

Legal Epistemology

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Introduction

Legal practice is up to its neck in epistemology. Legal practice involves proof, evidence, doubt, testimony, arguments, witnesses, experts, and so on. The epistemology of legal practice, often referred to as legal epistemology, examines epistemological questions raised by legal practice. It can also apply legal insights to illuminating perennial epistemological problems. Legal epistemology investigates whether standards of proof, such as “beyond reasonable doubt” or “preponderance of evidence”, are best understood as credences, statistical likelihoods, or as qualitative standards. It asks what, if anything, legitimates these standards and in what ways legal standards of proof should be sensitive to practical factors. Legal epistemology examines when and why evidence has a probative value; that is, it investigates how evidence makes a litigated claim more likely. It illuminates what reasons—moral, political, economic, practical, epistemic—justify excluding probative evidence. It questions whether particular kinds of evidence are apt to mislead factfinders. Perhaps some kinds of character evidence, for example, are prejudicial. Legal epistemology asks whether particular aspects of evidence law contribute to epistemic injustice, including hermeneutical injustice, and illuminates sources of legal injustice. It investigates the normativity of profiling. Legal epistemology questions the epistemic and legal values of epistemic properties such as safety, sensitivity, reliability, coherence, intelligibility, knowledge, justification, explanation, narrative structure, epistemic virtue, and truth. Legal epistemology asks whether and how juries and judges can form collective beliefs; it examines features of effective deliberation and judgment aggregation, and studies the effect of disagreement and dissent on legal judgments. Legal phenomena such as expert testimony raise distinctive epistemological questions, such as how to adjudicate and manage expertise in the courtroom. Legal epistemology studies the legal posit of reasonableness, which arises in the reasonable person standard, reasonable doubt standard, and various other areas of legal practice. Legal epistemology can also illuminate the role of knowledge and ignorance in culpability: how should we understand the epistemic criteria for recklessness and negligence, for example, and what precisely is *mens rea*? Law varies by jurisdiction; different legal systems create and resolve epistemological challenges in different ways. This is evident in topics such as the admissibility of character evidence or hearsay evidence, the permissibility of inferences from silence, or the exclusion of improperly obtained evidence. Legal epistemology is deeply interdisciplinary. In addition to law and philosophy, it involves research in psychology, forensic science, sociology, anthropology, criminology, history, theology, politics, economics (particularly behavioral economics), artificial intelligence, computing, and statistics.

Law Background

Legal epistemology requires familiarity with law and legal scholarship. Criminal law, evidence law, and (to a lesser extent) procedural law are most relevant. Other areas can, of course, be relevant for particular projects. These might include, for example, media law, human rights law, intellectual property law, and

reputation management law (which involves applied epistemology notions such as defamation, confidentiality, and privacy). Depending on the project, one might engage with Sharia law, international law, or law governing a particular jurisdiction. There is a vast array of legal resources available for law students, practitioners, and scholars; resources vary in thoroughness, detail, accessibility, aims, jurisdiction, and topic. I cannot hope to survey appropriate texts; I shall instead orient the reader to find appropriate resources effectively. (Note these resources are weighted towards common law systems.) Focusing on West Academic Press, which is a major US publisher of legal education resources, provides the following taxonomy: Their most simple “Short & Happy Guide Series” are brief (100–200 pages), accessible primers. The books are overviews, aimed at the general consumer, and each cover relatively large areas of law, such as evidence, torts, or criminal law. They are likely too brief for serious legal epistemology research. West Academic Press’s “Nutshell” and “Concepts and Insights” series provide a better orientation for substantial legal epistemology research: they are general overviews by serious legal scholars and offer differing levels of grain. There is a general Nutshell on criminal law, and Nutshells on specific areas of criminal law, for example (Loewy 2009, Niehoff 2016). At the next level of length, depth, and comprehensiveness, “Hornbooks” and “Concise Hornbooks” (abridged versions of Hornbooks) are large, hardcover volumes. They range from 600 to 1200 pages, and cover broad subjects, such as evidence law or criminal law (Dressler 2015, Broun 2014, LaFave 2017). Finally, legal texts also include multi-volume treatises that practitioners rely on for documenting every significant case, citation, and development. These are likely referred to, rather than read. Thus I have presented four levels of increasing depth, thoroughness (and arguably dryness) in legal education resources, using West Academic Press as an exemplar. Lempert 2007 provides a thorough understanding of hallmark legal evidence cases. ***Wigmore on Evidence*** is an influential, early, and extremely thorough treatise on evidence law. The ***Federal Rules of Evidence*** clearly defines US evidence law. Roberts and Zuckerman 2010 is a philosophically-informed, UK-centered introduction to evidence law. Jackson and Summer 2012 compares different approaches to evidence law.

Wigmore, John Henry. 1937. *Wigmore on Evidence: The Science of Judicial Proof, as Given by Logic, Psychology, and General Experience and Illustrated in Judicial Trials*, 3rd ed., Boston: Little, Brown.

In 1904 Wigmore published an enormous monograph called *Treatise on the Anglo-American System of Evidence in Trials at Common Law*, more commonly known as *Wigmore on Evidence* or just *Wigmore*. Wigmore is considered a pioneering scholar of evidence law and its history. The treatise was extremely influential and highly regarded; it surveyed and systematized almost all US evidence law. By 1940 *Wigmore on Evidence* had expanded to ten volumes.

Federal Rules of Evidence in the United States [<https://www.rulesofevidence.org>]

The *Federal Rules of Evidence in the United States* articulates the rules governing the introduction of evidence in United States federal trial courts. This clear and concise document describes laws

concerning relevance, character evidence, pleas, attorney-client privilege, witnesses, expert testimony, hearsay, and related topics. It is available online [<https://www.rulesofevidence.org>].

Loewy, Arnold H. 2009. *Criminal Law in a Nutshell*, 5th edition. West Academic Press (Nutshell Series).

Loewy's Nutshell provides a quick overview of US criminal law. It orients the reader within legal topics such as punishment, specific crimes, the ingredients of a crime, such as *mens rea* and *actus reus*, special defenses, the burden of proof, and group criminality. Nutshells are shorter and more accessible than Hornbooks, textbooks, treatises, and similar legal education resources.

Niehoff, Leonard. 2016. *Evidence Law*. West Academic Press (Concepts and Insights Series).

Niehoff provides an overview of the principles of evidence law, including relevance, character, hearsay, impeachment, opinion, and privileges. It provides a handy, brief overview of the topics. West Academic Press's "Concepts and Insights" series—like Nutshells—are shorter and more accessible than Hornbooks, textbooks, treatises, and similar legal education resources. The "Concepts and Insights" series is a more academic version of a Nutshell, but the series is still under development.

Dressler, Joshua. 2015. *Understanding Criminal Law*, 7th edition. Carolina Academic Press (Mini-Hornbook, Handbook).

Dressler's text is an accessible, affordable "Hornbook" overview of US criminal law. It is designed for first-year law students. It covers theories of punishment, sources of law, constitutional limits on law, burdens of proof and related presumptions. It describes issues concerning *actus reus* and *mens rea*, such as omissions, causation, harm, voluntariness, intentionality, recklessness, and negligence. It also examines various defenses, such as insanity, intoxication, duress, and diminished capacity.

Kaye, David H., Kenneth S. Broun, George E. Dix, Eleanor Swift, E. F. Roberts, Edward J. Imwinkelried, and Robert P. Mosteller. 2014. *McCormick's Evidence*, 7th edition. West Academic Press (Hornbook Series).

McCormick's Evidence is a modern, classic, well-known, respected Hornbook. "Hornbooks" are relied on for legal practice and research, and are often the primary text used for a course in a law degree, but they may be too dense, thorough, or pricy to be ideal for *initial* legal orientation. Hornbooks are authoritative in legal practice and scholarship: they are cited by judges, for example.

LaFave, Wayne R. 2017 *Criminal Law*, 6th edition. West Academic Press (Hornbook Series).

LaFave is a popular Hornbook on criminal law. It provides detailed discussion of philosophically rich areas of criminal law, such as responsibility, justification, excuse, inchoate crimes, accomplice, liability, causation, insanity, and conspiracy. Student versions of Hornbooks and treatises—rather

than practitioner or teacher versions—should suffice. They tend to be significantly less expensive, and often simply lack extensive footnotes.

Roberts, Paul and Adrian Zuckerman. 2010. *Criminal Evidence*, 2nd edition. Oxford University Press.

This text describes and critically evaluates the law of criminal procedure and evidence in the UK; it comments on the underlying principles, logic, and values and engages with the moral, jurisprudential and political issues. This introduction to the law of evidence is apt for legal epistemology because it discusses philosophical issues concerning criminal evidence, including discussing the work of Antony Duff, Ho Hock Lai, Larry Laudan, and Alex Stein.

Lempert, Richard. 2007. *Evidence Stories*. West Academic Press (Law Stories Series).

The Law Stories series provides in-depth background understanding of landmark legal cases. This book examines in great detail several key legal cases concerning evidence, such as *People v. Collins*, 68 Cal.2d 319, 320, 66 Cal.Rptr. 497, 438 P.2d 33, 36 A.L.R.3d 1176 (1968), and is an indispensable resource for a deep understanding of the full story behind influential cases.

Jackson, John D. and Sarah J. Summer. 2012. *The Internationalisation of Criminal Evidence*. Cambridge University Press.

This text compares various approaches to criminal evidence and charts the developing standardization of these systems across the globe. It aims to articulate “a common set of evidentiary principles” across disparate systems and proposes improvements to existing systems.

Interdisciplinary Background

Legal epistemology is highly interdisciplinary. It sits at the intersection of epistemology and law. Understanding this intersection requires drawing on psychology, forensic science, sociology, criminology, history, theology, politics, economics (particularly behavioral economics), and statistics. It also requires understanding various areas of philosophy: primarily philosophy of law and epistemology, including especially formal epistemology and social epistemology. Other areas of philosophy—such as political philosophy, ethics, action theory, and philosophy of language—and philosophical topics—such as expected utility theory and causation—are also relevant. Audi 2010 provides an introductory overview of epistemology; Weatherson 2015 explains formal epistemology and game theory. Finkelstein 2009 offers an excellent overview of statistics and probability as they apply to actual legal disputes. Aitken, Roberts, Jackson, and Puch-Solis 2010–2015 are free practitioner guides concerning statistical reasoning in legal judgment. Schneps and Colmez 2013 describes several infamous instances of mathematics being misused in the courtroom. McDermid 2014 is an enjoyable book on the history and practice of forensic science. Schneps and Colmez 2013 and McDermid 2014 are both “popular” books: they are educational but—unlike most items in this bibliography—would make perfectly normal gifts for non-academics. Kaye

2010 focuses on the role of DNA in legal proceedings. It describes the history, science, law, and epistemology of DNA evidence, and is accessible to non-specialists. Kapardis 2014 is a textbook introducing various ways psychology bears on legal factfinding and adjudication. Saks and Spellman 2016 uses psychological research to critically assess the US Federal Rules of Evidence. Anderson, Schum and Twining 2005 explains methods of analyzing legal evidence. For further interdisciplinary background, see *Law Background* and *Historical Standards of Proof*. Many other sections feature interdisciplinary approaches. See especially *Character Evidence and Society*, *The Situationist Critique of Character Evidence*, *Testimony and Silence*, *Expert Witness Testimony*, *Juries*, and “Prejudice and Justice”.

Audi, Robert. 2010. *Epistemology: A Contemporary Introduction to the Theory of Knowledge*, 3rd edition. London: Routledge.

This introduction to epistemology would be useful for students or researchers who are interested in legal epistemology, but currently lack the requisite background in epistemology. It is likely too introductory for scholars who have already studied epistemology beyond the undergraduate level.

Weatherson, Brian. 2015. *Lecture Notes on Decision Theory* [<http://brian.weatherson.org/DTBook-15.pdf>].

The proper role of quantification and mathematical reasoning is one of the central topics in legal epistemology. Formal epistemology and expected utility theory inform this debate. Weatherson provides a helpful introduction to these topics and other areas of decision theory, logic, and formal philosophy. See chapter seven for a guide to Bayesianism. Weatherson’s *Lecture Notes* are suitable as a standalone resource and are freely available online [<http://brian.weatherson.org/DTBook-15.pdf>].

Finkelstein, Michael O. 2009. *Basic Concepts of Probability and Statistics in the Law*. Springer.

An understanding of statistics—and especially statistical errors—is crucial to many areas of legal epistemology. Finkelstein 2009 explains statistics and probability with reference to the law, focusing throughout on actual legal disputes. This book is a more accessible, less challenging, descendant of Finkelstein’s co-authored 2009 book *Statistics for Lawyers*.

Aitken, Colin, Paul Roberts, Graham Jackson, and Roberto Puch-Solis. 2010–2015. *Statistics and the Law Practitioner Guides*. Royal Statistical Society.

[http://www.rss.org.uk/RSS/Influencing_Change/Statistics_and_the_law/Practitioner_guides/RSS/Influencing_Change/Current_projects_sub/Statistics_and_the_law_sub/Practitioner_guides.aspx?hkey=2cfd562-361e-432e-851b-ef6ff5254145].

The Royal Statistical Society provides four practitioner guides on statistical reasoning and the law. The guides are freely available online and “are intended to assist judges, lawyers, forensic scientists and other expert witnesses in coping with the demands of modern criminal litigation”. The guides

describe statistical and probabilistic reasoning, common errors, Bayesianism, Wigmore's chart method, and DNA and other scientific evidence.

Schneps, Leila and Coralie Colmez. 2013. *Math on Trial: How Numbers Get Used and Abused in the Courtroom*. Basic Books.

Most of the entries in this bibliography are either textbooks or recondite scholarship. Schneps and Colmez 2013, by contrast, is an enjoyable book for a general audience. Schneps and Colmez explain the value of math in the courtroom by describing several infamous cases where math was horrendously *misused* in the courtroom. It is a basic introduction to probability, statistical fallacies, DNA, and other areas of applied math in legal contexts.

McDermid, Val. 2014. *Forensics: The Anatomy of Crime*. Profile Books.

McDermid's *Forensics*—reprinted as *Forensics: What Bugs, Burns, Prints, DNA, and More Tell Us About Crime*—describes forensic science and its history. McDermid is a crime writer, and this is an enjoyable, engaging, well-written book. It offers a basic orientation in fingerprints, DNA, toxicology, forensic psychology, and so on. It is not a textbook; if you need a thorough understanding of forensic science topics, you need a textbook instead.

Kaye, David H. 2010. *The Double Helix and the Law of Evidence*. Harvard University Press.

Kaye describes the history of DNA evidence in the American legal system. He draws on molecular biology, population genetics, evidence law, and statistics to explain the epistemic and legal value of DNA evidence.

Kapardis, Andreas. 2014. *Psychology and Law: A Critical Introduction*, 4th Edition. Cambridge University Press.

The intersection of psychology and law is awash with legal epistemology. (Or, from another perspective, the intersection of law and epistemology is awash with psychology.) This international overview discusses the psychology of eyewitness reports, memory, the ability to recognize and identify suspects, interrogations, detecting deception, false confessions, and prejudice and discrimination. It examines the psychology of decision making, including especially juries and sentencing. It also explores psychologists as expert witnesses.

Saks, J. Michael and Barbara A. Spellman. 2016. *The Psychological Foundations of Evidence Law*. NYU Press.

