

UC Berkeley

UC Berkeley Electronic Theses and Dissertations

Title

Epistemic Institutions: Law's Encounters with Knowledge

Permalink

<https://escholarship.org/uc/item/5tj3q025>

Author

Dillon, James

Publication Date

2018

Peer reviewed|Thesis/dissertation

Epistemic Institutions: Law's Encounters with Knowledge

By

James Dillon

A dissertation submitted in partial satisfaction of the

requirements for the degree of

Doctor of Philosophy

in

Jurisprudence and Social Policy

in the

Graduate Division

of the

University of California, Berkeley

Committee in charge:

Professor Malcolm M. Feeley, Chair

Professor Andrea L. Roth

Professor Amy E. Lerman

Summer 2018

Abstract

Epistemic Institutions: Law's Encounters with Knowledge

by

James Dillon

Doctor of Philosophy

in

Jurisprudence and Social Policy

University of California, Berkeley

Professor Malcolm M. Feeley, Chair

This dissertation examines the construction of “legal knowledge”—the finding of facts to which legal norms are to be applied in the adjudication of disputes—from an interdisciplinary perspective emphasizing epistemology, the sociology of scientific knowledge, political theory, and cognitive psychology. While the construction of legal knowledge is an essential component of the legal process and the principal task of American trial courts, the process remains fraught with practical and theoretical challenges that complicate simplistic conceptions of factfinding as a transparent process of veridical reconstruction of past events. Legal epistemic agents, like all epistemic agents, lack direct access to past events; thus, legal knowledge cannot *perceive* the past directly, but can only *interpret* it. The process of legal factfinding inevitably creates distortions and is subject to systemic biases in its effort to create a veridical construct of past events giving rise to a legal dispute.

Although this dissertation cannot address every under-explored problem concerning the legitimacy and reliability of legal knowledge construction, its principal contribution is to bring interdisciplinary insights to bear on several of the more salient unresolved problems around the law's engagement with knowledge claims and the construction of legal knowledge through the adversarial process. The dissertation examines both practical and normative concerns regarding the construction of legal knowledge and its legitimacy as state-backed orthodoxy. It first asks whether judges' performance as factfinders is consistent with courts' claims of superlative judicial competence and objectivity vis-à-vis jurors. Second, the dissertation examines one area in which legal factfinders, both judges and jurors, have a notoriously poor record of reliable knowledge construction: the interpretation and application of scientific expert testimony to the resolution of legal disputes. Finally, the dissertation examines the legitimacy of legal factfinding in a liberal democratic society characterized by entrenched disagreement concerning matters of empirical fact through the lens of John Rawls's work on political liberalism.

The dissertation concludes that legal factfinding faces myriad practical and normative challenges that defy simple solutions, but that progress can be made toward the law's epistemic goals by applying relevant insights from the social sciences, philosophy, and political theory. It finds that three themes cut across all of the law's epistemic difficulties—the epistemic limitations of human decision makers, the social entrenchment of empirical disagreement, and the promise and limitations of systems-based reforms to improving the veridicality of legal knowledge—and suggests further engagement with these themes as the foundation of a new research agenda applying interdisciplinary insights to problems in the construction of legal knowledge.

To Rachel.

Contents

Abstract	1
Chapter 1 Problems of Competence and Legitimacy in the Construction of Legal Knowledge	1
Chapter 2 Epistemic Exceptionalism in Judicial Factfinding	6
I. Introduction	6
II. Epistemic Exceptionalism in Evidence and Civil Procedure	8
A. Evidentiary Double Standards	8
B. Complexity Exceptions to the Seventh Amendment	16
III. Are Judges Epistemically Exceptional?	18
A. Cognitive Exceptionality	19
B. Complexity and Epistemic Competence	27
IV. Mitigating Epistemic Exceptionalism	32
A. Institutional Logic of Epistemic Exceptionalism	32
B. Correcting the Problem: A Three-Tiered Approach	34
V. Conclusion	42
Chapter 3 Epistemic Competence and Institutional Cognition: The Need for an Epistemological Paradigm Shift in Courts' Engagement with Scientific Expertise	44
I. Courts, Scientific Evidence, and the Need for an Institutional Epistemological Perspective	44
II. The Doctrinal Framework of Law's Encounters with Scientific Expertise	47
A. Qualification of Expert Witnesses	47
B. Gatekeeping: Assessing the Reliability of Expert Methodology	49
C. Factfinding	54
III. Intellectual Due Process and the Intractable Problem of Epistemic Competence	56
A. The Normative Stakes of Epistemic Competence	57
B. Epistemological Foundations of Epistemic Competence	58
C. Empirical Studies of Epistemic Competence	62
D. Prior Reform Proposals	69
IV. Designing Competent Courts	73
A. The Failure of Brewer's Two Hat Solution	73
B. Social Epistemological Approaches: Avoiding the Atomization Trap	75
V. Conclusion	91
Chapter 4 Public Reason and Political Legitimacy in Legal Factfinding: The Case of Legal Challenges to Mandatory Vaccination Policies	93
I. The Problems of Normative and Epistemic Pluralism	96
A. Normative Pluralism and the Overlapping Consensus	96
B. Epistemic Pluralism: An Omission from Rawls's Account	99
II. Legal Challenges to Mandatory Vaccination Policies	105
A. History of Mandatory Vaccination Policies	107
B. Normative and Epistemic Pluralism in the Antivaccination Movement	109
C. Judicial Responses to Legal Challenges to Mandatory Vaccination Policies	122
D. Legislative Accommodation of Normative Pluralism	126
III. Pluralism and Realism: Rationalizing the Normative/Epistemic	

Divide in Law and Theory	128
A. Mandatory Vaccination and the Rawlsian Legitimacy Problem: The Failure of Epistemic Reasonableness.....	128
B. Moral Realism and Anti-Realism in Law and Theory: Alternative Rationales for Normative and Empirical Accommodation	132
IV. Conclusion.....	140
V. Post Script: A Note of Caution.....	145
Chapter 5 An Agenda for the Study of Legal Knowledge Construction.....	148
I. The Epistemic Limitations of Human Decision Makers.....	148
II. The Social Entrenchment of Empirical Disagreement	149
III. The Utility and Limitations of Systems-Based Reforms to Improving the Veridicality Of Legal Knowledge.....	151
References.....	153

Chapter 1

Problems of Competence and Legitimacy in the Construction of Legal Knowledge

Knowledge and truth are central concerns of the legal system. Witnesses must swear or affirm to tell “the truth, the whole truth, and nothing but the truth” (or some similar formulation) before testifying, subject to criminal prosecution for perjury.¹ Factfinding is essential to the trial process—trial courts take inputs in the form of live testimony, documents, and other evidence and produce outputs in the form of findings of fact, to which they apply legal standards to produce judgments in legal disputes. Whether this application takes place in the “black box” of the jury room or within the confines of the judicial mind, the integrity of these factual inputs—their correspondence with the true state of the world—is a necessary condition to the provision of just outcomes. As in the programmer’s maxim “garbage in, garbage out,” the quality of legal decision making is necessarily contingent of the quality of epistemic inputs in the legal process—both the veracity of primary evidence and, crucially, the reliability of the adversarial process by which courts distill findings of fact from the welter of conflicting evidence introduced at trial.

The construction of a coherent narrative from the disparate, conflicting pieces of evidence introduced at trial—the process of legal factfinding—places high demands on both the cognitive capacities and social competencies of the factfinder. Was the traffic light red, as the plaintiff claims, or green, as the defendant’s eyewitness recalls? Is the officer’s testimony that the decedent aggressively pointed a gun credible, or was it constructed after the fact? Did the loss to investors caused by the defendant’s financial misstatements reach the hundreds of millions, as the plaintiffs’ expert economists maintain, or was it negligible, as the defendant’s experts claim? In these and all other scenarios in which the court derive a definitive statement of facts from the adversarial presentation of conflicting evidence, finders of fact must apply their education, social knowledge, intuition, and in some cases, normative views about the world to discern the truth about some past state of affairs to which they lack firsthand access. Some measure of subjectivity is both inevitable and normatively desirable in this constructive task—indeed, among the jury system’s most highly regarded features is its capacity to bring the local community’s perspective to bear on the resolution of legal disputes.² At the same time, judges, scholars, and lawyers are keenly aware of the potential for individual and provincial biases to infect legal factfinding in ways that run counter to courts’ (admittedly aspirational) mission of the provision of even-handed legal justice.

Given the centrality of this process of knowledge construction to the institutional mission of the judiciary, the legal system imposes substantial constraints on the process of legal factfinding. In addition to the solemnity of the oath and the criminalization of perjury as guards against intentional deceit on the part of testifying witnesses, the Federal Rules of Evidence (FRE) act as a set of cognitive guardrails, distinguishing evidence that a court may legitimately consider from that which, for a variety of reasons, is deemed illegitimate or unreliable for the epistemic purpose

¹ Fed. R. Evid. 603; see 18 U.S.C. § 1623. Similar provisions exist in the law of every state.

² It is possible to overstate the constructive component of legal factfinding—few, I suspect, would agree with Sheila Jasanoff’s suggestion that “a trial is an occasion for... choosing between alternative constructions of possible realities” rather than “locating the truth.” SHEILA JASANOFF, *SCIENCE AT THE BAR: LAW, SCIENCE, AND TECHNOLOGY IN AMERICA* 52 (1997). But it is true that a naïve view of “the truth” and its accessibility to legal proceedings can blind us to the inevitable perspectivity of legal knowledge construction.

to which it might be put in a legal proceeding.³ Thus, for example, evidence that is irrelevant to the legal issues presented, evidence to be presented as hearsay, or expert witness testimony lacking sufficient indicia of methodological and substantive reliability may be excluded from presentation at trial and, thus, from the factfinder's deliberation. While the FRE are the most prominent locus of epistemic quality control in the federal judicial system, other rules of ethics and procedure—for example, rules against lawyers' suborning perjury,⁴ or against ex parte communications between parties and judges⁵—also serve epistemic ends. Far from the epistemic free-for-all that critics of the adversarial system might envision, American legal procedure employs a complex epistemic apparatus intended to facilitate correspondence between constructed legal knowledge and "objective" truth, while at the same time incorporating and even celebrating the influence of local perspectives and values on legal decision making.

At the same time, despite the complexity of the legal epistemic apparatus and its refinement over centuries of experience in common law courts, empirical and normative gaps remain between the epistemic aspirations of the legal system and its performance in the resolution of legal disputes. On the empirical side, to what extent can the minds of legal actors, operating within the parameters of the legal process, construct legal knowledge that corresponds, more or less, to past events giving rise to legal disputes? More importantly, how, and under what circumstances, do legal actors systemically *fail* to produce truth-convergent knowledge, and how might legal institutions be reformed to produce knowledge bearing a closer correspondence to truth? Normative questions, among others, include the legitimacy of legal institutions' role in coercively shaping orthodoxy—picking epistemic winners and losers—within a society characterized by deeply entrenched disagreement about matters of empirical fact. When, and under what circumstances, can legal authorities declare the truth, backed by the coercive force of law, about empirical questions as to which some measure of public disagreement persists?

This dissertation explores several contemporary problems concerning the construction of legal knowledge by legal institutions. It asks how, and under what circumstances, legal institutions can be effective at constructing generally veridical accounts of past events, how that constructive task can go awry in predictable ways, and how the construction of state-backed orthodoxy in the form of legal factfinding can be normatively legitimate in a liberal democratic society characterized by entrenched disagreement about questions of empirical fact. Chapters 2, 3, and 4 gradually move from the concrete to the abstract and from the descriptive to the normative in their exploration of the challenges and shortcomings in courts' engagement with knowledge claims. Broadly speaking, I seek to compare courts' public self-conception as dispassionate, supremely competent generators of veridical legal knowledge with the empirical evidence of their systemic epistemic shortcomings, to consider how developments in epistemology, cognitive psychology, and other fields might suggest improvements in the legal epistemic apparatus, and to introduce the largely unacknowledged problems of political legitimacy created by a legal system that necessarily generates a state-backed orthodoxy every time a court propounds a finding of

³ Some rules of admissibility, for example the Fourth Amendment's exclusionary rule, exist to serve non-epistemic policy goals. See *Weeks v. United States*, 232 U.S. 383 (1914) (adopting exclusionary rule where evidence is seized in violation of the Fourth Amendment). Others serve mixed purposes—for example, rape shield laws were motivated partly by concern that legal factfinders would over-weigh information about a victim's prior sexual history relative to its actual epistemic significance, and also from policy concerns about the traumatizing experience of cross-examination concerning sexual history for victims.

⁴ See MODEL CODE OF PROFESSIONAL RESPONSIBILITY EC 7-26.

⁵ CODE OF CONDUCT FOR UNITED STATES JUDGES Canon 3(A)(4) (2014).

fact. While this dissertation cannot hope to identify, much less resolve, every unresolved issue around courts' construction and application of legal knowledge, the themes recurring throughout these chapters—the epistemic limitations of human decision makers, the social entrenchment of empirical disagreement, and the promise and limitations of systems-based reforms to improving the veridicality of legal knowledge—point toward a new research paradigm in which the generation of legal knowledge is both contextualized as one form of collective, systems-based knowledge production while at the same time situated within a discrete class of knowledge production that is inextricably entwined with the exercise of state coercion and thus raises concerns of legitimacy and moral warrant that exceed the merely epistemological.

Chapter 2 compares courts' public claims about the quality of judicial factfinding, particularly in comparison to that of lay jurors, with emerging empirical evidence of judges' cognitive limitations. While most rules of evidence and procedure are not limited by their terms to jury proceedings, courts have often applied more permissive procedural and evidentiary standards in proceedings involving judges rather than juries as factfinders. They do so, often explicitly, on the basis of "epistemic exceptionalism"—the claim that judges' cognitive processes are more reliable than those of laypersons and can be trusted to operate with greater competence and objectivity even in the absence of evidentiary and procedural constraints. Surveying the empirical literature on human cognition generally and judicial cognition specifically, I argue that the claims of epistemic exceptionalism are, at best, exaggerated—while judges are less susceptible to some kinds of cognitive error, the differences are generally small in magnitude and insignificant in comparison to the extent to which judges and laypersons show similar susceptibility to cognitive illusions, implicit bias, and motivated reasoning. Moreover, generalist judges have little advantage over lay jurors in interpreting complex evidence outside the scope of their legal expertise. Thus, doctrines grounded in epistemic exceptionalism risk increasing the influence of cognitive error in judicial decisions, and they preempt the jury's factfinding prerogatives in favor of generalist judges for no corresponding epistemic benefit. Chapter 2 then offers three tiers of solutions to the problem of epistemic exceptionalism, ranging from specific doctrinal corrections at the lowest level, through a middle tier of institutional reforms, and culminating with a discussion of how to instill a culture of epistemic humility within judicial institutions.

Chapter 3 focuses on a single area of legal factfinding: courts' ability to interpret and apply complex scientific evidence, particularly the testimony of expert witnesses, to the resolution of legal disputes in a reliable way. It begins with the problem of "epistemic competence"—the inability of courts to effectively interpret and apply scientific expert testimony to the resolution of legal disputes—and argues that the intractability of the problem is the result of the epistemological paradigm by which the discussion among judges, lawyers, and scholars has heretofore been framed. The existing literature, grounded in an atomized epistemological paradigm that conceives only of individual human minds as epistemic agents, makes an impossible demand: that individual legal decision makers possess substantive expertise in all scientific domains in which expert witnesses testify. Because judges and jurors are not omniscient, this demand can never be satisfied, and reform proposals have therefore been limited to mitigating the problem rather than solving it. Chapter 3 proposes a new solution to the problem of epistemic competence. First, it traces the converging accounts of classical epistemology and the sociology of scientific knowledge to show that warranted judgments in

matters of scientific fact can be made only by judges who possess expertise in the relevant scientific domain. Second, it draws on insights from social epistemology to advocate a collectivist epistemological paradigm wherein the institution of the court, rather than the individual judge and jurors, is the epistemic agent of interest. I describe a system of “distributed cognition” that would vest scientific expertise and legal authority in courts as institutional epistemic agents, thus solving the problem of epistemic competence. Finally, Chapter 3 describes one method by which the social epistemological solution might be implemented, by creating a new office of scientific experts within the federal judiciary.

Chapter 4 shifts its focus from the epistemic warrant of legal factfinding to the political legitimacy of knowledge construction backed by the coercive force of law. It approaches the problem through the lens of John Rawls’s work on political liberalism, in which Rawls discussed the legitimacy of state action in a society characterized by irreducible moral pluralism. Rawls recognized that liberal democratic society is characterized by a state of permanent disagreement about questions of moral value, and concluded that the moral demands of civility and reciprocity require citizens, in matters concerning constitutional essentials or basic justice, to deliberate and vote on the basis of “public” reasons grounded in the overlapping consensus of “reasonable” moral viewpoints, rather than “private” reasons grounded directly in a single moral framework that others might reasonably reject. However, Rawls’s emphasis on normative pluralism overlooks another source of diversity endemic to liberal democratic society, which I refer to as “epistemic pluralism.” Not only do citizens in a liberal democracy fundamentally disagree about questions of normative value, they also disagree to a significant extent about the empirical facts of the world.

Chapter 4 examines the problem of epistemic pluralism in the context of legal challenges to mandatory vaccination policies in the United States. Notwithstanding a relatively widespread and stable consensus of medical experts that vaccination poses only limited risk to health, public skepticism persists toward the claim that vaccines are safe and effective. Responses to legal challenges to vaccination policy reveal a conspicuous disparity between legal authorities’ tolerance for normative and epistemic pluralism. Courts and legislatures defer far more readily to objections grounded in normative pluralism, whether religious or philosophical, than to objections grounded in epistemic rejection of the medical consensus surrounding vaccination policy. Chapter 4 considers, first, the development of a principle of “epistemic reasonableness” defining an overlapping consensus of reasonable epistemic viewpoints beyond which the principle of epistemic reciprocity does not apply. It ultimately concludes that any such principle would fail to obviate the *normative* duties owed to those epistemic outliers who are nevertheless normatively “reasonable” within Rawls’s conception. Thus, Chapter 4 ultimately concludes that the distinction between the reasonable accommodation granted to normative pluralism, compared to the relative lack of accommodation granted to epistemic outliers, is justified by ontological differences between normative and empirical propositions. Specifically, it finds a tacit commitment to moral anti-realism at work both in constitutional interpretation and in Rawls’s theory of political liberalism itself, Rawls’s protestations to the contrary notwithstanding. Finally, Chapter 4 argues that this tacit commitment to moral anti-realism should be made explicit, and explains how such a commitment could be used to rationalize disparate areas of law touching upon issues of accommodation of moral or epistemic disagreement.

Finally, Chapter 5 concludes by reviewing the themes connecting Chapters 2 through 4 and discussing directions for future research.

Chapter 2

Epistemic Exceptionalism in Judicial Factfinding

I. Introduction

In Greek and Roman mythology, Icarus was a young boy whose father, Daedalus, crafted pairs of wings from bird feathers to allow the two to escape the island of Crete, where they were imprisoned by King Minos.⁶ Although Daedalus warned his son not to fly too high, lest the sun melt the wax binding the feathers to the wooden frame, Icarus, in a burst of exuberant overconfidence, disregarded his father's warning and ascended higher and higher, with predictable results. The wax melted, the artificial wings disintegrated, and Icarus plunged to his death.⁷ The moral is self-evident: those who disregard the limits of their own abilities do so not only to their own peril, but, as seen through Daedalus's grief at his son's death, to the peril of those around them.

The story of Icarus has long been invoked as a warning to those whose overconfidence threatens to undermine their own goals. I would add a new group to that list: judges who, in the belief that their intelligence, legal training, and good faith grant them a competence and objectivity beyond that of which laypersons are capable, disregard rules of evidence intended to mitigate the effects of cognitive bias or displace the jury's factfinding prerogatives on the ground that the factual issues in the case are too complex for juries to evaluate. I refer to this belief as *epistemic exceptionalism*, as it is characterized by the premise, often made explicit, that judges are more intellectually capable, more fair-minded, and less susceptible to a variety of cognitive fallacies and motivated reasoning than jurors.

Epistemic exceptionalism provides at least a superficial answer to several puzzling questions.⁸ Why do courts applying the Federal Rules of Evidence (FRE) routinely adopt more lenient standards of admissibility,⁹ or in some instances hold the rules entirely inapplicable, in the context of pretrial and bench trial proceedings conducted by judges? Why do they so rarely invoke the authority provided by FRE 706 to appoint independent experts as witnesses or advisors to the court? And why have they approved the transfer of factfinding authority from the jury to the judge in some cases deemed too complex for a jury to adjudicate? All these doctrines are justified by an appeal to some form of epistemic exceptionalism; all rest on a claim that judicial cognition, even beyond judges' domain-specific expertise in law, is more reliable, more objective, and more competent than that of laypersons. In some cases, this appeal is active and explicit, as when courts hold that rules providing for the exclusion of prejudicial evidence do not apply in bench trials because judges are presumed capable of disregarding the prejudicial effect of such evidence and considering only its probative value. In others it is passive, as when judges'

⁶ OVID, *METAMORPHOSES* VIII: 183–235 (Horace Gregory trans. 1958).

⁷ *Id.*

⁸ This answer is superficial because I believe the doctrines rationalized by epistemic exceptionalism are ultimately motivated by deeper institutional incentives. *See infra* Part IV(A).

⁹ For convenience, I will treat the federal system as the paradigm case. However, the points addressed herein—both the prevalence of epistemic exceptionalism and the empirical evidence suggesting that the rationalizations on which its doctrines rely rest on exaggerated distinctions between judicial and juror factfinding—apply equally to state and federal courts.

failure to perceive their need for independent technical advice causes them to decline to appoint third-party experts under FRE 706. In all these instances, however, legal outcomes turn on judges' overestimation of their own cognitive capacities.

This chapter examines the empirical basis of epistemic exceptionalism and finds the premise of judicial cognitive superiority, at best, exaggerated. Federal judges are indeed exceptional in their intellectual and professional achievements; a random sample of the federal judiciary would almost surely rate higher in general intelligence, educational background, and professional achievement than a random sample of the general American public.¹⁰ The problem is that doctrines grounded in epistemic exceptionalism tend to overestimate judges' concededly exceptional abilities. It is true that judges are less prone to *some kinds* of cognitive errors, and may be somewhat less susceptible to outcome-oriented reasoning than laypersons.¹¹ But on the whole, judges show susceptibility to cognitive illusions, fallacies, and implicit biases that is comparable to that of laypersons. The few contexts in which they demonstrate statistically significant advantages do not justify the degree of confidence in judges' epistemic irreproachability that courts display in, for example, holding that provisions of the FRE requiring proposed expert witness testimony satisfy criteria of scientific reliability apply with less force at bench trials because judges can be trusted to evaluate such evidence more effectively than jurors.¹² Epistemic exceptionalism is defined by the gap between judges' actual epistemic capacities and the perception of those abilities expressed in appellate doctrine and the discretionary practices of trial courts. As we shall see, that gap is substantial, and courts' reliance on the assumptions of epistemic exceptionalism threatens the integrity of the legal process in myriad ways.

If epistemic exceptionalism threatens the quality of judicial decision making, what is to be done? The problem is multifaceted, and so a multi-tier solution is necessary. Relatively simple doctrinal reforms are adequate to resolve most of the specific manifestations of epistemic exceptionalism discussed in this chapter—for example, the FRE should be interpreted consistently with their text to apply equally to bench trials, jury trials, and most pretrial proceedings in which evidence is introduced, and courts should reject “complexity exceptions” to the Seventh Amendment right to jury trial that displaces jury factfinding with generalist judges. But addressing specific manifestations does not resolve the underlying problems. Thus, a second tier of institutional reforms may also be necessary—for example, we should consider imposing a single-blind bifurcated model of adjudication in which admissibility decisions are made during the pretrial phase before one judge, and the case is tried before a second judge from whom the pretrial record is sealed. Because judges' general failure to comprehend the need for independent experts contributes at least in part to their reluctance to appoint such experts under FRE 706, the rules should be changed to “nudge” judges toward making such appointments the norm rather than the exception. Above all, though, doctrines grounded in epistemic exceptionalism will persist until a culture of epistemic humility—an awareness of one's cognitive limitations and a commitment to

¹⁰ See Valerie Hans, *Judges, Juries, and Scientific Evidence*, 16 J. L. & POL'Y 19, 29–31 (2007) (discussing differences in educational background between judges and laypersons).

¹¹ See *infra* Part III(A).

¹² FRE 702; see *infra* Part II(A)(3).

act in accordance with that awareness—is instilled within the judiciary. The process of cultural change will surely be long and arduous, but it is the best hope of permanently diminishing the effects of epistemic exceptionalism on legal processes.

This chapter proceeds as follows. Part II describes some manifestations of epistemic exceptionalism in evidentiary double standards and invasions of the jury’s factfinding prerogatives. Part III surveys the empirical literature relevant to the assumptions of epistemic exceptionalism, first by examining the biases, fallacies, and other cognitive illusions to which human cognition in general is susceptible, and second by examining the body of evidence concerning the susceptibility of judges to those effects. It also examines the extent to which judges possess a domain-general epistemic superiority in interpreting complex or technical evidence in comparison to jurors. Part IV examines the institutional logic of epistemic exceptionalism, arguing that doctrines rationalized on the surface by appeal to judges’ superior cognitive endowments in fact are motivated by the judiciary’s vulnerable position vis-à-vis the other branches of government. It then offers a three-tiered prescription for mitigating the distorting effects of epistemic exceptionalism on the legal process. The first tier addresses corrections to the specific manifestations of epistemic exceptionalism discussed in Part II. The second tier discusses institutional reforms to protect against manifestations of epistemic exceptionalism more broadly. Finally, the third tier discusses how a culture of epistemic humility might be institutionalized in the professional culture of the judiciary. Part V concludes.

