes very clear that there is no guarantee *either* that all work that survives such review is sound, *or* that all sound work survives such review. So if this *Daubert* factor is understood as suggesting that courts screening for reliability should focus on whether proffered scientific testimony is based on work that has survived pre-publication peer review, though this will be relatively easy for a judge to determine, it is a very poor indicator of reliability. And if, on the other hand, it is understood as suggesting that courts should focus on whether the work on which proffered scientific testimony is based will survive the long-run scrutiny of the scientific community—which would certainly be a better indication of reliability—the problem is that it is impossible even for scientists expert in the field concerned, let alone for judges, to predict what work will survive and what will in due course be discarded as untenable.

In 1995, making the final ruling in *Daubert* (on remand from the Supreme Court), Judge Kozinski introduced a new *Daubert* factor of his own, suggesting that if the work on which proffered testimony is based is "litigation-driven," this raises a red flag about its reliability.¹² Thinking about the merits of this idea soon has us facing some subtle issues about the differences between real investigation and "advocacy research," i.e., seeking out plausible-sounding evidence supporting a predetermined conclusion. These are tackled, with Peirce's help, in the next essay, "What's Wrong with Litigation-Driven Science?" It's true, as Judge Kozinski suggests, that research undertaken for the purposes of litigation may be less reliable than research undertaken independently—but so too may research undertaken for marketing purposes; and, contrary to the exception Judge Kozinski makes in a footnote,¹³ the same is true of forensic science, almost always conducted for the police or the prosecution. Moreover, as we see from Judge Bernstein's ruling in a Pennsylvania case, *Blum v. Merrell Dow Pharmaceuticals*,¹⁴ in the kinds of toxic tort case that have shaped US law on scientific testimony, not only the expert testimony offered by plaintiffs, but

¹¹ *Daubert III* (note 5 above), 593.

¹² *Daubert v. Merrell Dow Pharm., Inc.*, 43 F.3d 1311 (9th Cir. 1995) ("*Daubert IV*").

¹³ *Id.*, 1317 n.5.

¹⁴ *Blum v. Merrell Dow Pharm., Inc.*, 33 Phila. Cnty. Rep. 193 (1996) ("*Blum IV*").

also the expert testimony offered by defendants, may be based on advocacy research.

In *Daubert*, in *Blum*, and in many such toxic tort cases—notably in *Oxendine v. Merrell Dow Pharmaceuticals*,¹⁵ in *Joiner*,¹⁶ and more recently in *Milward v. Acuity Specialty Products*¹⁷—plaintiffs argue that the expert testimony they wish to present is sufficient, considered jointly, to establish causation “by a preponderance of the evidence,” even though no part of it would be sufficient by itself; and defendants sometimes argue in response that a collection of pieces of evidence can never be any stronger than any of its components individually. The next paper, “Proving Causation: The Weight of Combined Evidence”—the first of a trio on questions of causation—draws on my epistemological theory to show that, *under certain conditions*, a combination of pieces of evidence none of which is sufficient by itself really *can* warrant a causal conclusion to a higher degree than any of its components alone can do.

When my account is applied to the very complex congeries of evidence typically proffered to prove general causation in toxic tort cases, it suggests answers to some frequently-disputed questions: Is epidemiological evidence essential for proof of causation? Should such evidence be excluded unless its results are statistically significant? Should animal studies be excluded on principle? And so on. Moreover, the argument of this paper reveals that (as I suggested in “Irreconcilable Differences”), by encouraging the practice of screening each item of expert testimony individually for reliability, the evidentiary atomism implicit in *Daubert* can actually stand in the way of an accurate assessment of the worth of complex causation evidence.

In assessing questions of general causation in toxic tort cases, courts sometimes rely on the so-called “Bradford Hill criteria,” which the original version of “Proving Causation” discussed only briefly. But in the next paper, “Correlation and Causation: The ‘Bradford Hill Criteria’ in Epidemiological, Legal, and Epistemological Perspective,” I look in detail at Hill’s ideas, the role they have played in litigation, and the ways in which they have been misunderstood. The first stage (the “epidemiological perspective”) looks closely at the famous lecture, “The Environment and Disease,”¹⁸ in which Hill spelled out the nine factors he believes should be taken into account in determining whether a statistical correlation between exposure to some substance and the occurrence of some disease or disorder is likely causal, and his many caveats

¹⁵ *Oxendine v. Merrell Dow Pharm., Inc.*, 506 A.2d 1100 (D.C. 1986) (“*Oxendine I*”).

¹⁶ *Joiner III* (note 8 above).

¹⁷ *Milward v. Acuity Specialty Prods. Grp., Inc.*, 69 F.3d 11 (1st Cir. 2011).

¹⁸ Austin Bradford Hill, “The Environment and Disease: Association or Causation?” *Proceedings of the Royal Society of Medicine* 58 (1965): 295–300.

about how these factors should be used. The next stage (the “legal perspective”) is to show that courts have sometimes badly misunderstood these factors, and have applied them in ways Hill never envisaged, and probably wouldn’t have endorsed. Then, putting Hill’s ideas in epistemological perspective, I show that what he offers is best conceived as a kind of sketch-map of the much larger territory of evidence potentially relevant to causal claims—a sketch-map that, when superimposed on the more detailed epistemological map I have provided, is seen to be helpful so far as it goes, but partial and incomplete.

Hill himself was very clear that there can be no hard-and-fast rules for determining when epidemiological evidence indicates causation, and seems to have grasped the quasi-holistic character of the determinants of evidential quality. But the legal *penchant* for convenient checklists, and the atomistic tendencies of US evidence law, have encouraged legal players to misconstrue his factors as “criteria” for the reliability of causation testimony, and many courts have misread his partial sketch-map.

The next piece, “Risky Business: Statistical Proof of Specific Causation,” draws attention to its pragmatist orientation from the start with its opening quotation from Holmes about the evolution of legal concepts and rules. In line with this, the essay begins with a brief history of the evolution of the concepts of causation, responsibility, negligence, etc., deployed in the US legal system, and of some of the social, technological, and other changes that prompted these adaptations: such as the rapid growth of the railroad system in the second half of the nineteenth century, and the subsequent rise in crossing accidents; and, later, the rise of massive drug and chemical companies whose products sometimes proved harmful—in some instances, decades after exposure.

But this paper focuses primarily on one recent development in particular: the rise of the idea that evidence showing that exposure to the defendant’s product more than doubles the risk of some disease or disorder is key to establishing specific causation, i.e., to showing that *this plaintiff’s* injury was caused by this product. The first stage is historical: tracing how this idea arose and how it spread, distinguishing the several ways it has been construed, and exploring the reasons some courts have given for accepting it and others for rejecting it. The next stage is epistemological: showing that evidence of more than doubled risk, though relevant, is *neither necessary nor sufficient* for proof of individual causation, and providing a more defensible account of the role such evidence *can* legitimately play. And the last stage is policy-oriented: arguing, first, that to require, as some courts have done, that a plaintiff’s expert must produce evidence of more than doubled risk for his testimony to be even admissible imposes an unreasonable burden; and finally, that the more

adequate understanding of the role of evidence of increased risk developed here would not only be epistemologically sounder, but also better serve the goals of tort law.