Saks and Spellman investigate psychological aspects of evidence law, and suggest ways to improve evidence law in light of psychological research. They focus on the psychology of

factfinders—such as the (in)ability to disregard evidence they were privy to—and witnesses. They examine kinds of evidence, such as character evidence, hearsay, and expert testimony.

Anderson, Terence, David Schum, and William Twining. 2005. *The Analysis of Evidence*. Cambridge University Press.

This textbook develops law students' skills in presenting and analyzing evidence and arguments. Professional philosophers may have already honed these skills, but may benefit from other features of this resource: cases, materials, concepts, and a detailed understanding of how practitioners proceed in legal reasoning. Chapters five and seven discuss the charting technique pioneered by Wigmore. Other chapters explain alternative devices of analysis, such as narrative and chronology.

Journals

There is no journal dedicated to legal epistemology. Given its interdisciplinary nature, journals in many different fields—such as law, philosophy, forensic science, genetics, statistics, computer science, criminology, critical theory, sociology, and economics—are relevant to legal epistemology. Several kinds of journal publish research on legal epistemology. These include journals in jurisprudence, political philosophy, applied philosophy, interdisciplinary journals about law, such as journals focusing on law and artificial intelligence, and epistemology journals, especially social epistemology journals. I shall draw attention to three journals that scholars from a background in philosophy are less likely to know already: *Law, Probability and Risk*, *The International Journal of Evidence and Proof*, and *International Commentary on Evidence* specialize in topics that are central to legal epistemology. But they do so from outside philosophy. It is important for legal epistemologists to know about these three journals.

Law, Probability and Risk [<https://academic.oup.com/lpr>]

Law, Probability and Risk specializes in the interface of law and probabilistic reasoning. This includes epistemological (and more broadly, philosophical) topics such as how to prove causation, assess risk, and interpret scientific evidence. The journal also discusses the epistemology and ethics of discrimination and profiling.

The International Journal of Evidence and Proof [<http://journals.sagepub.com/home/epj>]

This journal discusses evidence law, proof, and procedure. It is international and interdisciplinary, and so includes perspectives from legal theory, forensic science, sociology, psychology, philosophy, and so on, and analyzes a wide range of legal systems. The journal welcomes articles, book reviews, case commentaries, and notifications.

International Commentary on Evidence [<https://www.degruyter.com/view/j/ice>]

International Commentary on Evidence is an interdisciplinary journal that focuses on evidence law and theory.

Edited Volumes

Special issues, collections, and symposia are relatively common in law journals. Indeed, edited volumes and collections seem so typical of legal scholarship that if you find an article on a topic of interest, it can be worth checking the journal or volume in which the article appears, to see whether there are reply pieces or even an entire issue dedicated to the theme. Sinnott-Armstrong and Schauer 2008 and Kaptein, Prakken, and Verheij 2009 are both wide-ranging overviews of legal epistemology. Duff, Farmer, and Marshall 2004, 2006, 2007 is a three-volume discussion of the philosophical foundations of the criminal trial. Tillers and Green 1986 is a highly influential proceedings of a significant conference on Bayesianism in legal epistemology. Allen and Redmayne 1997 is a more recent examination of the same topic. Childs and Ellison 2000 investigates feminist perspectives on evidence law. Stehr and Weiler 2017 examines the law regarding intellectual property and the social and personal goods at stake in controlling knowledge.

Sinnott-Armstrong, Walter and Frederick Schauer (eds). 2008. *Evidence and Law*, Special Issue of *Episteme* Volume 5, Issue 3.

This special issue surveys themes at the intersection of epistemology and law, and includes contributions from influential legal epistemologists. A good range of topics are covered and (unlike many articles in law journals) the papers are all concise. If you need an upper-level syllabus in legal epistemology, you could draw heavily from this special issue!

Kaptein, Hendrik, Henry Prakken, and Bart Verheij (eds). 2009. *Legal Evidence and Proof: Statistics, Stories, Logic* (Applied Legal Philosophy Series). Ashgate.

This collection of essays examines epistemological issues that arise within legal investigation, procedure, and decision. As suggested by the subtitle, the selected papers represent statistical, story-based, and argumentation-based accounts of legal reasoning and legal proof.

Duff, Antony, Lindsay Farmer, Sandra Marshall, and Victor Tadros (eds). 2004, 2006, 2007. *The Trial on Trial Volumes I, II, III*. Oxford: Hart Publishing.

This three-part series, which stemmed from the three-year project, “the Trial on Trial”, aims towards a normative account of the criminal trial. The first two volumes are collected essays, and include contributions on jury nullification, adversarial and inquisitorial models, witness testimony, and appeals. The third volume, co-authored by the four editors, develops the thesis that the trial is a communicative process in which defendants are called to answer a charge.

Tillers, Peter and Eric D. Green (eds). 1986. Symposium: Probability and Inference in the Law of Evidence *Boston University Law Review* 66 (3–4).

This seminal special issue aims to illuminate evidence law, particularly the role of probabilistic evidence in legal proceedings. It features significant contributions from leading scholars, including Ronald J. Allen, Richard Lempert, Adrian Zuckerman, Charles Nesson, Jonathan Cohen, David H. Kaye, and Dale A. Nance, and was reprinted as the book, Tillers and Green (eds) *Probability and Inference in the Law of Evidence: The Uses and Limits of Bayesianism* (Springer, 1988).

Allen, Ronald J. and Mike Redmayne (eds). 1997. Bayesianism and Juridical Proof, Special Issue (unnumbered) of *The International Journal of Evidence and Proof*. London: Blackstone Press Ltd., pp. 253–360.

[<https://heinonline.org/HOL/Page?handle=hein.journals/intjev1&div=44&id=&page=&collection=jour%20nals>].

This special issue of *The International Journal of Evidence and Proof* debates Bayesian interpretations of legal evidence. The issue features lead articles and replies from Ronald J. Allen and Richard D. Friedman (Allen is skeptical about Bayesian approaches whilst Friedman defends them), and includes eleven discussant articles.

Childs, Mary and Louise Ellison (eds). 2000. *Feminist Perspectives on Evidence*. Cavendish Publishing.

This edited volume examines the rules of evidence from a feminist perspective. Topics include rules governing hearsay, privilege, proving workplace harassment, expert witness testimony about syndromes and symptoms, and the introduction of sexual history and prior crimes evidence in rape trials.

Stehr, Nico and Bernd Weiler (eds). 2017. *Who Owns Knowledge? Knowledge and the Law*. Routledge.

This edited volume offers a sample of interdisciplinary research at a somewhat different intersection of epistemology and law. Knowledge is a social and personal good, and can be regulated, legislated, and distributed in various ways. Laws concerning intellectual property can foster or impede creativity, education, and research. Big data technology allows new methods of data collection, analysis, and profiling. This raises questions concerning distributive justice, exploitation, and control of knowledge.

Monographs

These monographs are opinionated overviews of legal epistemology. I have not featured in this section any specialized monographs that only discuss one area of legal epistemology, such as expert scientific testimony, character evidence exclusions, or proving workplace discrimination. Each monograph listed in this section discusses almost every single topic featured in this annotated bibliography. Haack 2014, Ho 2008, and Stein 2005 each largely endorse existing evidence rules and procedure (with, of course,

various provisos and qualifications). Ho 2008 laments the trend towards judicial discretion over introducing evidence. Laudan 2006, by contrast, is largely critical of existing rules and procedure. Amaya 2015 and Cohen 1977 each advocate a particular account of legal reasoning. Amaya 2015 emphasizes the centrality of inference to the best explanation for legal reasoning. Cohen 1977 develops a “Baconian” inductive probability account. For most areas of legal epistemology—character evidence, statistical evidence, profiling, scientific testimony, and so on—it is very likely that these authors discuss it in their monograph.

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

Evidence Matters is a collection of twelve insightful essays, with a helpful introduction and glossary. The essays examine exclusionary rules, the relationship between statistical evidence and legal proof, the epistemology of expert testimony and scientific expertise in particular, and how and when correlations indicate causation. Throughout Haack applies “foundherentism” and “neo-classical pragmatism” to illuminate legal epistemology, and she contrasts epistemic features of scientific inquiry with legal inquiry.

Ho, Hock Lai. 2008. *A Philosophy of Evidence Law: Justice in the Search for Truth*. Oxford University Press.

Ho’s monograph examines the philosophical foundations of evidence law by focusing on the “internal” perspective of the factfinder; he argues the external, detached perspective of the “systems engineer” is inadequate. Ho intertwines moral and epistemic criteria to illuminate (and largely vindicate) the epistemology of current legal practices concerning hearsay, character evidence, and the standard of proof.

Stein, Alex. 2005. *Foundations of Evidence Law*. Oxford University Press.

Stein argues that the fundamental purpose of evidence law is to apportion the risk of error in conditions of uncertainty. He then develops three fundamental principles for allocating the risk of error: the cost-efficiency principle which applies across the board, the equality principle which applies in civil litigation, and the equal best principle which applies in criminal trials. Stein’s monograph is also published online

[<http://www.oxfordscholarship.com/view/10.1093/acprof:oso/9780198257363.001.0001/acprof-9780198257363>].

Laudan, Larry. 2006. *Truth, Error, and Criminal Law: An Essay in Legal Epistemology*. New York: Cambridge University Press.

In this provocative monograph Laudan argues that the legal system aims principally to determine the truth, and he emphasizes a trade-off between various risks of error. Using these foundational claims, Laudan criticizes many existing aspects of evidence law and procedure. He argues existing rules should be modified or eliminated to improve the accuracy of verdicts.

Amaya, Amalia. 2015. *The Tapestry of Reason: An Inquiry into the Nature of Coherence and its Role in Legal Argument*. Oxford and Portland: Hart Publishing.

Amaya develops a coherence-based theory of legal reasoning. She argues that a belief about the facts under dispute or about what the law requires is justified if and only if it could be the outcome of epistemically responsible coherence-based reasoning. Amaya draws on formal epistemology, linguistics, ethical theory, computing, and law to advance our understanding of coherence and inference to the best explanation.

Cohen, Jonathan. 1977. *The Probable and the Provable*. Oxford University Press.

Cohen influentially argues that what is called “probable reasoning” in everyday life (including law) does not involve Pascalian probabilities. That is, it does not satisfy the axioms of standard probability calculus. Instead he develops a “Baconian” inductive probability account of legal proof, in which the probability of a claim depends on the claim’s resistance to falsification by various tests.

Brief Overviews

Brief overviews, like the *Monographs*, survey several areas of legal epistemology. But they are briefer. For this reason they could be useful for introducing students or new researchers to legal epistemology. Haack 2014 overviews various projects in legal epistemology. This could be ideal for a graduate syllabus or for incoming researchers evaluating whether to pursue a project in legal epistemology. Goldman 1999 discusses several topics in legal epistemology and is well-pitched for undergraduates or early-stage graduates. Ho 2015, which is an exemplary *Stanford Encyclopedia of Philosophy* entry, explains several issues relating to legal evidence. Samuel 2014 describes projects in legal epistemology from the perspective a law scholar. Note that Samuel—a prominent scholar of comparative law—characterizes legal epistemology as focusing on theorizing about legal knowledge; that is, Samuel focuses on the epistemology of questions of law, whereas many others featured in this annotated bibliography focus on the epistemology of questions of fact. Pardo 2005 describes how recent developments in epistemology can illuminate evidence law scholarship. The next four entries are not general, representative overviews, because each has a particular perspective, theme, or angle. But they nonetheless qualify as overviews, since they survey several different topics within legal epistemology. Park and Saks 2006 surveys recent interdisciplinary work in evidence scholarship, including economics, psychology, statistics, feminist theory, and forensic science. Ronald J. Allen dubs Park and Saks 2006 a “compendious discussion of the present state of evidence scholarship”. Allen and Leiter 2001 evaluate several theories of evidence and

aspects of evidence law through the framework of (what they term) naturalized epistemology. Posner 1999 evaluates US evidence law and procedure through the lens of economics. Orenstein 1999 surveys a large amount of feminist research into evidence law. In her essay, Orenstein focuses on describing the research that others have produced, rather than evaluating issues (such as character evidence) directly.

Haack, Susan. 2014. "Epistemology and the Law of Evidence: Problems and Projects." *Evidence Matters: Science, Proof, and Truth in the Law*. Cambridge University Press, pp.1–26.

Haack provides an opinionated overview of various projects in legal epistemology. Topics include the role of statistical evidence in satisfying legal burdens and the epistemic properties of motivated argumentation and motivated research. (Motivated argumentation and research, which is common legal practice, aims at establishing a particular pre-determined conclusion.) Additionally, Haack outlines and applies her favored account of epistemic justification and proposes several avenues for future research in legal epistemology.

Goldman, Alvin. 1999. "Law" *Knowledge in a Social World*. Oxford University Press, pp. 272–314.

Goldman examines the legal system as a topic within social epistemology. He briefly discusses several topics, including the aims of the legal system, comparing inquisitorial and adversarial systems, exclusionary rules, expert testimony, and juries. Given its accessibility, this chapter could work well for introducing undergraduates to legal epistemology.

Ho, Hock Lai. 2015. "The Legal Concept of Evidence"

[<http://plato.stanford.edu/archives/win2015/entries/evidence-legal/>]. *Stanford Encyclopedia of Philosophy*. Edward N. Zalta (ed).

In this valuable resource, Ho explains several issues relating to legal evidence, including relevance, admissibility, exclusionary rules, proof paradoxes, and mathematical approaches to legal proof.

Samuel, Geoffrey. 2014. "What is Legal Epistemology?" *The Method and Culture of Comparative Law: Essays in Honour of Mark Van Hoecke*. M. Adams and D. Heirbaut (eds). Hart Publishing, pp. 23–36.

Samuel characterizes legal epistemology as "the critical study of legal knowledge itself", and holds that the central guiding question is "What is it to have knowledge of the law?" He investigates law understood as a body of knowledge, and asks whether that knowledge is cumulative, whether it is based on textual authority, and so on.

Pardo, Michael S. 2005. "The Field of Evidence and the Field of Knowledge." *Law and Philosophy* 24(4): 321–392.

In this longer essay, Pardo examines the intersection of evidence law and epistemology. By applying recent epistemological ideas such as reliabilism and coherentism, Pardo advocates the importance of

epistemological theory for evidence law. He articulates and defends Bentham's view that the field of evidence is the field of knowledge.

Park, Roger C. and Michael J. Saks. 2006. "Evidence Scholarship Reconsidered: Results of the Interdisciplinary Turn." *Boston College Law Review* 47(5): 949–1031.

Park and Saks survey and celebrate the "interdisciplinary turn" in evidence scholarship. They begin with a history of evidence scholarship. They then describe recent interdisciplinary inquiries. This includes research in psychology, forensic science, feminism, and economics that illuminates topics in evidence law and procedure, such as character evidence, hearsay, and witness memory. Park and Saks also survey the "new evidence scholarship" that applies formal methods to legal evidence and proof.

Allen, Ronald J. and Brian Leiter. 2001. "Naturalized Epistemology and the Law of Evidence." *Virginia Law Review* 87: 1491–1550.

Allen and Leiter apply "naturalized epistemology" to explore and evaluate evidence law. They emphasize two commitments of naturalized epistemology: "ought" implies "can" and the instrumental evaluation of outcomes. They evaluate various theories of evidence using this framework, including Bayesianism, expected utility theory, relative plausibility theory, and Posner's economic analysis of evidence law. They examine various aspects of evidence law, including relevance, character evidence, hearsay, and statistical evidence.