II. Epistemic Exceptionalism in Evidence and Civil Procedure

This Part will draw on examples from the law of evidence and civil procedure to demonstrate how the assumptions of epistemic exceptionalism shape legal doctrine. The manifestations of epistemic exceptionalism surveyed in this Part are intended only to highlight some of the more conspicuous examples of the phenomenon rather than to provide a full catalog or taxonomy. The problem of epistemic exceptionalism is broader than the specific manifestations addressed here;¹³ thus, the solutions considered in Part IV are likewise more comprehensive in their scope.¹⁴

A. Evidentiary Double Standards

We should note at the outset the broad and largely undifferentiated scope of the FREs’ coverage. Schauer observes that “the immediate absence of a jury is taken by many trial judges as sufficient cause to treat the law of evidence as somewhere between mildly suggestive and largely

¹³ This chapter does not address manifestations of epistemic exceptionalism in the criminal context, though examples certainly exist. See, for example, the line of cases holding that the rule announced in *Bruton v. United States*, 391 U.S. 123 (1968), “that in a joint criminal trial before a jury, a defendant’s Sixth Amendment right of confrontation is violated by admitting a confession of a non-testifying codefendant that implicates the defendant, regardless of any limiting instruction given to the jury,” *Johnson v. Tennis*, 549 F.3d 296, 298 (3d Cir. 2008), is inapplicable in bench trials because although “[a] jury may have difficulty in disregarding extrajudicial statements implicating a defendant[, w]e will not presume that a judge suffers from the same disability.” *U.S. v. Castro*, 413 F.2d 891, 895 n.7 (1st Cir. 1969); see also *U.S. v. Cardenas*, 9 F.3d 1139, 1154–55 (5th Cir. 1993) (same); *Rogers v. McMackin*, 884 F.2d 252, 255–257 (6th Cir. 1989) (same); *United States ex rel. Faulisi v. Pinkney*, 611 F.2d 176, 178 (7th Cir. 1979) (same); *Cockrell v. Oberhauser*, 413 F.2d 256, 257–58 (9th Cir. 1969) (same).

¹⁴ See Part IV(B)(2)–(3), *infra*.

irrelevant,”¹⁵ a double standard that finds no purchase in the text of the FRE. FRE 1101(a) states that the FRE apply to, among other things, “proceedings before United States district courts.” The rule makes no general distinction between pretrial and trial phases,¹⁶ or between trial before a petit jury and bench trial,¹⁷ yet courts have routinely imposed a lower standard of admissibility in pretrial and bench trial proceedings explicitly on the rationale that judges, unlike juries, have less (or no) need of the cognitive protection that the rules providing for exclusion of unreliable or unduly prejudicial evidence provide, or that judges are more capable than juries of interpreting and applying expert witness testimony without the reliability guidelines of FRE 702.¹⁸

1. Rules Applying to Prejudicial Evidence

We begin our survey of the manifestations of epistemic exceptionalism within courts’ application of the FRE with the rules most explicitly designed to guard against the effects of cognitive error: FRE 403 and FRE 609, both of which provide for the exclusion of relevant evidence where the court determines that the probative value of the evidence is outweighed by its prejudicial effect.¹⁹ The Advisory Committee Notes to FRE 403 explain that the rule is intended to guard against, among other things, the “harm likely to result” from the introduction of evidence that risks “inducing decision on a purely emotional basis.”²⁰ As a textual matter, FRE 403 applies to jury and bench trials.²¹ We have already noted that the FRE, by their general terms, make no

¹⁵ Frederick Schauer, *On the Supposed Jury-Dependence of Evidence Law*, 155 U. PA. L. REV. 165, 175 (2006).

¹⁶ FRE 104(a) exempts certain preliminary proceedings concerning the admissibility of evidence.

¹⁷ FRE 1101(d) exempts proceedings before a grand jury.

¹⁸ See, e.g., *Lucien v. Welborn*, 46 F.3d 1133, 1995 WL 29481, at *3 (7th Cir. 1995) (Table) (“In a bench trial, we presume that the trial judge will consider only relevant and admissible evidence in reaching his or her findings.”); *U.S. v. Cardenas*, 9 F.3d 1139, 1156 (5th Cir. 1993) (“The prejudicial impact of erroneously admitted evidence in a bench trial is presumed to be substantially less than it might have been in a jury trial [because] a judge... is presumed to have rested his verdict only on the admissible evidence before him and to have disregarded that which is inadmissible.”); but see *In re Oil Spill by the Amoco Cadiz off the Coast of France on March 16, 1978*, 954 F.2d 1279, 1305 (7th Cir. 1992) (“The Federal Rules of Evidence are statutes, and district judges may not disregard statutes no matter how inconvenient or cumbersome they believe the rules to be.”).

¹⁹ FRE 403 states in relevant part that “[t]he court may exclude relevant evidence if its probative value is substantially outweighed by a danger of one or more of the following: unfair prejudice, confusing the issues, misleading the jury, undue delay, wasting time, or needlessly presenting cumulative evidence.” FRE 609 identifies several circumstances in which evidence of a prior criminal conviction is admissible to impeach a witness’s character for truthfulness. As relevant here, FRE 609(a) provides that, for felonies within the convicting jurisdiction, evidence “must be admitted, subject to [FRE] 403,” where the witness is not a defendant, and “must be admitted... if the probative value of the evidence outweighs its prejudicial effect to that defendant” in a criminal case where the witness is a defendant.

As FRE 403 is the more general rule, and is incorporated by reference into FRE 609(a)(1)(A) and by substance into FRE 609(a)(1)(B), this discussion will focus primarily on it, while citing a few cases demonstrating that courts have imposed an identical double standard on admissibility under FRE 609(a).

²⁰ FRE 403, Advisory Committee’s Notes to Proposed Rules.

²¹ The same is true for FRE 609, which draws no textual distinctions at all between bench and jury trials. Indeed, the FRE 609 Conference Committee Notes explicitly anticipate that evidence of prior convictions may be excluded as unduly prejudicial from non-jury trials. Whereas the Senate Judiciary Committee’s notes focus on the potential for “the jury” to be prejudiced by evidence of prior convictions, the conference committee’s notes refer more broadly to the “trier of fact.” Compare FRE 609, Notes of Committee on the Judiciary, Senate Report No. 93–1277, with FRE 609, Notes of Conference Committee, H.R. 93–1597.

distinction between bench trials and jury trials in the scope of their application.²² And only one of FRE 403's several bases for exclusion—misleading the jury—is limited to juries. By implication, the other bases apply equally to non-jury proceedings.

Nevertheless, courts have consistently held that FRE 403 does not permit the exclusion of evidence as excessively prejudicial at a bench trial, and, in some cases, that excluding evidence on that basis is a reversible abuse of discretion. That was the holding, for example, in *Schultz v. Butcher*, in which the Fourth Circuit vacated a bench trial judgment where the trial judge had excluded evidence that a defendant had consumed alcohol prior to a boating accident as unduly prejudicial under FRE 403.²³ This view is consistently rationalized on the basis of epistemic exceptionalism; *Schultz*, for example, quoted approvingly from the Fifth Circuit's decision in *Gulf States Utilities. Co. v. Ecodyne Corp.*, which stated that "[FRE] 403 assumes a trial judge is able to discern and weigh the improper inferences, and then balance those improprieties against probative value and necessity. Certainly, in a bench trial, the same judge can also exclude those improper inferences from his mind in reaching a decision."²⁴ The appeal to epistemic exceptionalism is clear: judges need not—indeed, *cannot*—exclude relevant evidence as unduly prejudicial because they are presumed to be capable of mentally segregating the prejudicial effect from their deliberations in a way that jurors cannot. To suggest otherwise would be to puncture the pretense of superhuman objectivity and competence on which courts' institutional legitimacy relies.²⁵

2. The Hearsay Rule

Courts' application of the hearsay rule is also influenced by epistemic exceptionalism, albeit less consistently than their application of FRE 403. Some courts do at least pay lip service to the premise that the hearsay rule applies with equal force in a bench trial, but many of those courts authorize the practice of postponing rulings on motions to exclude evidence until after trial—allowing potentially inadmissible evidence in under the premise that the judge will disregard it

²² FRE 1101(a).

²³ 24 F.3d 626, 631–32 (4th Cir. 1994).

²⁴ 635 F.2d 517, 519 (5th Cir. 1981), *quoted in Schultz*, 24 F.3d at 632; *see also* U.S. v. Sperl, 458 F. App'x 535, 543 (6th Cir. 2012) ("Because this evidence was admitted during a bench trial, there was little danger of any prejudicial impact."); U.S. v. Kienlen, 349 F. App'x 349, 351 (10th Cir. 2009) ("Other circuits have held, and we agree, that excluding evidence in a bench trial under Rule 403's weighing of probative value against prejudice [is] improper."); U.S. v. Lim, 57 F. App'x 701, 704 (7th Cir. 2003) (rejecting appellant's arguments under FRE 403, "which are inapposite in a bench trial, where there is no risk of jury prejudice"); U.S. v. Hall, No. 98–6421, 2000 WL 32010, at *2 (6th Cir. Jan. 4, 2000) (per curiam) (provision of FRE 403 providing for exclusion on the basis of prejudicial effect has no application in a bench trial where it "has been seen as an unnecessary and 'useless procedure'" (quoting 22 CHARLES ALAN WRIGHT & KENNETH W. GRAHAM, JR., FEDERAL PRACTICE AND PROCEDURE § 5213 (1999))).

Courts have applied the same logic to the analysis of admissibility under FRE 609(a). *See, e.g.*, *Dixon v. Henderson*, 186 Fed. App'x 426, 429–30 (5th Cir. 2006) ("Because the trial was a bench trial, not a jury trial, the provision of [FRE 403] allowing for the exclusion of evidence if the probative value is outweighed by the danger of unfair prejudice had no application." (citing FRE 609)); U.S. v. Caudle, 48 F.3d 433, 435 (9th Cir. 1995) ("The prejudice referred to [in FRE 609(a)] is the danger that jurors will convict because they have discovered that it would be prudent to lock the defendant up, even if they are not sure he committed the crime charged.").

²⁵ *See infra* Part IV(A).

should she conclude, post-trial, that the evidence was inadmissible. Other courts apply a “liberal” standard of hearsay admissibility in bench trials, often explicitly rationalized by an appeal to epistemic exceptionalism.

Prior to the enactment of the FRE,²⁶ judicial practice granted judges some latitude concerning the application of the hearsay rule in bench trials.²⁷ Although some contemporary commentators argued in favor of preserving courts’ flexibility in dealing with hearsay evidence at bench trials,²⁸ the FRE, which supersede prior practice,²⁹ make no provision for doing so.³⁰ And, indeed, many courts in the FRE era have applied the hearsay rule in bench trials with no evident modification. For example, in *Broadcast Music, Inc. v. Xanthas, Inc.*, the Fifth Circuit reversed a trial court’s holding that the hearsay rule does not apply to bench trials, noting that under FRE 802, hearsay is not admissible unless specific legal authority dictates otherwise, and that “no such authority creates an exception for bench trials.”³¹

Other courts, however, apply a liberal standard of admissibility to hearsay evidence in bench trials³² and pretrial proceedings.³³ Such courts, if they offer a rationale at all, usually justify the

²⁶ The FRE were enacted by An Act to Establish Rules of Evidence for Certain Courts and Proceedings, Pub. L. No. 93–595 (1975).

²⁷ See, e.g., A. Leo Levin & Harold K. Cohen, *The Exclusionary Rules in Nonjury Criminal Cases*, 119 U. PA. L. REV. 905, 908 (1971) (urging “candid recognition” of longstanding practice of lax enforcement of rules of evidence in nonjury cases); Kenneth Culp Davis, *Hearsay in Nonjury Cases*, 83 HARV. L. REV. 1362 (1970).

²⁸ E.g., *id.* at 1365.

²⁹ See *Daubert v. Merrell Dow Pharm. Inc.*, 509 U.S. 579, 587 (1993).

³⁰ See FRE 104(a) (specifying certain “preliminary questions” to which the FRE do not apply); FRE 802 (hearsay is generally inadmissible; no distinction drawn between bench and jury trials); FRE 1101(a) (FRE apply, *inter alia*, to “proceedings before United States district courts”). To the extent any textual basis for the doctrines of epistemic exceptionalism exists, commentators have located it in FRE 102’s statement of purpose, which provides that “[t]hese rules should be construed so as to administer every proceeding fairly, eliminate unjustifiable expense and delay, and promote the development of evidence law, to the end of ascertaining the truth and securing a just determination.” See, e.g., Christopher B. Mueller & Laird B. Kirkpatrick, 1 FEDERAL EVIDENCE § 1:3 (4th ed. 2017). As this chapter shall show, however, there is little reason to believe that the doctrines of epistemic exceptionalism facilitate the ends of truth or justice.

³¹ 855 F.2d 233, 238 (5th Cir. 1988); see also, e.g., *Magnoni v. Smith & Laquercia*, 483 F. App’x 613, 616 (2d Cir. 2012) (affirming exclusion of hearsay from bench trial); *Paramount Farms Int’l LLC v. Ventilex B.V.*, 500 F. App’x 586, 588 (9th Cir. 2012) (same); *U.S. v. W.B.*, 452 F.3d 1002, 1004 (8th Cir. 2006) (applying hearsay analysis to bench trial).

³² See, e.g., *Concrete Works of Colorado, Inc. v. City & Cty. of Denver*, 321 F.3d 950, 989 (10th Cir. 2003) (approving the district court’s approach to anecdotal evidence at bench trial, in which the district court “‘expansively accepted hearsay and applied a liberal standard of relevance.’” (quoting *Concrete Works of Colorado, Inc. v. City and County of Denver*, Colo. 86 F. Supp. 2d 1042, 1071 (D. Colo. 2000)); *Null v. Wainwright*, 508 F.2d 340, 344 (5th Cir. 1975) (“Strict evidentiary rules of admissibility are generally relaxed in bench trials.”); *Cobell v. Norton*, 224 F.R.D. 266, 285 (D.D.C. 2004) (“In conducting civil bench trials, trial courts are afforded broader than usual latitude to admit evidence as they see fit, even hearsay evidence the Judge deems reasonably reliable and probative.”); cf. G. Michael Fenner, *The Forced Use of Inadmissible Hearsay Evidence in Bankruptcy Court*, 8 AM. BANKR. INST. L. REV. 453, 476 (2000) (describing disregard of FRE in bankruptcy trials).

³³ See, e.g., *Sierra Club, Lone Star Chapter v. F.D.I.C.* 992 F.2d 545, 551 (5th Cir. 1993) (“[A]t the preliminary injunction stage, the procedures in the district court are less formal, and the district court may rely on otherwise inadmissible evidence, including hearsay evidence.” (citing *Fed. Sav. & Loan Ins. Corp. v. Dixon*, 835 F.2d 554, 558–559 (5th Cir. 1987)); see also *Mullins v. City of New York*, 626 F.3d 47, 52 (2d Cir. 2010) (holding “that hearsay evidence may be considered by a district court in determining whether to grant a preliminary injunction”); *Kos Pharmaceuticals, Inc. v. Andrx Corp.*, 369 F.3d 700, 718–19 (3d Cir. 2004) (same).

practice on the basis of epistemic exceptionalism. Thus, in *McQuown v. United States*, a pre-FRE decision, the court commented that “[a] large part of the purpose of the [hearsay] rule—the protection of jurors deemed impressionable—is lost in a trial conducted by a judge alone.”³⁴

A third approach also exists, in which judges admit hearsay evidence provisionally or defer ruling on its admissibility under after trial—effectively admitting the evidence subject to possible post-trial exclusion should the judge conclude that the evidence was inadmissible.³⁵ Appellate courts have held that so long as a judge makes no explicit reference to inadmissible evidence in her decision, the provisional admission of evidence subsequently deemed inadmissible does not constitute reversible error.³⁶ Although no court of which I am aware has explicitly articulated a rationale for the practice of deferred rulings on contested hearsay, the obvious inference—made explicit in other contexts³⁷—is that provisional admission works no harm in bench trials because judges, unlike jurors, can be trusted to exclude evidence subsequently deemed inadmissible from their deliberations.

3. Rules Applying to Expert Witness Testimony

Courts’ engagement with the rules of evidence concerning the admissibility and use of expert witness testimony has also been deeply influenced by epistemic exceptionalism. Because they believe judges to be more capable of understanding the substance of expert testimony and less intimidated by highly credentialed expert witnesses than jurors, courts have declined to apply, or apply only minimally, the rules of judicial gatekeeping to pretrial and bench trial proceedings. As in the case of the hearsay rule, this manifests in a range of judicial approaches to applying the rules concerning the admissibility of expert witness testimony in the context of pretrial and bench trial proceedings. Some courts, at least at the formal level, hold that these rules apply with equal force before judicial factfinders, sometimes while simultaneously undercutting that claim with the observation that the rationale for expert witness gatekeeping has no application in the absence of a jury. Other courts have applied a less rigorous standard of admissibility, or have authorized the provisional admission of expert evidence, with questions of admissibility to be decided post-trial. Moreover, courts’ use—or rather, lack of use—of FRE 706’s provision for the

³⁴ 199 Ct. Cl. 858, 870 (1972).

³⁵ See, e.g., *Tewani Imports, Inc. v. Norwest Bank, N.A.*, 139 F. Supp. 2d 805, 812–13 (S.D. Tex. 2001) (applying hearsay analysis after bench trial to evidence received during trial).

³⁶ See, e.g., *U.S. v. Paz-Alvarez*, 799 F.3d 12, 29 (1st Cir. 2015); *U.S. v. Roach*, 164 F.3d 403, 409 (8th Cir. 1998); cf. *Greenberg Gallery, Inc. v. Bauman*, 817 F. Supp. 167, 170 n.3 (D.D.C. 1993) (retrospectively concluding that hearsay evidence introduced at bench trial was inadmissible; stating that “consideration of this evidence must be precluded”); *State v. Holiday*, 745 N.W.2d 556, 568 (Minn. 2008) (erroneous admission of hearsay was harmless in a bench trial when court did not reference testimony in its findings of fact). Provisional rulings on evidentiary motions are permitted in jury trials as well, but unlike bench trials, a court subsequently concluding that provisionally admitted evidence is inadmissible “may give a cautionary jury instruction or, on motion, declare a mistrial if an instruction would not prevent or cure the prejudice resulting from its provisional admission of the hearsay.” *U.S. v. Isabel*, 945 F.2d 1193, 1199 n.10 (1st Cir. 1991); see also *U.S. v. Freeman*, 208 F.3d 332, 344 (1st Cir. 2000) (“Striking the evidence and issuing this curative instruction were sufficient to shield Freeman from prejudice caused by the provisional admission of Drew’s hearsay testimony.”); *U.S. v. Peters*, 791 F.2d 1270, 1285 (7th Cir. 1986).

³⁷ See *supra* note 32 and accompanying text.

appointment of neutral experts suggests a failure on judges' part to grasp the extent of their need for independent assistance with scientific and technical matters.

FRE 702 governs the admissibility of expert witness testimony. It states that:

A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:

- (a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;
- (b) the testimony is based on sufficient facts or data;
- (c) the testimony is the product of reliable principles and methods; and
- (d) the expert has reliably applied the principles and methods to the facts of the case.

In *Daubert v. Merrell Dow Pharmaceuticals*, the Supreme Court held that FRE 702 imposes a "gatekeeping" obligation on the federal courts, pursuant to which "the trial judge must ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable."³⁸

Aside from proceedings concerning preliminary questions of the admissibility of evidence and certain miscellaneous proceedings, the FRE contain no exceptions for pretrial proceedings.³⁹ Yet some courts have held the reliability requirement of FRE 702 inapplicable to expert witness testimony introduced in pretrial proceedings, and have done so explicitly on the basis that judges are better able than jurors to evaluate expert witness testimony without the safeguards imposed by FRE 702 and *Daubert*. This issue has arisen, for example, around the use of predictive coding techniques to prepare responses to document requests in civil discovery.⁴⁰ In *Da Silva Moore v. Publicis Groupe*,⁴¹ the plaintiffs objected to the magistrate judge's acceptance of the defendant's proposed predictive coding protocol in the absence of *Daubert*-compliant expert testimony establishing the protocol's reliability. The magistrate judge rejected the plaintiffs' objections, holding that FRE 702 applies only to testimony introduced at trial, not in pretrial proceedings. FRE 702 and *Daubert*, the court wrote, "deal with the trial court's role as gatekeeper to exclude

³⁸ 509 U.S. 579, 589 (1993); see also *Kumho Tire Co. v. Carmichael* 526 U.S. 137 (1999) (*Daubert* applies to "technical" as well as "scientific" expert testimony); *Gen. Electric Co. v. Joiner*, 522 U.S. 136 (1997) (*Daubert* applies to a proposed expert's methods and conclusions; district court's admissibility decision is reviewable for abuse of discretion).

³⁹ See *supra* note 30.

⁴⁰ See Seth Katsuya Endo, *Technological Opacity & Procedural Justice*, 59 BOS. COLL. L. REV. 821 (2018); Daniel K. Gelb, *The Court as Gatekeeper: Preventing Unreliable Pretrial Ediscovery from Jeopardizing a Reliable Fact-Finding Process*, 83 FORDHAM L. REV. 1287 (2014); David J. Waxse & Brenda Yoakum-Kriz, *Experts on Computer-Assisted Review: Why Federal Rule of Evidence 702 Should Apply to Their Use*, 52 WASHBURN L. J. 207 (2013); Sharon D. Nelson & John W. Simek, *Predictive Coding: A Rose by Any Other Name*, 38 LAW PRAC. 20, 24 (2012); cf. Mark I. Bernstein, *Expert Testimony in Pennsylvania*, 68 TEMPLE L. REV. 699, 716 & n.110 (1995) (noting tendency of state judges to ignore rules of evidence regarding expert testimony in bench trials).

⁴¹ 287 F.R.D. 182 (S.D.N.Y. 2012) (Peck, Mag.); cf. Andrew Peck, *Search, Forward: Will Manual Document Review And Keyword Searches Be Replaced By Computer-Assisted Coding?*, Oct. 2011 L. TECH. NEWS 25 (2011).

unreliable expert testimony from being submitted to the jury at trial.”⁴² As a doctrinal matter, the magistrate judge’s ruling is clearly incorrect at the level of generality at which it was expressed; the Second Circuit has held that FRE 702 applies to evidence submitted in support of pretrial motions for summary judgment,⁴³ and it has never held or suggested that FRE 702 does not apply to bench trials.⁴⁴ Regardless of the merits of the particular question whether FRE 702 should apply to protocols for the identification of electronically stored information in pretrial discovery,⁴⁵ the court’s assertion that FRE 702 serves only the purpose of jury protection and thus has no application to pretrial proceedings is not well-grounded in the text of FRE 702, the FRE in general, or the *Daubert* decision and its progeny.⁴⁶ In this and other contexts,⁴⁷ doctrines excluding expert testimony introduced in pretrial proceedings from the reliability requirements of FRE 702 and *Daubert* are explicitly motivated by epistemic exceptionalism—the view that the jury, incapable of critically evaluating expert witness testimony, requires special protection against specious expertise that judges do not.

Courts have also undermined the force of FRE 702 gatekeeping in bench trials. All of the circuit courts to address the issue have stated that the FRE 702/*Daubert* gatekeeping inquiry applies less stringently in bench trials than in jury trials.⁴⁸ “[W]hile *Daubert*’s standards must still be met” in

⁴² *Id.* at 188–89.

⁴³ *Major League Baseball Properties, Inc. v. Salvino, Inc.*, 542 F.3d 290, 310–11 (2d Cir. 2008) (citing additional cases). Indeed, the Federal Rules of Civil Procedure (FRCP) make this clear. Although a party need not “produce evidence in a form that would be admissible at trial in order to avoid summary judgment,” *Celotex Corp. v. Catrett*, 477 U.S. 317, 324 (1986), FRCP 56(c)(2) provides that “[a] party may object that the material cited to support or dispute a fact cannot be presented in a form that would be admissible in evidence.”

⁴⁴ See *Sparta Commercial Services, Inc. v. DZ Bank*, 680 Fed. App’x 17, 19–20 (2d Cir. 2017) (affirming district court’s exclusion of proposed expert testimony under FRE 702 in bench trial).

⁴⁵ Compare *Da Silva Moore*, 287 F.R.D. at 188–89 with *U.S. v. O’Keefe*, 537 F. Supp. 2d 14, 24 (D.D.C. 2008) (Facciola, Mag.) (“[F]or lawyers and judges to dare opine that a certain search term or terms would be more likely to produce information than the terms that were used is truly to go where angels fear to tread. This topic is clearly beyond the ken of a layman and requires that any such conclusion be based on evidence that, for example, meets the criteria of Rule 702 of the Federal Rules of Evidence.”) and *Victor Stanley, Inc. v. Creative Pipe, Inc.*, 250 F.R.D. 251, 261 n.10 (D. Md. 2008) (“It cannot credibly be denied that resolving contested issues of whether a particular search and information retrieval method was appropriate—in the context of a motion to compel or motion for protective order—involves scientific, technical or specialized information.”).

⁴⁶ Indeed, every case in the *Daubert* trilogy involved expert witness testimony at the *summary judgment* stage—a pretrial proceeding in which no jury is involved. See *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 145 (1999); *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 140 (1997); *Daubert v. Merrill Dow Pharm.*, 509 U.S. 579, 582 (1993).

⁴⁷ See, e.g., *U.S. v. Ozuna*, 561 F.3d 728, 737 (7th Cir. 2009) (“The purpose of *Daubert* was to require courts to serve as gatekeepers so that unreliable expert testimony does not carry too much weight with the jury. Judges, on the other hand, are less likely to be swayed by experts with insufficient qualifications.”). Although *Ozuna* involved a pretrial suppression hearing to which the FRE, pursuant to FRE 104(a), do not apply, the Seventh Circuit’s analysis conflates the *qualifications* of individual expert witnesses with the *reliability* of those experts’ methodologies in specific instances; the latter concern, rather than the former, lies at the heart of *Daubert*’s reliability inquiry. See *Daubert*, 509 U.S. at 592–93 (the FRE 702 inquiry “entails a preliminary assessment of whether the *reasoning or methodology* underlying the testimony is scientifically valid and of whether that reasoning or methodology properly can be applied to the facts in issue” (emphasis added)). The Seventh Circuit’s mischaracterization of *Daubert*, like Magistrate Judge Peck’s, appears to be grounded in the assumption of epistemic exceptionalism that jurors are uniquely in need of cognitive protection, whereas judges are capable of interpreting and applying unreliable expert testimony without excluding it.