The concluding essay, “Nothing Fancy: Some Simple Truths about Truth in the Law,” turns from proof to truth. I begin with the distinction between truth (the phenomenon) and truths (particular true claims); and the confusions that neglect of this distinction has fostered: e.g., that, because some truths are vague, truth itself must be a matter of degree; that, because some truths hold only at a given place, time, or jurisdiction, truth itself must be relative; and so on. Then, developing an understanding of truth along the lines of F. P. Ramsey’s laconicism, I argue that, whatever the subject-matter of the proposition concerned, what it means to say that a proposition is true is the same: that it is the proposition that *p*, and *p*. Next, I look at the deceptively simple-seeming distinction between factual and legal truths, noting that there are many mixed and borderline cases—and, in passing, that the concept of legal reliability articulated in *Daubert* itself fudges the line somewhat. However, I continue, mixed and borderline cases aside, legal truths, i.e., truths about legal provisions, are a special sub-class of truths about social institutions; and, like many truths about a society, are socially constructed, made true by things people do—primarily by legislators’ decisions, but also in part by judges’ interpretations of statutes and precedents, and so forth.

And finally—anticipating the objection that, by focusing on truths *about* legal provisions to the neglect of the more vital issue of the truth *of* legal provisions, I have ducked the really hard questions—I turn specifically to the normative character of law. Legal systems, legal provisions, and legal decisions, I argue, may be morally better or worse, and the law *can* be an engine of moral progress; but legal norms cannot be assimilated to moral norms, and are not appropriately conceived as true or false representations of moral principles. And this, as I show, suggests a new and nuanced approach to an old but still daunting question: why the law should be obeyed.



These essays were written for publication in a wide variety of journals and books—some for US law reviews, one for the *American Journal of Public Health*, one for the *American Journal of Jurisprudence*, and others for publication in Spain, Mexico, and Brazil. So I have edited them to unify the style of references and trimmed them here and there to avoid annoying repetition. Inevitably, though, given their interlocking structure, certain themes recur: the multiple determinants of evidential quality, for example, the quasi-holistic character of warrant, the material character of relevance, the difference between genuine inquiry and advocacy research, the misguided search for the

“scientific method,” the constant evolution of the law and of legal concepts, and of US law on scientific testimony in particular.

Inevitably, also, while this editorial work was in process, there were various legal and other developments relevant to my arguments: for example, Bendectin, the drug at issue in *Daubert*, *Blum*, *Oxendine*, etc., returned to the US market (now made by a Canadian manufacturer and with a new name, “Diclegis”); and Florida, which had long been, at least officially, a *Frye* state, amended its Rule of Evidence 702 to correspond to the federal Rule 702 as modified in 2000 in light of the rulings in *Daubert*, *Joiner*, and *Kumho Tire*. I have given details of these changes in new footnotes. I have also included a glossary that will, I hope, be helpful to legal readers unfamiliar with the language of epistemology, to philosophical readers unfamiliar with the language of the law, and to any readers curious about the specifics of the diseases and disorders they read about in toxic tort cases; a table of cases cited, giving their histories; a list of the statutes, rules, etc., to which I refer; and, of course, a full bibliography.

July 2013

Epistemology and the Law of Evidence: Problems and Projects

As for the philosophers, they make imaginary laws for imaginary commonwealths; and their discourses are as the stars, which give little light, because they are so high.

—Francis Bacon¹

Even today, more than four centuries later, Bacon’s complaint still resonates. Now, as then, the writings of philosophers—even of philosophers of law, who might be expected to be a little more grounded in the real world—all too often “give little light, because they are so high.” I will try to buck this trend by showing you that epistemological ideas really can illuminate real-life legal issues.

1 IDENTIFYING EPISTEMOLOGICAL ISSUES IN THE LAW

Every legal system needs, somehow, to determine the truth of factual questions. At one time, courts in England and continental Europe relied on in-court tests²—“proof” in the old meaning of the English word (a meaning that still survives in descriptions of liquor as “80% proof,”³ and in the old proverb “the proof of the pudding is in the eating”). In trial by oath, a defendant would be asked to swear on the testament or on a reliquary that he was innocent, and “oath-helpers” or “con-jurors” might be called to swear that *his* oath wasn’t

¹ Francis Bacon, *The Advancement of Learning* (1605), in Basil Montagu, ed., *The Works of Francis Bacon* (London: William Pickering, 1825), vol. II, 295.

² For more details of the history sketched here, see “Legal Probabilism: An Epistemological Dissent,” pp. 47–77 in this volume, 48–50.

³ The phrase refers to the strength of the liquor, calculated as twice the percentage of alcohol present; so, e.g., liquor that is “80% proof” would be 40% alcohol. Merriam Webster, *Webster’s Ninth New Collegiate Dictionary* (Springfield, MA: Merriam-Webster Publishing, 1991), 942.

foresworn;⁴ in trial by ordeal, a defendant might be asked, e.g., to pick up a ring from the bottom of a cauldron of boiling water, and his arm would later be checked to determine whether it had healed cleanly or had festered—which supposedly showed that he was guilty;⁵ in trial by combat, the two parties to a case would literally fight it out.⁶ The rationale for these procedures was, presumably, theological: God would strike a man who swore falsely, would ensure that an innocent defendant's wound healed cleanly, would see to it that the party in the right prevailed in combat; and these methods of proof (or "proof") were tolerated, presumably, because such theological assumptions were widely-enough accepted.

In continental Europe, in-court tests by oath and ordeal would gradually be replaced by canonical law and the Inquisition, and then by secular, national legal systems—which, however, still relied on torture to extract confessions.⁷ In 1766 Voltaire, who had long criticized the use of torture to determine guilt, complained about the practice of courts in Toulouse, which acknowledged "not only half-proofs but also quarters [e.g., a piece of hearsay] and eighths [e.g., a rumor]"—and then added up these fractional proofs, so that "eight doubts could constitute a perfect proof." But by this time the system was already in trouble; and in 1808 it would be reformed under Napoleon's legal code.⁸

In England, in-court tests by oath and ordeal were gradually replaced by a nascent system of jury trials.⁹ The first such trial was held in Westminster in 1220: five men accused of murder agreed "to submit to the judgement of twelve of their property-owning neighbors"; and, in a procedure recognizably descended from the older practice of calling on con-jurors, these jurymen swore that one of the accused was law-abiding, but that the other four (who

⁴ Lisi Oliver, *The Beginnings of English Law* (Toronto: University of Toronto Press, 2002), 174 ff.

⁵ Robert Bartlett, *Trial by Fire and Water: The Medieval Judicial Ordeal* (Oxford: Clarendon Press, 1986), 9 ff.

⁶ George Neilson, *Trial by Combat* (London: Williams and Norgate, 1890).

⁷ Sadakat Kadri, *The Trial: A History, from Socrates to O. J. Simpson* (New York: Random House, 2005), 39–45.

⁸ *Id.*, 67–68.