Posner, R. 1999. "An Economic Approach to the Law of Evidence." *Stanford Law Review* 51: 1477–1546.

Posner evaluates US evidence law and procedure through the lens of economics. He explains and employs two economic models—a search model and a cost-minimization model—and employs Bayes theorem. In this essay, Posner compares inquisitorial and adversarial systems, investigates the burden of proof and statistical evidence, and evaluates several laws of evidence, including harmless error, limiting instructions, relevance, privileges, character evidence, hearsay, and expert witnesses.

Orenstein, Aviva. 1999. "Evidence and Feminism." *Feminist Jurisprudence, Women and The Law: Critical Essays and Articles*, Betty W. Taylor, Sharon Rush, and Robert John Munro (eds). Fred B Rothman & Co., pp. 509–540.

Orenstein surveys feminist approaches to evidence law. She describes feminist evaluations of the adversarial system and the teaching of evidence law, and she discusses feminist research on evidence rules that affect the interests of women, such as rape shields, character evidence, spousal privilege, and expert witness testimony about battered women syndrome and rape trauma.

Relevance and Admissibility

The principles that all relevant evidence is admissible (unless there is a specific reason for its exclusion) and that all irrelevant evidence is inadmissible are two maxims of modern evidence law. This raises questions such as: What is relevance? What kinds of considerations are relevant? What reasons—moral, political, economic, practical, epistemic—justify excluding evidence? What kinds of evidence should be excluded? How should the legal system weigh the competing considerations of reliably attaining true verdicts with other considerations? Ho 2015 surveys epistemological issues concerning relevance and admissibility. Lempert 1977 attempts to formalize relevance. Bentham 1827 stridently argues for the abolition of exclusionary rules; he holds that all relevant evidence should be available for consideration by the factfinder. Haack 2004 defends exclusionary rules against Bentham’s criticisms. Nesson 1985 theorizes about aims of the legal system other than simply determining the truth, and argues that these aims vindicate existing exclusionary rules. Stein 2005 argues that the aims of the legal system indicate that exclusionary rules should be tightened up to further constrain what evidence is admitted. The sections **Character Evidence and Society**, **The Situationist Critique of Character Evidence**, **Testimony and Silence**, **Expert Witness Testimony**, and **Profiling** evaluate specific kinds of exclusionary rule, including evaluating whether certain kinds of evidence are morally unfair or prejudicial (so that admitting it leads to less accurate verdicts). See also Shapiro 1991, especially chapter four, for a history of hearsay rules, circumstantial evidence, and related aspects of the law of evidence. See **Law Background** for existing exclusionary rules. Many of the **Monographs** and **Brief Overviews** discuss relevance and exclusionary rules.

Ho, Hock Lai. 2015. “The Legal Concept of Evidence”

[<http://plato.stanford.edu/archives/win2015/entries/evidence-legal/>]. *Stanford Encyclopedia of Philosophy*. Edward N. Zalta (ed).

Ho explains relevance, admissibility, and exclusionary rules. He also examines various approaches to assessing the probative value of evidence, such as Bayesian approaches. As an *SEP* entry, it provides an excellent orientation to the subject.

Lempert, R. 1977. “Modeling Relevance.” *Michigan Law Review* 75: 1021–1057.

Lempert argues that we can use mathematical models—Bayes’ Theorem and regret matrices—to illuminate the meaning of evidential relevance. This aims to make precise US Federal Rule of Evidence 401, which holds that evidence is relevant if “it has a tendency to make a fact more or less probable than it would be without the evidence”.

Bentham, Jeremy. 1827/1978. *Rationale of Judicial Evidence*. New York: Garland.

Bentham fiercely opposed exclusionary rules. He held that the aim of determining the truth is best served by free access to information. All relevant evidence should be admitted, unless it is superfluous or economically unviable (that is, too time consuming or expensive).

Haack, Susan. 2004. "Epistemology Legalized: Or, Truth, Justice, and the American Way." *American Journal of Jurisprudence* 49: 43–61.

Haack evaluates Bentham's criticisms of exclusionary rules of evidence and describes the history of exclusionary rules in the US legal system. Haack defends exclusionary rules against Bentham's criticisms, but notes that such rules are indeed unfair and an impediment to seeking the truth if the legal adversaries have wholly unequal resources. This essay is reprinted in Haack 2014.

Nesson, Charles. 1985. "The Evidence or the Event? On Judicial Proof and the Acceptability of Verdicts." *Harvard Law Review* 98: 1357–1392.

Nesson argues that a central aim of the trial is to convey particular legal values. Society must see legal condemnation as stemming from the event (the defendant's crime) not the evidence marshalled (the defendant's failing to cover his tracks), and verdicts must be "acceptable" to the public. Nesson argues these aims vindicate many evidentiary rules and other aspects of the trial process, such as attorney-client privilege and prohibitions against hearsay.

Stein, Alex. 2005. "Evidence Law: What is it for?" *Foundations of Evidence Law*. Oxford University Press, ch. 4.

Stein argues that evidence law should regulate the apportionment of risk of error in legal factfinding. Excluding some evidence is a central way to meet this aim, Stein argues, and current evidence law is not sufficiently regulating. He decries the trend towards increasing judicial discretion over admitting evidence, rather than constraint by robust evidentiary rules.

Character Evidence and Society

Character evidence is any evidence adduced to suggest that a person acted in a particular way on a particular occasion based on the character or disposition of that person. Character evidence includes evidence of an individual's past behavior—often in the form of previous convictions. It could also include the propensity of social groups to which the individual belongs. Character evidence might be, for instance, evidence of prior lying to suggest general dispositions of dishonesty, which then impugn the witness's current testimony. Character evidence bears on both the factfinding and sentencing phases of the trial. Character evidence is, in many legal systems, inadmissible except in certain specified circumstances. Whether to admit character evidence is extremely controversial; the answers depend on the nature of human character (Tillers 1998), the aims of the legal system (Sanchirico 2001), human biases (Lawson 1975, Goodman 2007, Baker 1996, and Orenstein 1998), and the aims of social justice (Childs 2000).

Picinali 2015 in the *Profiling* section argues that propensity evidence from base-rate traits in social groups should be admissible evidence. Wasserman 1991 argues that propensity evidence from base rates and prior behavior should be inadmissible for moral reasons. Sanchirico 2001 argues that character evidence has probative value; its proscription is justified by the non-epistemic aims of trials. Lawson 1975 argues that character evidence is misleading; Goodman 2007 and Baker 1996 argue that it triggers harmful stereotypes that adversely affect poor and ethnic minority defendants. Baker 1996 and Orenstein 1998 argue that character evidence hinders justice in sexual assault cases by perpetuating and invoking harmful misconceptions about rape. Childs 2000 surveys whether character evidence promotes or hinders feminist aims. Redmayne 2015 is a book-length project that addresses many questions about the acceptability of character evidence. See also Kapardis 2014 and Saks and Spellman 2016, and the sections *Profiling*, *Prejudice and Justice*, and *The Situationist Critique of Character Evidence*.

Redmayne, Mike. 2015. *Character in the Criminal Trial*. Oxford: Oxford University Press.

Redmayne's interdisciplinary monograph assesses arguments for and against using character evidence in determining guilt and sentencing. He considers the situationist critique of character evidence, evaluates recidivism rates, and explores whether character evidence is unfairly prejudicial or disregards defendants' autonomy. Redmayne examines the history of character evidence and, especially, the Criminal Justice Act 2003, which allows greater use of character evidence in criminal proceedings in England and Wales.

Tillers, Peter. 1998. "What is Wrong with Character Evidence?" *Hastings Law Journal* 48: 781–814.

Tillers first evaluates several central attempts to justify the prohibitions on character evidence. He then briefly describes how character is conceived in the history of philosophy; Tillers rejects the "bundle of traits" conception of character in favor of an "animating spirit" conception. Rather than evaluating whether the restrictions on character evidence are warranted, he instead articulates questions raised by debates about character evidence exclusion.

Sanchirico, C. 2001. "Character Evidence and the Object of Trial." *Columbia Law Review* 101: 1227–1311.

Sanchirico argues that existing character evidence law cannot be justified if we conceive of the trial as primarily aiming to discern the truth about past events. This is because excluding character evidence excludes probative evidence. Instead, Sanchirico argues, character evidence law is best understood when we conceive of the trial as primarily aiming to incentivize and regulate behavior in everyday life.

Lawson, Robert G. 1975. "Credibility and Character: A Different Look at an Interminable Problem." *Notre Dame Law Review* 50(5): 758–789.

Lawson decries the probative value of character evidence. Drawing on psychology, Lawson challenges the law's conception of character traits as stable features of a person that determine behavior across situations. Lawson also argues that jurors are poor judges of character, and are unduly influenced by biases such as the halo effect. Lawson concludes that admitting prior convictions as evidence to impugn defendant's credibility (qua witness) is unfairly prejudicial.

Wasserman, T. 1991. "The Morality of Statistical Proof and the Risk of Mistaken Liability." *Cardozo Law Review* 13: 943–953.

Wasserman argues that the moral acceptability of statistical (and propensity) evidence depends on the circumstances. Some statistical evidence, such as in toxic tort litigation, is acceptable. It is unacceptable when reliance on statistical or propensity evidence—such as neighborhood crime rates, base-rates of negative traits in populations, and the defendant's past conduct—undermines respect for the individual's autonomy or imposes improper risk of mistaken liability.

Goodman, Chris Chambers. 2007. "The Color of Our Character: Confronting the Racial Character of Rule 404(b) Evidence." *Law & Inequality: A Journal of Theory and Practice* 25(1): 1–58.

Chambers argues that the exceptions to the prohibitions of character-type evidence in the US Federal Rules of Evidence are unfairly prejudicial against Black and Hispanic defendants. Chambers explains how the permitted evidence—such as evidence of prior crimes—can trigger racist stereotypes and thereby impede justice. She proposes ways to mitigate the effect of jurors' racial biases, including amendments to the Federal Rules of Evidence and revised jury instructions.

Baker, Katherine K. 1997. "Once a Rapist? Motivational Evidence and Relevancy in Rape Law." *Harvard Law Review* 110(3): 563–624.

Baker criticizes the Federal Rule of Evidence 413 that permits the defendant's prior acts of sexual assault to be adduced in sexual assault cases. She argues that it unfairly disadvantages poor and minority men and women. On feminist grounds, Baker objects to evidence laws that suggest that rapists are a distinctive or unusual "monstrous" class. She instead advocates for an improved understanding of the motivations behind different types of rape.

Orenstein, Aviva. 1998. "No Bad Men! A Feminist Analysis of Character Evidence in Rape Trials." *Hastings Law Journal* 49: 663–716.

Orenstein discusses how cultural rape myths—perceptions of how sexual assault offenders and victims act—perpetuate epistemic injustice in the courtroom. Orenstein suggests ways that laws regulating character evidence can help to undermine this rape paradigm and promote legal justice, such as by combating jurors' misconceptions.

Childs, Mary. 2000. "The Character of the Accused." *Feminist Perspectives on Evidence*, Mary Childs and Louise Ellison (eds). London: Cavendish Publishing.

This essay helpfully surveys whether introducing character evidence advances feminist goals; it would aptly exemplify feminist legal epistemology for an undergraduate syllabus. Childs articulates various considerations: Character evidence concerning previous rapes, for example, might increase sexual offence convictions and encourage women's perspectives to be heard. But jurors may overestimate of the probative force of previous sex crimes convictions; and they might harbor prejudice against those who violate gender norms.

Laudan, Larry and Ronald J. Allen. 2011. "The Devastating Impact of Prior Crimes Evidence and Other Myths of the Criminal Justice Process." *Journal of Criminal Law and Criminology* 101(2): 493–528.

Laudan and Allen criticize the practice of excluding evidence of the defendant's prior misconduct. They argue that conviction statistics indicate that jurors infer prior misconduct, despite the exclusion laws; trials would be fairer, they suggest, if prior crimes were explicitly stated rather than inferred.

The Situationist Critique of Character Evidence

Situationism in psychology rejects the conception of character traits as stable features of a person that determine behavior across situations. Instead, situationists maintain, conduct is largely a function of the situation. Some law scholars invoke situationism to argue against admitting character evidence into legal proceedings. Foster 1988 and Spector 1979 criticize the practice of using witness's prior legal transgressions to impugn the witness's credibility; Leonard 1986–87 objects to using character evidence to prove conduct in general. Davies 1991 rejects the situationist critique and maintains that character evidence is probative. Mendez 1996 and Park 1998 offer more measured appraisals of the epistemic significance—and legal justification for—character evidence in light of the situationist critique. Several entries in **Monographs**, **Brief Overviews**, and **Character Evidence and Society** also discuss the situationist critique of character evidence. See also Kapardis 2014 and Saks and Spellman 2016.

Foster, Teree E. 1988. "Rule 609(a) in the Civil Context: A Recommendation for Reform." *Fordham Law Review* 57(1): 1–50.

Foster urges that we end the practice of using witness's prior legal transgressions to attack the witness's credibility. She focuses on civil cases. Foster vehemently argues that "social psychology research refutes the proposition that former convictions add probative weight to the credibility assessment" of a witness. See, especially, pages 27–37 for the situationist critique of character evidence. Foster articulates other negative outcomes of revealing witnesses' previous legal transgressions.

Spector, Robert G. 1979. "Rule 609: A Last Plea for Its Withdrawal." *Oklahoma Law Review* 32(2): 334–354.

Spector argues against character evidence, particularly focusing on the use of prior convictions to contest the credibility of a witness. Drawing on psychological studies, Spector argues that prior convictions have little probative value in ascertaining the credibility of a witness and (when that witness is the defendant) are prejudicial.

Leonard, David P. 1986–87. "The Use of Character to Prove Conduct: Rationality and Catharsis in the Law of Evidence." *University of Colorado Law Review* 58(1): 1–62.

Leonard argues that situationism in psychology establishes that character evidence fails the test of logical relevancy. (See especially section III.) The trial's aim of truth-seeking cannot justify admitting character evidence. Leonard argues, however, that the trial's non-epistemic goals—such as creating cathartic responses to crime—can explain why character evidence is sometimes admitted.

Davies, Susan Marlene. 1991. "Evidence of Character to Prove Conduct: A Reassessment of Relevancy." *Criminal Law Bulletin* 27(6): 504–537.

Davies responds to earlier legal scholars who applied experimental psychology to character evidence. She argues that they overstate the force of the situationist critique of character evidence, and understate the degree to which previous misconduct predicts future misconduct. She defends the probative value of trait information and argues that character evidence should be admissible, with a careful guided balancing of prejudice against probative force on a case-by-case basis.

Mendez, Miguel A. 1996. "The Law of Evidence and the Search for a Stable Personality." *Emory Law Journal* 45: 221–238.

Mendez clearly explains the central legal and epistemic issues surrounding character evidence exclusions. Drawing on experimental psychology—particularly the cognitive-affective theory of personality—Mendez explores whether evidence of dispositions has probative value. He asks, that is, whether one can reliably infer conduct in a particular instance from a person's general character. In earlier essays Mendez expresses conviction in the situationist critique of character evidence; this essay advances a more measured stance.

Park, Roger C. 1998. "Character at the Crossroads." *Hastings Law Journal* 49: 717–779.

Park offers a nuanced, measured exploration of various issues about character evidence exclusions; he refrains from advocating for particular views. He discusses rationales for excluding character evidence and distinguishes various roles for character evidence in a legal proceeding. Park evaluates the situationist legitimization of character evidence exclusions, articulates flaws in human reasoning

that might cause character evidence to be unfairly prejudicial, and explores proposals for selectively admitting character evidence.