⁴⁸ See *F.T.C. v. BurnLounge, Inc.*, 753 F.3d 878 (9th Cir. 2014); *David E. Watson, P.C. v. U.S.*, 668 F.3d 1008 (8th Cir. 2012); *Metavante Corp. v. Emigrant Sav. Bank*, 619 F.3d 748, 762 (7th Cir. 2010) (“the usual concerns of [FRE

a bench trial, “the usual concerns regarding unreliable expert testimony reaching a jury obviously do not arise when a district court is conducting a bench trial.”⁴⁹ This is “obvious” for reasons explicitly grounded in epistemic exceptionalism: “[t]he ‘gatekeeper’ doctrine was designed to protect *juries* and is largely irrelevant in the context of a bench trial.”⁵⁰ Juries must be shielded from unreliable scientific evidence, whereas epistemically superior judges are “better equipped than a jury to weigh the probative value of expert evidence.”⁵¹ As we have seen with respect to other types of evidence,⁵² some courts have approved admitting expert evidence provisionally by deferring a *Daubert* ruling until after the trial—preserving the gatekeeping function only in form, insofar as the questionable expert evidence is presented at trial before the judge makes a determination as to its admissibility.⁵³

Courts’ proclivity toward epistemic exceptionalism in connection with expert evidence is not limited to gatekeeping review under FRE 702. Judges’ overconfidence in their ability to interpret and apply expert witness testimony also becomes apparent in the utilization—or lack thereof—of their discretionary authority to appoint neutral expert witnesses pursuant to FRE 706. Although FRE 706 permits the court to appoint an independent expert as a technical advisor or as a third-party witness,⁵⁴ judges are generally quite reluctant to do so.⁵⁵ While this reluctance is to some

702]—keeping unreliable expert testimony from the jury—are not present” in a bench trial); *Att’y Gen. of Ok. v. Tyson Foods, Inc.*, 565 F.3d 769 (10th Cir. 2009); *U.S. v. Brown*, 415 F.3d 1257, 1269 (11th Cir. 2005); *Seaboard Lumber Co. v. U.S.*, 308 F.3d 1283, 1301–02 (Fed. Cir. 2002); *Gibbs v. Gibbs*, 210 F.3d 491, 500 (5th Cir. 2000) (“Most of the safeguards provided for in *Daubert* are not as essential in a case such as this where a district judge sits as the trier of fact in place of a jury.”). At least one state supreme court, however, has rejected the argument that gatekeeping standards apply differently in bench trials. *See State v. Griffin*, 273 Conn. 266, 280–281 (2005) (“[T]he fundamental purpose of a [*State v.] Porter*[, 241 Conn. 57 (1997)] hearing is the same irrespective of whether the trier of fact is a court or a jury.... Consequently, the standard for determining the admissibility of scientific evidence is not dependent upon the identity of the trier of fact.”).

⁴⁹ *Tyson Foods*, 565 F.3d at 779.

⁵⁰ *Deal v. Hamilton Cnty. Bd. of Educ.*, 392 F.3d 840, 852 (6th Cir. 2004) (emphasis added); *see also ATA Airlines, Inc. v. Fed. Exp. Corp.*, 665 F.3d 882, 896 (7th Cir. 2011) (“The responsibility [to closely review scientific evidence under *Daubert*] is especially great in a jury trial, since jurors on average have an even lower comfort level with technical evidence than judges.”); *BurnLounge*, 753 F.3d at 888 (“When we consider the admissibility of expert testimony, we are mindful that there is less danger that a trial court will be ‘unduly impressed by the expert’s testimony or opinion’ in a bench trial.” (quoting *Shore v. Mohave Cnty.*, *Ariz.*, 644 F.2d 1320, 1322–23 (9th Cir. 1981))); *Brown*, 415 F.3d at 1269 (“There is less need for the gatekeeper to keep the gate when the gatekeeper is keeping the gate only for himself.”).

⁵¹ *Traxys N. Am., LLC v. Concept Mining, Inc.*, No. 1:10CV00029, 2011 WL 1979385, at *1 (W.D. Va. 2011). Given that FRE 702 gatekeeping is intended to exclude only expert testimony that is not “scientifically valid,” it is unclear what probative value such evidence might have. *Daubert*, 509 U.S. at 583.

⁵² *See supra* note 35 and accompanying text.

⁵³ *See, e.g., Estate of Stuller v. U.S.*, 811 F.3d 890, 895 n.3 (7th Cir. 2016); *Kansas City S. Ry. Co. v. Sny Island Levee Drainage Dist.*, 831 F.3d 892, 900 (7th Cir. 2016); *In re Flashcom, Inc.*, 647 Fed. App’x 689, 691 n.1 (9th Cir. 2016); *In re Salem*, 465 F.3d 767, 777 (7th Cir. 2006) (noting that if “the gatekeeper and the factfinder are one and the same—that is, the judge—the need to make such decisions prior to hearing the testimony is lessened”); *Jones v. U.S.*, 127 F.3d 1154, 1156 (9th Cir. 1997).

⁵⁴ FRE 706(b).

⁵⁵ Although comprehensive statistics on the rate of appointment of independent experts under FRE 706 are difficult to obtain, the existing evidence indicates that such appointments are rare. *See JOE S. CECIL & THOMAS WILLGING, COURT-APPOINTED EXPERTS: DEFINING THE ROLE OF EXPERTS APPOINTED UNDER FEDERAL RULE OF EVIDENCE 706* 5 (1993) (judges view such appointments “as an extraordinary activity that is appropriate only in rare instances”). Only twenty percent of judges in Cecil & Willging’s study (*n* = 431) had ever appointed an expert pursuant to FRE

extent grounded in the Anglo-American culture of judicial passivity,⁵⁶ and to some extent in the logistical problems inherent in identifying and retaining experts on an ad hoc basis,⁵⁷ it also suggests a failure on judges' part to recognize the scope of their own ignorance in specialized expert domains and their need for independent advice in making credibility determinations between partisan experts.⁵⁸ This is epistemic exceptionalism of a passive rather than active sort—a failure on the part of judges to recognize the need for expert advice and insight on technical matters beyond the scope of most generalist judges' expertise.

B. Complexity Exceptions to the Seventh Amendment

In perhaps the purest expression of epistemic exceptionalism to be found in American law, several scholars and a few courts have recognized or spoken in support of a generalized “complexity” exception to the Seventh Amendment’s right to jury trial in cases in which the evidence is too complex for a jury to comprehend. The Supreme Court appeared to endorse that general approach in *Ross v. Bernhard*, noting that the question whether a claim is a “legal” (as opposed to equitable) one to which the jury trial right applies is to be determined in part by “the practical abilities and limitations of juries.”⁶⁰ The Third Circuit explicitly recognized a complexity exception in *In re Japanese Electronic Products Antitrust Litigation*, which held that

706. Of those, 52% had done so only once. *Id.* at 7; cf. Shirley A. Dobbin et al., *Federal and State Trial Judges on the Proffer and Presentation of Expert Evidence*, 28 JUS. SYS. J. 1, 9 (2007) (analyzing data of 1998 survey of district court judges; 26.2% reported having appointed a FRE 706 expert while 73.9% reported that they would not do so). Studies of state court practices under state rules analogous to FRE 706 present a similar picture of judges’ reticence to appoint independent experts. *Id.* at 9 (36% of state judges ($n = 400$) reported appointing an independent expert; 57% responded that they would not do so); Andrew W. Jurs, *Questions from the Bench and Independent Experts: A Study of the Practices of State Court Judges*, 74 U. PITT. L. REV. 47, 58 (2012) (22% of state court judges ($n = 118$) had appointed an independent expert under state equivalents of FRE 706); Samuel R. Gross, *Expert Evidence*, 1991 WIS. L. REV. 1113, 1191 (1991) (examination of 529 California civil trials in which expert witnesses were involved found “not a single reference to a court-appointed expert,” notwithstanding California rule that permits appointing independent expert witnesses).

⁵⁶ Christopher Tarver Robertson, *Blind Expertise*, 85 N.Y.U. L. REV. 174, 178 (2010) (“Rule 706 has failed to change practice, since it pushes against deeply ingrained norms, roles, and incentive structures of the adversarial status quo.”); CECIL AND WILLGING, *supra* note 55, at 4–5 (“[M]uch of the uneasiness with court-appointed experts arises from the difficulty in accommodating such experts in a court system that values, and generally anticipates, adversarial presentation of evidence.”); cf. Jurs, *supra* note 55, at 64 (77% of state court judges identified “concern about interference with the adversarial system” as a reason not to appoint independent experts under state equivalents of FRE 706).

⁵⁷ See, e.g., Robertson, *supra* note 56, at 200; Jurs, *supra* note 55, at 64 (31% of state court judges identified “lack of knowledge about the procedure” for appointment as a reason for not appointing independent experts, and approximately 15% wrote in concerns about the cost of the procedure).

⁵⁸ For example, 58% of the state court judges in Jurs’s study identified the “rarity of cases which make a Rule 706 expert necessary” as a reason for never having appointed an independent expert under state equivalents of FRE 706, and 53% believed that “party experts make Rule 706 experts unnecessary.” Jurs, *supra* note 55, at 64.

⁶⁰ 396 U.S. 531, 538 n.10 (1970). The Court later clarified that the language in *Ross* went to the permissibility of the delegation of certain types of claims to “an administrative agency or specialized court of equity.” *Granfinanciera, S.A. v. Nordberg*, 492 U.S. 33, 42 n.4 (1989); see also *Tull v. United States*, 481 U.S. 412, 418 n.4 (1987) (“The Court has also considered the practical limitations of a jury trial and its functional compatibility with proceedings outside of traditional courts of law in holding that the Seventh Amendment is not applicable to administrative proceedings.”). Whether *Granfinanciera* is properly read as foreclosing the sort of general complexity exception contemplated in *Japanese Electronic Products*, 631 F.2d 1069 (3d Cir. 1980), is an open question, though the Court did not consider *Granfinanciera* an impediment to the patent-specific complexity exception in *Markman v. Westview Instruments, Inc.*, 517 U.S. 370 (1996).

“due process precludes trial by jury when a jury is unable to perform this task with a reasonable understanding of the evidence and the legal rules.”⁶¹ Implicit in this holding, of course, is the premise that generalist judges *can* arrive at a reasonable understanding of the evidence even where juries cannot.⁶²

Although popular with scholars,⁶³ the general complexity exception recognized in *Japanese Electronic Products* has not been adopted by any other circuit court, and I am aware of no subsequent case within the Third Circuit clearly holding that a case falls within the exception.⁶⁴ A more successful, albeit more narrowly circumscribed, complexity exception is the exclusion of juries from the claim construction phase of patent litigation. In *Markman v. Westview Instruments, Inc.*, the Supreme Court held that the Seventh Amendment, which guarantees a jury trial in patent infringement cases, does not commit to the jury the construction of claim terms.⁶⁵ The Court drew that distinction partly on the basis of historical practice,⁶⁶ but the decision is also replete with the language of epistemic exceptionalism. Although claim construction involves making credibility determinations between opposed expert witnesses, *Markman* held that

⁶¹ 631 F.2d at 1090; see also *Contini v. Hyundai Motor Co.*, 149 F.R.D. 41, 42 n.2 (S.D.N.Y. 1993) (noting that *Japanese Electronic Products*, “although infrequently followed subsequently, ha[s] never been overturned or overruled”).

⁶² We need not question that judges’ legal expertise would enable them to understand legal rules too complex for lay jurors to rationally apply, though we may query whether such rules exist. The Third Circuit’s formulation distinguishes between legal and factual complexity—arguably independent bases for complexity exceptions. See ROBERT MACCOUN, GETTING INSIDE THE BLACK BOX: TOWARD A BETTER UNDERSTANDING OF CIVIL JURY BEHAVIOR 27–28 (1987); cf. Larry Heuer & Steven Penrod, *Trial Complexity: A Field Investigation of Its Meaning and Its Effects*, 18 LAW & HUM. BEH. 29, 48 (1994) (concluding after empirical study that “judges see complexity resulting from complicated evidence, complicated legal issues, and of information”).

⁶³ See Scott Brewer, *Scientific Expert Testimony and Intellectual Due Process*, 107 YALE L.J. 1535, 1672–77 (1997); Joseph A. Miron, *The Constitutionality Of A Complexity Exception To The Seventh Amendment*, 73 CHI.-KENT L. REV. 865 (1998); James S. Campbell, *The Current Understanding of the Seventh Amendment: Jury Trials in Modern Complex Litigation*, 66 WASH. U. L. Q. 63, 68–70 (1988); Patrick Devlin, *Equity, Due Process and the Seventh Amendment: A Commentary on the Zenith Case*, 81 MICH. L. REV. 1571 (1982); James S. Campbell & Nicholas Le Poidevin, *Complex Cases and Jury Trials: A Reply to Professor Arnold*, 128 U. PA. L. REV. 965 (1979); but see Richard C. Waites & David A. Giles, *Are Jurors Equipped to Decide the Outcome of Complex Cases*, 29 AM. J. TRIAL ADVOC. 19, 26–28 (2005) (arguing against complexity exception); Morris S. Arnold, *Historical Inquiry into the Right to Trial by Jury in Complex Civil Litigation*, 128 U. PA. L. REV. 829 (1979) (arguing that no historical precedent for complexity exception exists).

⁶⁴ See *SRI Int’l v. Matsushita Elec. Corp. of Am.*, 775 F.2d 1107, 1130 (Fed. Cir. 1985) (rejecting complexity exception); *In re U.S. Fin. Sec. Litig.*, 609 F.2d 411, 432 (9th Cir.1979) (same); *Soderbeck v. Burnett Co.*, 752 F.2d 285, 289 (7th Cir. 1985) (“tak[ing] no position” on the complexity exception); *Pinemont Bank v. Belk*, 722 F.2d 232, 238 (5th Cir.1984) (same); *City of New York v. Pullman Inc.*, 662 F.2d 910, 919 (2d Cir. 1981) (same); cf. *Phillips v. Kaplus*, 764 F.2d 807, 814 (11th Cir. 1985) (declining to adopt the complexity exception, but noting that the exception is “consistent” with the Supreme Court’s suggestion in *Ross* that the “abilities and limitations of the jury” are relevant to the Seventh Amendment analysis).

⁶⁵ 517 U.S. 370 (1996). Thus, the construction of patents is distinct from that of contracts, which are to be interpreted judicially where the document can be construed on the basis of the text alone, but questions of interpretation involving extrinsic evidence of intent or understanding are committed to the jury. See, e.g., *City of Hope Nat’l Med. Ctr. v. Genentech, Inc.* 43 Cal. 4th 375, 395 (2008). Claim construction routinely involves the consideration of extrinsic expert testimony concerning the meaning of the patent’s terms. See *Markman*, 517 U.S. at 386–87.

⁶⁶ *Id.* at 378–83.

“judges, not juries, are the better suited to find the acquired meaning of patent terms.”⁶⁷ This is because “[t]he judge, from his training and discipline, is more likely to give a proper interpretation to [patent claims] than a jury; and he is, therefore, more likely to be right, in performing such a duty, than a jury can be expected to be.”⁶⁸ The jury’s core competencies to “evaluate demeanor” or “reflect community standards,” the Court held, “are much less significant [in the claim construction context] than a trained ability to evaluate the testimony in relation to the overall structure of the patent.”⁶⁹

III. Are Judges Epistemically Exceptional?

Part II discussed several doctrines in the law of evidence and civil procedure that mutually reflect and reinforce the notion of epistemic exceptionalism. That Part was primarily descriptive, explaining the scope and rationale of these doctrines while minimizing discussion of the extent to which the claims of epistemic exceptionalism are empirically warranted. In this Part, we examine the empirical literature pertinent to the assumptions of epistemic exceptionalism.

The doctrines of epistemic exceptionalism are, of course, perfectly defensible if judges are in fact epistemically exceptional. And there is some reason, even beyond courts’ reassurances, to think that this might be so. Judges have ascended to prestigious heights in the competitive field of legal practice. They are more highly educated and more successful in their careers than the average person, and we may stipulate for the sake of discussion in the absence of direct evidence that they possess an average general intelligence above that of the general population. Moreover, they are professionally acculturated with norms of neutrality and objectivity.⁷⁰ Some judges vigorously deny that ideology or political preference plays any role in their decision making,⁷¹ and we need not doubt their word insofar as their descriptions extend to conscious processes.⁷² Nevertheless, the empirical evidence indicates that judges are at best only marginally exceptional in their cognitive processes, and insufficiently so to support the grandiose claims of epistemic

⁶⁷ *Id.* at 388.

⁶⁸ *Id.* at 388–89 (quoting *Parker v. Hulme*, 18 F. Cas. 1138, 1140 (E.D. Pa. 1849)).

⁶⁹ *Id.* at 389–90.

⁷⁰ *See, e.g.*, Code of Conduct for United States Judges Canon 3(A)(1) (2014) (“A judge should be faithful to, and maintain professional competence in, the law and should not be swayed by partisan interests, public clamor, or fear of criticism.”); 3(C)(1)(a) (“A judge shall disqualify himself or herself in a proceeding in which the judge’s impartiality might reasonably be questioned, including but not limited to instances in which the judge has a personal bias or prejudice concerning a party, or personal knowledge of disputed evidentiary facts concerning the proceeding.”).

⁷¹ *See, e.g.*, Harry T. Edwards & Michael A. Livermore, *Pitfalls of Empirical Studies That Attempt to Understand the Factors Affecting Appellate Decisionmaking*, 58 DUKE L.J. 1895 (2009); Harry T. Edwards, *The Effects of Collegiality on Judicial Decision Making*, 151 U. PA. L. REV. 1639 (2003).

⁷² Unconscious processes are another matter. *See* Avani Mehta Sood, *Motivated Cognition in Legal Judgments—An Analytic Review*, 9 ANN. REV. L. & SOC. SCI. 307, 309 (2013) (“The word motivated may seem to imply a conscious process, but motivated cognition operates under an ‘illusion of objectivity,’ which protects the integrity of decision makers in their own eyes and in the eyes of others.”); Chris Guthrie, Jeffrey J. Rachlinski & Andrew J. Wistrich, *Inside the Judicial Mind*, 86 CORNELL L. REV. 777, 780 (2001) (“[W]holly apart from political orientation and self-interest, the very nature of human thought can induce judges to make consistent and predictable mistakes in particular situations.”).

exceptionalism.⁷³ Judges may be less susceptible to some, but not all, forms of cognitive error than lay juries, and they gain some benefit from judicial experience, but the differences are inadequate to warrant wholesale exemptions from evidentiary guidelines intended to constrain cognitive error. Moreover, there is no reason to believe that judges are categorically better than jurors at engaging with complex evidence that lies beyond the scope of their own expertise in the domain of law. Judges' expertise in law does not extend to the scientific and technical domains in which expert witnesses testify, and general intelligence provides no protection against some forms of cognitive error, particularly those associated with motivated cognition; in fact, it has been shown to exacerbate the problem.

A. Cognitive Exceptionality

The processes of human belief formation, risk assessment, and decision making bear little resemblance to the sterile rationalism of *homo economicus*.⁷⁴ For better or worse, human cognition occurs under conditions of imperfect information and scarcity of processing time; it therefore evolved not to maximize truth-seeking above all, but rather to evaluate information according to heuristics that tend, on average, to promote survival and reproduction. Some cognitive errors are predictable from this fact alone—for example the tendency to project “agenticity” onto natural phenomena or to find patterns in meaningless data is readily explicable by the fact that, in the evolutionary environment, a false ascription of agency to, e.g., a perceived movement or passing shadow (a “false positive” or “Type I error”) carried little cost, whereas a false *rejection* of agenticity (a “false negative” or “Type II error”) carried a substantial risk of death by predator.⁷⁵ Thus, cognitive biases may be both adaptive and non-veridical;⁷⁶ we tend to see more hidden predators than are actually there, and more broadly, we tend to find patterns and causality where none exist. Sometimes the results are mostly harmless, as when the Virgin Mary is seen on a grilled cheese sandwich;⁷⁷ other times they are potentially deadly, as when Edgar Welch strode armed into a Washington, D.C., pizzeria, having been convinced by online conspiracy theories that it was the center of a pedophilia ring with which Hillary Clinton and other high-profile affiliates of the Democratic Party were involved.⁷⁸

Spurious ascription of agenticity is but one of many truth-divergent tendencies to which human cognition is susceptible. While a necessarily brief survey can barely scratch the surface of the complex model of human cognition established by cognitive psychology and related fields, it can

⁷³ Cf. Schauer, *supra* note 15, at 187 (arguing that “judges are often afflicted with the kinds of cognitive failings that juries are, and that many of the same reasons exist for imposing second-order exclusionary (or other) rules on juries’ first-order epistemological assessments also apply [to judges]”).

⁷⁴ See generally RICHARD H. THALER, *MISBEHAVING: THE MAKING OF BEHAVIORAL ECONOMICS* (2015); DANIEL KAHNEMAN, *THINKING, FAST AND SLOW* (2011).

⁷⁵ Michael Shermer, *Agenticity*, 300 SCI. AM. 36, 36 (2009).

⁷⁶ Cf. Justin T. Mark, Brian B. Marion & Donald D. Hoffman, *Natural Selection and Veridical Perceptions*, 266 J. THEORETICAL BIO. 504 (2010) (applying game-theoretic evolutionary simulations to conclude that the natural selection of perceptual apparatus may drive perceptual veridicality to extinction).

⁷⁷ See “*Virgin Mary*” *Toast Fetches \$28,000*, BBC NEWS (Nov. 23, 2004, 11:54 AM), <http://news.bbc.co.uk/2/hi/4034787.stm>; cf. Jiangang Liu et al., *Seeing Jesus in Toast: Neural and Behavioral Correlates of Face Pareidolia*, 53 CORTEX 60 (2014).

⁷⁸ See Matthew Haag & Maya Salam, *Man Gets 4 Years in Prison For ‘Pizzagate’ Shooting*, N.Y. TIMES A14 (June 23, 2017).

at least help to establish a baseline against which to measure judicial epistemic exceptionalism.⁷⁹ Among others, human cognition is susceptible to the effects of *anchoring* and *framing*, both of which describe effects whereby the outcome of a decision-making process is affected by arbitrary differences in its initial presentation.⁸⁰ Our evaluations of risk are susceptible to the *hindsight bias*, in which our estimate of the ex ante probability or foreseeability of a bad outcome is disproportionately affected by our ex post knowledge of its occurrence.⁸¹ We tend to over-value our contributions to collective achievements,⁸² and overestimate our competence, intelligence, and morality in comparison to others.⁸³ Indeed, the *least* skilled at a particular task

⁷⁹ I do not claim that a one-to-one relationship exists between the rules described in Part II and the cognitive effects surveyed in this paragraph. The common law of evidence on which many of the FRE are based predates the findings of modern psychology by decades, if not centuries. I do, however, maintain that the FRE are intended, however imperfectly, to guard against the *types* of cognitive effects that psychology has described. See MICHAEL J. SAKS & BARBARA A. SPELLMAN, *THE PSYCHOLOGICAL FOUNDATIONS OF EVIDENCE LAW* 7 (2016) (“In concluding that a gap [between optimal decision making and human cognitive processes] exists, rulemakers share the company of psychologists who have found whole classes of erroneous inferences and judgments that humans routinely make.”).

⁸⁰ Anchoring describes the disproportionate influence that the starting point for a numerical estimation—for example the list price of a house or the plaintiff’s demand in a lawsuit—exerts on the ultimate estimate. Guthrie, Rachlinski, and Wistrich, *supra* note 72, at 787–89 & n.61 (citing five studies finding anchoring effects in mock jurors’ assessment of damages); see generally Mark W. Bennett, *Confronting Cognitive Anchoring Effect and Blind Spot Biases in Federal Sentencing: A Modest Solution for Reforming a Fundamental Flaw Criminal Law*, 104 J. CRIM. L. & CRIMINOLOGY 489 (2014); Amos Tversky & Daniel Kahneman, *Judgment under Uncertainty: Heuristics and Biases*, 185 SCI. 1124, 1128–29 (1974). Framing refers to the effects on risk assessment of the presentation of economically equivalent gains or losses vis-à-vis some reference point. Guthrie, Rachlinski, and Wistrich, *supra* note 72, at 794 (“People tend to make risk-averse decisions when choosing between options that appear to represent gains and risk-seeking decisions when choosing among options that appear to represent losses.”); Amos Tversky & Daniel Kahneman, *The Framing of Decisions and the Psychology of Choice*, 211 SCI. 453 (1981).

⁸¹ See Guthrie, Rachlinski, and Wistrich, *supra* note 72, at 799–801; Jay J.J. Christensen-Szalanski & Cynthia Fobian William, *The Hindsight Bias: A Meta-Analysis*, 48 ORGANIZATIONAL BEHAV. & HUM. DECISION PROCESSES 147 (1991); Scott A. Hawkins & Reid Hastie, *Hindsight: Biased Judgments of Past Events After the Outcomes are Known*, 107 PSYCHOL. BULL. 311 (1990); cf. Maggie Wittlin, *Hindsight Evidence*, 116 COLUM. L. REV. 1323 (2016) (arguing that hindsight evidence is probative under some circumstances and that the effects of hindsight bias can be mitigated).

⁸² Guthrie, Rachlinski, and Wistrich, *supra* note 72, at 811–15 (discussing egocentric biases).