⁹ These early English jury trials were not, to be sure, the first-ever trials by jury. A (very different) kind of jury trial was found in ancient Athens, where in 399 B.C. Socrates was tried before 501 fellow-citizens. Kadri (note 7 above), 9. On ancient Greek legal procedure more generally, A. Andrewes, "The Growth of the Athenian State," in John Boardman and N. G. L. Hammond, eds., *Cambridge Ancient Histories* (Cambridge: Cambridge University Press, 1983), III Part 3, *The Expansion of the Greek World, Eighth to Sixth Centuries B.C.*, chapter 43, 360–91, 388; Mogens Herman Hansen, *The Athenian Democracy in the Age of Demosthenes: Structure, Principles, and Ideology*, trans. J. A. Cook (Oxford: Blackwell, 1991), chapter 8.

in due course were hanged) were thieves.¹⁰ But it would take centuries for the full array of now-familiar common-law evidentiary procedures—witnesses, cross-examination, exclusionary rules of evidence—to evolve.¹¹

Had the theological assumptions on which they rested been true, tests by oath, ordeal, and combat would have been epistemologically reasonable ways to determine facts at issue. But now, because we no longer believe those theological assumptions *are* true, we don't see those proof-procedures as epistemologically defensible. Still, even today some legal systems rely on practices reminiscent of the old provision in trial by oath that whether a defendant needed oath-helpers, and if so, how many, depended on his rank.¹² In traditional Sharia law, as presently practiced in, for example, Saudi Arabia, a man's testimony is given twice the weight of a woman's.¹³ And even in modern, western legal systems there are occasional reminders of the older proof-procedures: for example—rather as the word of the king or a bishop was taken to be sufficient by itself, without his needing to swear a solemn oath or, *a fortiori*, to produce oath-helpers¹⁴—some courts in the US have held government websites to be self-authenticating.¹⁵

Modern western legal systems, however, don't use anything like those older in-court tests, but instead rely primarily¹⁶ on the presentation of evidence: the testimony of witnesses, documentary evidence, and physical evidence such as the alleged murder weapon, the allegedly forged will, and so forth—"proof" in the current sense of the word, of showing some claim to be true, or likely true. Of course, the rationale for these practices *also* depends on certain presuppositions. This point can be made vivid by thinking about what the consequences would be for the law if these assumptions were false. If, for example,

¹⁰ Kadri, *The Trial* (note 7 above), 70–71. (The defendants, Kadri reports, had been identified by a self-confessed murderer in hopes that, by informing on them, she would save her own life.)

¹¹ See e.g., Stephan Landsman, "Of Witches, Madmen, and Product Liability: An Historical Survey of the Use of Expert Testimony," *Behavioral Science and Law* 13, no.2 (1995): 131–57.

¹² Oliver, *The Beginnings of English Law* (note 4 above), 174 ff.

¹³ Hunt Janin and André Kahlmeyer, *Islamic Law: The Sharia from Muhammad's Time to the Present* (Jefferson, NC: McFarland and Company, 2007), 32.

¹⁴ Oliver, *The Beginnings of English Law* (note 4 above), 174.

¹⁵ Federal Rule of Evidence 902 provides that certain kinds of evidence, including documents bearing "a seal purporting to be [sic] that of the United States," are self-authenticating; and this has been interpreted as including government websites. See e.g., *Estate of Gonzales v. Hickman*, ED CV 05–660 MMM (RCx), 2007 WL 3237727, *2 (C.D. Cal. May 30, 2007); *Paralyzed Veterans of Am. v. McPherson*, No. C 06–4670 SBA, 2008 WL 4183981 (N.D. Cal. Sept. 9, 2008); *Williams v. Long*, 585 F. Supp. 2d 679, 685 (D. Md. 2008).

¹⁶ The qualification "primarily" is intended to acknowledge, e.g., the role of legal presumptions.

Richard Rorty had been right to insist that the entire epistemological enterprise is misconceived,¹⁷ if standards of what makes evidence stronger or weaker really were, as he professed to believe,¹⁸ purely conventional—not universal, but local to this or that epistemic community, and not truth-indicative, but free-floating¹⁹—then what we optimistically call the “justice system” would really be nothing but a cruel kind of judicial theater.

As this thought-experiment reveals, modern evidentiary procedures (in both common-law and civil-law jurisdictions) presuppose that evidence may be objectively better, or worse; that the better a claim is warranted by the evidence, the likelier it is to be true; and that these or those legal rules and procedures are good-enough ways of ensuring that verdicts are factually sound. In fact, as I understand it, what we ask the finder of fact to do is precisely to determine whether the defendant’s guilt or his liability has been established to the legally-required degree of proof by the evidence presented; and this is to make an *epistemological* judgment.

As I put it nearly a decade ago, the law is “up to its neck in epistemology,”²⁰ for even the briefest reflection on the rationale for evidentiary rules and procedures raises a host of questions of interest to an epistemologist. Are degrees and standards of proof best understood as degrees of credence on the part of the fact-finder, as mathematical probabilities, or as degrees of warrant of a claim by evidence? What is the relation of degrees of proof to the mathematical calculus of probabilities—and what role, if any, does that calculus have in legal proof?²¹ And if, as I believe, degrees of proof are degrees of warrant, what determines how well this or that evidence warrants a claim? Must we choose between “fact-based” and “story-based” or “narrative” accounts of proof, or are

¹⁷ Richard Rorty, *Philosophy and the Mirror of Nature* (Princeton, NJ: Princeton University Press, 1979). Rorty’s critique of epistemology is, however, nothing but a farrago of confusions and equivocations—confusions and equivocations painstakingly disentangled in Susan Haack, *Evidence and Inquiry* (1993; 2nd ed., Amherst, NY: Prometheus Books, 2009) chapter 9, and revisited more briefly in Susan Haack, “Confessions of an Old-Fashioned Prig,” in Haack, *Manifesto of a Passionate Moderate: Unfashionable Essays* (Chicago, IL: University of Chicago Press, 1998), 7–30, and in Susan Haack, “Coherence, Consistency, Cogency, Congruity, Cohesiveness, &c.: Remain Calm! Don’t Go Overboard!” (2004), in Haack, *Putting Philosophy to Work: Inquiry and Its Place in Culture* (Amherst, NY: Prometheus Books, 2008, expanded ed., 2013), 69–82.

¹⁸ I say “professed” because, I assume, when he needed to choose a medical treatment or find out whether the publisher’s check had arrived, Rorty looked to the evidence, just as you or I would do.

¹⁹ Rorty, *Philosophy and the Mirror of Nature* (note 17 above), chapter 5, §§5, 6.

²⁰ “Epistemology Legalized: or, Truth, Justice, and the American Way,” pp. 27–46 in this volume, 28.

²¹ The subject of “Legal Probabilism: An Epistemological Dissent,” pp. 47–77 in this volume.

there other possibilities? Can combined evidence sometimes reach a higher degree of proof than any of its elements alone could do? When can we rely on the testimony of a witness, and when should we be suspicious of his honesty, or his competence, or both? Are there special difficulties when the witness is an expert? How are we to distinguish the genuine expert from the plausible charlatan? Is a group of people always, or sometimes, in an epistemologically stronger position than an individual—and if so, when, and why? Was C. S. Peirce right to complain that the adversarial procedures of common-law systems are poorly suited to discovering the truth?²² Was Jeremy Bentham right to argue that, because they prevent relevant evidence from ever being heard, exclusionary rules are a clear impediment to arriving at the facts of a case, and mainly serve the interests of attorneys who benefit from their skill in gaming the system?²³ Etc., etc., etc.