Testimony and Silence

Testimony is crucial to the legal system. Testimony encompasses confession (including false confession); witness assertions, the practice of cross examination, and the testimony of appointed experts. The legal epistemology of testimony includes inferences from silence, credibility evaluations, and the epistemic significance of narrative. Simon 2012 examines various sources of error—most concerning testimony—in criminal proceedings. Loftus 1996 draws on psychology to cast doubt on the reliability of eyewitness testimony. Redmayne 2008 and Stein and Seidmann 2000 examine the epistemic consequences of an individual's refusal to testify and instructions to jurors to not infer adverse conclusions from that refusal. See also Whitman 2008, Laudan 2006, Kapardis 2014, and Saks and Spellman 2016. And see the sections *Expert Witness Testimony* and *Prejudice and Justice* (especially Carlin 2016).

Simon, Dan. 2012. *In Doubt: The Psychology of the Criminal Justice Process*. Harvard University Press
Simon's influential monograph investigates the psychology of error in legal judgment. He focuses on sources of error: eyewitness unreliability, bias, coercive interrogation, false confession, and jurors' limitations at assessing the accuracy of testimony.

Loftus, Elizabeth F. 1996. *Eyewitness Testimony*. Harvard University Press.
Loftus's monograph argues against the reliability of eyewitnesses. Loftus examines the psychology of memory and perception to cast doubt on relying on eyewitness testimony for criminal conviction.

Redmayne, Mike. 2008. "English Warnings." *Cardozo Law Review* 30(3): 1047–1088.
Redmayne critically assesses the Criminal Justice and Public Order Act 1994 that was passed in England and Wales. This legislation reduced the right to silence by allowing, in some circumstances, adverse inferences to be drawn from silence. He asks whether similar changes should be made to US evidence law and examines the relationship between immunity from adverse inferences and the privilege against self-incrimination.

Stein, Alex and Daniel J. Seidmann. 2000. "The Right to Silence Helps the Innocent: A Game-Theoretic Analysis of the Fifth Amendment Privilege." *Harvard Law Review* 114: 430–510.
Stein and Seidmann challenge the orthodox claim that the right to silence helps only the guilty. Drawing on game theory, they argue that the right to silence creates differences in behavior between guilty and innocent suspects. By distinguishing them from the guilty, the right thereby aids the innocent.

Expert Witness Testimony

Expert witness testimony can help settle disputed facts. Experts can testify in legal proceedings about relevant math, forensic science, psychology (such as battered women syndrome), engineering, professional issues, and complex systems (such as taxation, computing, and finance). This raises questions about what kinds of expert testimony should be admitted. The legal system must identify experts in a field. It must also decide what areas of study are sufficiently legitimate to underwrite expert witnesses. Plausibly epidemiology expert witnesses should be admitted, for example, but not phrenology expert witnesses. The legal system should address how to oversee these experts, such as whether they should be neutral or introduced by adversarial sides in the litigation (Danaher 2011), and how financing may influence expert witnesses (Haack 2014). It matters whether factfinders apportion the correct level of credibility to expert witnesses and understand their testimony. Many epistemological questions about expert witnesses concern scientific expertise. For this reason, the epistemology of expert witness testimony lies at the intersections of science, philosophy of science, sociology of science, law, psychology, and epistemology. Smith et al. 2011 is a reference manual for judges overseeing expert evidence involving science or technology. Redmayne 2001 is a balanced and broad-ranging overview that discusses various issues about legal expertise. Walton 1997, Brewer 2006, and Haack 2014 investigate when reliance on expert testimony is appropriate. Jasanoff 1992 argues that sociology of science—rather than philosophy of science—can best explain the controversy about scientific expert testimony in legal proceedings. Feldman 1995 and Leiter 1997 focus on US evidence law concerning scientific expert witnesses. Specifically, they draw on philosophy of science to evaluate whether *Frye* (*Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923)) or *Daubert* (*Daubert v. Merrell Dow Pharmaceuticals Inc.*, 43 F.3d 1311 (9th Cir. 1995)) better governs the introduction of scientific expert testimony. Feldman 1995 favors *Daubert*; Leiter 1997 replies to Feldman and favors *Frye*. Danaher 2011 evaluates how to manage expert testimony, given that experts can be difficult to understand and (particularly if commissioned by one party to the dispute) biased. See also Berger and Solan 2008, Kapardis 2014, Saks and Spellman 2016, Aitken, Roberts, Jackson, and Puch-Solis 2010–2015, and Orenstein 1999. Schneps and Colmez 2013 recounts some eye-opening failures of expert witness testimony.

Smith, Fern M. et al. 2011. *Reference Manual on Scientific Evidence* [<https://www.fjc.gov/content/321618/reference-manual-scientific-evidence-second-edition-superseded>], 2nd edition. Federal Judicial Center.

This reference manual assists US judges in managing expert testimony in cases that involve science or technology. It includes guides to DNA, toxicology, epidemiology, statistics, survey methods, and medical testimony. It also describes the law governing expert evidence in legal contexts and some basic philosophy of science for legal practitioners.

Walton, Douglas. 1997. *Appeal to Expert Opinion: Arguments from Authority*. Pennsylvania State University Press.

As a leading scholar in the field of argumentation, Walton works at the intersection of philosophy, law, logic, artificial intelligence, and other fields. This monograph examines when appeal to authority is a legitimate reasoning strategy and when it is a fallacy. Chapter six focuses on legal practice.

Redmayne, Mike. 2001. *Expert Evidence and Criminal Justice*. Oxford University Press.

Redmayne's monograph examines several areas concerning statistical reasoning, scientific evidence, expertise, and legal factfinding. The resource is deeply interdisciplinary, and illuminates debates about battered women syndrome, fingerprinting, DNA, and eyewitness expertise.

Brewer, Scott. 2006. "Scientific Expert Testimony and Intellectual Due Process." *The Philosophy of Expertise*, Evan Selinger and Robert Crease (eds). Columbia University Press, pp. 111–158.

Brewer examines whether and under what conditions scientific experts can transfer justified beliefs to legal factfinders. This essay is a shortened descendant of a significantly longer essay of the same title, published in *The Yale Law Journal* in 1998. The original article is 147 pages.

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

Scientific testimony in legal contexts is a central theme in *Evidence Matters*. See especially chapters four to eight, inclusive; all five essays are also published independently as journal articles; see Haack 2014 pp. xi–xii for details.

Jasanoff, Sheila. 1992. "What Judges Should Know about the Sociology of Science." *Jurimetrics Journal* 32(3): 345–360.

Scientific expert testimony in the courtroom has generated a lot of controversy. Jasanoff surveys ways that the sociology of science can help explain these perennial conflicts about the quality or acceptability of scientific evidence. She argues that investigation into the social structure and operation of science can illuminate the legal process and inform judges about how to manage expert scientific testimony.

Feldman, Heidi Li. 1995. "Science and Uncertainty in Mass Exposure Litigation." *Texas Law Review* 74(1): 1–48.

Feldman compares the *Frye* decision, which holds that scientific evidence "must be sufficiently established to have gained general acceptance in the particular field in which it belongs" with the more recent *Daubert* decision, which broadens the criteria for admissibility of scientific expert testimony. Feldman favors *Daubert*. She argues *Daubert* better aligns legal standards of evidence

with scientific standards of evidence; but this includes inheriting the uncertainties inherent in scientific practice.

Leiter, Brian. 1997. "The Epistemology of Admissibility: Why Even Good Philosophy of Science Would Not Make for Good Philosophy of Evidence." *Brigham Young University Law Review* 4: 803–820.

Leiter responds to and casts doubt on Feldman 1995's "revised empiricist" epistemology of science. Drawing on philosophy of science and social epistemology, he argues that adhering to norms of scientific epistemic practice is inappropriate for legal epistemic practice. Leiter suggests the superseded *Frye* provided better scientific evidence admissibility rules than *Daubert*.

Danaher, John. 2011. "Blind Expertise and the Problem of Scientific Evidence." *The International Journal of Evidence & Proof* 15(3): 207–231.

Scientific expert evidence can be both difficult to understand and biased: In adversarial systems, each side can introduce their own expert witnesses, and forensic laboratories are often operated by police which creates biases towards conviction. In this essay Danaher examines ways to counteract the incomprehensibility and bias of scientific expert testimony. He explains the popular "reliability test", and favors introducing "blinding protocols", similar to those already employed in scientific investigation.

The Presumption of Innocence

The presumption of innocence plays a key role in many legal systems. The presumption of innocence generates a corresponding burden of proof that falls on the state to prove the defendant's crime; the defendant, by contrast, need not prove his innocence. The presumption of innocence raises many philosophical questions, such as how broadly or narrowly the presumption applies, whether it requires a particular cognitive and/or practical attitude, and whether it is compatible with reverse burdens (Picinali 2014). Lippke 2016 and Laudan 2005 argue that the presumption of innocence is restricted to the trial phase. Kitai 2002 and Duff 2013 have a more expansive conception of the presumption of innocence; drawing on broader commitments in political philosophy, they articulate roles for presumptions of innocence outside the trial setting.

Lippke, Richard L. 2016. *Taming the Presumption of Innocence*. Oxford University Press.

There are few book-length treatments of the presumption of innocence. In this monograph, Lippke presents an account of the presumption of innocence and its role in trials. He argues that the presumption of innocence should be contained within the trial process; in the pre-trial and post-trial stages, no presumption should be made about guilt or innocence.

Laudan, Larry. 2005. "The Presumption of Innocence: Material or Probatory?" *Legal Theory* 11(4): 333–361.

Laudan investigates questions surrounding the presumption of innocence, including when it applies and what it is. He distinguishes material innocence and probatory innocence: material innocence means the defendant did not commit the crime; probatory innocence means the case fails to satisfy the standard of proof. Laudan argues that the presumption of innocence is best cast as an assumption of probatory innocence at the outset of a criminal trial.

Duff, Antony. 2013. "Who Must Presume Whom to Be Innocent of What?" *Netherlands Journal of Legal Philosophy* 3: 170–192.

Drawing on the rights and duties accompanying various social roles—such as that of suspect, defendant, convict, and ex-offender—Duff argues presumptions of innocence are not restricted to the trial setting. Various presumptions of innocence apply throughout the justice system; the presumptions help define criminal action, protect citizens from capricious prosecution, and characterize civic life. The other articles in the same journal issue respond to Duff.

Picinali, Federico. 2014. "Innocence and Burdens of Proof in English Criminal Law." *Law, Probability and Risk* 13(3–4): 243–257.

Picinali contrasts substantive and procedural interpretations of the presumption of innocence, and defends a procedural interpretation. He explores the relationship between reverse burdens of proof and the presumption of innocence.

Kitai, Rinat. 2002. "Presuming Innocence." *Oklahoma Law Review* 55. 257–295.

Kitai defends the presumption of innocence against criticisms; she holds it is fundamental to political morality. Kitai argues that, rather than being restricted to the trial phase, the presumption of innocence should apply throughout the criminal process, including various pre-trial stages.

Standards of Proof

A legal burden of proof requires a formal standard of proof. The standard of proof is the standard to which the facts must be established to satisfy the burden. Standards of proof raise several foundational questions, such as whether they should exist, and whether they should vary by significance of crime, severity of punishment, chance of reoffending, and so on. Should standards of proof be influenced by practical factors at all? What are standards of proof and what do they govern? Clermont 2013 is a book-length investigation of the psychology and logic of legal standards of proof. Kaplow 2012 applies economic theorizing to understanding standards of proof. Fisher 2012 argues that the binary verdicts—guilty or not guilty—should be replaced by a sliding scale of confidence in guilt, where increased confidence corresponds to more significant sentences. Sand and Rose 2003 argue that convictions that

involve the death penalty should be governed by a standard higher than “beyond reasonable doubt”. Lawson 2017 notes that in existing legal practice, standards of proof govern disputed matters of fact, but not disputed matters of legal interpretation. He questions this status quo. Pardo 2010 reflects on the Gettier problem to motivate important links between legal standards of proof and knowledge. See also Kaplan 1968, *Monographs*, *Brief Overviews*, *The Presumption of Innocence*, *Historical Standards of Proof*, *Beyond Reasonable Doubt*, *Probabilistic Approaches to Legal Evidence and Proof*, *Non-Quantitative Approaches to Legal Evidence and Proof*, *The Proof Paradox*, *Modal Epistemology and the Law*, and *Profiling*.

Clermont, Kevin M. 2013. *Standards of Decision in Law: Psychological and Logical Bases for the Standard of Proof, Here and Abroad*. Carolina Academic Press.

Clermont develops a taxonomy of legal standards of proof, based on whether the standard governs the original decision, a review, or a review of the review. He examines the psychology and logic of various legal standards, from slightest suspicion onwards, and advocates recognizing at most seven categories of confidence. Clermont criticizes probabilistic approaches to interpreting standards of proof and proposes an alternative theory, based on belief functions and fuzzy logic.

Kaplow, L. 2012. “Burden of Proof.” *Yale Law Journal* 121(4): 738–859.

Kaplow develops an ambitious, influential economic approach to the standard of proof and evidence law. He argues that evidence law should incentivize socially optimal behavior. Activities should be penalized if they have undesirable concentrations of harmful consequences compared to benefits. The probabilities required to authorize those penalties will vary according to the expected consequences.

Fisher, Talia. 2012. “Conviction Without Conviction.” *Minnesota Law Review* 96: 833–885.

Legal decision making currently uses the threshold model: guilt is either established or not. Below the threshold, no sentence is bestowed; above it, the sentence is bestowed. Fisher argues for an alternative: a sliding-scale punishment, correlated with the certainty of guilt.

Sand, Leonard and Danielle Rose. 2003. “Proof Beyond All Possible Doubt: Is There a Need for a Higher Burden of Proof when the Sentence may be Death?” *Chicago-Kent Law Review* 78: 1359–1375.

Sand and Rose propose that in cases where the death sentence is available, a more demanding standard of proof—“proof beyond all possible doubt”—should be employed at the sentencing stage. This newly proposed standard requires “absolutely certainty”. Sand and Rose aim to reduce the risk that innocent persons will be sentenced to death.

Lawson, Gary. 2017. *Evidence of the Law: Proving Legal Claims*. University of Chicago Press.

Standards of proof in current legal practice govern the level to which factual claims—such as who was where, when—are established. Current legal practice does not apply burdens of proof or standards of proof in relation to assertions about what the law itself means. Instead an implicit “best interpretation of the law” standard governs disputes about legal interpretation. In this monograph, Lawson challenges this status quo.

Pardo, Michael S. 2010. “The Gettier Problem and Legal Proof.” *Legal Theory* 16(1): 37–57.

Pardo applies recent epistemological theorizing—particularly about the Gettier problem—to illuminate the epistemic aims of legal procedures. He surveys theories about the relationship between legal proof and orthodox epistemic topics such as knowledge, belief, and justification. Pardo argues that knowledge and legal proof are deeply connected, and that legal verdicts can be Gettiered. This essay is short and suitable for undergraduates. McBride 2011 (in *Modal Epistemology and Law*) replies.

Historical Standards of Proof

Understanding the historical development of legal standards can both illuminate current legal standards and generate further legal epistemological questions. I cannot hope to provide a comprehensive guide to the history of legal standards; I have instead selected resources that legal epistemologists draw on.