⁸³ See, e.g., Anna Sundström, *Self-Assessment of Driving Skill—A Review from a Measurement Perspective*, 11 TRANSP. RES. PART F: TRAFFIC PSYCHOL. & BEHAV. 1 (2008) (reviewing studies showing that majorities of respondents rate themselves above average in driving skill and safety); Nicholas Epley & David Dunning, *Feeling “Holier than Thou”: Are Self-Serving Assessments Produced by Errors in Self- or Social Prediction?*, 79 J. PERSONALITY & SOC. PSYCH. 861 (2000) (surveying literature finding that individuals tend to overestimate their morally praiseworthy traits relative to others); Leilani Greening & Carla C. Chandler, *Why It Can’t Happen to Me: The Base Rate Matters, But Overestimating Skill Leads to Underestimating Risk*, 27 J. APP. SOC. PSYCHOL. 760 (1997) (study participants overestimated their own skill relative to others).

Andrew Jurs’s survey of jurors in cases involving expert witnesses finds an apparent manifestation of the egocentric bias of particular relevance to our discussion: 97% of Jurs’s respondents believed that they personally had understood the expert testimony in their case, but only 69% believed that juries in general understood experts. Jurs, *supra* note 55, at 372.

are often the most prone to such overestimation.⁸⁴ Hume’s maxim notwithstanding,⁸⁵ we routinely fail to distinguish “ought” from “is”—our empirical beliefs and risk assessments are often motivated by our political or personal preferences,⁸⁶ by other forms of ingroup identity,⁸⁷ and by the effects of cultural cognition, whereby we tend to underestimate the risks associated with activities we deem socially beneficial, and to exaggerate the risks associated with activities we deem socially harmful.⁸⁸ Our beliefs tend to follow “identity-protective” patterns, whereby the profession of empirical beliefs—concerning, for example, the reality of anthropogenic climate change, the safety and efficacy of vaccination, or principle of biological evolution via natural selection—comes to comprise an element of an individual’s self-perception and ingroup status.⁸⁹ Kahan *et al.* explain the phenomenon as follows:

Individual wellbeing, material and emotional, is bound up with membership in various self-defining groups. Rejecting factual beliefs widespread within such a group can undermine individual well-being, either by threatening to estrange a person from his peers or by forcing that person to contemplate the social incompetence of those he identifies with. As a means of psychological self-defense,

⁸⁴ David Dunning, *The Dunning Kruger Effect: On Being Ignorant of One’s Own Ignorance*, in ADVANCES IN EXPERIMENTAL SOCIAL PSYCHOLOGY 247 (James M. Olson and Mark P. Zanna eds. 2011); Justin Kruger & David Dunning, *Unskilled and Unaware of It: How Difficulties in Recognizing One’s Own Incompetence Lead to Inflated Self-Assessments*, 77 J. PERSONALITY & SOC. PSYCHOL. 1121 (1999). The “Dunning-Kruger Effect” refers to the prediction that “those who are incompetent” in a particular field “should have little insight into their incompetence.” Dunning, *supra*, at 260.

⁸⁵ DAVID HUME, A TREATISE OF HUMAN NATURE Book III, Pt. I, § 1 (1739) (cautioning against the “imperceptible” change in normative argumentation from “is, and is not” to “ought, or ought not”).

⁸⁶ “The modern day psychological theory of motivated reasoning holds that when decision makers have a preference regarding the outcome of an evaluative task, they are more likely to arrive at that desired conclusion by engaging in inadvertently biased processes for ‘accessing, constructing, and evaluating beliefs.’” Avani Mehta Sood, *Motivated Cognition in Legal Judgments—An Analytic Review*, 9 ANN. REV. L. & SOC. SCI. 307, 309 (2013) (quoting Ziva Kunda, *The Case for Motivated Reasoning*, 108 PSYCH. BULL. 480, 480 (1990)); cf. MILTON LODGE & CHARLES S. TABER, THE RATIONALIZING VOTER (2013).

⁸⁷ See, e.g., Anca M. Miron, Nyla R. Branscombe & Monica Biernat, *Motivated Shifting of Justice Standards*, 36 PERSONALITY & SOC. PSYCHOL. BULL. 768 (2010) (finding that individuals apply higher standards of proof to claims of injustice perpetrated by ingroup with which they identify). In the seminal study on this topic, students at Dartmouth and Princeton literally perceived the events of a contested football game differently based on their ingroup allegiances. See Albert H. Hastorf & Hadley Cantril, *They Saw a Game: A Case Study*, 49 J. ABNORMAL & SOC. PSYCH. 129 (1954).

⁸⁸ See, e.g., Dan M. Kahan, Hank Jenkins-Smith & Donald Braman, *Cultural Cognition of Scientific Consensus*, 14 J. RISK RES. 147, 166-67 (2011) (“Individuals systematically overestimate the degree of scientific support for positions they are culturally predisposed to accept as a result of a cultural availability effect that influences how readily they can recall instances of expert endorsement of those positions.”); Dan M. Kahan et al., *Culture and Identity-Protective Cognition: Explaining the White-Male Effect in Risk Perception*, 4 J. EMPIRICAL LEGAL STUD. 465, 491 (2007) (finding that demographic differences in risk perception “could be explained as a form of motivated cognition aimed at protecting identities individuals form through their commitment to cultural norm”).

⁸⁹ Robert Jervis, *Understanding Beliefs*, 27 POL. PSYCH. 641 (2006); see also Per Espen Stoknes, *Rethinking Climate Communications and the “Psychological Climate Paradox,”* 1 ENERGY RES. & SOC. SCI. 161, 165 (2014) (discussing the effects of personal identity on interpretation of information about climate change).

then, people tend to process information in a selective fashion that bolsters beliefs dominant within their self-defining groups.⁹⁰

Cognitive tribalism manifests in other ways as well; even individuals who consciously attempt to excise negative racial, gendered, and other stereotypes from their cognitive processes may be susceptible to *implicit bias*—negative judgments grounded in those stereotypes of which we are consciously unaware.⁹¹

Against this brief sketch of the human cognitive condition, we can now evaluate an essential claim of epistemic exceptionalism: that judges’ cognitive processes are resistant to the truth-divergent effects to which human thought processes are generally susceptible. If so, then the double standards of epistemic exceptionalism might be justified. A review of the available evidence on judicial cognition, however, demonstrates that claims of judicial exceptionalism are, at best, significantly exaggerated. Judges, like laypersons,⁹² “are predominantly intuitive decision makers, and intuitive judgments are often flawed.”⁹³

The empirical literature on judicial susceptibility to cognitive biases shows that judges’ experience in the courtroom leave them better prepared to resist some forms of cognitive error, but on the whole, does not depart from the cognitive processes of laypersons to a degree sufficient to warrant the strong claims of epistemic exceptionalism.⁹⁴ In a leading article,

⁹⁰ Dan M. Kahan et al., *They Saw a Protest: Cognitive Illiberalism and the Speech-Conduct Distinction*, 64 STAN. L. REV. 851, 852 (2012); see also Dan M. Kahan et al., *Motivated Numeracy and Enlightened Self-Government*, 1 BEHAV. PUB. POL’Y 54, 56–57 (2017) (“[I]dentity-protective cognition can be viewed as psychic self-defense mechanism that steers individuals away from beliefs that could alienate them from others on whose support they depend in myriad domains of everyday life.”).

⁹¹ See Justin D. Levinson, Danielle M. Young & Laurie A. Rudman, *Implicit Racial Bias: A Social Science Overview*, in IMPLICIT RACIAL BIAS ACROSS THE LAW 9 (Justin D. Levinson & Robert J. Smith eds. 2012); Anthony Greenwald & Linda Hamilton Krieger, *Implicit Bias: Scientific Foundations*, 94 CAL. L. REV. (2006); see generally SHANKAR VEDANTAM, *THE HIDDEN BRAIN: HOW OUR UNCONSCIOUS MINDS ELECT PRESIDENTS, CONTROL MARKETS, WAGE WARS, AND SAVE OUR LIVES* (2010); A. G. Greenwald, D. E. McGhee & J. L. Schwartz, *Measuring Individual Differences in Implicit Cognition: The Implicit Association Test*, 74 PERSONALITY & SOC. PSYCH. 1464 (1998) (introducing the Implicit Association Test (“IAT”) as a measure of implicit bias). Other psychologists, however, have questioned the IAT’s usefulness as a measure of implicit bias, pointing out, for example, the relative inconsistency of individuals’ IAT scores across multiple tests and the test’s lack of correlation to external manifestations of bias. See, e.g., Frederick L. Oswald et al., *Predicting Ethnic and Racial Discrimination: A Meta-Analysis of IAT Criterion Studies*, 105 PERSONALITY & SOC. PSYCH. 171 (2013).

⁹² See generally KAHNEMAN, *supra* note 74; Michael J. Saks & Robert F. Kidd, *Human Information Processing and Adjudication: Trial by Heuristics*, 15 L. & SOC. REV. 123 (1980) (describing heuristic decision making in laypersons and judges).

⁹³ Chris Guthrie, Jeffrey J. Rachlinski & Andrew J. Wistrich, *Blinking on the Bench: How Judges Decide Cases*, 93 CORNELL L. REV. 1, 5 (2007) (sample of state court judges “performed comparably to other well-educated adults” on test of intuitive decision making); see also SAKS AND SPELLMAN, *supra* note 79, at 204–05 (discussing examples of intuitive judicial factfinding); Saks and Kidd, *supra* note 92 (describing heuristic decision making in laypersons and judges).

⁹⁴ Much of the cognitive research on judges has been performed by Jeffrey Rachlinski, Chris Guthrie, and Andrew Wistrich. Some scholars have suggested that the authors’ prominence in the field may call into question the validity of their later results, insofar as judges’ responses may be affected by their awareness of the authors’ work. See Bernard Chao et al., *Why Courts Fail to Protect Privacy: Race, Age, Bias, and Technology* 147 (2017), <https://papers.ssrn.com/abstract=2924744> (also raising concerns regarding the authors’ aggregation of studies on hindsight bias). This is a valid concern, and more broadly, we should bear in mind that far fewer studies on judicial samples exist than studies of the general population; we should therefore ascribe less confidence to our knowledge

Guthrie, Rachlinski, and Wistrich evaluated a sample of 167 federal magistrate judges' susceptibility to five "cognitive illusions:" anchoring, framing, hindsight bias, the representative heuristic, and egocentric biases.⁹⁵ They found that judges "appear to be just as susceptible as other decision makers to three of the cognitive illusions we tested: anchoring, hindsight bias, and egocentric bias."⁹⁶ Consistently with other studies,⁹⁷ judges showed susceptibility to anchoring effects comparable to that of laypersons.⁹⁸ The authors asked judges to estimate damages in a personal injury case, in which half the respondents' materials contained no numerical anchor and the other half included an intentionally low anchor.⁹⁹ The low anchor affected the judges' estimates; the average award among judges receiving the low anchor was 29.4% lower than the average among judges receiving no anchor.¹⁰⁰ The rate of judicial susceptibility to hindsight bias is also similar to that shown by mock jurors in other studies.¹⁰¹ Guthrie et al. presented judges with a hypothetical case involving the imposition of Rule 11 sanctions that included three variations of the outcome of an appeal—judges were randomly assigned materials in which the appellate court imposed a lesser sanction, affirmed the trial court's decision in its entirety, and vacated the decision.¹⁰² They were then asked which of the three outcomes was most likely *ex ante*. If the judges' probability estimates were not affected by hindsight bias, we would not expect significant differences in their predictions; in fact, each group of judges was significantly more likely to rate the outcome that the judges were told *had* happened as the most likely.¹⁰³

of judicial cognition. Nevertheless, these studies, by the Rachlinski group and others, represent the current state of knowledge about judicial cognition; while knowledge generated by empirical methods is in all cases subject to revision in light of further evidence, we are justified in relying on the current state of the empirical evidence in deciding policy and legal doctrine. In any event, to the extent that the weight of the empirical evidence favors the null hypothesis that no (or, at least, few) significant differences between judicial and lay cognition exist, proponents of epistemic exceptionalism fail to meet their burden of persuasion.

⁹⁵ The *representativeness heuristic* refers to the tendency to evaluate the probability that an object or effect is a member of a broader class on the basis of the extent to which the individual object resembles the class. Guthrie, Rachlinski, and Wistrich, *supra* note 72, at 805–11; Tversky and Kahneman, *supra* note 80, at 1124–27. As this illusion has special bearing on the interpretation of complex or specialized evidence, I will discuss it at greater length in Part III(B), *infra*.

⁹⁶ Guthrie, Rachlinski, and Wistrich, *supra* note 72, at 816.

⁹⁷ The susceptibility of judges to anchoring effects is well established in the literature on sentencing. *See, e.g.*, Jeffrey J. Rachlinski, Andrew J. Wistrich & Chris Guthrie, *Can Judges Make Reliable Numeric Judgments: Distorted Damages and Skewed Sentences*, 90 IND. L.J. 695 (2015); Bennett, *supra* note 80; Nancy Gertner, *What Yogi Berra Teaches About Post-Booker Sentencing*, 115 YALE L.J. POCKET PART 137 (2006); Birte Englich & Thomas Mussweiler, *Sentencing Under Uncertainty: Anchoring Effects in the Courtroom*, 31 J. APPLIED SOC. PSYCHOL. 1535 (2001); *see also* James R. Dillon, *Doubting Demaree: The Application of Ex Post Facto Principles to the United States Sentencing Guidelines after U.S. v. Booker*, 110 W. VA. L. REV. 1033, 1089 n.320 (2007) (discussing anchoring as a possible explanation for judges' continued adherence to the United States Sentencing Guidelines after the Supreme Court's decision in *U.S. v. Booker*, 543 U.S. 220 (2005)).

⁹⁸ Guthrie, Rachlinski, and Wistrich, *supra* note 72, at 816–17.

⁹⁹ *Id.* at 790–91.

¹⁰⁰ *Id.* at 791–92.

¹⁰¹ *Id.* at 817–18 & n.198 (citing study of hindsight bias in mock jurors); *see also* Jonathan D. Casper, Kennette Benedict & Jo L. Perry, *Juror Decision Making, Attitudes, and the Hindsight Bias*, 13 LAW & HUM. BEH. 291 (1989) (mock jurors were less likely to find civil rights violations when told that the search produced evidence of criminal conduct).

¹⁰² *Id.* at 802.

¹⁰³ *Id.* at 802–03; *see also* Chris Guthrie, Jeffrey J. Rachlinski & Andrew J. Wistrich, *The "Hidden Judiciary" : An Empirical Examination of Executive Branch Justice*, 58 DUKE L.J. 1477, 1512–16 (2009) (administrative law

Finally, the judges tended to show egocentric bias at rates equivalent to other groups.¹⁰⁴ Asked to rate themselves in comparison to the other judges in the room in terms of the rate at which their decisions had been overturned on appeal, 56.1% of the respondents rated themselves in the lowest quartile (that is, the least overturned), while only 4.5% ranked themselves in the highest.¹⁰⁵

As to the effects of framing, judges showed a clear susceptibility to the effect, albeit at a somewhat diminished level as compared to studies of other groups.¹⁰⁶ The authors presented judges with a hypothetical copyright dispute; half of the judges were then presented with economically equivalent settlement offers from the plaintiff's and defendant's perspectives, respectively, and asked whether the party should accept the offer. Although the offers were identical relative to the expected value of litigation, a statistically significantly greater number of judges—39.8% vs. 25%, respectively—responded that the plaintiff should accept the settlement offer.¹⁰⁷ Although the judges showed susceptibility to framing effects, the 15-point magnitude of the effect in this study was lower than that found in most studies on student samples, which have reported differences ranging from fourteen to fifty-one percentage points.¹⁰⁸

Judges are also susceptible to the effects of motivated cognition, albeit to a lesser degree than some laypersons.¹⁰⁹ Redding and Reppucci, for example, examined whether the judgments of law students and state court judges concerning the legal relevance, admissibility, and weight of social science evidence in death penalty cases was affected by the respondents' normative views on the death penalty.¹¹⁰ They found that law students tended to favor evidence that supported their normative views in all three judgments. Judges, on the other hand, did not exhibit motivated reasoning with respect to the questions of legal relevance and admissibility, but they did display motivation effects concerning the “critically important question” of the weight accorded to the

judges' decisions affected by hindsight bias); John C. Anderson et al., *Evaluation of Auditor Decisions: Hindsight Bias Effects and the Expectation Gap*, 14 ECON. PSYCHOL. 711, 725–27 (1993) (finding hindsight bias effects in a sample of 65 state and federal judges). On the other hand, Viscusi finds that judges' ex post risk assessments, although affected by hindsight bias, were less affected than those of jurors. W. Kip Viscusi, *How Do Judges Think About Risk?*, 1 AM. L. & ECON. REV. 26, 50–52, 59 (1999).

¹⁰⁴ Guthrie, Rachlinski, and Wistrich, *supra* note 72, at 817–18 & nn. 203–04 (citing studies of egocentric biases in non-judicial samples); *see also* Theodore Eisenberg, *Differing Perceptions of Attorney Fees in Bankruptcy Cases*, 72 WASH. U. L. Q. 979, 983–87 (1994) (bankruptcy judges overestimated their own efficiency and performance in comparison to the estimates of lawyers appearing before them).

¹⁰⁵ Guthrie, Rachlinski, and Wistrich, *supra* note 72, at 813–14.

¹⁰⁶ *Id.* at 816–17 & n.196 (citing study of framing effects in law student sample).

¹⁰⁷ *Id.* at 797.

¹⁰⁸ *Id.* at 817–18; *accord* Russell Korobkin & Chris Guthrie, *Psychology, Economics, and Settlement: A New Look at the Role of the Lawyer*, 76 TEX. L. REV. 77, 99–100 (1997) (lawyers less susceptible to framing effects than laypersons).

¹⁰⁹ I say “some” because the Redding and Reppucci study discussed in this paragraph compared the susceptibility of motivated cognition between judges and law students. The latter group may be more prone to motivated cognition than the typical layperson. Eileen Braman & Thomas E. Nelson, *Mechanism of Motivated Reasoning? Analogical Perception in Discrimination Disputes*, 51 AM. J. POL. SCI. 940, 952 (2007).

¹¹⁰ Richard E. Redding & N. Dickon Reppucci, *Effects of Lawyers' Socio-Political Attitudes on Their Judgments of Social Science in Legal Decision Making*, 23 LAW & HUM. BEH. 31 (1999).

evidence.¹¹¹ Similarly, the available evidence suggests that judges as a group are susceptible to the effects of implicit bias against a variety of outgroup characteristics. Notwithstanding the traditional depiction of Justice as blindfolded and thus inattentive to extralegal characteristics, empirical studies have found judicial decision making to be sensitive to such factors as a litigant's out-of-state residence,¹¹² race,¹¹³ and gender.¹¹⁴ Moreover, judges' decisions are clearly responsive to their political preferences.¹¹⁵

Judges' legal training and above average general intelligence do not render them less susceptible to motivated cognition; indeed, they may exacerbate the problem. As Sood notes, Redding and Reppucci "also found that legal training and experience seemed to exacerbate the illusion of objectivity—which can ironically increase the risk of nonobjective decision making."¹¹⁶ As to the effects of above-average general intelligence, Kahan et al. found that higher general intelligence creates *greater* polarization on issues associated with identity protective cognition.¹¹⁷ Intelligence, access to information, and education are not correctives to cognitive tribalism; to the contrary, the polarizing effects of cultural and identity protective cognition tend

¹¹¹ *Id.* at 48; see also Joshua R. Fergusson, Linda Babcock & Peter M. Shane, *Do a Law's Policy Implications Affect Beliefs About Its Constitutionality? An Experimental Test*, 32 LAW & HUM. BEH. 219 (2008) (finding law students' political views affected their legal analysis of a hypothetical statute's constitutionality); cf. Braman and Nelson, *supra* note 109, at 952 (finding law students more susceptible to motivated cognition than laypersons).

¹¹² Rachlinski, Wistrich, and Guthrie, *supra* note 97 (judges responding to hypothetical cases imposed greater punitive damages against out-of-state defendants).

¹¹³ David S. Abrams, Marianne Bertrand & Sendhil Mullainathan, *Do Judges Vary in Their Treatment of Race?*, 41 J. LEG. STUDIES 347 (2012); Jerry Kang & Kristin Lane, *Seeing Through Colorblindness: Implicit Bias and the Law*, 59 U.C.L.A. L. REV. 1124 (2010); Jeffrey J. Rachlinski et al., *Does Unconscious Racial Bias Affect Trial Judges*, 84 NOTRE DAME L. REV. 1195 (2008) (judges harbor implicit racial biases and these affect judicial decision making, but "given sufficient motivation," judges can compensate for these effects). see also Jeffrey Rachlinski & Andrew Wistrich, *Judging the Judiciary by the Numbers: Empirical Research on Judges*, 13 ANN. REV. L. & SOC. SCI., 221–22 (2017) (surveying literature on implicit racial bias in the judiciary).

¹¹⁴ Cassia Spohn, *The Effects of the Offender's Race, Ethnicity, and Sex on Federal Sentencing Outcomes in the Guidelines Era*, 76 L. & CONTEMP. PROBS. 75 (2013) (finding gender-based disparities in sentencing outcomes after controlling for differences in offender backgrounds); Sonja Starr, *Estimating Gender Disparities in Federal Criminal Cases*, 17 AM. L. & ECON. REV. 127 (2012) (same); Celesta A. Albonetti, *Sentencing under the Federal Sentencing Guidelines: Effects of Defendant Characteristics, Guilty Pleas, and Departures on Sentence Outcomes for Drug Offenses, 1991-1992*, 31 LAW & SOC'Y REV. 789 (1997) (same); Margareth Etienne, *Sentencing Women: Reassessing the Claims of Disparity*, 14 J. GENDER RACE & JUST. 73, 73 (2010) (noting that sentencing disparities based on gender remain "among the most visible and persistent"); Jo-Ellen Paradise, *The Disparity between Men and Women in Custody Disputes: Is Joint Custody the Answer to Everyone's Problems*, 72 ST. JOHN'S L. REV. 517 (1998) (noting legal presumption of maternal custody); Carla C. Kunin, Ebbe B. Ebbesen & Vladimir J. Konecni, *An Archival Study of Decision-Making in Child Custody Disputes*, 48 J. CLINICAL PSYCH. 564 (1992) (finding preference for women in child custody decisions); see also Rachlinski and Wistrich, *supra* note 113, at 220–21 (surveying literature on implicit gender bias).

¹¹⁵ The literature on this point is voluminous. See generally, e.g., BRIAN Z. TAMANAHA, BEYOND THE FORMALIST-REALIST DIVIDE: THE ROLE OF POLITICS IN JUDGING (2009); CASS R. SUNSTEIN ET AL., ARE JUDGES POLITICAL?: AN EMPIRICAL ANALYSIS OF THE FEDERAL JUDICIARY (2007); JEFFREY A. SEGAL & HAROLD J. SPAETH, THE SUPREME COURT AND THE ATTITUDINAL MODEL REVISITED (2002); William M. Landes & Richard A. Posner, *Rational Judicial Behavior: A Statistical Study*, 1 J. LEG. ANALYSIS 775 (2009).

¹¹⁶ Sood, *supra* note 72, at 317 (citing Jerry Kang et. al, *Implicit Bias in the Courtroom*, 59 U.C.L.A. L. REV. 1124 (2012)).

¹¹⁷ Dan M. Kahan et al., *The Polarizing Impact of Science Literacy and Numeracy on Perceived Climate Change Risks*, 2 NATURE CLIM. CHANGE 732 (2012); see also Kahan et al., *supra* note 90 (finding cultural cognition effects in interpretation of quantitative data).

to be positively associated with access to information and technical proficiency.¹¹⁸ More intelligent and educated individuals become more adept at reconciling empirical data with their normative priors.

Even given all the above, the premise of judicial epistemic exceptionality might yet be warranted if judges are systemically better at *mitigating* the biases and effects to which they are susceptible than jurors are. Indeed, this is a central tenet of some doctrines of epistemic exceptionalism—judges are presumed to disregard the prejudicial effects of evidence and consider it only for the point to which it is narrowly relevant.¹¹⁹ Jurors are notoriously incapable of this feat; many studies show that instructions to disregard inadmissible evidence to which mock jurors have been exposed are generally ineffective.¹²⁰ The available evidence, however, suggests that judges possess only a limited ability to disregard inadmissible or prejudicial evidence. In the most comprehensive study on this question, Wistrich et al. tested the ability of judges to disregard several categories of legally inadmissible evidence: settlement demands, conversations protected by the attorney-client privilege, the sexual history of an alleged rape victim, and information obtained in violation of a criminal defendant’s right to counsel.¹²¹ They found that judges’ decision making process is influenced by information deemed inadmissible,¹²² albeit with two significant exceptions: judges are generally able to disregard information concerning the outcome of a police search when adjudicating issues of probable cause,¹²³ and they show some ability to disregard illegally obtained confessions.¹²⁴ Similarly, Landsman and Rakos found that

¹¹⁸ See, e.g., Brendan Nyhan & Jason Reifler, *Does Correcting Myths about the Flu Vaccine Work? An Experimental Evaluation of the Effects of Corrective Information*, 33 VACCINE 459 (2015) (finding that corrective information that the influenza vaccine cannot cause influenza paradoxically resulted in individuals with an initially high degree of concern about the vaccine self-reporting a lower probability that they would receive it); Kahan et al., *supra* note 90 (polarization of interpretation of quantitative data on politically salient issue was highest among respondents who displayed high numeracy); Kahan et al., *supra* note 117, at 732 (finding that “[m]embers of the public with the highest degrees of science literacy and technical reasoning capacity were not the most concerned about climate change. Rather, they were the ones among whom cultural polarization was greatest.”). Reflective “System 2” thinking is also not a reliable guard against motivated cognition; indeed, some experimental evidence suggests that “the disposition to engage in conscious and effortful System 2 information processing... actually *magnifies* the impact of motivated reasoning.” Dan M. Kahan, *Ideology, Motivated Reasoning, and Cognitive Reflection*, 8 JUDGMENT & DECISION MAKING 407, 416 (2013).

¹¹⁹ See *supra* note 24.