2 CHARACTERIZING LEGAL EPISTEMOLOGY

The word “epistemology” is a relatively recent coinage, dating from the mid-to late-nineteenth century.²⁴ But epistemology, the philosophical theory of knowledge, is very old, dating back at least to Plato’s efforts to distinguish genuine knowledge (*episteme*) from mere belief or opinion (*doxa*).²⁵

In the course of its long history, epistemology has undertaken a whole range of projects: not only distinguishing genuine knowledge from mere belief or sheer opinion, but also offering definitions or explications of the concept of knowledge; proposing arguments to establish that knowledge is possible—or that it isn’t; articulating the differences between knowing that *p*, knowing *X*, and knowing how to Φ ; exploring the relations of knowledge, certainty, and probability; asking how we know mathematical truths, empirical truths, moral truths, religious truths, etc., etc.; reflecting on supposed sources of knowledge—intellectual intuition, sensory experience, introspection, memory, inference, testimony, revelation, religious experience?—and their

²² C. S. Peirce, *Collected Papers*, eds. Charles Hartshorne, Paul Weiss, and (vols. 7 and 8) Arthur Burks (Cambridge, MA: Harvard University Press, 1931–58) 2.635 (1878); also in *Writings: A Chronological Edition*, ed., the Peirce Edition Project (Indianapolis, IN: Indiana University Press, 1982–present) 3:331. See also “Epistemology Legalized” (note 20 above), 33–39.

²³ Jeremy Bentham, *Rationale of Judicial Evidence* (1827; New York: Garland, 1978). See also “Epistemology Legalized” (note 20 above), 39–45.

²⁴ Merriam Webster, *Webster’s Ninth New Collegiate Dictionary* (note 3 above), 419, dates the word to c.1856; but fifty years later we find Peirce complaining that it is “an atrocious translation of *Erkenntnislehre*.” Peirce, *Collected Papers* (note 22 above), 5.494 (c.1906).

²⁵ See, e.g., Plato, *Republic*, trans. G. A. Grube, revised by C. D. C. Reeve (Indianapolis, IN: Hackett Publishing Company, 1992), Book 7.

interrelations; articulating the structure of evidence and the determinants of evidential quality; trying to understand what makes evidence relevant to a claim, and what it means to describe evidence as misleading; characterizing procedures of inquiry and what makes them better or worse; distinguishing genuine inquiry from pseudo-inquiry and “advocacy research”; exploring epistemological virtues, such as intellectual honesty, patience, and thoroughness, and epistemological vices, such as self-deception, hastiness, and carelessness; looking at the effects of the environment in which inquiry takes place on how well or poorly it is conducted; evaluating the effects of sharing information; suggesting how to assess the worth of testimony, and investigating social aspects of knowledge more generally; and so on and on.

And what, exactly, do I mean by “legal epistemology” or “epistemology legalized”? In my mouth these phrases refer, not to a specialized, peculiar *genre* of epistemology, but simply to *epistemological work relevant to issues that arise in the law*.

John Stuart Mill writes in the introduction to his *System of Logic* (1843) that “[t]he business of the magistrate, of the military commander, of the navigator, of the physician, of the agriculturalist is to judge of evidence and act accordingly.” For they all “have to ascertain certain facts, in order that they apply certain rules...”²⁶ The word “epistemology” hadn’t yet become current; but Mill’s agreeably old-fashioned phrase, “judge of evidence,” identifies what I take to be the *core* epistemological concern: to understand what evidence is, how it is structured, and what makes it better or worse, stronger or weaker. And, as Mill’s putting “the magistrate” at the top of his list signals, it is precisely *this* aspect of epistemology that is most relevant to legal issues about proof and proof-procedures.

Relevance, however, is a matter of degree; some epistemological work is highly relevant to legal concerns, some relevant but less so, some only marginally relevant—and some not relevant at all. Moreover, not all legally-relevant epistemology will be helpful. What we need is not only epistemological theory *focused centrally on evidence and its evaluation* (though it may, to be sure, use other words, such as “data,” “reasons,” or “information”), but also epistemological theory *detailed enough* to get a serious grip on specific questions

²⁶ John Stuart Mill, *A System of Logic: Being a Connected View of the Principles of Evidence and the Methods of Scientific Investigation* (1843; 8th ed., London: Longman, Green, 1970), 7. Nowadays, we would probably say, not “judge of evidence,” but “judge the weight [or the worth] of evidence”; but Mill’s phrase is exactly apt—as is his addendum, “and act accordingly”: the navigator must assess the evidence, that, say, a storm is coming, and do what is necessary to protect his ship, a physician must assess the evidence that, say, the patient is having a heart attack, and treat him appropriately, and so on.

raised by evidentiary procedures in the law; and, of course—well, *true* epistemological theory.

When I speak of the relevance of epistemology to the law, I refer to the field or discipline of epistemology, *not* to a professional specialism—which is by no means the same thing. Of late, philosophy has become hyper-professionalized and hyper-specialized,²⁷ so that by now there is a whole cadre of people self-identified as epistemologists. And these days many seem to use the word “epistemology” to refer to whatever those who identify themselves professionally as specialists in epistemology do. But this, while no doubt helpful to the careers of members of the guild, threatens to narrow the scope of the epistemological enterprise to issues that happen to be fashionable in the Analytic Epistemologists’ Union (AEU).²⁸ Indeed, so severe is the hyper-specialization that the AEU seems, in turn, to have splintered into sub-groups—the virtue epistemologists, the feminist epistemologists, the social epistemologists, etc. Moreover, self-styled “social epistemologists” are sometimes thought, by themselves and others, to have the monopoly on legally-relevant epistemology.²⁹ But this, though again no doubt helpful to the careers of members of the guild, threatens to narrow the scope of the epistemological ideas brought to bear on the law even further, to the current preoccupations of this sub-group—which is particularly unfortunate when, as happens more often than one would like, social epistemology is conducted without benefit of a good understanding of evidence and its quality.³⁰

Neither *all* the work of those specialists and sub-specialists in epistemology nor *only* the work of those specialists and sub-specialists is helpful in understanding the evidentiary issues with which the law deals. Some of the work of specialist-epistemologists (e.g., the seemingly endless attempts to refute the skeptic, those constantly-recycled “Gettier paradoxes,”³¹ efforts to catalogue

²⁷ See Susan Haack, “Out of Step: Academic Ethics in a Preposterous Environment,” in Haack, *Putting Philosophy to Work* (note 17 above), 251–68.

²⁸ My coinage, of course. See e.g., my “Foreword” to the 2nd ed. of *Evidence and Inquiry* (note 17 above), 23.

²⁹ For example, the only category acknowledged by the Philosophy Research Network (PRN: the relevant branch of SSRN, the Social Sciences Research Network) in which work on legal epistemology seems to belong is “Social Epistemology and Testimony.”

³⁰ For example, to judge by the index, in Alvin I. Goldman, *Knowledge in a Social World* (Oxford: Clarendon Press, 1999) (an influential foray into “social epistemology”) there are *no* references to the concept of evidence—except in the chapter on the law!