Franklin 2001 describes reasoning about probability, especially in law, before Pascal and Fermat's discovery of the mathematics of probability. Shapiro 1986 describes the history of the standard of proof governing criminal conviction in Anglo-American law. Shapiro 1991 is more comprehensive; she examines the history of legal burdens of proof, procedure, and evidence law. Whitman 2008 argues that the “beyond reasonable doubt” standard developed to assuage jurors’ religious fears of judging others. The monograph includes an interesting partial history of witness testimony. Langbeim 2006 examines the historical relationship between severity of sentence and standard of proof.

Franklin, James. 2001. *The Science of Conjecture: Evidence and Probability before Pascal*. John Hopkins University Press.

This accessible monograph provides a historical account of the law of proof, intertwining it with the historical development of the concept of probability. It describes Ancient, Medieval, and Renaissance approaches to legal proof, and describes the history of reasoning about probability in law, science, commerce, gambling, and philosophy.

Shapiro, Barbara J. 1986. “‘To a Moral Certainty’: Theories of Knowledge and Anglo-American Juries, 1600-1850.” *Hastings Law Journal* 38(1): 153–194.

Shapiro traces the historical development of the “to a moral certainty” and the “beyond a reasonable doubt” standards in legal practice. This article is the foundation for chapter one of Shapiro 1991.

Shapiro, Barbara J. 1991. *"Beyond Reasonable Doubt" and "Probable Cause": Historical Perspectives on the Anglo-American Law of Evidence*. University of California Press.

Shapiro documents the history of evidence law in the Anglo-American tradition. Shapiro focuses on English legal practice from about 1500 to 1800, and compares English law to the Romano-canon tradition. She charts the development of legal concepts such as suspicion, common fame, probable cause, *prima facie* case, presumption, circumstantial evidence, satisfied conscience, and beyond reasonable doubt. Chapter four includes a history of hearsay rules, circumstantial evidence, and related aspects of evidence law.

Whitman, J. Q. 2008. *The Origins of Reasonable Doubt: Theological Roots of the Criminal Trial*. Yale University Press.

Whitman argues that confusions and uncertainties about the "beyond reasonable doubt" standard largely stem from not appreciating its original role. Contemporary theorists understand the standard as protecting defendants from false conviction. Whitman argues it was originally devised to serve a theological aim, namely to reassure jurors worried about the risks of eternal damnation through judging others as guilty. Chapter three contains an interesting discussion of social class and witness credibility.

Langbeim, John. 2006. *Torture and the Law of Proof: Europe and England in the Ancien Régime: Europe and England in the Ancient Regime*. Chicago University Press.

Langbeim is an influential historian of evidence law. This short monograph outlines the origins and decline of judicial torture—the factfinding use of pain in pre-trial procedure—in England and Europe. He argues that as judicial punishment evolved from capital punishment to less severe punishments, the standard of proof correspondingly decreased; absolute certainty was no longer required. And these more permissive standards of proof meant that torture was no longer required.

Beyond Reasonable Doubt

Understanding and evaluating the "beyond reasonable doubt" standard is an enormous and vexed topic. The appropriate standard for criminal conviction is one of the central concerns of legal epistemology. Mulrine 1997 describes the standards employed in various jurisdictions. Interpreting what "beyond reasonable doubt" means is intimately connected to whether the standard is justified (see especially Lillquist 2002, Ho 2009, and Walen 2015 for exemplification of this connection). Some authors challenge the "beyond reasonable doubt" standard, at least in some contexts: Laudan 2011 argues that the standard of proof required for criminal conviction should be drastically reduced. Gardiner 2017 challenges Laudan's arguments. Lee 2015 denies that the "beyond reasonable doubt" standard should apply to moral elements of a crime. He argues the standard is too demanding. Other theorists defend the "beyond reasonable doubt" standard, arguing that it is the appropriate standard to govern criminal conviction.

Walen 2015 employs a retributivist approach to vindicating the standard. Picinali 2018 aims to justify the standard using commitments common to both consequentialist and deontological normative frameworks. Lillquist 2002 argues that the standard of proof is flexible—how demanding it is depends on the details of the case—and this partially underwrites why the standard is appropriate. Picinali 2013 disputes the claim that beyond reasonable doubt is a variable standard, and argues against applying an expected utility framework to interpreting the standard. Ho 2009 argues that whether the standard has been met depends on substantive moral evaluation of the factfinder, such as whether the factfinder conducted themselves with appropriate virtue. Further resources that aim to understand and evaluate the “beyond reasonable doubt” standard can be found in the related sections: *Monographs*, *Standards of Proof*, *Historical Standards of Proof*, *Probabilistic Approaches to Legal Evidence and Proof*, *Non-Quantitative Approaches to Legal Evidence and Proof*, *Modal Epistemology and the Law*, and *The Proof Paradox*.

Mulrine, Thomas. 1997. “Reasonable Doubt: How in the World Is It Defined?” *American University Journal of International Law and Policy* 12(1): 195–225.

Mulrine first overviews the historical development of the criminal standard of proof. He then explains some perennial problems faced by attempts to define the standard. Finally, he surveys several countries’ approaches to the determination of criminal guilt.

Laudan, Larry. 2011. “The Rules of Trial, Political Morality and the Costs of Error: Or, Is Proof Beyond a Reasonable Doubt Doing More Harm Than Good?” *Oxford Studies in Philosophy of Law*, Leslie Green and Brian Leiter (eds). Oxford University Press, pp. 195–227.

Laudan argues that the “beyond reasonable doubt” standard is far too demanding for criminal conviction for violent crimes, especially when trying repeat offenders. He contends the high standard of proof imposes too much risk of subsequent criminal victimization by the falsely acquitted.

Gardiner, Georgi. 2017. “In Defence of Reasonable Doubt.” *Journal of Applied Philosophy* 34(2): 221–241.

Gardiner argues that Laudan’s use of crime statistics is flawed, and thereby defends the “beyond reasonable doubt” standard against Laudan’s arguments.

Lee, Youngjae. 2015. “Reasonable Doubt and Moral Elements.” *Journal of Criminal Law and Criminology* 105(1): 1–38.

Lee distinguishes doubts about facts and doubts about norms. Norms include moral or normative aspects of criminal law, such as “reckless”, “unjustifiable”, “depraved”, “grave”, “cruel”, “wanton”, “heinous”, “debased”, and “perversion”. Lee argues that the “beyond reasonable doubt” standard should not apply to “moral elements”, because this is too demanding. This proposal is bold, since it suggests that the state need not prove every element of the crime beyond reasonable doubt.

Walen, Alec. 2015. "Proof Beyond a Reasonable Doubt: A Balanced Retributive Account." *Louisiana Law Review* 76(2): 355–446.

Walen aims to illuminate both interpreting and justifying the "beyond reasonable doubt" standard. He first articulates the legal, historical, and sociological background of the criminal standard of proof, and criticizes deontological and consequentialist approaches. He argues that rather than allowing the instrumental importance of punishment to determine the standard—such as by weighing the disutilities—we should instead focus on the retributivist commitment to punishing only the guilty.

Picinali, Federico. 2018. "Can the Reasonable Doubt Standard be Justified? A Reconstructed Dialogue." *Canadian Journal of Law and Jurisprudence* 31(2): 365–402.

Picinali reconstructs the debate about whether the reasonable doubt standard is justified. He presents an imaginary dialogue between ideal representatives of the different viewpoints involved, and thereby argues that the standard can be justified by appeal to commitments shared by all parties to the debate.

Lillquist, Erik. 2002. "Recasting Reasonable Doubt: Decision Theory and the Virtues of Variability." *U.C. Davis Law Review* 36: 85–179.

Employing expected utility theory, Lillquist argues that the "beyond reasonable doubt" standard is flexible in nature; how demanding it is varies from case to case and depends on the nature of the crime and the character of the defendant. Lillquist argues that this is a virtue of the "beyond reasonable doubt" standard.

Picinali, Federico. 2013. "Two Meanings of 'Reasonableness': Dispelling the 'Floating' Reasonable Doubt." *Modern Law Review* 76(5): 845–875.

Picinali emphasizes two functions of "reasonableness" evaluations, and argues that the meaning of "reasonableness" depends on whether the object is theoretical or practical reasoning. Picinali argues that *practical* reasoning might suggest a floating, "sliding-scale", variable standard of reasonable doubt (as mandated by expected utility theory). But, he argues, the legal standard is best understood as governing *theoretical* reasoning. He argues that theoretical reasoning cannot be understood with a decision-theoretic approach.

Ho, Hock Lai. 2009. "Re-Imagining the Criminal Standard of Proof: Lessons from the 'Ethics of Belief'." *The International Journal of Evidence & Proof* 13(3): 198–211.

Ho rejects simplistic interpretations of the standard of proof as a probabilistic threshold or an attempt to balance relevant disutilities. Instead he advocates understanding "beyond reasonable doubt" by focusing on the character and conduct of the decision maker; he introduces substantive moral content

to interpret the legal standard. To satisfy the standard, factfinders must act with virtue—empathy, compassion, open-mindedness, prudence, humility, patience, courage, conscientiousness and scrupulousness—and with practical wisdom.

Probabilistic Approaches to Legal Evidence and Proof

The subject of whether and how to apply formal, quantitative approaches to legal evidence and legal standards of proof is enormous. There is a huge amount written about this, particularly applying Bayesian analysis to legal factfinding. I cannot hope to comprehensively capture this debate. I have selected resources that are overviews, defenses of quantificational approaches, and objections to quantificational approaches. For further discussion of these questions, see *Monographs*, *Standards of Proof* (especially Clermont 2013), *Beyond Reasonable Doubt*, *Non-Quantitative Approaches to Legal Evidence and Proof*, *The Proof Paradox*, and *Profiling*. See also Lempert 1977, Franklin 2001, Franklin 2012, Dietrich and List 2004, and the following two volumes in *Edited Volumes*: Tillers and Green 1986; Allen and Redmayne 1997.

Overviews

This section contains overviews or surveys about Probabilistic Approaches to Legal Evidence and Proof. Ho 2015 provides a helpful, accessible overview of the issues. Di Bello 2013 includes a lengthy and thorough survey of the literature about probabilistic approaches to legal factfinding, including categorizing the evolution of the ideas by decade and motivation. McCauliff 1982 surveys legal scholars and practitioners about whether they interpret legal standards of proof in a quantified way.

Ho, Hock Lai. 2015. "The Legal Concept of Evidence"
[<http://plato.stanford.edu/archives/win2015/entries/evidence-legal/>]. *Stanford Encyclopedia of Philosophy*.
Edward N. Zalta (ed).

In this *Stanford Encyclopedia of Philosophy* entry, Ho explains the debate about quantitative and probabilistic interpretations of legal evidence and proof.

Di Bello, Marcello. 2013. *Statistics and Probability in Criminal Trials: The Good, the Bad and the Ugly*.
Doctoral Dissertation, Stanford University.

This dissertation surveys the history of the debates concerning statistical evidence in the law, and develops a positive proposal which aims to reconcile the probabilist and traditionalist positions. It includes a well-researched and thorough discussion of the role of statistical evidence in the law and the quantification of legal burdens of proof.

McCauliff, C.M.A. 1982. "Burdens of Proof: Degrees of Belief, Quanta of Evidence, or Constitutional Guarantees?" *Vanderbilt Law Review* 35: 1293–1335.

This article describes legal scholars' and legal practitioners' understanding of whether and how various standards of proof can be quantified. McCauliff surveys judges' interpretations of nine different standards. The article is valuable because it discusses many standards—including probable cause, reasonable suspicion, clear and convincing evidence, clearly erroneous, and substantial evidence—in addition to the more frequently studied standards of preponderance of evidence and beyond reasonable doubt.

Defending Probabilistic Approaches

Kaplan 1968, Finkelstein and Fairley 1969–70, Cohen 1977, and Eggleston 1983 are early and influential attempts to formalize the legal burdens of proof and legal evidence. Kaye 1979 defends probabilistic approaches to legal evidence against criticisms. Schum 1994 and Kadane and Schum 1996 are more recent approaches to formalizing legal evidence and proof. Nance 2016's recent treatment of burdens of proof emphasizes the epistemic significance of Keynesian weight. Picinali 2012 advocates combining a probability assessment and a weight assessment as part of factual inferences.

Kaplan, John. 1968. "Decision Theory and the Factfinding Process." *Stanford Law Review* 20(6): 1065–1092.

An early and influential attempt to apply mathematical decision theory (namely, expected utility theory and Bayesianism) to judicial decision making. Kaplan introduced a formula for setting a probabilistic threshold as a standard of proof.

Finkelstein, Michael O. and William B. Fairley. 1969–70. "A Bayesian Approach to Identification Evidence." *Harvard Law Review* 83(3): 489–517.

In this early and influential paper, Finkelstein and Fairley discuss how statistical evidence can help identify a perpetrator. Drawing on the infamous *Collins* prosecution (People v. Collins, 68 Cal.2d 319 (1968)), they argue that although bare statistical evidence alone rarely identifies a perpetrator, Bayes theorem shows how to update suspicions about a suspect in light of statistical evidence. Tribe 1971 and Haack 2014 (chapter three) criticize Finkelstein and Fairley's approach.

Cohen, Jonathan. 1977. *The Probable and the Provable*. Oxford University Press.

"Pascalian" accounts of probability are those that satisfy standard axioms of probability calculus. Cohen presents six difficulties or "paradoxes" that face Pascalian accounts of judicial probability. These include, for example, the proof paradox, the conjunction paradox, the question of whether every tier on multi-tier inferences must be proven "beyond reasonable doubt", and the compatibility of very high statistical frequencies and reasonable doubt. He develops his own "Baconian" theory of probability.

Eggleston, R. 1983. *Evidence, Probability and Proof*, 2nd edition. London: Weidenfeld & Nicolson.

This is a classic text, originally published in 1978, applying probability theory to evidence law, factfinding, and proof. The monograph explores the probabilistic foundations of admissibility, relevance, expert evidence, witness credibility, forensics, predictions for tort litigation, surveys, and computer-generated statistics. Eggleston aims to keep the formalism accessible to non-experts. Note that some evidence laws have changed significantly since the book was written.

Kaye, David H. 1979. "The Laws of Probability and the Law of the Land." *University of Chicago Law Review* 47(1): 34–56.

This essay is an early defense of the probabilistic approach. Kaye defends applying the laws of probability in the courtroom from objections raised in Cohen 1977. The article defends the subjective conception of probability for legal factfinding.

Schum, David. 1994. *Evidential Foundations of Probabilistic Reasoning*. New York: John Wiley and Sons.

Schum ambitiously attempts to develop a general theory of evidence. Focusing on legal evidence and courtroom contexts, Schum aims to illuminate how we should navigate uncertainty in everyday life. Schum frequently employs Bayesian approaches, but emphasizes that no single formal system can adequately capture the richness of probabilistic reasoning in general. The monograph is deeply interdisciplinary, drawing on law, philosophy, logic, probability, semiotics, artificial intelligence, psychology, and history.

Kadane, Jay and David Schum. 1996. *A Probabilistic Analysis of the Sacco and Vanzetti Evidence*. New York: John Wiley and Sons.

Kadane and Schum apply formal probability theory, particularly Bayesianism, to the vast amounts of evidence presented in the trial of Nicola Sacco and Bartolemeo Vanzetti (*Commonwealth v. Sacco*, 255 Mass. 369 (1926)). The defendants were two immigrants charged with first-degree murder; Kadane and Schum use this famous and complex trial as a case study to exemplify formal approaches to evaluating legal evidence. See Haack 2014 (chapter three) for criticisms.