¹²⁰ See generally Nancy Steblay et al., *The Impact on Juror Verdicts of Judicial Instruction to Disregard Inadmissible Evidence: A Meta-Analysis*, 30 LAW & HUM. BEH. 469, 486 (2006) (meta-analysis of 48 studies concluding that exposure to inadmissible evidence has a “small, but reliable” effect on jury deliberation, and that judicial instructions to disregard such evidence “do[] not fully eliminate the impact”).

¹²¹ Andrew J. Wistrich, Chris Guthrie & Jeffrey J. Rachlinski, *Can Judges Ignore Inadmissible Information? The Difficulty of Deliberately Disregarding*, 153 U. PA. L. REV. 1251, 1251 (2005).

¹²² For example, the percent of judges saying they would convict the defendant in a hypothetical rape case dropped from 49% to 20% when the judges were given information about the victim’s sexual history that is inadmissible under the jurisdiction’s rape shield law, a statistically significant decline. *Id.* at 1302.

¹²³ *Id.* at 1313–18; see also Jeffrey J. Rachlinski, Chris Guthrie & Andrew J. Wistrich, *Probable Cause, Probability, and Hindsight Judgment by the Numbers: Converting Qualitative to Quantitative Judgments in Law*, 8 J. EMPIRICAL LEGAL STUD. 72 (2011) (study of 900 state and federal judges finding that probable cause judgments are generally unaffected by knowledge of outcome).

¹²⁴ Wistrich, Guthrie, and Rachlinski, *supra* note 121, at 1318–22. Subsequent work has shown that judges’ willingness to consider inadmissible evidence in criminal cases varies with the gravity of the crime and the

judges and laypersons were equally incapable of disregarding inadmissible information to which they had been exposed.¹²⁵ Interestingly, however, both the judges and laypersons in Landsman and Rakos's study shared a belief that judges were *better* than laypersons at disregarding such information.¹²⁶ Even if not empirically well supported, the premises of epistemic exceptionalism appear to be deeply entrenched in the popular perception of the judiciary.¹²⁷

B. Complexity and Epistemic Competence

We turn now to a second premise of epistemic exceptionalism: the claim that judges possess a domain-general superiority to juries in interpreting complex or technical evidence.¹²⁸ This premise underlies several manifestations of epistemic exceptionalism, from the complexity exceptions of *Japanese Electronic Products*¹²⁹ and *Markman*¹³⁰ to the lax application of *Daubert* in bench trials and pretrial proceedings¹³¹ and the general judicial reluctance to appoint independent experts under FRE 706.¹³² This section will discuss, first, the extent to which judges are susceptible to the cognitive heuristics and biases that can impede scientific laypersons' comprehension of statistical evidence, and second, the extent to which judges more generally are able to interpret and apply complex scientific evidence reliably to the resolution of legal disputes.

Humans have not evolved the cognitive apparatus to intuitively draw valid inferences from statistical data.¹³³ We tend to exaggerate the significance of vivid anecdotes in comparison to statistical baselines—a complex phenomenon that Kahneman and Tversky term the *representativeness heuristic*, “in which probabilities are evaluated by the degree to which A is representative of B, that is, by the degree to which A resembles B.”¹³⁴ Thus we tend to over-rely

magnitude of police misconduct. See Jeffrey J. Rachlinski, Andrew J. Wistrich & Chris Guthrie, *Altering Attention in Adjudication*, 60 UCLA L. REV. 1586, 1613 (2012).

¹²⁵ Stephan Landsman & Richard F. Rakos, *A Preliminary Inquiry into the Effect of Potentially Biasing Information on Judges and Jurors in Civil Litigation*, 12 BEHAV. SCI. & L. 113 (1994).

¹²⁶ *Id.* at 117.

¹²⁷ This may be the point. See *infra* Part IV(A); see also Schauer, *supra* note 15, at 188 (“[W]e assume that judges are less prone than juries to the cognitive and decision-making failures we worry about in jurors, possibly because judges are smarter, possibly because they are better educated, possibly because of their greater experience in hearing testimony and finding facts, and almost certainly because of their legal training and legal role-internalization.”).

¹²⁸ I specify “domain-general” because judges are, of course, experts in the domain of law, and their superiority to juries at interpreting the law need not be questioned. But expertise is generally domain-specific; expertise in one domain does not necessarily translate even into closely related domains, much less to domains further removed. See, e.g., HARRY COLLINS, *GRAVITY'S KISS: THE DETECTION OF GRAVITATIONAL WAVES* 317 (2017) (“imitation game” scores of non-specialist physicists on technical questions concerning gravitational wave physics were closer to the scores of social scientists than scores of gravitational wave specialists); see generally HARRY COLLINS & ROBERT EVANS, *RETHINKING EXPERTISE* (2007).

¹²⁹ *In re Japanese Elec. Prods. Antitrust Litig.*, 631 F.2d 1069 (3d Cir. 1980); see *supra* Part II(B).

¹³⁰ *Markman v. Westview Instruments, Inc.*, 517 U.S. 370 (1996); see *supra* Part II(B).

¹³¹ *Daubert v. Merrell Dow Pharmaceuticals*, 509 U.S. 579 (1993); see *supra* Part II(A)(3).

¹³² See *supra* notes 54–59 and accompanying text..

¹³³ See David L. Faigman & A.J. Baglioni, Jr., *Bayes' Theorem in the Trial Process: Instructing Jurors on the Value of Statistical Evidence*, 12 LAW & HUM. BEH. 1, 4 (1988) (citing studies that “generally show[] that individuals do not intuitively understand rules of statistical inference”).

¹³⁴ Tversky and Kahneman, *supra* note 80, at 1124; cf. Guthrie, Rachlinski, and Wistrich, *supra* note 72, at 806 (“Individuating evidence is more salient and vivid, and hence more compelling than pallid base-rate statistics.”);

on simple stereotypes—for example, to overestimate the likelihood that an individual is a librarian rather than a farmer or airline pilot because the individual exhibits stereotypical librarian traits, without taking into account the prevalence of librarians in the population.¹³⁵ We also tend to place undue weight on conspicuous outliers to the exclusion of statistical trends, as when antivaccinationists emphasize relatively rare instances of adverse events while ignoring the much greater number of cases in which vaccination causes no harm.¹³⁶ As Guthrie et al. note, “[w]hen people rely on the representativeness heuristic, they tend to undervalue statistical information, which can lead to notable decision errors.”¹³⁷

Both jurors¹³⁸ and judges¹³⁹ have difficulty correctly interpreting evidence grounded in statistics and probability. Both groups tend to under-weigh statistical evidence in comparison to other forms of evidence.¹⁴⁰ For example, Wells’s experiments on judges and university students found

Daniel Kahneman & Amos Tversky, *Subjective Probability: A Judgment of Representativeness*, 3 COGNITIVE PSYCHOL. 430 (1972) (describing the representativeness heuristic).

¹³⁵ Tversky and Kahneman, *supra* note 80, at 1124–25; *see also* Daniel Kahneman & Amos Tversky, *On the Psychology of Prediction*, 80 PSYCHOL. REV. 237, 241–42 (1973) (finding reliance on stereotype heuristics to the exclusion of base rate information).

¹³⁶ *See, e.g.*, Robert M. Jacobson, Paul V. Targonski & Gregory A. Poland, *A Taxonomy of Reasoning Flaws in the Anti-Vaccine Movement*, 25 VACCINE 3146, 3147 (2007) (identifying “[d]ifficulty in detecting and correcting biases in incomplete and unrepresentative data” and “[e]agerness to interpret ambiguous and inconsistent data to fit theories and expectations” among the cognitive flaws in antivaccinationist rhetoric).

¹³⁷ Guthrie, Rachlinski, and Wistrich, *supra* note 93, at 22; *see also* Joe S. Cecil, Valerie P. Hans & Elizabeth C. Wiggins, *Citizen Comprehension of Difficult Issues: Lessons from Civil Jury Trials Symposium Issue on the Selection and Function of the Modern Jury*, 40 AM. U. L. REV. 727, 757 (1990) (“Laypersons[, including both jurors and generalist judges,] view statistical information, a key aspect of much scientific and technical evidence, differently than experts trained in its interpretation.”).

¹³⁸ Jason Schklar & Shari Seidman Diamond, *Juror Reactions to DNA Evidence: Errors and Expectancies*, 23 LAW & HUM. BEH. 159, 178 (1999) (“[J]urors generally underweight probabilistic evidence in their decisions... via the misaggregation error. However, when jurors receive two separate probability estimates they appear to overweight the extremely small probability by misperceiving how the two estimates should be combined.”); Brian C. Smith et al., *Jurors’ Use of Probabilistic Evidence*, 20 LAW & HUM. BEH. 49 (1996) (jurors under-weigh statistical evidence relative to anecdotal evidence); Faigman and Baglioni, *supra* note 133, at 13 (mock jurors “significantly underutilized the statistical evidence”); JOE S. CECIL, *JURY SERVICE IN LENGTHY CIVIL TRIALS* 8 (1987) (discussing jurors’ difficulty understanding complex and technical evidence in complex antitrust actions); Saks and Kidd, *supra* note 92 (rejecting hypothesis that jurors are “overawed” by technical evidence in favor of hypothesis that they tend to undervalue it); *but see* Neil Vidmar & Shari Seidman Diamond, *Juries and Expert Evidence*, 66 BROOK. L. REV. 1121, 1166–67 (2001) (“[a]lthough jurors struggle and are occasionally misled, they generally make reasonable use of complex material, utilizing the expert testimony when it is presented in a form that they can use”).

¹³⁹ *Id.* at 1170; SAKS AND SPELLMAN, *supra* note 79, at 205 (“Most people, including most judges... have difficulty making good use of statistical pictures of the world.”). Fienberg et al. undertook a qualitative examination of courts’ engagement with statistical evidence in a variety of litigation contexts. *THE EVOLVING ROLE OF STATISTICAL ASSESSMENTS AS EVIDENCE IN THE COURTS*, (Stephen E. Fienberg ed., 1989). Their case studies revealed that judges struggle to interpret and apply statistical evidence in nearly all situations; even cases in which judges invested substantial time and effort in understanding the import of statistical evidence did not produce error-free judgments. *Id.* at 72–74.

¹⁴⁰ *See, e.g.*, Daniel A. Krauss & Bruce D. Sales, *The Effects of Clinical and Scientific Expert Testimony on Juror Decision Making in Capital Sentencing*, 7 PSYCHOL. PUB. POL’Y & L. 267, 300 (2001) (mock jurors weighed clinical opinion testimony more highly than actuarial evidence); Schklar & Seidman Diamond, *supra* note 138, at 163 (defining the “misattribution error” and citing studies describing it).

Perhaps the most notorious instance of judicial disregard of statistical evidence is the Supreme Court’s rejection of the petitioner’s evidence of systemic racial bias in the imposition of the death penalty in *McCleskey v. Kemp*, 481

that both groups were more reluctant to reach a verdict in favor of the plaintiff in a hypothetical civil case on the basis of purely statistical evidence than on other types of evidence, even when the subjective probabilities that the defendant acted negligently were identical.¹⁴¹ For the most part, judges also resemble legal laypersons in their susceptibility to statistical fallacy. For example, the *inversion fallacy* confuses the conditional probability of an outcome given the evidence with the conditional probability of the evidence given the outcome—e.g., the false conclusion that a low probability of a DNA match given a defendant’s innocence connotes a complementary high probability of guilt given a DNA match,¹⁴² or that a high probability of injury given the defendant’s negligence equates to a comparatively high probability of negligence given that injury occurred.¹⁴³ Jurors are susceptible to the inversion fallacy, and judges appear to be equally susceptible. Indeed, some studies have measured a *greater* susceptibility to forms of the inversion fallacy in judges than has been found in other mock juror studies. For example, Thompson and Schumann conducted two experiments in which 13.2% and 3%, respectively, of mock jurors gave answers consistent with what they term the “Prosecutor’s Fallacy,” a form of inversion fallacy.¹⁴⁴ Similarly, Kaye et al.’s study of mock jurors’ assessment of statistical DNA evidence found that approximately 17% of respondents gave answers indicating susceptibility to the inversion fallacy.¹⁴⁵ Guthrie et al.’s study of judicial cognition, by comparison, found that 40% of judges committed the inversion fallacy in their responses to the study’s evaluation of judicial susceptibility to the representativeness heuristic,¹⁴⁶ while Roth’s examination of appellate courts’ rejection of sufficiency challenges to convictions based on DNA alone found that “nearly all” such decisions committed the inversion fallacy.¹⁴⁷ Of course, it is unlikely that judges are actually *more* susceptible to the inversion fallacy than laypersons, but these studies give no reason to believe that they are resistant to it. Judges do, however, appear to be resistant to what Thompson and Schumann term the “Defense Attorney’s Fallacy”—the false

U.S. 279 (1987), in which the court wrote that “[e]ven a sophisticated multiple-regression analysis... can only demonstrate a risk that the factor of race entered into some capital sentencing decisions and a necessarily lesser risk that race entered into any particular sentencing decision.” As Cohen points out, “even the fact that an eyewitness testifies that she saw a particular event occur also only demonstrates that there is a risk (i.e., a probability) that the event has occurred.” Neil B. Cohen, *The Gatekeeping Role in Civil Litigation and the Abdication of Legal Values in Favor of Scientific Values Symposium*, 33 SETON HALL L. REV. 943, 964 (2002).

¹⁴¹ Gary L. Wells, *Naked Statistical Evidence of Liability: Is Subjective Probability Enough?*, 62 J. PERSONALITY & SOC. PSYCHOL. 739, 748 (1992); see also Amos Tversky & Daniel Kahneman, *Evidential Impact of Base Rates*, in JUDGMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES (Daniel Kahneman, Paul Slovic, & Amos Tversky eds., 1982).

¹⁴² See Andrea Roth, *Safety in Numbers—Deciding When DNA Alone is Enough to Convict*, 85 N.Y.U. L. REV. 1130, 1150–51 (2010).

¹⁴³ Guthrie, Rachlinski, and Wistrich, *supra* note 72, at 807 (discussing the cognitive illusion undergirding the doctrine of *res ipsa loquitur*).

¹⁴⁴ William C. Thompson & Edward L. Schumann, *Interpretation of Statistical Evidence in Criminal Trials: The Prosecutor’s Fallacy and the Defense Attorney’s Fallacy*, 11 LAW & HUM. BEH. 167, 173, 179 (1987). The authors note that, in the second experiment, 28% of mock jurors identified the hypothetical prosecutor’s argument asserting the fallacy as “correct,” but only 3% professed a posterior probability of guilt consistent with the Prosecutor’s Fallacy. *Id.* at 177–79.

¹⁴⁵ David H. Kaye et al., *Statistics in the Jury Box: How Jurors Respond to Mitochondrial DNA Match Probabilities*, 4 J. EMPIRICAL LEGAL STUD. 797, 825 (2007).

¹⁴⁶ Guthrie, Rachlinski, and Wistrich, *supra* note 72, at 809–10.

¹⁴⁷ Roth, *supra* note 142, at 1150–51.

conclusion that “associative evidence is irrelevant... because it shows, at best, that the defendant and the perpetrator are both members of the same large group.”¹⁴⁸ In Hans et al.’s comparative study, only 15% of judges accepted the fallacious argument presented by a hypothetical defense attorney that associative mtDNA evidence was irrelevant, compared to 49% of mock jurors.¹⁴⁹ Thus it may be true, as Guthrie et al. suggest,¹⁵⁰ that judicial experience grants judges some measure of resistance to *some* statistical fallacies; taken as a whole, however, the evidence does not support the strong claims of epistemic exceptionalism that judges are immune to fallacious cognition or have the ability to engage with statistical evidence at an expert level.¹⁵¹

Turning to the complexity exceptions established by *Japanese Electronic Products* and *Markman*,¹⁵² neither is well supported by the available empirical evidence. Both complexity exceptions share a premise: that generalist judges have an epistemic advantage in interpreting factually complex or technical evidence. There is little evidence that the general complexity exception’s underlying premise is true. To be sure, jurors do struggle with complex evidence.¹⁵³ But the premise underlying the complexity exception is a comparative one: it holds not only that jurors are sub-optimal decision makers in complex cases, but that judges are categorically *better*. Judges and juries show high rates of agreement in outcomes, rates that are unaffected by the

¹⁴⁸ Thompson and Schumann, *supra* note 144, at 171. For example, a juror committing the Defense Attorney’s Fallacy would deem evidence of the defendant’s blood type irrelevant where that blood type was shared by, say, 20,000 people in the local area. The juror would conclude that the evidence shows only that one out of 20,000 people committed the crime, ignoring the fact that the blood type evidence may be highly probative when considered in conjunction with other individuating evidence.

¹⁴⁹ Hans, *supra* note 10, at 37.

¹⁵⁰ Guthrie et al. conclude that “judicial experience might curb undue reliance on the representativeness heuristic” and rate judges as “better” than other decision makers at resisting the representativeness heuristic, solely on the basis of a comparison of their study with one in which 18% of physicians gave the correct answer to a question of statistical analysis. Guthrie, Rachlinski, and Wistrich, *supra* note 72, at 824 (discussing Ward Casscells, Arno Schoenberger, & Thomas B. Graboy, *Interpretations by Physicians of Clinical Laboratory Results*, 299 NEW ENG. J. MED. 999, 999–1000 (1978)). Surprisingly, given that their discussion of the other cognitive illusions to which judges are susceptible includes comparisons to general population or mock juror studies, the authors do not cite or discuss the studies discussed here in their discussion of the representativeness heuristic. Moreover, other studies involving larger sample sizes have indicated that medical and psychological training have a *greater* effect in mitigating susceptibility to the representativeness heuristic than does legal training. See Darrin R. Lehman, Richard O. Lempert & Richard E. Nisbett, *The Effects of Graduate Training on Reasoning: Formal Discipline and Thinking About Everyday-life Events*, 43 AM. PSYCH. 431, 437 (1988). In any event, the results of the Guthrie et al. study do not appear to show that judges have any particular advantage in interpreting statistical evidence relative to the legal layperson.

¹⁵¹ This is not a meta-analysis, and I cannot claim that *no* statistically significant difference between judges and jurors exists on the basis of the studies discussed here. Rather, I claim that, even if such a difference exists, it is insufficiently large in magnitude to warrant the grandiose claims of epistemic exceptionalism, particularly given judges’ well-documented difficulties in interpreting statistical evidence.

¹⁵² See *supra* Part II(B).

¹⁵³ See Matthew A. Reiber & Jill D. Weinberg, *The Complexity of Complexity: An Empirical Study of Juror Competence in Civil Cases*, 78 U. CIN. L. REV. 929, 963 (2009) (results of survey responses “suggest that modest increases in complexity create problems even for well-educated jurors who possess prior jury experience”); Irwin A. Horowitz et al., *The Effects of Complexity on Jurors’ Verdicts and Construction of Evidence*, 86 J. APP. PSYCHOL. 641, 649 (2001) (cases with high “information load” resulted in jurors recalling facts of lesser probative value, to the plaintiff’s detriment); Heuer and Penrod, *supra* note 63, at 41 (finding that “increases in the quantity of information also caused the jurors to report greater difficulties in reaching a verdict and less confidence that their verdict reflected a proper understanding of the judge’s instructions”).

complexity of the evidence.¹⁵⁴ Both groups sometimes perform well at basic comprehension tasks.¹⁵⁵ But judges' expertise in legal doctrine does not extend to expertise in the subject matter of factually complex cases. If the complexity arises from highly technical subject matter or esoteric expert testimony, judges are laypersons just as jurors are; they lack expertise in the subject domain and are forced to utilize unreliable heuristics to make credibility determinations between competing expert witnesses. Thus, the general complexity exception would trade away the benefits of jury adjudication—to say nothing of the parties' Seventh Amendment rights—for no tangible benefit.¹⁵⁷

Similarly, any judicial advantage in patent claim construction is likely modest. Empirical comparisons of judge and jury claim construction do not exist,¹⁵⁸ but the available evidence indicates that generalist judges have great difficulty with patent construction. Studies indicate that the Federal Circuit reverses about one-third of appealed claim constructions.¹⁵⁹ Moreover, contrary to the Court's prediction in *Markman*, general legal expertise does not appear to improve a judge's ability to accurately construe patent claims. Stiernberg's study of the effect of scientific expertise on the quality of claim construction found that a judge's years on the bench—a proxy for the judge's level of general legal expertise—is not significantly associated with the

¹⁵⁴ See Waites and Giles, *supra* note 63, at 23–25 (citing studies).

¹⁵⁵ See, e.g., Hans, *supra* note 10, at 38 (“both judges and jurors performed reasonably well [on a comprehension test concerning mitochondrial DNA], scoring between eight and nine questions correct on average”).

¹⁵⁷ If generalist judges and jurors are on roughly equal cognitive footing, then it may be the case that juries are actually better factfinders simply by virtue of bringing more minds to bear on the task. Condorcet's Jury Theorem states that, assuming a true-or-false question with an objectively correct answer, and assuming that each factfinder has a greater than 50% chance of deciding the question correctly, and that each factfinder arrives at an answer independently of the others, the probability that a majority of factfinders will arrive at the correct answer increases with the number of factfinders. See Nicholas Quinn Rosenkranz, *Condorcet and the Constitution: A Response to the Law of Other States*, 59 STAN. L. REV. 1281, 1284 (2006). Of course, the assumptions of Condorcet's Jury Theorem do not hold in actual jury deliberations—many questions are not true-or-false with objectively correct answers, jurors do not deliberate independently, jury verdicts, at least in criminal and some civil cases, are made unanimously rather than by majority vote, and it is unclear whether most jurors have a greater than 50% likelihood of answering correctly those questions that are true-or-false. Nevertheless, my argument does not turn on a claim that juries are more reliable factfinders than generalist judges—only that they are, at least with respect to the cognitive claims on which advocates of epistemic exceptionalism rely, no worse, and that the Seventh Amendment right to jury trial should not be curtailed for no corresponding benefit.

¹⁵⁸ Moore's study of differences between judge and jury patent trials from 1983 to 1999 concluded:

Patent holders have been more successful in jury trials than in bench trials. Juries find for the patent holder more often on validity, infringement, and willfulness issues and they do award higher damages. The magnitude of the differences, however, is much smaller than many might have anticipated. In addition, there are no significant differences in outcome data from judge and jury trials on the issue of enforceability of the patents confounding popular perception.

Kimberly A. Moore, *Judges, Juries, and Patent Cases: An Empirical Peek inside the Black Box*, 99 MICH. L. REV. 365, 409 (2000).

¹⁵⁹ David L. Schwartz, *Practice Makes Perfect? An Empirical Study of Claim Construction Reversal Rates in Patent Cases*, 107 MICH. L. REV. 223, 248–49 (2008) (finding 32% reversal rate of lower court claim constructions between 1996–2007); Kimberly A. Moore, *Markman Eight Years Later: Is Claim Construction More Predictable*, 9 LEWIS & CLARK L. REV. 231, 233 (2005) (finding a 34.5% reversal rate of appealed claim constructions from 1996–2003); Kimberly A. Moore, *Are District Court Judges Equipped to Resolve Patent Cases*, 15 HARV. J. L. & TECH 1, 2–3 (2001) (33% rate of reversal of construction claim appeals between 1996–2000).

likelihood that the Federal Circuit will reverse the judge's claim constructions.¹⁶⁰ It is the case that a generalist judge's prior experience with patent cases specifically is significantly associated with a decreased likelihood of reversal of the judge's claim construction, though the effect is relatively modest.¹⁶¹ All this, in addition to the fact that Federal Circuit judges who themselves possess substantive expertise in the relevant domain are significantly more likely to vote to reverse the district court's claim constructions,¹⁶² suggests that "there is some tangible skill or quality peculiar to the claims construction exercise that lies beyond the average experience of a generalist judge."¹⁶³ In other words, it may well be the case that a specialized patent trial court, staffed by judges with specialist expertise in the scientific and technical domains with which patent law routinely interacts, could more effectively construe patent claim language,¹⁶⁴ but there is little reason to think that generalist judges are substantially better than lay jurors. *Markman*, replete with the language and assumptions of epistemic exceptionalism, simply traded one generalist decision maker for another, to little apparent benefit.¹⁶⁵

IV. Mitigating Epistemic Exceptionalism

A. Institutional Logic of Epistemic Exceptionalism

The reader may by now be wondering whether I am being reductive and perhaps ungenerous in my characterization of judges' overconfidence as the source of epistemic exceptionalism. If judicial minds are human minds, then surely judges vary as widely as any other group in their cognitive styles; some are overconfident and imperious—"hedgehogs," in Tetlock's taxonomy of cognitive styles—while others are humble and thoughtful—Tetlockian "foxes."¹⁶⁶ And this is true; my account of the foundations of epistemic exceptionalism does not assert that all judges, or even a majority of them, are individually hubristic in their outlook. The overconfidence to which I refer is an emergent property of formal legal decisions, taken in the aggregate and

¹⁶⁰ Charlie Stiernberg, *Science, Patent Law, and Epistemic Legitimacy: An Empirical Study of Technically Trained Federal Circuit Judges*, 27 HARV. J. L. & TECH. 279, 295 (2013); see also Schwartz, *supra* note 159, at 267 (empirical study concluding that "[c]ontrary to theory, district court judges do not appear to improve based upon various measures of experience").

¹⁶¹ Stiernberg, *supra* note 160, at 294–95 ("for every additional patent case a district court judge has had on his or her docket at the time of issuing a claim construction order, the odds of being overruled on a claim construction issue... decrease by 0.26 percent").

¹⁶² *Id.* at 294 ("the predicted probability of a Federal Circuit judge overturning a claim construction increases by 53.42 percent when his or her technical background is relevant to the patent at issue").

¹⁶³ *Id.* at 295.

¹⁶⁴ See Jay P. Kesan & Gwendolyn G. Ball, *Judicial Experience and the Efficiency and Accuracy of Patent Adjudication: An Empirical Analysis of the Case for a Specialized Patent Trial Court*, 24 HARV. J. L. & TECH. 393 (2010).