³¹ Edmund Gettier, “Is Justified True Belief Knowledge?” *Analysis* 23 (1963): 121–23; reprinted in Louis J. Pojman, ed., *Theory of Knowledge: Classical and Contemporary Sources* (Belmont, CA: Wadsworth, 2nd ed., 1998), 142–43. In a paper I wrote in 1983 but didn’t publish until 2009 (when a new wave of Gettierology was well under way), I had argued that these paradoxes arise from the mismatch between the concept of knowledge, which is categorical, and

and classify the epistemic virtues)³² is irrelevant, or only marginally relevant, to legal concerns. Moreover, much work by specialist-epistemologists even on legally-relevant topics—e.g., about the evaluation of testimony, or the epistemological consequences of evidence-sharing—isn’t detailed enough, or isn’t detailed enough in the relevant respects, to be very helpful to an understanding of evidentiary issues in the law; and a good deal of the work of professional epistemologists (e.g., efforts to understand epistemic justification in terms of the truth-ratios of belief-forming processes)³³ is, to put it bluntly, just wrong-headed.³⁴

Besides, before the current hyper-specialization set in, when philosophers felt somewhat freer to go where their intellectual bent and the task at hand took them, inductive logician L. J. Cohen had contributed significantly to issues in legal epistemology.³⁵ And there have long been legal scholars and judges who have made real contributions to epistemological issues in the law: I think, e.g., of Jeremy Bentham’s battery of criticisms of exclusionary rules of evidence;³⁶ of John Wigmore’s diagrammatic representations of the structure of evidence;³⁷ of Judge Learned Hand’s diagnosis of the “logical anomaly” at the heart of expert-witness testimony;³⁸ and of Leonard Jaffee’s reflections on the role of statistical evidence at trial³⁹—to mention just a few. For that matter, there is a good deal of epistemology built into such routine legal materials

the concept of justification, which is gradational; and that in consequence there *can be* no definition of knowledge which doesn’t *either* allow such paradoxes *or else* lead to skepticism. Susan Haack, “‘Know’ Is Just a Four-Letter Word,” in Haack, *Evidence and Inquiry* (note 17 above), 2nd ed., 301–31. This diagnosis, I still believe, simply dissolves the supposed problem on which so much energy has been, and continues to be, wasted.

³² See e.g., Linda Zagzebski, *Virtues of the Mind* (New York: Cambridge University Press, 1996); Abrol Fairweather and Linda Zagzebski, eds., *Virtue Epistemology: Essays on Epistemic Virtue and Responsibility* (New York: Oxford University Press, 2001).

³³ See e.g., Alvin I. Goldman, “What Is Justified Belief?,” in George Pappas, ed., *Justification and Knowledge* (Dordrecht, the Netherlands: Reidel, 1979), 1–21; *Epistemology and Cognition* (Cambridge, MA: Harvard University Press, 1986); “Two Concepts of Justification,” in James Tomberlin, ed., *Philosophical Perspectives*, 2: *Epistemology* (Atascadero, CA: Ridgeview, 1988), 51–70.

³⁴ As I argued in excruciating detail in *Evidence and Inquiry* (note 17 above) chapter 7.

³⁵ L. Jonathan Cohen, *The Provable and the Probable* (Oxford: Clarendon Press, 1977).

³⁶ Bentham, *Rationale of Judicial Evidence* (note 23 above).

³⁷ John Henry Wigmore, *The Principles of Judicial Proof as Given by Logic, Psychology, and General Experience as Illustrated in Judicial Trials* (1913; 5th American ed., Littleton, CO: Fred B. Rothman & Co., 1981).

³⁸ Learned Hand, “Historical and Practical Considerations Regarding Expert Testimony,” *Harvard Law Review* 15 (1901): 40–58.

³⁹ Leonard R. Jaffee, “Of Probativity and Probability: Statistics, Scientific Evidence, and the Calculus of Chances at Trial,” *University of Pittsburgh Law Review* 46 (1984–5): 925–1083.

as jury instructions on standards of proof,⁴⁰ and a good deal of epistemology implicit in judicial rulings.⁴¹

Thoughtful scientists have also made real epistemological contributions: Percy Bridgman,⁴² for example, whose reflections on the pointless “ballyhoo” made about the “scientific method” and the need to get down, instead, to the nuts and bolts of scientific work, reveal the naïveté of some judicial observations about the supposed method of science, notably Justice Blackmun’s comments on “methodology” in *Daubert*;⁴³ or W. K. Clifford,⁴⁴ whose reflections on when and why it is appropriate to rely on experts’ opinions, and when and why it is inappropriate, have a lot to teach us about expert testimony. And many novelists explore epistemological themes—often, to be sure, matters of epistemic character, with only indirect bearing on legal issues, as with Samuel Butler’s remarkable portrayal of self-deception, hypocrisy, and sham inquiry in *The Way of All Flesh*;⁴⁵ but sometimes strikingly legally relevant. You can learn a lot about what makes evidence misleading from Michael Frayn’s playful treatment in *Headlong*,⁴⁶ or (in a more directly legal way) from Scott Turow’s exploration in *Reversible Errors*.⁴⁷ You can learn even from (good) *bad* novels, such as Arthur Hailey’s *Strong Medicine*,⁴⁸ which is quite revealing

⁴⁰ See §4, pp. 16–18 below.

⁴¹ See, for example (on the weight of combined evidence), *Milward v. Acuity Specialty Prods. Grp., Inc.*, 639 F.3d 11 (1st Cir. 2011).

⁴² Percy W. Bridgman, “On ‘Scientific Method’” (1949), in Bridgman, *Reflections of a Physicist* (New York: Philosophical Library, 2nd ed., 1955), 81–83, 81.

⁴³ *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 589–95 (1993) (“*Daubert III*”).

⁴⁴ William Kingdon Clifford, “The Ethics of Belief” (1877) in Clifford, *The Ethics of Belief and Other Essays*, eds. Leslie Stephen and Frederick Pollock (London: Watts & Co., 1947), 70–96, 85 ff.

⁴⁵ Samuel Butler, *The Way of All Flesh* (1903; New York: American Library, 1998). This semi-autobiographical *Bildungsroman* tells the story of a young man who grows from callow boy to self-deceived curate, and finally, after professional and personal disgrace, achieves intellectual adulthood. It is discussed at length in Susan Haack, “The Ideal of Intellectual Integrity, in Life and Literature” (2005), in Haack, *Putting Philosophy to Work* (note 17 above), 209–220.

⁴⁶ Michael Frayn, *Headlong* (New York: Picador, 1999) tells the story of a hapless philosophy lecturer who, hoping to buy a painting cheaply from his financially stressed and artistically clueless aristocratic neighbor, uncovers evidence suggesting that the painting is, as he suspects, a missing Bruegel—no, that it isn’t—yes, that it is—no, that it isn’t, . . . , and so on and on through the whole book.

⁴⁷ Scott Turow, *Reversible Errors* (New York: Warner Vision Books, 2002) tells the story of an attorney who, required by the court to take on the last-minute appeal of a death-row inmate, uncovers more and more evidence indicating that his client is guilty—until, at last, he finds the one piece of evidence that puts all the rest in a different light, and shows the client to be innocent after all.