Nance, Dale A. 2016. *The Burdens of Proof: Discriminatory Power, Weight of the Evidence, and Tenacity of Belief*. Cambridge University Press.

Nance distinguishes two aspects of the epistemic significance of evidence. Firstly, there is the familiar "discriminatory power" of evidence—whether the evidence supports a claim or its negation, and to what extent. Secondly, there is "Keynesian weight". This is the overall amount of evidence being considered. The latter aspect is underappreciated and undertheorized, and Nance aims to illuminate it.

Picinali, Federico. 2012. "Structuring Inferential Reasoning in Criminal Fact Finding: An Analogical Theory." *Law, Probability and Risk* 11(2–3): 197–223.

Picinali argues that analogical reasoning is an important tool for understanding legal reasoning. The article advances a theory that combines the Pascalian notion of "relevance" based on the Bayesian likelihood ratio and the Baconian concept of "weight", and addresses the reference class problem.

Objections to Probabilistic Approaches

Probabilistic and quantitative approaches to legal evidence and proof are controversial. Theorists object to probabilistic theories, or any attempt at quantification, because they hold that it is either not possible or not desirable. Some theorists, such as Davidson and Pargetter 1987, Stein 2005, Picinali 2012, and Haack 2014, have epistemological objections. They argue that mere statistical probability does not adequately capture the epistemic phenomena because other considerations, such as evidential weight or coherence, also matter. Some have psychological objections, holding that it is not psychologically plausible that we reason in quantitative or Bayesian ways in legal contexts. (See, for example, Pennington and Hastie 1992 in *Non-Quantitative Approaches to Legal Evidence and Proof*.) Others, such as Tribe 1971, combine epistemic and psychological concerns: given how people reason, attempts to quantify legal evidence will introduce unnecessary epistemic flaws. Others have moral, social, political, or procedural objections. See Tribe 1971, Nesson 1979, and Nesson 1985. And see Di Bello 2013 for a more comprehensive survey. Nesson 1979 and Nesson 1985 argue that trials aim to resolve disputes, and quantifying the legal standard of proof would thwart that aim. Many theorists who object to probabilistic approaches additionally endorse a competing non-probabilistic approach. Note that there are at least two related but distinct questions: Can a probabilistic or quantitative account capture the normativity of legal evidence and proof? And what role (if any) does bare statistical evidence play in meeting a legal standard of proof?

Tribe, Laurence. 1971. "Trial by Mathematics: Precision and Ritual in the Legal Process." *Harvard Law Review* 84(6): 1329–1393.

Tribe resists mathematical decision-theoretic techniques in legal factfinding. He argues such techniques over-weight evidence that can be quantified, and impair values embodied by the legal system. Tribe's classic article is largely a reply to Finkelstein and Fairley 1969–70, which was published in the previous volume of *Harvard Law Review*. Issue eight of the same volume hosts a further exchange between the authors on the topic.

Haack, Susan. 2014. "Legal Probabilism: An Epistemological Dissent." *Evidence Matters: Science, Proof, and Truth in the Law*. Cambridge University Press.

This paper was first published in Spanish as "El Probabilismo Jurídico: Una Disensión Epistemológica" María José Viana and Carlos Bernal (trans), in *Estándares de prueba y prueba*

científica: Ensayos de epistemología jurídica Carmen Vázquez, (ed), (Barcelona: Marcial Pons, 2013), pp. 65–98. Haack rejects legal probabilism—the thesis that legal standards of proof are mathematical probabilities. She contends instead that standards of proof are foundherentist degrees of warrant.

Nesson, Charles. 1979. “Reasonable Doubt and Permissive Inferences: The Value of Complexity.” *Harvard Law Review* 92(6): 1187–1225.

Nesson argues that attempts to quantify or precisely define “reasonable doubt” undercut its function. In addition to determining the truth, trials aim to resolve disputes. This aim requires public deference to the jury. Complex evidence, and treating cases as unique, prevents quantification and insulates the jury from criticism. Nesson argues that for this reason the legal system prevents conviction in cases that would allow quantification of “reasonable doubt”.

Nesson, Charles. 1985. “The Evidence or the Event? On Judicial Proof and the Acceptability of Verdicts.” *Harvard Law Review* 98: 1357–1392.

Nesson argues that the trial aims to project (that is, communicate to society) substantive legal rules and values. To do this, it must generate “acceptable” verdicts, which can differ from the verdict that is most likely true. Nesson argues that this aim vindicates various aspects of trial procedure, including illuminating when courts admit and exclude bare statistical evidence. Nesson compares legal reasoning with historical narratives: both reject conjunction.

Davidson, Barbara and Robert Pargetter. 1987. “Guilt Beyond Reasonable Doubt.” *Australasian Journal of Philosophy* 65(2): 182–187.

This short essay argues that legal burdens of proof are not merely degrees of probability of guilt. Additionally the probability of guilt should have high weight. The authors suggest the required weight might vary by severity of punishment.

Schoeman, Ferdinand. 1987. “Statistical vs. Direct Evidence.” *Noûs* 21(2): 179–198.

Schoeman surveys various arguments for the superior epistemic (and moral) value of individualized evidence over bare statistical evidence. He responds to these arguments and defends the epistemic value—indeed, epistemic necessity—of statistical reasoning in inference.

Non-Quantitative Approaches to Legal Evidence and Proof

Much like *Probabilistic Approaches to Legal Evidence and Proof*, non-quantitative approaches comprise an enormous topic. I cannot hope to comprehensively survey the range of theories proposed. Several theorists endorse an “inference to the best explanation” account of legal evidence and proof. See Pardo and Allen 2008, Amaya 2015, and Stein 2005 in *Monographs*. See also Allen and Leiter 2001’s “relative

plausibility theory". Laudan 2007 rejects inference to the best explanation accounts of legal proof. Pennington and Hastie 1992 develop their view that jurors interpret legal evidence, and decide verdicts, via constructing a narrative about what happened. Griffin 2013 explores the epistemic effects of narrative structure in legal proceedings. Many other theorists discussed in this annotated bibliography develop non-quantitative approaches to legal evidence and proof. See especially Ho 2008, Amaya 2015, Stein 2005, and Haack 2014. See also the entries in *The Proof Paradox*, *Modal Epistemology and the Law*, and *Objections to Probabilistic Approaches*

Pennington, Nancy and Reid Hastie. 1992. "Explaining the Evidence: Tests of the Story Model for Juror Decision Making." *Journal of Personality and Social Psychology* 62(2): 189–206.

According to Pennington and Hastie, jurors impose narrative story organization on trial evidence. Story construction mediates the jurors' perceptions of evidence strength, witness credibility, and so on. Pennington and Hastie explain this "story model" of legal judgment, and then describe experiments that support the view. They argue that Bayesian accounts are not supported by empirical psychology.

Griffin, Lisa Kern. 2013. "Narrative, Truth, and Trial." *Georgetown Law Journal* 101: 281–335.

Griffin evaluates to what extent narratives play a role in trials. She suggests they play some role, but jurors do not reach verdicts exclusively by narratives. She then evaluates how narrative structure affects judicial reliability and suggests how trial design might accordingly influence reliability, given the roles of narratives. In particular, Griffin examines how understanding the role of narrative in the courtroom can illuminate jurors' biases.

Allen, Ronald J. and Brian Leiter. 2001. "Naturalized Epistemology and the Law of Evidence." *Virginia Law Review* 87(8): 1491–1550.

Allen and Leiter evaluate Bayesianism, expected utility theory, and Posner's economic analysis of evidence law. They favor the "relative plausibility theory", according to which legal factfinders compare the relative plausibility of the parties' competing explanations. They argue this account is empirically adequate (it captures the relevant empirical phenomena), is psychologically plausible (factfinders are capable of this), and makes sense of existing evidence law.

Pardo, Michael S. and Ronald J. Allen. 2008. "Juridical Proof and the Best Explanation." *Law and Philosophy* 27: 223–268.

Pardo and Allen argue that legal reasoning proceeds via inference to the best explanation, rather than through Bayesian inference. They hold that the probative value of evidence depends on the quality of explanatory connections between it and competing hypotheses, and this cannot be

quantified. They argue that focusing on legal reasoning as inference to the best explanation explains various features of evidence law and legal procedure.

Laudan, Larry. 2007. "Strange Bedfellows: Inference to the Best Explanation and the Criminal Standard of Proof." *International Journal of Evidence and Proof* 11: 292–306.

Laudan denies that inference to the best explanation is a good model for legal proof. He argues that sometimes guilt's being the "best explanation" is insufficient for a guilty criminal verdict; conversely sometimes requiring the best explanation is too demanding.

The Proof Paradox

The proof paradox is the puzzle about why (arguably) statistical evidence that makes guilt highly likely does not satisfy legal burdens of proof. Yet non-statistical, individualized evidence can satisfy the legal standards of proof, even if the individualized evidence supports a lower overall likelihood of guilt. The paradox suggests that legal standards of proof cannot be equated with statistical likelihoods. The proof paradox in legal epistemology is related to the lottery paradox. See the *Oxford Bibliographies* in Philosophy article "The Lottery and Preface Paradoxes" [obo-9780195396577-0196]. Redmayne 2008 is an excellent overview of the proof paradox. It is valuable because it describes real-life and hypothetical examples, and provides a taxonomy of responses. Thomson 1986 is a classic, well-known article in philosophy about proof paradoxes. Smith 2017 argues that to satisfy a legal burden of proof, the evidence must "normically support" culpability, not merely probabilify it. Gardiner 2018 is an introduction to proof paradoxes—written for students—that critically evaluates the proposals developed in Thomson 1986, Enoch, Spectre, and Fisher 2012, and Smith 2017. Buchak 2014 argues that belief and credence play different normative roles. Bare statistical evidence can support high credence even if (in some cases) it cannot support belief. But high credence cannot legitimate blame and punishment. Di Bello 2018 applies the formal apparatus of decision theory and risk assessment to the proof paradox. Blome-Tillmann 2017 and Littlejohn 2017 appeal to the role of knowledge to respond to proof paradoxes: what matters is the probability that your verdict is known, not the probability that your verdict is true. Blome-Tillman and Littlejohn develop this idea within the knowledge-first paradigm. The proof paradox is discussed widely in legal epistemology: See the papers in "Probabilistic Approaches to Legal Evidence and Proof," "Non-Quantitative Approaches to Legal Evidence and Proof," and "Profiling," and every entry under "Monographs." See especially Cohen 1977, Nesson 1979, Nesson 1985, which were early discussions of the proof paradox, and Stein 2005, Ho 2008, and Moss 2018. See also the section "Modal Epistemology and the Law"—many of these proposals were developed in response to the proof paradox.

Redmayne, Mike. 2008. "Exploring the Proof Paradoxes." *Legal Theory* 14: 281–309.

In this well-researched article, Redmayne first explains the proof paradox using both real-life and hypothetical examples. He then surveys and categorizes several responses to the paradox.

Thomson, Judith Jarvis. 1986. "Liability and Individualized Evidence." *Law and Contemporary Problems* 49(3): 199–219.

Thomson 1986 is a classic philosophical discussion of proof paradoxes in the law. Thomson argues that bare statistical evidence cannot suffice to meet the standard of proof because statistical evidence lacks a causal relationship to the defendant's liability, and so cannot generate the guarantee provided by individualized evidence. Richard Schmalbeck replies to Thomson immediately afterwards in the same issue. This research is criticized in Blome-Tillman 2015 and Gardiner 2018.

Smith, Martin. 2017. "When Does Evidence Suffice for Conviction?" *Mind*.
[<https://doi.org/10.1093/mind/fzx026>].

Smith proposes that we can resolve the proof paradox by appeal to a relation of epistemic support called normic support; normic support differs from statistical probabilification. See Gardiner 2018 for discussion.

Gardiner, Georgi. 2018. "Legal Burdens of Proof and Statistical Evidence" *Routledge Handbook of Applied Epistemology*, eds. David Coady and James Chase. Routledge.

Gardiner explains the proof paradox, and then evaluates Thomson 1986's causal-relationship, Enoch, Spectre, and Fisher 2012's sensitivity-based, and Smith 2017's normic-support approaches to resolving the proof paradox.

Buchak, Lara. 2014. "Belief, Credence, and Norms." *Philosophical Studies* 169(2): 285–311.

Buchak argues that in at least some cases bare statistical evidence cannot support belief, even if it can support very high credence. She then suggests belief and credence have different normative roles; belief is required for appropriate blame and punishment.

Di Bello, Marcello. 2018. "Trial by Statistics: Is a High Probability of Guilt Enough to Convict?" *Mind*
[<https://doi.org/10.1093/mind/fzy026>]

Di Bello applies decision theory to the proof paradox, with examples from both criminal and civil standards of proof. He argues that we can explain the inadequacy of bare statistical evidence in these cases if the goal of expected utility maximization is combined with fairness constraints. He also argues that under some proof paradox conditions, the risk of mistaken conviction surges.

Michael Blome-Tillmann. 2017. "'More Likely Than Not' Knowledge First and the Role of Bare Statistical Evidence in Courts of Law." *Knowledge First: Approaches in Epistemology and Mind*. Adam Carter, Emma Gordon & Benjamin Jarvis (eds). Oxford University Press, pp. 278–292.

Blome-Tillman applies a knowledge-first framework to interpret the preponderance of the evidence standard. This standard is often interpreted as simply requiring a probabilistic likelihood above 50%, given the evidence. But this interpretation is challenged by the proof paradox and the apparent inadequacy of merely statistical evidence. Blome-Tillman argues that what matters is the probability that the factfinder possesses knowledge, not the probability that the defendant is liable.

Littlejohn, Clayton. 2017. "Truth, Knowledge, and the Standard of Proof in Criminal Law." *Synthese*. [https://doi.org/10.1007/s11229-017-1608-4].

Littlejohn argues for the importance of knowledge in legal contexts. He argues that a person can punish appropriately only if they are guided by the right kind of reasons. And having reasons requires knowledge; high degrees of confidence are insufficient. What matters for legal verdicts is thus the likelihood that the factfinder possesses knowledge. This, Littlejohn argues, explains the inadequacy of merely statistical evidence for legal judgment.

Modal Epistemology and the Law

Modal epistemology explores the epistemic and practical value of judgments that are modally stable; such judgments are not merely luckily true, and this absence of luckiness is understood in modal terms. The main modal conditions are safety (S could not easily have falsely believed p) and sensitivity (were p false, S would not believe that p). See the *Oxford Bibliographies in Philosophy* article "Modal Epistemology" [obo-9780195396577-0139]. These modal conditions are applied to legal epistemology, including to resolve the proof paradox and to elucidate the epistemic aims of the legal system. Pardo 2018 notes that "[i]n the legal context, sensitivity concerns whether a factual finding would be made if it were false, and safety concerns how easily a factual finding could be false." Enoch, Spectre, and Fisher 2012 argue that beliefs based on bare statistical evidence are insensitive, and this explains why such beliefs fail to satisfy legal burdens of proof. Pritchard 2017 invokes the notion of an "easy possibility of error" to explain the inadequacy of bare statistical evidence. Blome-Tillman 2015 criticizes the accounts in Thomson 1986 and Enoch, Spectre, and Fisher 2012. Pardo 2018 argues that safety, but not sensitivity, plays an important role in evidence law. McBride 2011 argues that safety is not a necessary condition on legal verdicts. See also "Standards of Proof" and "The Proof Paradox".