¹⁶⁵ *Markman* also based its holding on historical practice. 517 U.S. at 379–83. I take no position on the accuracy of that historical analysis or its viability as an independent rationale for *Markman*'s outcome.

¹⁶⁶ PHILIP E. TETLOCK, *EXPERT POLITICAL JUDGMENT: HOW GOOD IS IT? HOW CAN WE KNOW?* 2 (2005). Tetlock, drawing on Isaiah Berlin, describes the cognitive style of the hedgehog as "those who 'know one big thing,' toil devotedly within one tradition, and reach for formulaic solutions to ill-defined problems," while cognitive foxes "'know many little things,' draw from an eclectic array of traditions, and accept ambiguity and contradiction as inevitable features of life." *Id.* (quoting Isaiah Berlin, *The Hedgehog and the Fox*, in ISAIAH BERLIN, *THE PROPER STUDY OF MANKIND: AN ANTHOLOGY OF ESSAYS* 436 (1997)).

expressed in the doctrine of appellate courts¹⁶⁷ and in the discretionary practices of trial judges; it is a characteristic of the institution of the judiciary, not of any individual judge.¹⁶⁸ Individual judges may well be aware of their personal epistemic limitations; acting collectively and in their official capacities, however, they create a body of doctrine characterized by epistemic exceptionalism.

Why would judges' collective official actions give rise to an emergent epistemic hubris, even when individual judges may be epistemically humble? I believe that the answer lies in judges' institutional incentives. Courts have an interest in being perceived as disinterested and apolitical—as umpires rather than players, in Chief Justice Roberts's famous analogy.¹⁶⁹ Correctly or not, they perceive their institutional legitimacy as tied to public perceptions of their neutrality.¹⁷⁰ And judges are keenly aware that, as the “least dangerous” branch of government, possessing “neither the purse nor the sword,”¹⁷¹ they are dependent upon that perception of legitimacy to motivate compliance with their judgments by other branches.¹⁷² Thus a powerful motivation for the claims of superhuman objectivity and competence that underlie the double standards of epistemic exceptionalism springs from the logic of the judiciary's relative vulnerability: only by making such claims can courts preserve that most valuable of political resources, their institutional legitimacy.

¹⁶⁷ Doctrines of epistemic exceptionalism are formulated in *appellate* courts, and generally involve the ascription of superhuman cognitive abilities to the judges of *trial* courts. This, too, contributes to the institutional dissonance in which epistemic exceptionalism manifests. Appellate judges do not generally make hubristic claims on their own behalf, but rather express their confidence in the abilities of their district court colleagues. *See, e.g.*, *Daubert v. Merrill Dow Pharm., Inc.*, 509 U.S. 579, 592–93 (1993) (FRE 702 requires “a preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid and of whether that reasoning or methodology properly can be applied to the facts in issue. We are confident that federal judges possess the capacity to undertake this review.”); *but see id.* at 600 (Rehnquist, C.J., dissenting) (“I defer to no one in my confidence in federal judges; but I am at a loss to know what is meant when it is said that the scientific status of a theory depends on its ‘falsifiability,’ and I suspect some of them will be, too.”); *Daubert v. Merrill Dow Pharm., Inc.*, 43 F.3d 1311, 1315–16 (9th Cir. 1995) (the Supreme Court's *Daubert* decision “puts federal judges in an uncomfortable position” of “resolv[ing] disputes among respected, well-credentialed scientists about matters squarely within their expertise, in areas where there is no scientific consensus as to what is and what is not ‘good science’”). Of course, the individual trial judge who attempts to disclaim this projection of superhuman cognition is likely to receive appellate rebuke. *See, e.g.*, *McClain v. Metabolife Intern., Inc.*, 401 F.3d 1233, 1238 (11th Cir. 2005) (trial judge's denial of *Daubert* motion on the ground that he lacked the scientific knowledge necessary to adjudicate the motion was abuse of discretion).

¹⁶⁸ *See* Alvin Goldman, *A Guide to Social Epistemology*, in *RELIABILISM AND CONTEMPORARY EPISTEMOLOGY* 226 (Alvin I. Goldman ed. 2012); Kay Mathiesen, *The Epistemic Features of Group Belief*, 2 *EPISTEME* 161 (2006).

¹⁶⁹ Confirmation Hearing on the Nomination of John G. Roberts, Jr. To Be Chief Justice of the United States: Hearing Before the S. Comm. on the Judiciary, 109th Cong. 55 (2005) (“Judges and justices are servants of the law, not the other way around. Judges are like umpires. Umpires don't make the rules, they apply them.”).

¹⁷⁰ *See, e.g.*, *Casey v. Planned Parenthood of Southeastern Penn.*, 505 U.S. 833, 866 (1992) (“[T]he Court's legitimacy depends on making legally principled decisions under circumstances in which their principled character is sufficiently plausible to be accepted by the Nation.”).

¹⁷¹ Alexander Hamilton, *Federalist* 78 (1788); *cf.* ALEXANDER M. BICKEL, *THE LEAST DANGEROUS BRANCH: THE SUPREME COURT AT THE BAR OF POLITICS* (2d ed. 1986).

¹⁷² *See, e.g.*, Lauren Maisel Goldsmith & James R. Dillon, *The Hallowed Hope: The School Prayer Cases and Social Change*, 59 *ST. LOUIS U. L. J.* 409 (2015); MATTHEW ERIC KANE HALL, *THE NATURE OF SUPREME COURT POWER* (2011); GERALD N. ROSENBERG, *THE HOLLOW HOPE: CAN COURTS BRING ABOUT SOCIAL CHANGE?* (2d ed. 2008).

But we know that, in fact, judges are not perfectly objective, and legal questions often are not amenable to mechanistic resolution.¹⁷³ In moments of candor, judges themselves have admitted as much.¹⁷⁴ As Martin Shapiro observed, judges have every incentive to “lie”—to perpetuate the myth of their own complete impartiality.¹⁷⁵ Indeed, that lie might be essential to courts’ ability to function effectively. The problem of epistemic exceptionalism arises when courts act in accordance with that rhetoric—claiming superhuman abilities to “unring the bell” of prejudicial or irrelevant evidence,¹⁷⁶ to ignore their own ideological commitments in deciding cases in which such values are implicated, or to understand complex technical or scientific evidence simply by virtue of their legal expertise. Epistemic exceptionalism thus arises not from cognitive dissonance but from the lack thereof; judges, compelled to present themselves to the public as apolitical, unbiased, and supremely competent across all domains, come to act in accordance with that pretense. In so doing, however, they risk undermining their own claims by creating a body of doctrine that risks exacerbating the very cognitive vulnerabilities the existence of which judges, in their professional capacities, are compelled to deny.

B. Correcting the Problem: A Three-Tiered Approach

Guthrie et al. note that “[i]n the course of making decisions in the courtroom, judges certainly face more complex fact patterns, have more motivation to make good decisions, have more time to make decisions, and receive assistance from litigants, lawyers, and clerks” than they did in answering the study’s hypothetical questions.¹⁷⁷ “But,” they add, “unless these factors alter the fundamental ways judges think, they will not eliminate the effects of cognitive illusions.”¹⁷⁸ The “way judges think” might refer to one of two things—first, the *process* of legal decision making, including the inputs and formal procedures through which courts produce legal outcomes; and second, judges’ internal modes of cognition. This section will discuss strategies for addressing the phenomenon of epistemic exceptionalism that engage both of these “ways” of thinking.

This section will propose three tiers of solutions to the problem of epistemic exceptionalism. The bottom tier addresses the specific manifestations of epistemic exceptionalism discussed in Part III. Most of these manifestations can be corrected rather easily through doctrinal reforms, but correcting them will not eliminate the root causes of epistemic exceptionalism or prevent future recurrences. The middle tier proposes institutional reforms that go beyond existing provisions of the FRE and FRCP to further insulate the judicial process against the effects of cognitive error. Though these reforms would improve the process, they, too, do not address the root causes. The

¹⁷³ See, e.g., SEGAL AND SPAETH, *supra* note 115.

¹⁷⁴ RICHARD A. POSNER, *HOW JUDGES THINK* (2008); BENJAMIN N. CARDOZO, *THE NATURE OF THE JUDICIAL PROCESS* (1921); OLIVER WENDELL HOLMES, *THE COMMON LAW* (1881).

¹⁷⁵ Martin Shapiro, *Judges as Liars*, 17 HARV. J. L. & PUB. POL’Y 155 (1994).

¹⁷⁶ See *State v. Rader*, 124 P. 195, 197 (Ore. 1912) (“While in some cases an express instruction to the jury to disregard testimony injuriously admitted is properly held to cure the error, yet the courts are cautious in the application of this rule. It is not an easy task to unring a bell, nor to remove from the mind an impression once firmly imprinted there.”).

¹⁷⁷ Guthrie, Rachlinski, and Wistrich, *supra* note 72, at 821.

¹⁷⁸ *Id.*

top tier, therefore, discusses how we might instill in the judiciary a professional norm of epistemic humility, characterized by a more realistic conception of judges' cognitive limitations.

1. First Tier: Doctrinal Reforms to Resolve Existing Problems

- a. FRE Apply with Equal Force in Pretrial Proceedings and Bench Trials

With the exception of preliminary questions of admissibility¹⁷⁹ and miscellaneous proceedings,¹⁸⁰ the FRE by their terms already apply to pretrial proceedings and bench trials.¹⁸¹ Courts should therefore reverse doctrinal rules holding otherwise, and should apply the FRE to pretrial and bench trial proceedings with the same force as jury trials. This is simply a matter of enforcing the existing rules without the distorting effects of judicial exemptions grounded in epistemic exceptionalism,¹⁸² but it is not only a matter of fidelity to the statutory text.

In addition to rationales grounded in epistemic exceptionalism, courts sometimes justify exemptions from the FRE for bench trials on the ground that applying the FRE to exclude evidence from consideration would be futile where the judge acts as factfinder—the judge would see the evidence in the admissibility hearing anyway.¹⁸³ It is true that pretrial exposure to inadmissible evidence would likely affect judicial factfinding—judges, like jurors,¹⁸⁴ are not entirely capable of disregarding evidence to which they have been exposed even when instructed to do so.¹⁸⁵ But that does not mean that applying the FRE to exclude inadmissible evidence in bench trials and pretrial proceedings would be futile. Temporal proximity alone makes a difference—evidence to which the judge was exposed in a pretrial motion to exclude is less fresh in the mind than is evidence introduced during trial.¹⁸⁶ Moreover, the process of ruling a piece of evidence inadmissible would focus the judge's attention on its illegitimacy, which has been demonstrated to reduce the effect of motivated cognition.¹⁸⁷ Of course, this solution is

¹⁷⁹ FRE 104(a).

¹⁸⁰ FRE 1101(d).

¹⁸¹ FRE 101; FRE 1101; *see supra* Part II(A).

¹⁸² As noted above, the double standard between jury and bench trials, rationalized on the basis of epistemic exceptionalism, existed in the law of evidence long before the advent of the FRE. *See supra* note 27. But the FRE supersede prior practice; thus, historical practice is no justification for perpetuating a double standard for which the FRE make no textual provision. *See Daubert v. Merrell Dow Pharm. Inc.*, 509 U.S. 579, 587 (1993).

¹⁸³ *See, e.g.*, Christopher B. Mueller & Laird C. Kirkpatrick, 1 FEDERAL EVIDENCE § 4:13 (4th ed. 2017) (“Excluding evidence for concerns of ‘unfair prejudice’ in bench trials is in a sense ridiculous. The judge is exposed to proffered evidence when asked to rule on its admissibility.”); Rachlinski and Wistrich, *supra* note 113, at 217 (“Whereas information can be kept from a jury[,] judges cannot shield themselves from inadmissible evidence. They are both the gatekeepers of evidence and the decision makers.”).

¹⁸⁴ *See, e.g.*, Steblay, *supra* note 120.

¹⁸⁵ *See supra* notes 119–127 and accompanying text.

¹⁸⁶ *Cf.* Guthrie, Rachlinski, and Wistrich, *supra* note 72, at 793 (noting that motion to dismiss for lack of subject matter jurisdiction would not provide anchoring effect in real-life damages calculation; “[the] temporal separation of the motion from the determination of the damage award would dull any anchoring effect the motion might otherwise have”).

¹⁸⁷ Sood, *supra* note 72, at 320 (citing studies). On the other hand, a formal ruling of inadmissibility could have an effect similar to that of limiting instructions on the jury, which are known to produce “backlash effects” in which the forbidden inference is highlighted in the jurors' minds. Steblay et al., *supra* note 120; Rachel K. Cush & Jane Goodman Delahunty, *The Influence of Limiting Instructions on Processing and Judgements of Emotionally Evocative Evidence*, 13 PSYCHIATRY, PSYCHOL. & L. 110 (2006).

imperfect—the judge is still exposed to the inadmissible evidence, and as noted above, cannot entirely expunge that evidence or its prejudicial effect from her mind¹⁸⁸—but it is nevertheless an improvement over existing practice. As discussed below, additional steps are necessary to fully insulate the trial judge from the epistemic pollution of inadmissible evidence.¹⁸⁹

b. Eliminate Complexity Exceptions in Generalist Courts

Complexity exceptions shifting factfinding prerogatives from juries to generalist judges—whether general exceptions such as the one recognized in *In Re Japanese Electronic Products Antitrust Litigation*¹⁹⁰ or narrower ones such as the pretrial judicial patent claim construction hearings approved in *Markman v. Westview Instruments, Inc.*¹⁹¹—eliminate the benefits of jury adjudication for little corresponding gain. Although the doctrines of epistemic exceptionalism hold that judges are superior to juries at interpreting and applying complex technical information to the resolution of legal disputes, the available empirical evidence suggests that generalist judges lack any significant epistemic advantage over the jury in interpreting and applying complex scientific evidence in general, and that they are not particularly skilled at patent claim construction (though, unlike jurors, they do have the potential to benefit from repeat experience). Lacking specialized expertise, judges must rely on heuristic decision making just as juries must. This is not to say that juries are *good* at interpreting complex technical evidence, only that generalist judges are insufficiently *better* at the task to warrant abridgement of the jury’s factfinding prerogatives. We might well desire a more effective solution to the problem of epistemic competence in generalist courts—specialized tribunals are one proposed solution, though they present their own challenges—but epistemic exceptionalism substantially overestimates the value that generalist judges can add to the quality of the outcome in comparison to generalist jurors.

2. Second Tier: Structural Reforms to Mitigate Future Manifestations of Epistemic Exceptionalism

a. Single-Blind Concealment of Excluded Evidence through Bifurcated Trial Procedure

“In retrospect, we were totally blinded by our belief [in our findings].... [W]e were not as careful or rigorous as we should have been... in interpreting these experiments.”¹⁹³ Such were the words of Nobel Laureate Jack Szostack concerning the retraction of a 2016 study following the authors’ post-publication discovery that the paper had misinterpreted the experimental data. Law is by no means the only domain in which unconscious cognitive biases can affect decision making. These effects are particularly salient in the natural and social sciences, and scientists are far more

¹⁸⁸ See Wistrich, Guthrie, and Rachlinski, *supra* note 121.

¹⁸⁹ See *infra* Part IV(B)(2)(i).

¹⁹⁰ 631 F.2d 1069, 1084 (3d Cir. 1980).

¹⁹¹ 517 U.S. 370, 389 (1996).

¹⁹³ “Definitely Embarrassing:” Nobel Laureate Retracts Non-Reproducible Paper in Nature Journal, RETRACTION WATCH (Dec. 5, 2017), <http://retractionwatch.com/2017/12/05/definitely-embarrassing-nobel-laureate-retracts-non-reproducible-paper-nature-journal>.

cognizant than judges of the potentially confounding effects of observer bias¹⁹⁴ and of investigators' susceptibility to motivated reasoning.¹⁹⁵ For that reason, the double-blind experiment, in which the identity of the treatment and control groups is masked from participants and investigators until the experiment is complete, is the "gold standard" of inquiry in the experimental sciences.¹⁹⁶ Although the double-blind form cannot be replicated in litigation—parties necessarily know their own evidence, and will prepare their cases with full knowledge of the facts, admissible and otherwise, of which they are aware—we can nevertheless move toward it by adopting a single-blind structure in which proceedings are bifurcated into pretrial and trial phases overseen by different judges.¹⁹⁷ Doing so will add another layer of cognitive insulation to the doctrinal fixes proposed above.

I propose a procedure in which pretrial motions, including rulings on the admissibility of evidence, are decided by a pretrial judge and trial is overseen by a second judge, from whom records dealing with any evidence deemed inadmissible are sealed. The process would not be altogether different from the existing system, in which non-dispositive pretrial motions, including evidentiary motions, are often decided in the first instance by magistrate judges, subject to the district judge's review.¹⁹⁸ The significant differences from current practice would be, first, that one district judge would be appointed to conduct pretrial proceedings, including rulings on evidentiary motions or reviewing objections to the magistrate judge's rulings if the matter is referred to a magistrate judge, and then, upon the pretrial judge's certification that the matter is ready for trial, it would be randomly assigned to a second district judge for trial; second, that the parties would be required to submit foreseeable evidentiary disputes at the pretrial stage, and the pretrial judge would be encouraged to rule on all motions in limine unless good cause exists why the motion cannot be resolved until trial; and third, that rulings on evidence deemed inadmissible would be sealed during trial and the parties would be forbidden, subject to sanctions and, in egregious circumstances, mistrial, to refer to such evidence before

¹⁹⁴ See, e.g., Stewart Wolf, *Effects of Suggestion and Conditioning on the Action of Chemical Agents in Human Subjects—The Pharmacology of Placebos*, 29 J. CLINICAL INVESTIGATION 100 (1950).

¹⁹⁵ See, e.g., Timothy D. Wilson et al., *Scientists' Evaluations of Research: The Biasing Effects of the Importance of the Topic*, 4 PSYCH. SCI. 322 (1993); Jonathan J. Koehler, *The Influence of Prior Beliefs on Scientific Judgments of Evidence Quality*, 56 ORG. BEH. & HUM. DECISION MAKING PROCESSES 28 (1993). Social scientists are also aware of the risks of motivated reasoning in interpreting empirical results. See, e.g., Robert J. MacCoun, *Biases in the Interpretation and Use of Research Results*, 49 ANN. REV. PSYCHOL. 259 (1998).

¹⁹⁶ Kenneth F. Schulz & David A. Grimes, *Blinding in Randomised Trials: Hiding Who Got What*, 359 LANCET 696, 696–97 (2002); but see, e.g., Ted J Kaptchuk, *The Double-Blind, Randomized, Placebo-Controlled Trial: Gold Standard or Golden Calf?*, 54 J. CLINICAL EPIDEMIOLOGY 541 (2001) (arguing that the process of blinding can itself produce forms of "masking bias").

¹⁹⁷ Cf. Guthrie, Rachlinski, and Wistrich, *supra* note 93, at 42 (recommending a "divided decision-making strategy" to "shield the ultimate adjudicator from various stimuli that are likely to induce intuitive, heuristic-based decision making").

¹⁹⁸ See 28 U.S.C. § 636(b)(1)(A) (magistrate judges empowered to decide non-dispositive motions on reference from district judge).

the trial court judge.¹⁹⁹ The trial judge simply would not know what evidence has been deemed inadmissible, and therefore could not be influenced by it.²⁰⁰

The most obvious objection to a blinding proposal is that it would increase the cost, and perhaps the duration, of litigation. While this is an empirical question about which further research would be necessary, there is at least some room for doubt whether this is the case. As Wistrich et al. point out, “[s]uch ‘master calendar’ systems are common in many state courts and were common in the federal courts until the late 1960s,” at least in part because such systems are seen as *more* efficient than one in which a single judge oversees all proceedings in a case.²⁰¹ Moreover, some of the efficiency gains in having a single judge oversee the pretrial and trial process come from the very reliance on inadmissible information that gives rise to the problems of biased and motivated cognition. To the extent that such information constitutes an epistemic contaminant in the adjudicatory process, the ignorance of the blinded trial judge to inadmissible facts is a *feature* of the single-blind model.

Even assuming, *arguendo*, that the single-blind procedure would materially increase the cost of adjudication, this seems of minor concern in comparison to the benefit of eliminating the influence of prejudicial and inadmissible evidence at trial. Efficiency and affordability are important factors in the operation of a judicial system, but they are by no means the only factors. Perhaps beyond all other social institutions, courts’ reputation for unbiased decision making is central to their institutional identity and public legitimacy.²⁰² It is thus surprising that that

¹⁹⁹ It would of course be possible that events at trial might necessitate a re-evaluation of pretrial evidentiary rulings. A defendant’s testimony, for example, might open the door to introducing evidence of prior bad acts previously deemed inadmissible. Parties would necessarily be permitted to move for leave to introduce evidence deemed inadmissible prior to trial; sanctions could deter frivolous or strategic use of this practice. At the same time, courts should be discouraged from the widespread practice of treating rulings on motions in limine as presumptively provisional and thus failing to preserve issues on appeal unless the objecting party renews its objection at trial. *See, e.g.*, *U.S. v. Gilbert*, 229 F.3d 15, 17 (1st Cir. 2000). While it is true that some evidentiary issues cannot be definitively resolved until presented in a concrete context at trial—statements of co-conspirators excepted from the hearsay rule under FRE 801(d)(2)(E) are a classic example, as their admissibility is entirely contingent on the introduction of evidence at trial sufficient to prove the defendant’s participation in the conspiracy—this should not prevent pretrial judges from issuing definitive rulings on matters in which the question of admissibility is relatively clear. Absent an explicit statement by the pretrial judge that a ruling on a motion in limine is provisional, parties should be required to show cause why unforeseen circumstances at trial warrant reconsideration of the pretrial ruling.

²⁰⁰ While this section focuses on trial factfinding, blinding via the division of judicial duties may be valuable in other contexts as well, such as the adjudication of summary judgment motions, judicial participation in settlement conferences, and appellate review. *See, e.g.*, Harold Jr. Baer, *History, Process, and a Role for Judges in Mediating Their Own Cases*, 58 N.Y.U. ANN. SURV. AM. L. 131, 144–47 (2001) (discussing ethical concerns in judicial participation in settlement negotiations).

²⁰¹ Wistrich, Guthrie, & Rachlinski, *supra* note 121, at 1326; *cf.* Rule 8.1, Superior Court of California, County of San Francisco Local Rules of Court (2017), http://www.sfsuperiorcourt.org/sites/default/files/pdfs/Local%20Rules/Uniform-Local-Rules-of-Court-January-1-%202017_FINAL.pdf (identifying pretrial matters to be heard in the Law and Motion Department). Wistrich et al. suggest separating judges’ “managerial” and “adjudicative” roles by assigning the pretrial and trial phases of each case to different judges. Wistrich, Guthrie, & Rachlinski, *supra*, at 1325–27. Although the authors do not draw comparisons to the natural sciences, their proposal is similar to one of single-blind adjudication, the major difference being that Wistrich et al. do not propose any formal blinding mechanism; the record of pretrial proceedings and the nature of evidence deemed inadmissible would presumably be open to the trial judge under their proposal.

²⁰² *See supra* Part IV(A).

reputation is currently largely grounded in the fiction of judges' immunity from the myriad biases and fallacies to which human cognition is susceptible rather than in more reliable methods of debiasing procedure that have been implemented in other fields. Blinding is ubiquitous in situations where unbiased decision making is important.²⁰³ In addition to the "gold standard" status of double-blind randomized controlled trials in the experimental natural sciences,²⁰⁴ we might also include the anonymized review of manuscripts by academic journals,²⁰⁵ the establishment of blind trusts for the management of public officials' assets,²⁰⁶ and even the grading of law school exams.²⁰⁷ Is the provision of legal justice a less important process than others in which blinding is routinely implemented? I think not, but the doctrines of epistemic exceptionalism, with their "presumptions" that judges are immune to the cognitive effects to which all other humans are susceptible,²⁰⁸ have thus far prevented the legal system from implementing prophylactic measures that have proven effective in other contexts.

b. Revise FRE 706 to "Nudge" Courts to Appoint Independent Experts

Courts' doctrines and discretionary practices regarding gatekeeping and FRE 706 appointments may indicate manifestations of the Dunning-Kruger effect.²⁰⁹ Judges are laypersons in the domains of expertise in which the expert witnesses testify. They therefore can be expected to overestimate their ability to comprehend and apply expert testimony to the resolution of legal disputes without assistance.²¹⁰

In Chapter 3, I will propose reforming the epistemic system of the courts more radically, reallocating decision making authority to evaluate expert witnesses' qualifications and to decide gatekeeping motions to "scientific adjuncts" with expertise in the scientific domain at issue. But even if that proposal is not implemented, we can mitigate the effects of epistemic exceptionalism by encouraging judges to appoint neutral experts pursuant to FRE 706. Although judges currently have that authority and would likely benefit from the advice of a neutral scientific advisor or third-party witness in many cases, they rarely exercise their discretion to appoint such

²⁰³ See Robertson, *supra* note 56, at 206 (citing examples of blinding as a debiasing mechanism); see generally BLINDING AS A SOLUTION TO BIAS (Christopher T. Robertson & Aaron S. Kesselheim eds., 2016) [hereinafter BLINDING] (discussing utility and ethical concerns of blinding in a variety of contexts).

²⁰⁴ See Schultz & Grimes, *supra* note 196.

²⁰⁵ See Emily A. Largent and Richard T. Snodgrass *Blind Peer Review by Academic Journals*, in BLINDING, *supra* note 203, at 75-93; Nancy McCormack, *Peer Review and Legal Publishing: What Law Librarians Need To Know About Open, Single-Blind, and Double-Blind Reviewing*, 101 LAW LIBR. J. 59 (2009).

²⁰⁶ See Perry A. Pirsch, *Blind Trusts as a Model for Campaign Finance Reform*, 4 WM. & MARY POL'Y REV. 212, 223-25 (2012).

²⁰⁷ See Paul D. Carrington, *One Law: The Role of Legal Education in the Opening of the Legal Profession Since 1776*, 44 FLA. L. REV. 501, 565 (1992).