⁴⁸ Arthur Hailey, *Strong Medicine* (London: Pan Books, 1984) tells the story of a drug company’s development of a drug against morning-sickness in pregnancy, a drug that turns out

about what can go wrong, epistemologically speaking, with a pharmaceutical company's trials of a drug.

Of course legal epistemology, like all legal philosophy, is inherently susceptible to certain pitfalls. One very real danger, foreshadowed in the quotation from Bacon with which I began, is ascending to so high a level of abstraction that you fail to engage in a meaningful way with any real-world legal system. And then there's the opposite danger, being so closely concerned with the evidentiary practices of a particular jurisdiction that you fail to engage with legal practices that are even slightly different—a danger Bacon also notes; though he attributes it to lawyers, who, he complains, “write according to the states where they live, what is received law.”⁴⁹ It's also all too easy to confuse the epistemologically ideal with the best that's practically feasible—and it can be very hard to figure out what practical constraints we simply have to live with, and what could, and perhaps should, be overcome. And yet another problem is keeping clear which elements of the rationale for, or which elements of criticisms of, various evidentiary rules and procedures are truly epistemological, and which depend, rather, on concern for various policy objectives.

Then there's what I think of as the problem of “conceptual slippage”: the small (and sometimes not-so-small) differences between legal and epistemological uses of the same terms. The concept of *evidence*—which in legal contexts includes physical evidence, rarely considered by epistemologists, is itself an example; then there's *reliability*—a technical term in reliabilist epistemology and, since *Daubert*, a very different technical term in US evidence law, and moreover one that doesn't, like the ordinary concept, come in degrees;⁵⁰ *causation*—which, as articulated over centuries of tort law, has diverged both from ordinary and from scientific usage;⁵¹ and *knowledge*—which, as it appears in “*scienter*” requirements, e.g., that the defendant “knew or should

to cause terrible birth defects. (Bendectin, the drug at issue in *Daubert*, which the plaintiffs believed had caused their son's birth defect, was also prescribed for the treatment of morning-sickness.)

⁴⁹ Bacon, *The Advancement of Learning* (note 1 above), 295.

⁵⁰ *Daubert III* (note 43 above), 590 n.9. I should note that Federal Rule of Evidence 702 (which *Daubert III* was interpreting) was modified in 2000, coming into effect in its modified form in December that year; and was “restyled” in 2011; and now requires that expert testimony be “based upon sufficient facts or data,” is “the product of reliable principles and methods,” “which the witness has applied ... reliably ... to the facts of the case.” The first of these three clauses may hint at a gradational understanding of “reliable”; but the second and third, like that footnote in *Daubert III*, suggest a categorical understanding.

⁵¹ See e.g., Lawrence M. Friedman, *A History of American Law* (New York: Simon and Schuster, 1973), 409 ff.

have known” that the goods he bought suspiciously cheaply were stolen,⁵² seems quite far removed from most epistemologists’ conceptions. Moreover, even when a concept is of interest both to legal scholars and to epistemologists, their focus is often very different. The AEU’s interest in the definition of knowledge, for example, is often motivated by the hope of refuting skepticism or, more recently, with resolving a new rash of Gettier-type paradoxes; and epistemological interest in testimony is often focused on a (not always well-defined) idea of “social knowledge.”

3 ARTICULATING LEGALLY-RELEVANT EPISTEMOLOGICAL IDEAS

The epistemological ideas developed in my *Evidence and Inquiry*⁵³ and later modified, refined, and amplified in chapter 3 of *Defending Science—Within Reason*⁵⁴ are focused centrally on the structure of evidence and its evaluation; and they interlock both with my ideas about the nature and conduct of inquiry,⁵⁵ and with my ideas about epistemological character.⁵⁶ They are worked out in greater-than-usual (though, inevitably, still far from perfect) detail; and they are at least approximately true—or so I believe: if I didn’t, I’d drop them and start again! So, given the argument of the previous section, they should prove legally helpful; as, in fact, I believe they have. Setting

⁵² The Model Penal Code explains the presumption of knowledge in such cases as requiring: (a) that a dealer be found in possession of stolen property from two or more persons on separate occasions; or (b) that he have received stolen property in another transaction within the year preceding the transaction charged; or (c) being a dealer in the type of property received, he acquired it for a consideration he knows is far below its reasonable value. Model Penal Code § 223.6(2) (ALI 1962), in 10A *Uniform Laws Annotated* 561 (West Group 2001). Statutes on receiving stolen property vary somewhat from state to state: e.g., the Minnesota statute speaks of the defendant’s “knowing or having reason to know” that the property was stolen (Minn Stat Ann § 609.53 (West 2009)); the Missouri statute adds to the provisions of the Model Penal Code that the defendant knew the property to be stolen or acquired it “under such circumstances as would reasonably induce a person to believe the property was stolen” (Mo Ann Stat § 570.080 (Vernon 1999 & Supp 2012)); and the Delaware statute speaks of the defendant’s “knowing that [the property] has been acquired under circumstances amounting to theft, or believing that it has been so acquired” (11 Del Code Ann § 851 (Mitchie Supp 2012)).

⁵³ Haack, *Evidence and Inquiry* (note 17 above); “A Foundherentist Theory of Empirical Justification,” in Pojman, *Theories of Knowledge* (note 31 above), 2nd ed., 283–93.

⁵⁴ Susan Haack, *Defending Science—Within Reason* (Amherst, NY: Prometheus Books, 2003).

⁵⁵ See Susan Haack, “Preposterism and Its Consequences” (1996), in Haack, *Manifesto of a Passionate Moderate* (note 17 above), 188–204.

⁵⁶ See Haack, “The Ideal of Intellectual Integrity, in Life and Literature” (note 45 above), where I argue, *inter alia*, that epistemic virtues such as intellectual honesty concern a person’s relation to evidence: e.g., his willingness to acknowledge, and adapt his beliefs in response to, contrary evidence.

questions of epistemic character aside (because, fascinating as they are, their relevance to the law is very indirect), I will focus here on questions about *inquiry* and its conduct, and about when and how evidence contributes to the *justification* of a belief or the *warrant* of a claim.

Inquiry and Pseudo-Inquiry: Inquiry, as I understand it, is an attempt to discover the truth of some question or questions; by which I mean, simply, that the goal of an inquiry into whether p , say, is to end up concluding that p , if p , and that not- p , if not- p (and that it's more complicated than a simple matter of whether p or not- p , if it is more complicated than that). Pseudo-inquiry, by contrast, is an attempt to make the best possible case for some conclusion determined in advance. So a genuine inquirer is motivated to seek out all the evidence he can; to judge as fairly as possible how strong it is, in what direction it points, and how clearly; and to draw a conclusion only when he judges that he has adequate evidence to do so. A pseudo-inquirer, by contrast, will seek out all the favorable evidence he can, and try to play down or explain away any evidence unfavorable to his predetermined conclusion. "Advocacy research" (as we might call, e.g., a trade union's efforts to find evidence in support of their demands) is a form of pseudo-inquiry.