Enoch, David, Levi Spectre, and Talia Fisher. 2012. "Statistical Evidence, Sensitivity, and the Legal Value of Knowledge." *Philosophy and Public Affairs* 40(3): 197–224.

Enoch, Spectre, and Fisher argue that beliefs based on bare statistical evidence are insensitive, and this explains the legal inadequacy of bare statistical evidence. They suggest that the law should not care about the *epistemic* value of sensitivity. Instead the legal value of sensitivity is *instrumental*, relying solely on bare statistical evidence undermines incentives to obey the law. This research is criticized in Blome-Tillman 2015 and Gardiner 2018.

Pritchard, Duncan. 2017. "Legal Risk, Legal Evidence and the Arithmetic of Criminal Justice." *Jurisprudence* 9(1): 108–119.

Pritchard argues that bare statistical evidence is insufficient to satisfy a legal burden of proof because beliefs formed via bare statistical evidence could easily be wrong. The law aims to reduce the risk of false verdicts, not to maximize true verdicts.

Blome-Tillmann, Michael. 2015. "Sensitivity, Causality, and Statistical Evidence in Courts of Law." *Thought* 4(2): 102–112.

In this short essay, Blome-Tillmann criticizes both Thomson 1986's causation-based and Enoch, Spectre, and Fisher 2012's sensitivity-based responses to the proof paradox. The paper articulates counterexamples to the views and suggests that neither view can account for findings of culpability that are factually erroneous yet satisfy the legal standard of proof. Blome-Tillman also argues that necessary truths generate a problem for Enoch, Spectre, and Fisher's sensitivity account.

Pardo, Michael S. 2018. "Safety vs. Sensitivity: Possible Worlds and the Law of Evidence." *Legal Theory* 24: 50–75.

Pardo evaluates the relative value of safety and sensitivity conditions in law. He argues that the sensitivity condition is not important to evidence law, but the safety condition does play important roles in understanding this area of law.

McBride, Mark. 2011. "Reply to Pardo: Unsafe Legal Knowledge?" *Legal Theory* 17: 67–73.

McBride responds to Pardo's claim that the safety condition can illuminate evidence law. McBride advances a putative counterexample to safety as a necessary condition of legal knowledge.

Juries

Juries raise various epistemological questions. Hastie 1993 is a collection of essays that use psychology to understand juror decision making. Hedden 2017 questions the epistemic value of open-ended deliberation within juries. Stein 2018 and Lee 2017 apply recent theorizing about the epistemic significance of disagreement to legal disagreement within juries and panels. Pardo 2015 applies a conception of juries as group agents to illuminate the epistemology of legal verdicts. Dietrich and List 2004 apply Bayesianism to model jury judgments. Lever 2016 examines the right to be tried by a jury of one's peers in light of bias and discrimination in society. Feigenson 2016 investigates attempts to simulate for jurors the subjective experiences of litigants. A great deal is written on the psychology and epistemology of jury trials—and rightly so—but the vast majority of cases are dispensed with before jury trials. In light of this, the epistemology searching, detaining, arresting, charging, confessing, dropping charges, and plea bargaining are also important topics. For more on the epistemology of jurors, see the

entries in **Prejudice and Justice**, especially Thomas 2017, **Character Evidence and Society**, and **Monographs**. See also Kapardis 2014 and Saks and Spellman 2016.

Hastie, Reid (ed.) 1993. *Inside the Juror: The Psychology of Juror Decision Making*. Cambridge University Press.

This edited volume uses psychology to develop models of juror decision making. Early chapters are organized by model, such as the narrative, stochastic, and cascade inference models; later chapters provide commentaries. The volume aims to illuminate why jurors disagree, how prejudice influences juror decisions, how jurors understand instructions, and the limits of competent decision making in juries.

Hedden, Brian R. 2017. "Should Juries Deliberate?" *Social Epistemology* 31(4): 368–386.

Hedden argues that juries should not deliberate, at least in free-wheeling, unstructured discussions. He argues that deliberation thwarts independent judgment, and that deliberation impedes the aim of reaching the truth reliably. Hedden evaluates alternative approaches to jury decision making, including constrained and structured deliberation, voting without deliberation, and the averaging of probabilistic judgments.

Stein, Alex. 2018. "Law and the Epistemology of Disagreement." *Washington University Law Review* 96: 51–103.

Stein examines various areas of law where decision makers reach a verdict in the face of disagreement. This includes magistrates, juries in criminal trials, and judges in the supreme court. Stein argues that these practices are incompatible with recent epistemological theorizing about peer disagreement.

Lee, Youngjae. 2017. "Reasonable Doubt and Disagreement." *Legal Theory* 23: 203–257.

Lee discusses whether proof "beyond reasonable doubt" is compatible with disagreement amongst the jurors. He argues the "equal weight view" of disagreement implies that jury unanimity is required to satisfy the "beyond reasonable doubt" standard; he then argues the equal weight view should guide jurors in determining factual issues, but not moral issues, about a case. (Lee 2015 argues instead that "beyond reasonable doubt" should not apply to moral issues.)

Pardo, Michael S. 2015. "Group Agency and Legal Proof; or, Why the Jury Is an 'It'." *William & Mary Law Review* 56(5): 1793–1858.

Pardo argues that juries are group agents. He then applies this conclusion to problems such as the conjunction paradox to argue that his favored "explanatory conception" of legal judgments is superior to its probabilistic rival.

Dietrich, Franz and Christian List. 2004. "A Model of Jury Decisions Where All Jurors Have the Same Evidence." *Synthese* 142(2): 175–202.

Dietrich and List apply Bayesian networks to jury decision making.

Lever, Annabelle. 2017. "Democracy, Epistemology and the Problem of All-White Juries." *Journal of Applied Philosophy* 34(4): 541–556.

Cheryl Thomas claims that all-white juries in England and Wales do not discriminate against non-white defendants. Thomas argues that racially balanced juries are thus not needed to ensure fair decision making in jury trials with non-white defendants in England and Wales. Lever argues that foreseeably creating all-white juries is unfair, regardless of whether they have adverse effects on jury decisions. See also Thomas 2017 in *Prejudice and Justice*.

Feigenson, Neal. 2016. *Experiencing Other Minds in the Courtroom*. University of Chicago Press.

Some litigation depends on an individual's subjective experience. Legal practitioners have begun to use digital technologies to attempt to recreate these subjective sensations in the courtroom. They aim to simulate litigants' subjective experiences to help jurors know what it is like to be that litigant.

Feigenson explores the philosophical, psychological, and legal considerations of these attempts.

Profiling

By "profiling" I mean the practice of using information about prevalence of traits in a group to infer something about an individual member of that group. Tillers 2005 calls this "group-to-individual inference". A person might infer Jane is likely pro-choice on the evidence that she is a university professor, for example. Profiling raises many epistemological, ethical, legal, and social questions. A lot of profiling is epistemically flawed: perhaps most professors are pro-life and relevant stereotypes are misleading. And well-grounded profiling can lead astray: perhaps Jane is pro-life even though most of her colleagues are not. Even instances of well-grounded profiling that lead to true beliefs can be morally or epistemically dubious. Perhaps we morally or epistemically should not judge Jane based on her reference classes. Questions about profiling arise throughout legal practice. Debates include whether evidence concerning base rates and behavioral generalizations should be admissible and whether they can ever suffice to satisfy a standard of proof. Profiling can affect frisking, arrests, restricting freedoms (such as with no-fly lists or prohibitions against blood donation), affirmative defenses for violence committed in putative self-defense, sentencing, and parole. Koehler 2001 investigates court records to determine when courts deem statistical evidence relevant. Harcourt 2007 criticizes actuarial approaches to policing and punishment and favors randomized approaches. Pundik 2017, Moss 2018, and Colyvan, Regan, and Ferson 2001 argue against using profiling to satisfy legal standards of proof. Tillers 2005 responds to Colyvan, Regan, and Ferson 2001. Tillers 2005, Schauer 2003, Picinali 2015, and Bacigal 2004 defend the use of profiling

to satisfy legal standards of proof. Goodman 2017 explores the influence of profiling on damages awarded in civil cases, such as via predictions of lifetime earnings. See also the sections: *The Proof Paradox*, *Prejudice and Justice*, and *Character Evidence and Society*. Debates about whether to quantify the legal standards of proof are also relevant to the legal, epistemic, procedural, and moral features of profiling; see *Probabilistic Approaches to Legal Evidence and Proof*.

Koehler, Jonathan. 2001. "When Do Courts Think Base Rate Statistics are Relevant?" *Jurimetrics Journal* 42: 373–402.

Koehler studied hundreds of US state and federal cases to determine when courts deem base rate evidence to be relevant. (Note that relevance is necessary, but not sufficient, for admissibility.) Base rates tend to be seen as relevant if, for example, they are offered to rebut a claim that an event "happened by chance" or if the reference class is adequately specific.

Harcourt, Bernard E. 2007. *Against Prediction*. University of Chicago Press.

Harcourt describes and criticizes the increased reliance on actuarial methods in policing and sentences. He highlights the flaws with such methods, and argues that they might even increase overall crime. He instead advocates randomized approaches to policing and punishment. See also Harcourt 2015 in *Prejudice and Justice*.

Pundik, Amit. 2017. "Freedom and Generalisation." *Oxford Journal of Legal Studies* 37(1): 189–216.

In this essay, Pundik develops his view that in some cases, group-to-individual inference requires presupposing that the individual's behavior was causally determined and so unfree. Pundik argues that this presupposition is a problem because legal proceedings must presuppose that this is false; legal attributions of culpability apply to defendants as unique and free agents.

Moss, Sarah. 2018. "Knowledge and Persons." *Probabilistic Knowledge*. Oxford University Press, ch. 10.

Moss applies her distinctive posit "probabilistic knowledge" to illuminate the ethics and epistemology of proof paradoxes, profiling, and other kinds of applied statistical inference. Legal burdens of proof, according to Moss, require knowledge. But they do not require propositional knowledge; instead they require probabilistic knowledge. The contents of probabilistic knowledge are sets of probability spaces over propositions (that is, probabilistic contents).

Colyvan, Mark, Helen Regan, and Scott Ferson. 2001. "Is it a Crime to Belong to a Reference Class?" *Journal of Political Philosophy* 9(2): 168–181.

The infamous Shonubi case (*United States v. Shonubi*, 962 F.Supp. 370 (1997); 103 F.3d 1085 (1997); 895 F.Supp. 460 (1995); 998 F.2d 84 (1993); 802 F.Supp. 859 (1992)) employed statistics about Nigerian smugglers to sentence a convicted individual. Using this case to illustrate the

reference class problem—and applying expected utility theory—the authors criticize such group-to-individual inferences. This essay is reprinted in Kyburg and Thalos (eds) 2003 *Probability is the Very Guide of Life*, Open Court.

Tillers, Peter. 2005. “If Wishes Were Horses: Discursive Comments on Attempts to Prevent Individuals from Being Unfairly Burdened by their Reference Classes.” *Law, Probability and Risk* 4: 33–49.

Responding to Colyvan, Regan, and Ferson 2001, Tillers defends the practice of using statistics about groups to support inferences about individuals. He distinguishes between moral and epistemic reasons for refusing such inferences, and argues neither are compelling.

Schauer, Frederick. 2003. *Profiles, Probabilities, and Stereotypes*. Harvard University Press.

In this monograph, Schauer defends the morality of basing decisions on categories and generalizations. That is, he presents a qualified defense of profiling. Schauer examines how to distinguish permissible and impermissible profiling. Topics discussed include racial profiling, minimum voting and drinking ages, mandatory retirement, military exclusions based on gender and sexual orientation, and sentencing.

Picinali, Federico. 2015 “Base Rates of Negative Traits: Instructions for Use in Criminal Trials.” *Journal of Applied Philosophy* 33(1): 69–87.

Picinali argues for the moral permissibility of using the base-rate of a negative trait in an oppressed social group in order to draw an inference concerning a member of that group. That is, he argues for the permissibility of using statistical demographic evidence, such as crime rates, against individual defendants.

Bacigal, Ronald. 2004. “Making the Right Gamble: The Odds on Probable Cause.” *Mississippi Law Journal* 74: 279–340.

Bacigal examines the epistemic criteria for “probable cause”, with particular attention to the epistemic role of bare statistical evidence in establishing probable cause. Bacigal describes the historical and legal precedents of probable cause. He supports establishing probable cause via statistical profiling, and argues the epistemic standard required by probable cause should depend on the stakes of the case; if societal interests are high, the probable cause standard requires less evidence.

Goodman, Loren D. 2017. “For What It’s Worth: The Role of Race- and Gender-Based Data in Civil Damages Awards.” *Vanderbilt Law Review* 70(4): 1353–1391.

Using statistics to predict future lost earnings and life expectancy is central to damage assessments in civil litigation practice. But such predictions are affected by race and gender. Goodman explores

the ethical and epistemological implications of relying on demographic evidence to award future damages.

Prejudice and Justice

Needless to say, the intersection of prejudice and legal justice is enormous. This section samples a few representative topics. Gonzales Rose 2017 argues that US evidence law creates and sustains a “dual-race evidentiary system”. Carlin 2016 argues that the courtroom is a “white space” that excludes people of color, in large part through discrediting their narratives. Both Gonzales Rose 2017 and Carlin 2016 work within critical race theory. Richardson 2017 explores various sources of racial injustice in the legal system; she draws on and supplements Van Cleve’s ethnographic study of criminal justice institutions in Cook County, Illinois. Armour 1995 argues against color-blind policies in the courtroom. Harcourt 2015 argues that risk-assessment practices that govern early release decisions perpetuate and aggravate racial injustice by relying on criminal records. Armour 1994 discusses the phenomena of defendants invoking their victim’s race to motivate a self-defense claim. The defense is, roughly, “I had reasonable fear for my safety, in part because of the race of the ‘perceived threat’.” Thomas 2017 argues that, although treated unfairly in other areas of the legal system, BAME (Black, Asian and Minority Ethnic) defendants are not disproportionately convicted by juries in England and Wales. Eberhardt, Goff, Purdie, and Davies 2004 and Kahan, Hoffman, Braman, Evans, and Rachlinski 2012 examine how top-down effects on perception can influence criminal justice. See also Kapardis 2014, Saks and Spellman 2016, *Character Evidence and Society*, *Testimony and Silence*, *Hermeneutical Injustice*, *Profiling*, and *Juries*.

Jasmine B. Gonzales Rose. 2017. “Toward a Critical Race Theory of Evidence.” *Minnesota Law Review* 101: 2243–2311.

Gonzales Rose presents evidence for a “dual-race evidentiary system”. Applying critical race theory, she argues that existing evidence law and practice systemically disadvantage non-white defendants. She presents historical examples of racist evidence law in the US and then explores current evidence law examples, such as “stand your ground” laws, the evidentiary significance of flight from police, and cross-race eyewitness testimony.

Carlin, Amanda. 2016. “The Courtroom as White Space: Racial Performance as Noncredibility.” *UCLA Law Review* 63: 450–484.

Carlin applies critical race theory to argue that people of color are discredited in the courtroom. Drawing on George Zimmerman’s trial (*State of Florida v. George Zimmerman*, Case No 592012CF001083A) as a case study, she explores “the courtroom as white space and the construction of legal narrative and legal truth as distinctly white”.

Richardson, L. Song. 2017. "Systemic Triage: Implicit Racial Bias in the Criminal Courtroom." *The Yale Law Journal* 126(3): 862–893.