²⁰⁸ See *supra* Part II(A).

²⁰⁹ See *supra* note 84.

²¹⁰ Indeed, the judicial respondents to Cecil and Willgang's study of FRE 706 appointment practices noted that "[t]he opportunity to appoint an expert is often hindered by failure to recognize the need for such assistance until the eve of trial." CECIL AND WILLGING, *supra* note 55, at 5. Adversarial scruples alone cannot fully explain these results; Dobbins et al.'s analysis of federal district judges' survey responses found that judges were also unlikely to appoint a special master to prepare a report for the court on issues relating to scientific evidence (77.9% of judges responded that they would never do so) or appoint a scientific advisor to educate the court (90.7% would never do so). Dobbins et al., *supra* note 55, at 9.

experts.²¹² This is a circumstance in which “nudging” judges toward a more effective process may yield benefits.²¹³ FRE 706 could be revised to provide that, in cases involving expert testimony, the parties shall jointly prepare a list of candidates to be appointed by the court as an independent FRE 706 expert; the court shall then select and appoint one of the parties’ candidates unless it concludes in a written order that doing so is not in the interests of justice. Thus, the default option would be that an independent expert is appointed. Judges would retain discretion not to appoint an FRE 706 expert, but would be required to articulate reasons why such an appointment would not be helpful in a particular case. In addition to resulting in more independent experts being appointed, the act of articulating reasons why an expert is unnecessary might itself mitigate the Dunning Kruger effect by compelling judges to consider their need for independent expert advice about the relevant domain of expertise.²¹⁴

Christopher Robertson raises several practical objections to widespread use of FRE 706 experts. Aside from a judicial culture reticent to overshadow partisan experts with court-appointed ones,²¹⁵ the process of identifying and appointing a qualified independent expert is a time-consuming one for which judges may be unprepared,²¹⁶ and mandating the appointment of FRE 706 experts is politically infeasible.²¹⁷ The proposal to nudge, rather than require, the use of independent experts blunts those objections.²¹⁸ Changing the default option to appointing an independent expert gives judges some cover against party objections to the appointment of independent experts, and may assuage their own adversarial scruples. The parties, rather than the judge, would be required to prepare the initial list of candidates, and we may anticipate that, as FRE 706 appointments become more common, a class of repeat-player independent experts will emerge such that the judicial appointment process becomes routine in many cases. Finally, the shift to appointing independent experts as a default position, subject to judicial override, is a less radical change to current practice than a full mandate, and may be more politically palatable.

3. Top Tier: Instilling an Institutional Culture of Epistemic Humility

Changes to the formal process of judicial decision making are relatively straightforward, and most of the specific manifestations of epistemic exceptionalism identified in Part III can be corrected with doctrinal or institutional reforms. Unless the underlying causes of epistemic

²¹² See *supra* note 55.

²¹³ See RICHARD H. THALER & CASS R. SUNSTEIN, *NUDGE: IMPROVING DECISIONS ABOUT HEALTH, WEALTH, AND HAPPINESS* (2009).

²¹⁴ See *supra* note 84.

²¹⁵ Robertson, *supra* note 56, at 199–200; cf. Joe S. Cecil & Thomas E. Willging, *Accepting Daubert’s Invitation: Defining a Role for Court-Appointed Experts*, 43 EMORY L. J. 995, 1005, 1018–19 (1994) (only 20% of judges in sample ($n = 431$) had appointed a FRE 706 expert; noting judges’ view that appointed experts are incompatible with the adversarial system and parties’ objections to judicially appointed experts as common reasons given for courts’ reluctance to appoint experts more frequently).

²¹⁶ Robertson, *supra* note 56, at 200.

²¹⁷ *Id.* at 201.

²¹⁸ Robertson’s own proposal, to adopt a regime of “blind” partisan experts, is an interesting one that has generated promising results in empirical testing. See Christopher T. Robertson & David V. Yokum, *The Effect of Blinded Experts on Juror Verdicts*, 9 J. EMPIRICAL LEGAL STUD. 765 (2012); Robertson, *supra* note 56. The proposals are not incompatible; a regime of blind partisan experts and FRE 706 nudges might well be preferable to either option individually.

exceptionalism are addressed, however, new manifestations will continue to sprout, hydra-like, from the institutionalized belief in judges' exceptional competence and objectivity. A complete solution to the problem will require a shift in courts' perspectives toward an awareness of judges' cognitive limitations and a greater appreciation for the usefulness of evidentiary and procedural rules in guarding against the effects of unconscious bias and cognitive illusions. I refer to this attitude generally as *epistemic humility*.²¹⁹ Humility in this sense is not simply a supererogatory virtue, nor an exercise in false modesty; it is a recognition, operationalized in doctrine and discretionary practice, that the legal system works best when its procedures are grounded in a realistic, empirically-informed conception of human cognition and its limitations. Epistemic humility is associated with openness, curiosity, tolerance of ambiguity, and low dogmatism—all valuable characteristics to effective judging.²²⁰ Individuals displaying epistemic humility are also “more attentive to the evidentiary basis of their beliefs” and “more clearly distinguish[] strong from weak arguments... those that were based on scientific evidence and expert testimony from those that were based on trivial considerations, anecdotal evidence, or recommendations by laypeople.”²²¹

Changing the institutional culture of the courts to one of greater epistemic humility will not be easy, in part because epistemic exceptionalism is a rational response to courts' institutional incentives. As noted above, the principal cause of epistemic exceptionalism is not personal hubris on the part of individual judges, but rather an institutionalized commitment to the myth of judicial infallibility on the part of courts as collective epistemic agents.²²² This commitment is motivated by the necessity of courts, in order to maintain the perception of apolitical legitimacy upon which their institutional authority relies, to maintain the pretense of perfect impartiality and universal expertise; to deny, insofar as possible, that judicial cognition resembles human cognition.²²³ Those incentives are rooted deeply in the institutional structure of the judiciary, and can be regarded as more or less permanent.²²⁴ In that regard, the judicial culture of epistemic exceptionalism can itself be conceived as an instance of motivated cognition—courts' institutional authority, political capital, and judges' professional identities all turn on the belief that judicial decision making is immune to the cognitive illusions and biases to which laypersons are susceptible. Pressures toward epistemic exceptionalism will always exist in an institution that depends on its reputation for disinterestedness as a source of political authority.

How, then, should an institutional culture of epistemic humility be fostered? Persuasion is likely more effective than prescription; if a culture of epistemic humility is to take root, judges must

²¹⁹ See Mark R. Leary et al., *Cognitive and Interpersonal Features of Intellectual Humility*, 43 PERS. & SOC. PSYCHOL. BULL. 793, 793 (2017) (defining “intellectual humility” as “recognizing that a particular personal belief may be fallible, accompanied by an appropriate attentiveness to limitations in the evidentiary basis of that belief and to one’s own limitations in obtaining and evaluating relevant information”). The psychology literature generally uses the phrase “intellectual humility”; I use the term “epistemic humility” synonymously to emphasize the relation of humility to the production of legal knowledge.

²²⁰ *Id.* at 796–97.

²²¹ *Id.* at 808.

²²² See *supra* Part IV(A).

²²³ See Shapiro, *supra* note 175, at 155–56.

²²⁴ See Hamilton, *supra* note 171.

understand the mechanisms of unconscious cognitive error and the value of procedural and evidentiary rules intended to mitigate them.²²⁵ They also must come to appreciate the contexts in which their legal training and general intelligence give them a meaningful epistemic advantage over lay jurors and, crucially, the contexts in which they do not. If, as proposed above, the rules of evidence and procedure are revised to state more explicitly that they apply with equal force to pretrial proceedings and bench trial as to jury trials, or to encourage judges to appoint independent experts under FRE 706, advisory committee notes should summarize the relevant psychological research and explain why cognitive safeguards are necessary for judges. Judicial training should be updated to include research on the cognitive effects discussed in Part II, with the goal of convincing judges that general intelligence, expertise in law, and a conscious commitment to neutrality are inadequate to protect against all forms of cognitive error. Only when judges themselves appreciate the value of procedural protections against cognitive error can we hope for manifestations of epistemic exceptionalism to cease.²²⁶

V. Conclusion

Having begun this chapter with a reference to Greek mythology, it is appropriate to end it on a note of Roman history. Roman generals returning home in victory were honored with elaborate triumphal processions in which a public slave traditionally held a golden crown above the general's head while repeating, "Look behind you. Remember you are a man."²²⁷ Federal judges will never be mistaken for triumphant generals, but they are subject to the same temptations to forget the limits of their own abilities.²²⁸ In this they are eminently human; the tendency to overestimate one's competence and objectivity relative to others is nearly universal. It is for this reason, among others, that the law has imposed cognitive guardrails in the Federal Rules of

²²⁵ See Sood, *supra* note 72, at 320 (suggesting that "especially in legal decision-making contexts, in which people strive to reach accurate and lawful conclusions, the key to reining in motivated cognition might lie in drawing attention to inadvertently and inappropriately motivating factors"); Guthrie, Rachlinski, and Wistrich, *supra* note 72, at 822–25 (arguing that judges can mitigate the effects of cognitive illusions by considering multiple perspectives, limiting heuristics to normatively appropriate circumstances, and reducing reliance on judgments that are likely to be influenced by cognitive illusions).

²²⁶ Even under the most favorable conditions, greater judicial awareness will not eliminate the danger of epistemic exceptionalism. Some cognitive effects can be mitigated by deliberative System 2 effort, but others persist even in the face of conscious efforts to neutralize them. See, e.g., Timothy D. Wilson et al., *A New Look at Anchoring Effects: Basic Anchoring and its Antecedents*, 125 J. EXPERIMENTAL PSYCHOL. 387, 397 (1996) (finding that anchoring effects were not diminished by forewarning study participants about anchoring); Jon D. Hanson & Douglas A. Kysar, *Taking Behavioralism Seriously: The Problem of Market Manipulation*, 74 N.Y.U. L. REV. 630, 633 (1999) ("[C]ognitive illusions... are not limited to the uneducated or unintelligent, and they are not readily capable of being unlearned. Instead, they affect us all with uncanny consistency and unflappable persistence."). The best hope is that through a combination of judicial vigilance and process-based cognitive guardrails, manifestations of epistemic exceptionalism can be diminished.

²²⁷ MARY BEARD, *THE ROMAN TRIUMPH* 85 (2009).

²²⁸ The Roman insight that public acclaim and political authority can be associated with cognitive impairment has been borne out by a robust literature on the effects of political power on behavior and cognition. See, e.g., David Owen & Jonathan Davidson, *Hubris Syndrome: An Acquired Personality Disorder?*, 132 BRAIN 1396, 1397–99 (2009) (proposing diagnostic criteria for "hubris syndrome"); Dacher Keltner, Deborah H. Gruenfeld & Cameron Anderson, *Power, Approach, and Inhibition*, 110 PSYCHOL. REV. 265, 279 (2003) (finding that people feeling powerful "act in a more disinhibited and at times counternormative fashion"); see generally Dacher Keltner, *Don't Let Power Corrupt You*, HARV. BUS. REV. 108 (Oct. 2016) (summarizing research on the psychological effects of power).

Evidence. The FRE exist in part to avoid the cognitive pitfalls that centuries of experience revealed even before modern psychology articulated such concepts as “cognitive illusions,” “cultural cognition,” and “implicit bias.” These solutions are imperfect, but they go some distance toward mitigating sources of cognitive bias in legal decision making.

The problem of epistemic exceptionalism arises when judges exempt themselves from the guidelines the law has put in place to steer legal cognition away from these epistemic precipices, or when they preempt juries’ factfinding prerogatives on the basis of spurious claims of domain-general epistemic superiority. While we need not doubt that federal judges are highly intelligent and conscientiously strive for impartiality, they are still human; they are necessarily ignorant of the scope of their own ignorance in matters outside their expertise, and they are susceptible, to a substantial if not identical degree, to all of the cognitive pitfalls that beset lay jurors. By disregarding the psychological insights expressed by the FRE, judges deprive themselves of valuable safeguards against cognitive error and greatly increase the risk of biased or irrational decision making.

I have not attempted to survey the full scope of the problem or to detail all of the manifestations of epistemic exceptionalism. The specific manifestations that this chapter identifies are problematic in themselves and should be addressed. In most cases, the solutions are simple—the FRE should apply to pretrial and bench trial factfinding with the same force as jury trials, courts’ incentives should be changed to encourage the appointment of independent expert witnesses, and complexity exceptions to the Seventh Amendment should be rejected where the alternative is a bench trial before a generalist judge. But these are only examples of a broader phenomenon, one rooted ultimately in the judicial psyche. Only by instilling a culture of epistemic humility in the judiciary in combination with more robust procedural and institutional safeguards can we hope to finally end the distortions to the legal process caused by epistemic exceptionalism.

Chapter 3

Epistemic Competence and Institutional Cognition: The Need for an Epistemological Paradigm Shift in Courts' Engagement with Scientific Expertise

*How long we shall continue to blunder along without the aid of unpartisan and authoritative scientific assistance in the administration of justice, no one knows; but all fair persons not conventionalized by provincial legal habits of mind ought, I should think, unite to effect some such advance.*²²⁹

Learned Hand, 1911

I. Courts, Scientific Evidence, and the Need for an Institutional Epistemological Perspective

Consider the following situation. Bob is a 37-year-old chain smoker with a family history of lung cancer, who has worked as a municipal electrician for about 18 years. During that time, he came into routine contact with polychlorinated biphenyls (PCBs), industrial chemicals used in electrical transformers. Bob has recently been diagnosed with lung cancer; he believes that it was caused by long-term exposure to PCBs, despite his smoking habit and family history.

Unfortunately for Bob, most of the scientific community does not believe that PCB exposure causes lung cancer in humans. But Bob finds two experts, Drs. Schechter and Teitelbaum, who find his claim plausible. Both doctors are tenured medical professors and nationally recognized experts in medical toxicology generally and the effects of PCBs specifically. They cite two sets of studies in support of their conclusion that Bob's cancer could have been caused by PCB exposure: the first found statistically significant associations between PCB exposure and cancer in laboratory mice, while the second set reinterpreted data from several epidemiological studies, concluding that those studies support a causal relationship between PCB exposure and lung cancer. Bob's experts conclude that these studies, taken together, support the inference that PCB exposure can be carcinogenic to humans.

Now answer the following questions:

1. Are Bob's experts actually *experts* in the scientific domain for which they claim to speak? What criteria distinguish an expert from a layperson in a given scientific field, and how can those criteria be applied by a layperson to distinguish genuine experts from pseudo-experts or frauds?
2. Is the methodology that Bob's experts rely on reliable? Is it scientific? Do the studies they cite adequately support their conclusions about PCBs' causal role in human oncogenesis?
3. Assume for the moment that you find Schechter and Teitelbaum's method sufficiently reliable to consider. Is it *convincing*? That is, do you believe that it is more likely than not the case that Bob's cancer was caused by PCB exposure? What if there were a two other doctors, equally well-credentialed, who read the same studies and came to the opposite conclusion? How should you choose between the two sides?

The legally trained reader could be excused for wondering if she has picked up a journal of toxicology or oncology by mistake. Lacking technical training, a lawyer can hardly hope to make

²²⁹ Parke-Davis & Co. v. H.K. Mulford Co., 189 F. 95, 115 (S.D.N.Y. 1911).

sufficient sense of the intricacies of those fields to take an informed view of the questions presented. And the hypothetical dissenters introduced in the third question only confuse the matter further—how can the lay reader hope to make an informed choice between the opposing views of qualified experts? Surely disagreements about these technical matters are better referred to medical researchers, with doctoral degrees and years of lab experience; what could the scientific layperson, legally trained or otherwise, possibly add? And yet, judges and juries engage in this task every day. The work of courts demands that they evaluate the claims of expert witnesses in scientific fields as varied as epidemiology, economics, forensic identification, and civil engineering, among many others. Indeed, the example offered above is a slightly modified version of the expert dispute at issue in one of the Supreme Court’s trilogy of cases on the admissibility of expert witness testimony.²³⁰

This chapter addresses that unresolved difficulty. Courts routinely hear expert testimony in scientific fields in which judges and juries lack specialized training.²³¹ How, then, can legal decision makers determine the scientific truth from the adversarial presentation of expert witness testimony? Most of the scholarship to address this question finds that they simply can’t; they make decisions by relying on heuristics and stereotypes rather than substantive evaluation of the contending experts’ scientific views.²³² One scholar has declared this situation a constitutional crisis, arguing that the Due Process Clause contains an “intellectual due process” component requiring legal decision makers to possess “epistemic competence” to interpret and apply expert testimony in an epistemically warranted way.²³³

The problem of epistemic competence has proven far easier to diagnose than to remedy. Judges, lawyers, and academics have spent more than a century proposing reforms intended to make courts more effective at applying scientific evidence to the resolution of legal disputes.²³⁴ Some of these proposals have mitigated the problem, but none has eliminated it; today’s commentators bemoan courts’ lack of scientific literacy and the partisanship of hired-gun experts just as those of the nineteenth century did. The problem has become intractable.

The intractability of the problem can be traced in large part to the epistemological frame within which the conversation has occurred. Scholars working in classical epistemology and the sociology of scientific expertise have independently concluded that competent judgments on issues of scientific fact can be made only by legal decision makers who possess scientific expertise.²³⁵ Lacking expertise in the scientific fields about which expert witnesses testify, lay judges and jurors are forced to employ proxies that are inadequate to reach epistemically

²³⁰ General Elec. Co. v. Joiner, 522 U.S. 136 (1997).

²³¹ This chapter addresses the problem of epistemic competence specifically with respect to *scientific*, as opposed to technical or other specialized knowledge. This is so for two reasons. First, the problem of epistemic competence seems most acute with respect to scientific expert testimony. Second, the problem appears more readily solvable if addressed in the narrower frame of scientific evidence.

²³² See *infra* Part III(B)–(C).

²³³ Scott Brewer, *Scientific Expert Testimony and Intellectual Due Process*, 107 YALE L.J. 1535 (1997); cf. Jennifer L. Mnookin, *Idealizing Science and Demonizing Experts: An Intellectual History of Expert Evidence*, 52 VILLANOVA L. REV. 763, 766 (2007).

²³⁴ See *infra* Part III(E).

²³⁵ See *infra* Part III(B).

warranted scientific judgments. But when that insight is applied within an atomized epistemological paradigm that can only conceive of individual, limited human minds as epistemic agents, only two solutions can exist: either judges and jurors must become omniscient, or courts must be carved up into specialist institutions resolving legal disputes involving only the scientific domain in which the specialist decision makers are proficient. Neither solution is feasible, and so much of the conversation of the past century has focused on mitigation measures within the individualist epistemological paradigm. A full solution has seemed out of reach.

Recent work in social epistemology provides a more fruitful perspective. Individual human minds cannot possess expertise in every scientific domain relevant to litigation. *Institutions*, however, can come much closer. We routinely think of institutions as capable of possessing knowledge and mental states. We worry that Facebook *knows* too much about our private lives, say that Wells Fargo *knew or should have known* that its employees were creating fraudulent bank accounts, or question whether Russia *intended* to influence the 2016 presidential election.²³⁶ Social epistemology examines the epistemic systems of institutions, exploring the mechanisms by which collective knowledge is generated.

I advocate a shift in epistemological perspective from the individual to the institution. Refocusing the discussion of epistemic competence on the institution of the court provides a way to satisfy the condition that the legal decision maker—the court itself—possess scientific expertise. I will sketch a social epistemological solution to the problem of epistemic competence, which would bring scientific expertise into the court by 1) creating an administrative office staffed by individuals with expertise in a range of scientific domains that most commonly arise in litigation; and 2) granting those experts authority to decide legal questions requiring scientific judgment.²³⁷ This proposal addresses the demonstrated need for greater reliability in judicial engagement with scientific expertise while preserving, insofar as possible, the structure and normative values served by the existing institutional design of the common law court.

This chapter proceeds as follows. Part II provides an overview of the doctrinal framework governing courts' interactions with scientific expertise. Part III examines the problem of

²³⁶ The law, too, conceives of institutions as epistemic agents, for example in its conception of corporations as capable of possessing the mental states necessary for criminal liability. See Mihailis E. Diamantis, *Corporate Criminal Minds*, 91 NOTRE DAME L. REV. 2049 (2016). Indeed, the Supreme Court recently held that some closely held for-profit corporations can claim First Amendment protection for their religious beliefs, as non-profits have long been able to do. *Burwell v. Hobby Lobby Stores, Inc.*, 134 S. Ct. 2751 (2014).

²³⁷ As this synopsis of my proposal makes clear, an institutional epistemic agent is, of course, comprised of individual minds. Institutions must act through individuals, and they must *think* and *know* through individuals; thus, if, as I believe to be the case, we may speak of institutions as epistemic agents in some sense distinct from the sum of their constituent members, this must be because the individuals' epistemic tasks are organized in such a way that the institution itself can be said to act *as if* it possesses more than the sum of its individual members' knowledge. I will discuss in greater detail below how recent developments in social epistemology describe this phenomenon, and how such insights might be applied to the design of judicial epistemic agents. The key distinction—and what separates this proposal from the history of proposals discussed in Part III(D), *infra*, is the union of expertise with authority. Unlike, for example, reliance on FRE 706 independent experts or special masters, institutional epistemic agents can be said to possess the knowledge of their constituent members only when an individual member with expertise in a given domain possesses decision-making authority over questions arising in that domain. Solutions in which decision-making authority is vested in a generalist administrator like a trial court judge do not satisfy this condition.

epistemic competence and its proposed solutions in greater detail. Part IV proposes a shift in epistemological perspective and describes a system of reforms that would solve the problem of epistemic competence by reconfiguring courts to possess both scientific expertise and legal authority. Part V briefly concludes.

II. The Doctrinal Framework of Law's Encounters with Scientific Expertise

Courts engage with expert testimony in three distinct contexts during the course of litigation: 1) expert witness *qualification*; 2) evaluation of the *reliability* of the expert's methodology for the purpose of determining admissibility (i.e., "gatekeeping"); and 3) *factfinding* on the basis of admissible expert testimony. I will use the federal system as the paradigm case; state-level deviations from that paradigm are occasionally discussed, but this section is not intended as a comprehensive overview of state departures from the federal model.

FRE 702 is the principal doctrinal frame for the court's engagements with scientific expertise. It states as follows:

A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:

- (a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;
- (b) the testimony is based on sufficient facts or data;
- (c) the testimony is the product of reliable principles and methods; and
- (d) the expert has reliably applied the principles and methods to the facts of the case.

A. Qualification of Expert Witnesses

In order to testify as an expert witness, one must, of course, be an expert in the relevant scientific domain. Thus, proponents of expert witness testimony bear the burden of demonstrating their proposed expert's qualification by a preponderance of proof.²³⁸ While philosophers and psychologists have long debated the question of what distinguishes "experts" from laypersons,²³⁹ the Federal Rules of Evidence largely avoid the nuances of the academic debates. FRE 702 takes a permissive approach to qualification that recognizes a broad range of sources of expertise.

²³⁸ FRE 104(a); see *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 592 n.10 (1993). "Preponderance of proof" rather than "preponderance of the evidence" is the correct term because, pursuant to FRE 104(a), the Rules of Evidence do not apply to preliminary questions.

²³⁹ See, e.g., David Z. Hambrick et al., *Deliberate Practice: Is That All It Takes to Become an Expert?*, 45 INTELLIGENCE 34 (2014); K. Anders Ericsson, Ralf T. Krampe & Clemens Tesch-Römer, *The Role of Deliberate Practice in the Acquisition of Expert Performance*, 100 PSYCHOL. REV. 363 (1993); see generally FERNAND GOBET, UNDERSTANDING EXPERTISE: A MULTI-DISCIPLINARY APPROACH (2016); ANDERS ERICSSON & ROBERT POOL, PEAK: SECRETS FROM THE NEW SCIENCE OF EXPERTISE (2016); HARRY COLLINS, ARE WE ALL SCIENTIFIC EXPERTS NOW (2014); HARRY COLLINS & ROBERT EVANS, RETHINKING EXPERTISE (2007); THE PHILOSOPHY OF EXPERTISE (Evan Selinger & Robert P. Crease eds., 2006).

Although no empirical studies on the frequency with which proposed experts are deemed qualified exist, FRE 702 establishes a relatively low doctrinal bar for expert qualification.²⁴⁰

The language of FRE 702 raises two questions concerning the threshold issue of expert qualification: first, what sorts of knowledge can sustain claims of expertise—*i.e.*, which domains can a witness be an expert *in*?—and second, what distinguishes an expert from a layperson? As to the first question, the Rule’s language is quite broad, as has been its application. FRE 702(a) states that an expert’s “scientific, technical, or other specialized knowledge” is admissible if it “will help the trier of fact to understand the evidence or to determine a fact in issue.” All fields of “specialized knowledge” are thus potential subjects of expert testimony to the extent that they will assist the trier of fact to understand the evidence or determine a relevant fact. But replacing one obscure term with another does not really answer the underlying question: what sorts of knowledge does the law recognize as “specialized”? Courts solve that problem by referring to Rule 702’s instrumental language: “specialized” knowledge is that which will assist the trier of fact in its task, generally because it involves some component that is beyond the experience of the typical juror.²⁴¹ Thus, courts have recognized such fields of knowledge as the meaning of gang and drug jargon,²⁴² procedures for the emergency evacuation of disabled individuals,²⁴³ and the interpretation of foreign law²⁴⁴ as sufficiently specialized to warrant the certification of expert witnesses.²⁴⁵

As to the second question, the rules provide no formal definition of “expert,” and approach the subject only obliquely by reference to the types of knowledge that can properly be the subject of expert testimony. FRE 702 provides, by implication, that an expert is one who possesses “scientific, technical, or other specialized knowledge” by virtue of “knowledge, skill, experience, training, or education,” while the Advisory Committee’s notes state simply that “lay testimony ‘results from a process of reasoning familiar in everyday life,’ while expert testimony ‘results from a process of reasoning which can be mastered only by specialists in the field.’”²⁴⁶ Who, then, can be an expert in a scientific, technical, or other specialized field, and how is the court to distinguish genuine experts from charlatans, novices, or incompetents? Courts have adopted a flexible approach to that question, reflecting the diversity of types of specialized knowledge to

²⁴⁰ Courts have, however, deemed proposed expert witnesses unqualified where the witness’s expertise is too attenuated. *See, e.g.*, *Chapman v. Procter & Gamble Distrib., LLC*, 766 F.3d 1296 (11th Cir. 2014); *Milne v. USA Cycling Inc.*, 575 F.3d 1120 (10th Cir. 2009).