In real life, of course, people's motives are usually mixed; and what we find is not so much a clean, sharp demarcation between pseudo-inquiry and the real thing as a continuum from less to more commitment to arriving at a predetermined upshot, from less to more openness to all the evidence. In line with this, how well inquiry is conducted depends, *inter alia*, on how honest, thorough, and competent the search for evidence is, and how honest, thorough, and competent the appraisal of its worth. And as this reveals, inquiry conducted in an environment in which there is pressure to reach a predetermined conclusion, or for that matter to reach *some* conclusion right away, is likely to be less well-conducted than inquiry free of such pressures.

Evidence and Warrant: My account of what makes a person justified in believing something, or what makes a claim warranted is, in brief, evidentialist, experientialist, gradational, foundherentist, quasi-holistic, and worldly; and, in its most developed form, it combines individual and social elements. Each of these points, obviously, requires considerable amplification and explanation.

My theory is *evidentialist*:⁵⁷ by which I mean that it rests on the assumption that whether, and if so to what degree, a person is justified in believing

⁵⁷ I first used the term in *Evidence and Inquiry* (note 17 above), 22, 118, 191, 194, 195, 271. After I had introduced it, I found it had already been used, with at least roughly the same meaning, in Richard Feldman and Earl Conee, "Evidentialism," *Philosophical Studies* 48 (1985): 15–34. (I gather from our correspondence that Prof. Goldman thinks evidentialism denies that there

something depends on how good his evidence is—“his evidence” including both his experiential evidence and his background beliefs or reasons. My theory is also, as this reveals, *experientialist*: i.e., it takes the evidence with respect to empirical claims to include a subject’s sensory experience, his seeing, hearing, etc., this or that and his remembering seeing, hearing etc., this or that.⁵⁸ From a purely epistemological perspective, it is crucial to spell out what, exactly, experiential evidence is, and how, exactly, it contributes to justification;⁵⁹ but for present purposes I will set these issues aside, except to say that I conceive of experiential evidence as consisting, not of propositions believed, but of perceptual events, and of its causal role in bringing about beliefs as contributing to justification in virtue of the way language is learned.⁶⁰

My theory is also *gradational*: i.e., it construes the quality of evidence (and hence of epistemic justification), not as categorical, but as a matter of degree: evidence with respect to a claim may be stronger, or weaker; a person may be more, or less, justified in believing something; and a claim or proposition may be warranted in greater, or in lesser, degree.⁶¹

And my theory is *foundherentist*: i.e., it is intermediate between the traditionally-rival families of theories of epistemic justification, foundationalism and coherentism—which, however, don’t exhaust the options. Unlike coherentism, but like (some forms of) foundationalism, foundherentism allows a role for experiential evidence as well as for reasons; unlike foundationalism, but like coherentism, it allows pervasive relations of mutual support among beliefs.⁶²

The foundherentist account of the structure of evidence is informed by an analogy with a crossword puzzle: experiential evidence is the analogue of the

is any connection between epistemic justification and likely truth; but as readers of the last chapter of *Evidence and Inquiry* will clearly see, in my case at any rate, this is egregiously false.)

⁵⁸ I also include introspective evidence under “experiential evidence”; but have no theoretical account of such evidence to offer.

⁵⁹ See Haack, *Evidence and Inquiry* (note 17 above), chapter 5 (but note that, when I turn to the explanation of what makes evidence better or worse, I rely on propositional proxies for experiential states); Haack, *Defending Science* (note 54 above), 61–63.

⁶⁰ The picture I offer is of language as learned in part by ostension and in part by verbal definition, but with a gradualist twist: all language-learning involves both—the more observational a term, the greater the role of ostension, and the more theoretical the term, the greater the role of intra-linguistic connections. This is why a person’s being in, say, the kind of perceptual state a normal person would be in when seeing a cardinal bird three feet away in good light gives support to his belief that there’s a cardinal in front of him (how much depending also to some degree on other beliefs of his, e.g., about how normal his vision is). For a fuller account, see again Haack, *Defending Science* (note 54 above), 61–63.

⁶¹ Haack, *Evidence and Inquiry* (note 17 above), chapter 4.

⁶² *Id.*, chapter 1; see also Haack, “A Foundherentist Theory” (note 53 above).

clues, and reasons (a person's background beliefs, ramifying in all directions) the analogue of already-completed crossword entries. The same analogy also informs the foundherentist account of the determinants of evidential quality, of what makes evidence stronger or weaker, better or worse; which has three dimensions:

- how *supportive* the evidence is of the belief in question (analogue: how well a crossword entry fits with the clue and any completed intersecting entries);
- how *secure* the reasons are, independently of the belief in question (analogue: how reasonable those intersecting completed crossword entries are, independently of the one in question);
- how *comprehensive* the evidence is (analogue: how much of the crossword has been completed).

Because this theory of what makes evidence better or worse is multi-dimensional, it doesn't guarantee a linear ordering of degrees of justification; nor, *a fortiori*, does it offer anything like a numerical scale. And, as this suggests, it precludes identifying degrees of warrant with mathematical probabilities.⁶³

Of course, each of the determinants of evidential quality needs to be spelled out in a lot more detail—much more detail than I can make room for here. But, briefly and roughly: how well a body of evidence supports a conclusion depends on the degree of explanatory integration of this evidence with that conclusion, i.e., how well evidence and conclusion fit together in an explanatory account.⁶⁴ How supportive a particular piece of evidence is depends on whether, and if so, how much, adding that piece of evidence enhances the explanatory integration of the whole. Evidence may be *positive* with respect to a claim, i.e., support it to some degree; or *negative*, i.e., undermine it to some degree; or it may be *neutral* with respect to the claim in question, neither supporting it nor undermining it—i.e., *irrelevant* to that claim.

How well evidence E justifies a belief is enhanced the *more* independently secure the positive reasons are, but the *less* independently secure the negative reasons are. I should also note that, while the independent security requirement might appear, at first glance, to be circular—since “secure” here is a synonym for “justified”—there is really no vicious circle, and no infinite regress. The independent security requirement applies only to reasons for a belief, not to the experiential evidence that ultimately grounds our beliefs about the

⁶³ This argument is made in much more detail in “Legal Probabilism” (note 21 above), 60–62.

⁶⁴ Hence the need for propositional proxies for experiential evidence (note 59 above): an explanatory account needs to be, as the phrase suggests, a set of propositions.

world; and this experiential evidence consists of events, not propositions, and so neither has nor stands in need of justification.

How comprehensive evidence is depends on how much of the evidence relevant (positively or negatively) to the proposition in question it includes.

My theory is *worldly*: i.e., its account of evidential quality isn't purely formal or syntactic, but material; it depends on facts about the world. Why so? First, the foundherentist understanding of supportiveness of evidence relies on the idea of degree of explanatory integration of evidence-plus-conclusion; and genuine explanation requires a vocabulary that picks out real kinds of thing or stuff.⁶⁵ Second, the foundherentist understanding of comprehensiveness relies on the concept of relevance; which, again, isn't a formal but a material matter. Is the way this job applicant loops the letter "g," for example, relevant to whether he can be trusted with the firm's money? It depends on whether graphology (the theory that handwriting is indicative of character) is true—i.e., on facts about the world.

My theory is *quasi-holistic*: i.e., 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. So what I offer is a kind of articulated quasi-holism.