Richardson describes, supplements, and extends the account of systematic racism described in Nicole Gonzalez Van Cleve's book *Crook County: Racism and Injustice in America's Largest Criminal Court* (Stanford University Press, 2016). Richardson builds on Van Cleve's ethnographic study by emphasizing the significance of implicit bias and unobservable racial injustice. In particular, Richardson emphasizes the racialized effects of overburdened public defenders.

Armour, Jody. 1995. "Stereotypes and Prejudice: Helping Legal Decisionmakers Break the Prejudice Habit." *California Law Review* 83(3): 733–772.

Armour argues that "colorblind" trial protocols—that is, proscribing references to race and similar social groups—hinder the aim of reducing discrimination. Armour argues that the effects of prejudice can be mitigated by consciously attending to the prejudice, rather than by suppressing reference to the social category. A nine-page distillation of this article is published as "Color-Consciousness in the Courtroom" in *Southwestern Law Review* (1999, 28: 281–288).

Harcourt, Bernard E. 2015. "Risk as a Proxy for Race: The Dangers of Risk Assessment." *Federal Sentencing Reporter* 27(4): 237–243.

Risk assessment tools are used to identify candidates for early release. This is viewed as a politically viable, progressive approach to reducing the prison population. Harcourt distrusts such methods. He argues that using criminal records as a proxy for risk of re-offending discriminates against Black inmates. He argues instead that progressive policies should focus on the front end of mass incarceration: reducing admission to prison in the first place.

Armour, Jody. 1994. "Race Ipsa Loquitur: Of Reasonable Racists, Intelligent Bayesians, and Involuntary Negrophobes." *Stanford Law Review* 46(4): 781–816.

The affirmative defense of self-defense in the US requires that the defendant had a "reasonable fear of imminent peril or great bodily harm". Armour discusses whether the race of the putative assailant should be legally recognized as contributing to "reasonable fear". He argues it should not.

Thomas, Cheryl. 2017. "Ethnicity and the Fairness of Jury Trials in England and Wales 2006-2014." *Criminal Law Review* (11): 860–876.

Thomas conducts statistical analysis on a large criminal justice dataset (three million charges and almost 400,000 jury verdicts; all jury verdicts from the Crown Court of England and Wales between 2006 and 2014). She concludes that BAME (Black, Asian and Minority Ethnic) defendants are disproportionately charged, and are overrepresented among defendants tried by jury, but are not disproportionately convicted by juries in England and Wales.

Eberhardt, Jennifer, Phillip Goff, Valerie Purdie, and Paul Davies. 2004. "Seeing Black: Race, Crime, and Visual Processing." *Journal of Personality and Social Psychology* 87(6): 876–893.

The authors describe psychological studies investigating police officers and civilians. The studies aim to document the effect of stereotypic associations between crime and Blackness on visual processing mechanisms. The studies conclude, for example, "Black faces looked more criminal to police officers; the more Black, the more criminal." As the authors note, this has considerable implications for understanding racial profiling.

Kahan, Dan, David Hoffman, Donald Braman, Daniel Evans, and Jeffery Rachlinski. 2012. "They Saw a Protest: Cognitive Illiberalism and the Speech-Conduct Distinction." *Stanford Law Review* 65: 850–906.

Speech is constitutionally protected. Conduct is not. Kahan et al.'s studies show how political commitments can influence whether subjects perceive protestors as committing particular acts, such as blocking pedestrians. The authors then discuss the effect of this top-down "cultural cognition" on law.

Hermeneutical Injustice

Hermeneutical injustice is a kind of injustice experienced by members of groups who lack the resources needed to make sense of their experience. This might be because they lack a particular concept, such as sexual harassment, or because appropriate labelling of their experience is impeded by social factors. Legal practice can contribute to or ameliorate hermeneutical injustice, and hermeneutical injustice can threaten legal justice. Jenkins 2017 argues that widespread misconceptions about rape and domestic abuse lead to hermeneutical injustice in legal proceedings. Orenstein 1998 focuses on the role of character evidence in rape trials in perpetuating hermeneutical injustice. Ho 2012 emphasizes the role of character virtues in avoiding testimonial and hermeneutical injustice in legal proceedings. See also *Character Evidence and Society* and *Prejudice and Justice*.

Jenkins, Katharine. 2017. "Rape Myths and Domestic Abuse Myths as Hermeneutical Injustices." *Journal of Applied Philosophy* 34(2): 191–205.

Jenkins argues that widespread inaccurate perceptions concerning rape and domestic abuse perpetuate hermeneutical injustice. Invoking Haslanger's distinction between manifest and operative concepts, Jenkins argues that despite the fact that rape and domestic abuse are codified in law, widespread misconceptions lead victims and factfinders to not recognize incidents as rape and domestic abuse. Jenkins proposes strategies to tackle such misconceptions in the trial context.

Orenstein, Aviva. 1998. "No Bad Men! A Feminist Analysis of Character Evidence in Rape Trials." *Hastings Law Journal* 49: 663–716.

Orenstein argues that invoking character evidence in sexual assault cases perpetuates and invokes harmful misconceptions about rape. She argues that rape myths—false beliefs about how sexual assault offenders and victims act—are triggered and sustained when character evidence prohibitions are lifted for sexual assault cases. Orenstein holds that such exceptions misleadingly suggest that rape is distinctively recognizable through our existing (but false) cultural scripts.

Ho, Hock Lai. 2012. "Virtuous Deliberation on the Criminal Verdict." *Law, Virtue and Justice*, Amalia Amaya and Hock Lai Ho (eds). Oxford: Hart Publishing, pp. 241–263.

Ho discusses testimonial and hermeneutical injustice in legal factfinding, and emphasizes the importance of character virtues in mitigating these injustices. Ho focuses on the virtues of practical wisdom and empathy, and the vice of prejudice and the corresponding virtues of integrity, open-mindedness, and humility.

Reasonableness

The reasonable person standard plays a central role in the law, especially in tort law, criminal law, and administrative law. This standard raises many epistemological questions, including to what extent the standard is an epistemological one—that is, a standard about belief, judgment, evidence, and rational reasoning—as opposed to a standard concerning values, ethical treatment, and so on. The standard is highly controversial. Controversies include what the standard is, and whether it should be eschewed. Gardner 2015 and Baron 2011 explore the nature and value of the standard, and largely defend its role in law. Moran 2003 is significantly more critical of the standard and suggests a radical overhaul. See also the discussions of reasonableness in the *Ignorance and Culpability* section, especially Baron 2001, and see Armour 1994 in *Profiling*.

Gardner, John. 2015. "The Many Faces of the Reasonable Person." *Law Quarterly Review* 131: 563–584.

Gardner investigates various uses and nuances of the reasonable person standard in legal practice. Gardner suggests the standard blends two distinct roles: it stands for justification (the reasonable person is justified) and for prevailing social norms (the common person). Gardner argues that the reasonable person is invoked to avoid setting specific legal precedents; the purview of the reasonable person is legally deregulated. The reasonable person standard is extra-legal and versatile.

Baron, Marcia W. 2011. "The Standard of the Reasonable Person in Criminal Law." *The Structures of Criminal Law*, Antony Duff, Lindsay Farmer, S.E. Marshall, Massimo Renzo, and Victor Tadros (eds). Oxford University Press, pp. 11–36.

Baron evaluates various objections to the reasonable person standard. She aims to better understand the standard and evaluate whether it should be retained. Baron provisionally defends the standard against criticisms. She articulates that its value stems, in part, from the way a common element—self-

governance—admits of variability: the standard varies by context but is unified by the common idea of self-correction towards attentiveness to one's environment.

Moran, Mayo. 2003. *Rethinking the Reasonable Person: An Egalitarian Reconstruction of the Objective Standard*. Oxford University Press.

Moran's monograph critically examines existing legal understandings of the reasonable person standard. She argues that reasonableness is often equated either with what is normal or typical—that is, statistically common—or is too sensitive to the personal characteristics of the defendant. Either way, she argues, the standard reinforces and perpetuates stereotypes, discrimination, and injustice. Moran proposes radically reconstructing the standard.

Ignorance and Culpability

Epistemologists often theorize about the distinction between knowledge and ignorance, and about the normative significance of this distinction. Knowledge might license particular actions, for instance, whereas ignorance might excuse actions. This epistemological theorizing has rich implication for legal practice. A lot of existing legal epistemology concerns the knowledge or ignorance of the legal factfinders and those involved in the factfinding processes, such as eyewitnesses. But the defendant's epistemic status as knowing or ignorant is also legally and morally significant. It can affect offenses—including his status as negligent or reckless—as well as defenses such as excuse and justification. The legal and moral significance of ignorance arises when the defendant claims ignorance of key facts (Baron 2016, Guerrero 2007, Husak 2011), or when the defendant claims ignorance of the law (Husak 2016). Baron 2016 examines the role of ignorance in excusing and justifying. She argues that ignorance can never justify, but it can excuse. Guerrero 2007 argues that we can be culpable for actions that stem from non-culpable ignorance. Baron 2001 argues that if a defendant falsely believed that the victim consented to sex, this can exculpate only if the false belief was reasonably held. Husak 2011 considers how forgetting affects a defendant's status as negligent or reckless. Husak 2016 explores whether and how ignorance of the law can exculpate by comparing it to mistake of fact.

Baron, Marcia W. 2016. "Justification, Excuse, and the Exculpatory Power of Ignorance." *Perspectives on Ignorance from Moral and Social Philosophy*, Rik Peels (ed). New York: Routledge, pp. 53–76.

Baron examines the distinction between justification and excuse. She argues that under any conception of justification, ignorance never underwrites justification. She then explores how and when ignorance can underwrite an excuse.

Guerrero, Alexander A. 2007. "Don't Know, Don't Kill: Moral Ignorance, Culpability, and Caution." *Philosophical Studies* 136: 59–97.

Guerrero distinguishes actions stemming from ignorance for which the person is culpable from actions stemming from ignorance for which the person is not culpable. He denies the “moral ignorance thesis”, which holds that whenever an agent acts from moral ignorance, he is culpable for the act only if he is culpable for the ignorance from which he acts. Guerrero argues individuals can be culpable for actions stemming from non-culpable ignorance.

Baron, Marcia W. 2001. “‘I Thought She Consented’.” *Philosophical Issues* 11: 1–32.

Baron examines mistakes about sexual consent—specifically, falsely judging that someone has consented to sex. She argues that only reasonable mistakes about consent should exculpate; those not based on reasonable grounds should not exculpate.

Husak, Doug. 2011. “Negligence, Belief, Blame and Criminal Liability: The Special Case of Forgetting.” *Criminal Law and Philosophy* 5: 199–218.

Husak explores the distinction between recklessness and negligence by examining species of cases in which a defendant forgets that he has created a substantial and unjustifiable risk of harm. This includes, for example, a case where someone forgets that they left a baby unattended in the bath. Husak emphasizes the difficulties of distinguishing recklessness from mere negligence and understanding their precise epistemological conditions.

Husak, Doug. 2016. *Ignorance of Law*. Oxford University Press.

Husak discusses the exculpatory effect of ignorance of law: When, and to what extent, do offenders deserve punishment when they are ignorant of the law they transgress? Husak models ignorance of law on our approach to ignorance of fact, which is more familiar, and argues that ignorance of law should usually be a complete excuse from criminal liability.

Comparison with Other Fields

One way to understand the epistemology of law is by comparison with the epistemology of other fields, such as science, history, medicine, and math. Given the frequent appeals to science in the courtroom, the large body of existing research on the epistemology of science, and the importance and success of science, comparisons with the epistemology of science are a natural starting point. Berger and Solan 2008 is an interdisciplinary edited volume dedicated to understanding the relationship between the epistemology of science and law. Samuel 2015 contrasts medical reasoning with legal reasoning in order to better illuminate legal reasoning. Samuel 2016a argues that law does not qualify as a science. Samuel 2016b contrasts knowledge of law with knowledge in other domains, including the natural and social sciences. He argues that legal knowledge is “post-axiomatic”. Rescher and Joynt 1959 describe the similarities and differences between epistemic practices in history and in law. Finally, Franklin 2012 addresses the artificial intelligence project of formalizing and automating legal reasoning, highlighting the

formidable obstacles facing this project and comparing legal reasoning with areas more amenable to algorithmic representation, such as mathematics. See also the essays in *Expert Witness Testimony*, particularly Haack 2014. See also Nesson 1985, which compares legal reasoning with historical reasoning in the context of thinking about the conjunction paradox for legal verdicts.

Berger, Margaret A. and Lawrence M. Solan (eds). 2008. Symposium: A Cross-Disciplinary Look at Scientific Truth: What's the Law to Do? *Brooklyn Law Review* 73 (3): 847–1251.

This edited collection addresses the relationship between the epistemology of science and the epistemology of law. It examines how to prove general and specific causation, how legal practice should treat expert scientific testimony, how the law's adversarial structure affects participating scientists, compares legal and scientific perspectives on uncertainty, and asks to what extent lay people can identify junk- or pseudo-science. It includes papers by epidemiologists, philosophers, psychologists, and law scholars.

Samuel, Geoffrey. 2015. "Is Legal Reasoning Like Medical Reasoning?" *Legal Studies* 35(2): 323–347.

Samuel surveys the scholarship of legal reasoning and compares legal reasoning to medical reasoning. Samuel discusses the extent to which legal reasoning is, for example, analogical, inductive, deductive, causal-explanatory, and hermeneutical. Challenging the traditional distinction between understanding the law and discovering the objective facts of a case, Samuel argues that interpretation of the law influences what facts can be determined.

Samuel, Geoffrey. 2016a. "Have There Been Scientific Revolutions in Law?" *The Journal of Comparative Law* 11(2): 186–213.

Drawing on philosophy of science, Samuel argues that law is not a scientific discipline. It lacks the relevant features. He also argues that legal thought is characterized by continuity more than change. He thereby concludes that it is inappropriate to apply Kuhn's thesis to law. The question in the title should not really be asked. But if we must answer it, the answer is no.

Samuel, Geoffrey. 2016b. *Epistemology and Method in Law*. Routledge.

In this monograph, which was first published in 2003, Samuel argues that knowledge of law cannot be expressed by a set of linguistic propositions. He argues instead that legal knowledge is knowledge of models, is partially constructed by institutions, and is "post-axiomatic". He argues that legal knowledge differs from scientific knowledge in this regard, and is more akin to the epistemology of the social sciences.

Rescher, Nicholas and Carey B. Joynt. 1959. "Evidence in History and in the Law." *Journal of Philosophy* 56: 561–578.

Rescher and Joynt enumerate similarities and differences between reasoning, evidence, and decision making in history and in law. They argue that the differences stem from their different functions: history aims simply to determine what happened and why. The law aims to determine this, but also aims to safeguard rights, and to protect the individual, the community, and the “rule of law” itself.

Franklin, James. 2012. “How Much of Legal and Commonsense Reasoning is Formalizable? A Review of Conceptual Obstacles.” *Law, Probability and Risk* 11: 225–245.

Franklin surveys obstacles encountered by attempts to formalize and hence automate legal decision making. These obstacles concern how to represent claims about the world, where those claims might be vague, context-dependent, or concern relations such as causation, conditionals, and counterfactuals. There are also, of course, problems with representing reasoning algorithmically. These include the reference class problem, deciding priors, drawing on background knowledge, non-monotonic reasoning, and the problem of formalizing evidential weight.

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