And, in its most fully-developed form, my theory *combines individual and social elements*. In *Evidence and Inquiry* I focused on *what makes an individual more or less justified* in believing something at a time; but by the time of *Defending Science* I was able to go beyond this to construct an account of *what makes a claim more or less warranted* at a time. (In ordinary English, of course, the words "justification" and "warrant" are more or less interchangeable; but I have adopted them as technical terms to represent these two different, though related, concepts.) *Evidence and Inquiry* focused on the evidence that actually leads someone to believe something at a time. The result was an account of justification that is personal (because it depends on the quality of the evidence that causes a person to have a certain belief), but not subjective (because how good a person's evidence is doesn't depend on how good he believes it to be).⁶⁶ *Defending Science* focused instead on the evidence a person possesses at a time, whether or not this is what causes him to have the belief in question at that time. This shift made it possible to construct, first, an account of how warranted a claim is for a person at a time; then an account of how warranted a claim is for a group of people at a time—which requires,

⁶⁵ Haack, *Defending Science* (note 54 above), chapter 5.

⁶⁶ Haack, *Evidence and Inquiry* (note 17 above), 58, 160.

inter alia, an understanding of what is involved epistemologically in relying on others' testimony; and finally, an account of how warranted the claim is by the evidence available at a time.⁶⁷

4 APPLYING THESE EPISTEMOLOGICAL IDEAS TO EVIDENTIARY ISSUES

As I will show, these epistemological ideas illuminate a number of the issues about evidence and evidentiary procedure listed earlier. By way of preliminary, however, I need to articulate the epistemological dimensions of the legal concepts of burden, degree, and standard of proof.

US law assigns burdens of proof (also known as burdens of persuasion): i.e., it specifies which party has the obligation to establish the elements of a case; and it sets standards of proof: i.e., specifies to what degree those elements must be proven for the party that has the burden of proof to prevail. In criminal cases, the burden of proof falls on the prosecution, which is required to make its case "beyond a reasonable doubt";⁶⁸ in civil cases, the burden of proof falls on the plaintiff, who is normally required to make his case "by a preponderance of the evidence" or, as is sometimes said, "more probably than not"; and in a smaller class of cases, e.g., those involving issues of citizenship, an intermediate standard, "clear and convincing evidence," applies.⁶⁹

⁶⁷ This is worked out in some detail in Haack, *Defending Science* (note 54 above) chapter 3. The reason for starting with the individual is simple, but crucial: the warrant of any empirical claim depends ultimately on experience, i.e., on sensory interactions with the world; and it is individuals who have such interactions. This point is not a new one; it is made, for example, in Bertrand Russell, *Human Knowledge, Its Scope and Limits* (New York: Simon and Schuster, 1948), 8; but the account I construct to accommodate it is not, so far as I know, to be found, even in embryo, elsewhere.

⁶⁸ "The requirement that guilt of a criminal charge be established by proof beyond a reasonable doubt dates at least from our early years as a nation." *In re Winship*, 397 U.S. 358, 362 (1970). "[The] demand for a higher degree of persuasion in criminal cases was recurrently expressed though ancient times, [though] its crystallization into the formula 'beyond a reasonable doubt' seems to have occurred as late as 1878." Charles T. McCormick, *Handbook of the Law of Evidence* (St. Paul, MN: West Publishing Co., 1954), 681–82.

⁶⁹ Kenneth S. Broun, et al., eds., *McCormick on Evidence* (St. Paul, MN: Thomson/West, 2006), vol. 2, 487–90. The details may differ, but my understanding is that approximately the same structure is found in many legal systems. Not in all, however: according to Jean-Sébastien Borghetti, "Litigation on Hepatitis B Vaccination and Demyelinating Disease in France: Breaking Through Scientific Uncertainty in France," in Diego Papayannis, ed., *Uncertain Causation in Tort Law* (Cambridge: Cambridge University Press, forthcoming), "[f]acts do not have to be established 'on the balance of probabilities', or 'beyond a reasonable doubt'. First and second instance judges freely decide if evidence is enough to consider a fact as established. Their appreciation is a matter of 'intime conviction' and may not be challenged before the *Cour de cassation* or the *Conseil d'Etat*."

The different standards indicate that legal proof must be understood as coming in degrees, a matter of more and less; but there is disagreement about what, exactly, these degrees of proof are degrees of. Some (stressing the phrase “burden of persuasion”) take them to be fact-finders’ degrees of belief;⁷⁰ some (stressing the phrase “more probable than not”) take them to be mathematical probabilities;⁷¹ and some—the subjective Bayesians—combine the two: degrees of proof are to be construed as mathematical probabilities, and mathematical probabilities are in turn to be construed as subjective degrees of belief.⁷² Others, myself among them, take degrees of proof to be *epistemological likelihoods*,⁷³ i.e., degrees of warrant of a claim by evidence.

How legal degrees of proof are best understood is not itself an epistemological question. It is, rather, a matter of understanding, for example, what is going on when standards of proof are spelled out in jury instructions and in instructions to judges about the circumstances in which they may preempt or override a jury verdict; and also requires reflection on why we need such standards at all. To keep things manageable, here I will comment, very briefly, only on jury instructions.⁷⁴

Sometimes these instructions sound subjective, as if they referred simply to jurors’ degrees of belief: Florida jury instructions in criminal cases, for example, contrast “an abiding conviction of guilt” with a conviction that “wavers and vacillates”;⁷⁵ and federal jury instructions speak of “a settled conviction of

⁷⁰ Broun et al., eds., *McCormick on Evidence* (note 69 above), vol. 2, 483.

⁷¹ See, e.g., David Kaye, “Do We Need a Calculus of Weight to Understand Proof Beyond a Reasonable Doubt?” in Peter Tillers and Eric D. Green, eds., *Probability and Inference in the Law of Evidence: The Uses and Limits of Bayesianism* (Dordrecht, the Netherlands: Kluwer, 1988), 129–45; Richard Lempert, “The New Evidence Scholarship: Analyzing the Process of Proof,” 61–102 in the same volume.

⁷² See e.g., Michael O. Finkelstein and William B. Fairley, “A Bayesian Approach to Identification Evidence,” *Harvard Law Review* 83, no.3 (1969–70): 489–517; David Schum, *Evidential Foundations of Probabilistic Reasoning* (New York: John Wiley and Sons, 1994); Jay Kadane and David Schum, *A Probabilistic Analysis of the Sacco and Vanzetti Evidence* (New York: Wiley and Sons, 1996). Both are criticized in detail in “Legal Probabilism” (note 21 above).

⁷³ In ordinary English, of course, the words, “probability” and “likelihood,” mean essentially the same thing; but I have adopted “likelihood” specifically for the epistemological meaning.

⁷⁴ My treatment here will be very sketchy—just enough to get the epistemology in focus. In “Legal Probabilism” (note 21 above) I will give a much fuller discussion of jury instructions, of the circumstances in which a judge may grant JMOL (Judgment as a Matter of Law, the term now used to include both directed verdicts and judicial rulings overturning a jury verdict), and of the rationale for setting standards of proof.

⁷⁵ *Florida Standard Jury Instructions in Criminal Cases* ([Tallahassee, FL]: The Florida Bar/LexisNexis, 7th ed., 2009), § 3.7. (“Conviction,” here, of course means “degree of belief, degree of confidence in the truth of a proposition.”)