²⁴¹ *See, e.g.*, *U.S. v. Hill*, 749 F.3d 1250, 1258 (10th Cir. 2014) (“The touchstone of admissibility under Rule 702 is the helpfulness of the evidence to the trier of fact.”). The Advisory Committee notes to FRE 702 explicitly encourage this approach, noting that “[w]hether the situation is a proper one for the use of expert testimony is to be determined on the basis of assisting the trier.” FRE 702, Advisory Committee’s Notes on 1972 Proposed Rule.

²⁴² *See, e.g.*, *U.S. v. York*, 572 F.3d 415, 421–22 (7th Cir. 2009); *U.S. v. Dukagjini*, 326 F.3d 45, 52–53 (2d Cir. 2002).

²⁴³ *E.E.O.C. v. E.I. Du Pont de Nemours & Co.*, 406 F. Supp. 2d 645, 653–54 (E.D. La. 2005), *rev’d in part on other grounds*, 480 F.3d 724 (5th Cir. 2007).

²⁴⁴ *Universe Sales Co., Ltd. v. Silver Castle, Ltd.*, 182 F.3d 1036 1037–39 (9th Cir. 1999); *see Fed. R. Civ. P.* 44.1.

²⁴⁵ Of course, not *all* knowledge is “specialized.” *See, e.g.*, *Hatch v. State Farm Fire & Cas. Co.*, 930 P.2d 382, 389 (Wyo. 1997) (witness not permitted to testify as expert in how a “good neighbor” would act in handling plaintiff’s insurance claim).

²⁴⁶ FRE 701(a); FRE 701, Advisory Committee’s Notes to 2000 Amendment (quoting *State v. Brown*, 836 S.W.2d 530, 549 (Tenn. 1992)).

which the rule applies as well as the diversity of methods by which expertise can be acquired. Many domains in which courts have recognized expertise lack formal credentialing mechanisms; even in domains in which credentialing authorities exist, courts have recognized expertise on the basis of professional experience even where the proposed expert lacks the relevant credential.²⁴⁷ Outside of the area of forensic science, however, formal credentials appear to be a *de facto* requirement for *scientific* (as opposed to “technical” or “other specialized”) expert qualification; I am aware of no cases in which a court has recognized an uncredentialed expert in a scientific domain as a qualified expert, despite sociological evidence suggesting that uncredentialed scientific expertise does exist.²⁴⁸

B. Gatekeeping: Assessing the Reliability of Expert Methodology

If the expert is qualified, the court may be called upon to perform a “gatekeeping” task; that is, to evaluate the reliability of the methodology underlying the expert’s anticipated testimony. Unlike the threshold issue of expert qualification, gatekeeping is generally undertaken only upon motion of the opposing party. A few decisions have held that a court may engage in gatekeeping review *sua sponte*;²⁴⁹ but the practice remains rare. The admission of expert testimony at trial is thus no guarantee of its reliability, as the decision to seek gatekeeping review is subject to a variety of strategic considerations that may be unrelated to the reliability of an opposing expert’s methodology.²⁵⁰

Gatekeeping rules vary from state to state and the federal courts, but their function in all jurisdictions is to ensure that the testimony is sufficiently methodologically reliable to warrant its introduction at trial. Two principal doctrinal models of gatekeeping review exist in contemporary law; one largely delegates the question of reliability to an extrajudicial community of acknowledged experts, while the other requires courts to make independent assessments of experts’ methodology on the basis of (contested) criteria of scientific validity. Both have been subject to extensive criticism, and neither provides a fully satisfactory framework for effectively distinguishing reliable scientific methodology from pseudoscience, non-science, or incompetent science.

1. The Sporting Theory

In the 19th and early 20th centuries, the law of gatekeeping was essentially an absence of law. The partisan expert witness emerged as a recognizable figure during the late 18th and early 19th

²⁴⁷ See, e.g., *U.S. v. Council*, 777 F. Supp. 2d 1006 (E.D. Va. 2011) (admitting the testimony of fingerprint examiner who lacked professional certification).

²⁴⁸ See Steven Epstein, *The Construction of Lay Expertise: AIDS Activism and the Forging of Credibility in the Reform of Clinical Trials*, 20 SCI. TECH. & HUM. VALUES 408 (1994); Brian Wynne, *Sheepfarming after Chernobyl: A Case Study in Communicating Scientific Information*, 31 ENVIRONMENT: SCI. & POL’Y FOR SUSTAINABLE DEV. 10 (1989).

²⁴⁹ See *Miller v. Baker Implement Co.*, 439 F.3d 407 (8th Cir. 2006); *O’Conner v. Commonwealth Edison Co.*, 13 F.3d 1090 (7th Cir. 1994).

²⁵⁰ See, e.g., Greg Ryan, *5 Definite No-Nos for Daubert Motions*, LAW360 (April 9, 2013, 9:14 PM EDT), <https://www.law360.com/articles/431334/5-definite-no-nos-for-daubert-motions> (advising practitioners that the “strategy” of filing a gatekeeping motion “is not always wise, in large part because judges are quick to anger when they feel a motion isn’t legitimate or efficient”).

centuries, as the practice of specialized juries and court-appointed, non-partisan experts gave way to party-retained partisans.²⁵¹ By the middle of the 19th century, expert testimony had achieved its more or less contemporary form, but the law had developed no particularized rules governing its admissibility.²⁵² Mnookin applies Roscoe Pound's account of the "sporting theory of justice" to the 19th century evidentiary regime, under which putative expert testimony was freely admissible and the process of cross-examination served as the principal check against specious claims of epistemic authority.²⁵³ As long as the proposed expert's testimony was relevant and the expert was qualified, parties generally had a free hand to introduce and develop the testimony of experts as they saw fit.

By the end of the 19th century, the sporting theory had produced a crisis of confidence in the courts. The "rising tide" of scientific and technical cases during the Industrial Revolution increased the frequency with which expert witnesses were involved in litigation, and experts' status as partisan witnesses placed them in adversarial positions that undermined the public's confidence in scientific objectivity.²⁵⁴ "Such cases, where the court and the jury found themselves again and again in the paradoxical position of being expected to decide on issues about which they knew absolutely nothing except what the clearly partisan scientific experts had told them, appalled the courts."²⁵⁵ The public was also appalled. Mnookin recounts that by the late nineteenth century, "[e]xpert witnesses were denounced in legal journals and by the popular press. They were attacked for routinely contradicting one another, accused of confusing rather than aiding juries, and lambasted for being partisan 'hired guns,' paid by and thus partial to one party or the other."²⁵⁶ A new approach was needed, though it would not be developed for several decades.

2. *Frye v. United States* and Delegatory Gatekeeping

The D.C. Circuit's 1923 decision in *Frye v. United States* was an early effort to constrain the free-for-all sporting theory, and it remains influential.²⁵⁷ *Frye* involved an appeal from a

²⁵¹ See, e.g., Mnookin, *supra* note 233, at 767–70; TAL GOLAN, LAWS OF MEN AND LAWS OF NATURE: THE HISTORY OF SCIENTIFIC EXPERT TESTIMONY IN ENGLAND AND AMERICA 6–7, 18–22 (2007); Learned Hand, *Historical and Practical Considerations Regarding Expert Testimony*, 15 HARV. L. REV. 40, 40–41 (1901).

²⁵² GOLAN, *supra* note 251, at 110–23; Mnookin, *supra* note 233, at 769–70.

²⁵³ Jennifer L. Mnookin, *Expert Evidence, Partisanship, and Epistemic Competence*, 73 BROOK. L. REV. 1009, 1015 (2008); see Roscoe Pound, *The Causes of Popular Dissatisfaction with the Administration of Justice*, 14 AM. L. 445 (1906).

²⁵⁴ GOLAN, *supra* note 251, at 51; see *id.* at 51–106; cf. *Winans v. N.Y. & Erie R.R. Co.*, 62 U.S. 88, 101 (1858) ("[E]xperience has shown that opposite opinions of persons professing to be experts may be obtained to any amount.").

²⁵⁵ *Id.* at 88; see Mnookin, *supra* note 233, at 771–72 (surveying court decisions critical of expert witness testimony); Hand, *supra* note 251, at 54–55. This history, along with the century-long academic conversation surveyed in Part III(C), *infra*, stands in opposition to recent "debunking" arguments that the problem of epistemic competence is of recent origin. See Barbara Pfeffer Billauer, Daubert *Debunked: A History of Legal Retrogression and the Need to Redefine "Science" in Law*, 21 SUFFOLK J. TRIAL & APP. ADVOC. 1, 49–55 (2016). Billauer argues, on the basis of two cherry-picked appellate opinions and a string citation of unanalyzed jury decisions, that courts of the early twentieth century had no problem interpreting and applying expert scientific evidence. The authorities noted in this footnote, none of which Billauer cites, belie that claim.

²⁵⁶ Mnookin, *supra* note 233, at 771.

²⁵⁷ 293 F. 1013 (D.C. Cir. 1923).

conviction of second-degree murder. At trial, the defendant sought to introduce testimony concerning the results of a “systolic blood pressure” test, an early form of lie detector.²⁵⁸ The trial court granted the prosecution’s motion to exclude the evidence, and the D.C. Circuit affirmed that decision. The principles underlying scientific or technical evidence, the court held, “must be sufficiently established to have gained general acceptance” by the relevant scientific community in order to be admissible at trial.²⁵⁹ *Frye*’s “general acceptance” standard became the controlling test for the admissibility of scientific and technical evidence for much of the twentieth century, although in reality, the sporting theory remained the *de facto* standard at least until courts began to apply *Frye* more stringently in the 1970s.²⁶⁰

The *Frye* test delegates the question of reliability to the epistemic community of recognized experts. The court’s task consists only in identifying the relevant community and determining whether it generally accepts the methodology at issue. While *Frye* imposes a lower epistemic burden than the more demanding *Daubert* standard, it does nevertheless make several substantial demands of judges. Perhaps the knottiest problem posed by *Frye* is the definition of the relevant community: if the reliability inquiry is a matter of nose counting, whose noses are to be counted?²⁶¹ This is a problem of great practical import because domains or sub-disciplines often have disciplinary axioms and epistemic norms that lead them to view the reliability of a particular methodology quite differently. Closely related to the problem of identifying the relevant epistemic community is the problem of identifying its boundaries. Should the community be defined broadly or narrowly? As Cole and Edmond observe, “[c]ontestation over whether the [reference community] should be construed narrowly or broadly is endemic to a *Frye* analysis.... [N]arrow interpretations tend to favor proponents of contested evidence whereas broad interpretations tend to favor opponents and exclusion.”²⁶²

This ambiguity regarding the reference community highlights yet another epistemic challenge in the *Frye* standard, which is in the operationalization of the ambiguous phrase “general acceptance.” Assuming that the problem of defining the relevant epistemic community can be

²⁵⁸ *Id.* at 1013–14. For an engaging history of the development of the systolic blood pressure test by William Marston and its ultimate rejection by the D.C. Circuit in *Frye*, see Jill Lepore, *On Evidence: Proving Frye as a Matter of Law, Science, and History*, 124 YALE L.J. 1092 (2015), and JILL LEPORE, *THE SECRET HISTORY OF WONDER WOMAN* 72–78 (2014).

²⁵⁹ *Frye*, 293 F. at 1014.

²⁶⁰ Michael J. Saks, *Judging Admissibility*, 35 J. CORP. L. 135, 139 (2009); Mnookin, *supra* note 253, at 1016. The first federal appellate court decision to adopt the *Frye* test appears to have been the 5th Circuit’s decision in *Barrel of Fun, Inc. v. State Farm Fire & Cas. Co.*, 739 F.2d 1028, 1031 (5th Cir. 1984); see Michael H. Gottesman, *From Barefoot to Daubert to Joiner: Triple Play or Double Error?*, 40 ARIZ. L. REV. 753, 755 n.11 (1998). Indeed, some recent scholarship argues that courts maintained a *laissez-faire* attitude toward gatekeeping until the early 1990s. JACK FISHER, *SILICONE ON TRIAL: BREAST IMPLANTS AND THE POLITICS OF RISK* 222 (2015); see Billauer, *supra* note 255, at 26. An empirical study found, paradoxically, that “general acceptance” was used only rarely (5% of the sample cases) between 1980 and 1993, and became much more prominent *after* the *Daubert* decision. LLOYD DIXON & BRIAN GILL, *CHANGES IN THE STANDARDS FOR ADMITTING EXPERT EVIDENCE IN FEDERAL CIVIL CASES SINCE THE DAUBERT DECISION* 44 (2001).

²⁶¹ See Paul C. Giannelli, *The Admissibility of Novel Scientific Evidence: Frye v. United States, A Half-Century Later*, 80 COLUM. L. REV. 1197, 1208–10 (1980).

²⁶² Simon A. Cole & Gary Edmond, *Science without Precedent: The Impact of the National Research Council Report on the Admissibility and Use of Forensic Science Evidence in the United States*, 4 BRIT. J. AM. LEGAL STUD. 585, 606 (2015).

resolved, how “general” must the community’s acceptance be to establish the scientific reliability of the methodology at issue?²⁶³ A “general acceptance” threshold of, say, 90% of the reference community will prove quite conservative in practice, limiting admissibility to matters of near-unanimous consensus in the field and excluding much well-supported but nevertheless speculative scientific knowledge. In conjunction with the burden of proof, particularly in civil litigation, the effect of a high threshold for general acceptance will generally have an anti-plaintiff effect, excluding much evidence on which civil plaintiffs might rely to establish an element by a preponderance of the evidence.

Notwithstanding these difficulties, the *Frye* standard held sway over the law of expert witness admissibility in most states for much of the mid-twentieth century. It is still the law in some states today.²⁶⁴

3. FRE 702 and the *Daubert* Trilogy

In 1975, Congress implemented the FRE by statutory enactment.²⁶⁵ Rule 702 of the FRE, as originally adopted, stated that: “If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise.” In *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, the Supreme Court held that FRE 702 superseded the *Frye* test and that “general acceptance” was no longer a necessary or sufficient condition of admissibility, though it remains relevant.²⁶⁶ Under *Daubert*’s interpretation, courts themselves are to determine the scientific reliability of a proposed expert’s methodology by reference to such indicia of reliability as the methodology’s falsifiability, its known or potential error rate, its reliance on peer-reviewed publications, and, as one factor among the others, general acceptance by the scientific community.²⁶⁷ *Daubert* places a greater epistemic burden on judges tasked with determining the reliability of proposed expert testimony; indeed, Chief Justice Rehnquist complained in dissent that *Daubert* forces judges to become “amateur scientists,” though in reality the task is more akin to that of an amateur philosopher of science.²⁶⁸

²⁶³ See, e.g., Marc S. Klein, *Expert Testimony in Pharmaceutical Product Liability Actions*, 45 FOOD DRUG COSM. L.J. 393, 421–22 (1990); Pamela A. Wilk, *Expert Testimony on Rape Trauma Syndrome: Admissibility and Effective Use in Criminal Rape Prosecution*, 33 AM. U. L. REV. 417, 432 (1984); Giannelli, *supra* note 261, at 1210–11.

²⁶⁴ See *infra* note 269.

²⁶⁵ Pub. L. No. 93–595 (1975).

²⁶⁶ 509 U.S. 579 (1993).

²⁶⁷ *Id.* at 593–94. A decade earlier, the Court had stated that the FRE “anticipate that relevant, unprivileged [expert] evidence should be admitted and its weight left to the factfinder.” *Barefoot v. Estelle*, 463 U.S. 880, 898 (1983). *Daubert* made no reference to *Barefoot* and offered no explanation for the apparent contradiction between the gatekeeping regime it read into FRE 702 and the sporting theory the Court had seemingly approved the earlier decision. See Gottesman, *supra* note 260, at 755–56; Paul C. Giannelli, *Daubert: Interpreting the Federal Rules of Evidence Scientific Evidence after the Death of Frye*, 15 CARDOZO L. REV. 1999, 2020–21 (1993). A likely explanation is that the problem of “junk science” in litigation had become more salient in the decade between *Barefoot* and *Daubert*. See Gottesman, *supra* note 260, at 756–58; PETER W. HUBER, *GALILEO’S REVENGE: JUNK SCIENCE IN THE COURTROOM* (1993).

²⁶⁸ *Daubert*, 509 U.S. at 601 (Rehnquist, C.J., dissenting); see David S. Caudill & Richard E. Redding, *Junk Philosophy of Science?: The Paradox of Expertise and Interdisciplinarity*, 57 WASH. & LEE L. REV. 685 (2000);

Chief Justice Rehnquist’s reservations notwithstanding, the *Daubert* majority’s decision remains the controlling interpretation of Rule 702, and its approach has been adopted, at least partially, by most state judiciaries.²⁶⁹ In two subsequent cases, the Supreme Court clarified the scope of the *Daubert* standard. In *General Electric Co. v. Joiner*, the Court held that the *Daubert* standard applies to a proposed expert’s methods and conclusions, and that a district court’s admissibility decision is reviewable for abuse of discretion.²⁷⁰ In *Kumho Tire Co. v. Carmichael*, the Court held that the *Daubert* standard applies to non-scientific “technical” expertise as well as “scientific” expertise—in other words, to all testimony sought to be introduced under FRE 702.²⁷¹ *Kumho Tire* also reiterated that the reliability inquiry is a “flexible” one wherein the individual factors articulated in *Daubert* “may or may not be pertinent” to a particular type of putative expertise.²⁷²

Daubert has been criticized from a variety of perspectives. Scholars have argued that it relies on an overly narrow and perhaps incoherent conception of scientific knowledge,²⁷³ that it imposes duties on courts that they lack epistemic competence to perform,²⁷⁴ and that, in practice, *Daubert* has not changed courts’ decision making process with respect to the admissibility of expert

Brewer, *supra* note 233, at 1547 (“[I]n interpreting Rule 702’s reference to ‘scientific knowledge,’ the Court set itself the paradigmatically philosophical task of exploring the criteria of the concept of science.”).

The distinction between the scientist and the philosopher of science is summed up by Richard Feynman’s possibly apocryphal remark that “[t]he philosophy of science is as useful to scientists as ornithology is to birds.” See Ben Trubody, *Richard Feynman’s Philosophy of Science*, PHILOSOPHY NOW (2016), https://philosophynow.org/issues/114/Richard_Feynmans_Philosophy_of_Science. Though often construed as disparaging to philosophers of science, Feynman’s analogy is apt; what he perhaps failed to consider is that, if one wants to know whether a particular specimen is a bird, one is wiser to consult an ornithologist than a cockatiel.²⁶⁹ In 2012, Faigman et al. counted 28 states adopting *Daubert*, six states and the District of Columbia following a state law approximation of *Daubert*, nine states rejecting *Daubert*, and eight states following a mixed approach. DAVID L. FAIGMAN ET AL., MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY § 4:21 (2012). The Supreme Court of California’s decision in *Sargon Enterprises v. University of Southern California*, 55 Cal. 4th 747, 772 n.6 (2012) appears to have adopted a *Daubert*-like standard for California, though the decision also explicitly reserved a role for the state’s previous admissibility standard applying *Frye* and *People v. Kelly*, 17 Cal. 3d 24 (1976). See David L. Faigman & Edward J. Imwinkelried, *Wading into the Daubert Tide: Sargon Enterprises, Inc. v. University of Southern California*, 64 HASTINGS L.J. 1665 (2012). In *Murray v. Motorola*, 147 A.3d 751 (D.C. App. 2016), the D.C. Court of Appeals adopted the *Daubert* standard.²⁷⁰ 522 U.S. 136 (1997).

²⁷¹ 526 U.S. 137 (1999); see Margaret Berger, *The Supreme Court’s Trilogy on the Admissibility of Expert Testimony*, in FEDERAL JUDICIAL CENTER, REFERENCE MANUAL ON SCIENTIFIC EVIDENCE (3d ed. 2011).

²⁷² 526 U.S. at 150.

²⁷³ Several commentators point out that *Daubert* indiscriminately relied upon on Popper’s falsificationist conception of scientific knowledge, Hempel’s logical empiricism, and the views of social constructivist sociologists without commenting upon or evidently recognizing the incompatibility of these accounts of the nature of scientific knowledge. See, e.g., Barbara Pfeffer Billauer, *Admissibility of Scientific Evidence under Daubert: The Fatal Flaws of Falsifiability and Falsification*, 22 B.U. J. SCI. & TECH. L. 21 (2016); Susan Haack, *An Epistemologist in the Bramble Bush: At the Supreme Court with Mr. Joiner*, 26 J. HEALTH POL. POL’Y & L. 217, 232 (2001) (“[I]f the reference to Popper is a *faux pas*, running Popper together with Hempel... is a *faux pas de deux*.”); SHEILA JASANOFF, *SCIENCE AT THE BAR: LAW, SCIENCE, AND TECHNOLOGY IN AMERICA* 63 (1997).

²⁷⁴ See, e.g., Brewer, *supra* note 233; Mnookin, *supra* note 233.

testimony.²⁷⁵ As we shall see, many of those criticisms are empirically well-founded.²⁷⁶ Nevertheless, *Daubert* remains firmly established as the dominant gatekeeping paradigm at the federal level and in most state courts.²⁷⁷

C. Factfinding

1. What is a Legal “Fact”?

Before examining the doctrinal rules of legal factfinding, we should first consider the conceptually prior question of what constitutes a legal “fact” in the first place. This turns out to be a trickier proposition than it would seem because of the diversity of propositions encompassed, often without differentiation, within courts’ use of the term “fact.” Nevertheless, a workable typology can be sketched from the existing literature.

In the first instance, a fact is to be defined by what it is not. The law has long distinguished “facts” from “opinions,” though the practical difficulty of implementing that distinction compelled some judges to acknowledge that it “is at best only one of degree.”²⁷⁸ At common law, lay witnesses were generally forbidden to testify about their opinions or characterizations and were limited to testifying only as to the bare facts of the relevant events.²⁷⁹ Courts eventually found the distinction too difficult to maintain, and it is largely abandoned by the modern law of evidence,²⁸⁰ though it remains relevant in some areas of substantive law, particularly defamation.²⁸¹ Under the modern law, lay witnesses may offer opinion testimony that is “(a) rationally based on the witness’s perception; (b) helpful to clearly understanding the witness’s testimony or to determining a fact in issue; and (c) not based on scientific, technical, or other specialized knowledge within the scope of [FRE] 702.”²⁸²

Within the category of “facts,” further distinctions are necessary. At the highest level, courts and scholars distinguish between “legislative” facts, which “have relevance to legal reasoning and

²⁷⁵ See, e.g., Billauer, *supra* note 255; A. Leah Vickers, *Daubert, Critique and Interpretation: What Empirical Studies Tell Us about the Application of Daubert*, 40 U.S.F. L. REV. 109 (2005).

²⁷⁶ See *infra* Part III(A)(2).

²⁷⁷ See *supra* note 269.

²⁷⁸ *C. R. Co. of New Jersey v. Monahan*, 11 F.2d 212, 214 (2d Cir. 1926) (L. Hand, J.). The legal distinction is ultimately grounded in Enlightenment notions of the immediacy (and thus, reliability) of sense impressions, as distinct from the more attenuated processes by which inferences are drawn. See Edward J. Imwinkelried, *The Next Step After Daubert: Developing A Similarly Epistemological Approach to Ensuring the Reliability of Nonscientific Expert Testimony*, 15 CARDOZO L. REV. 2271, 2275–76 (1994) (“In short, the common law restrictions on opinion testimony are traceable to Lockean epistemology.”).

²⁷⁹ See 29 CHARLES ALAN WRIGHT ET AL., *FEDERAL PRACTICE & PROCEDURE: EVIDENCE* § 6251 (2d ed.) (19th century “witnesses had to limit their testimony just to the facts they perceived and avoid opinions or inferences based on those facts”).

²⁸⁰ For example, in *Beech Aircraft Corp. v. Rainey*, 488 U.S. 153 (1988), the Supreme Court eschewed “arbitrary distinction[s] between ‘fact’ and ‘opinion’” to hold “evaluative reports”—reports stating not only bare facts but also the author’s conclusions drawn from those facts—admissible under FRE 803(8)(C)’s (now FRE 803(A)(iii)) hearsay exception for “factual findings resulting from an investigation made pursuant to authority granted by law.”

²⁸¹ See generally Eileen Finan, *The Fact-Opinion Determination in Defamation*, 88 COLUM. L. REV. 809 (1988).

²⁸² FRE 701; see FRE 701, Advisory Committee’s Notes to 1972 Proposed Rule (“[N]ecessity as a standard for permitting opinions and conclusions has proved too elusive and too unadaptable to particular situations for purposes of satisfactory judicial administration.”)

the lawmaking process, whether in the formulation of a legal principle of ruling by a judge or court or in the enactment of a legislative body,” and “adjudicative” facts, which “are simply the facts of the particular case.”²⁸³ In jury trials, juries are permitted to make conclusive findings as to the adjudicative facts of the case, but judges can take binding judicial notice of legislative facts concerning propositions “unrelated to the activities of the parties to [the instant] litigation.”²⁸⁴ In bench trials, the trial judge makes determinations of both legislative and adjudicative facts, often without clearly distinguishing between the two; nevertheless, at the conceptual level, the law’s references to the “finder of fact” are primarily to the “finder of *adjudicative* fact.”

Adjudicative facts themselves exist in gradations that partly track the fact/opinion distinction noted above.²⁸⁵ Within the category of adjudicative fact, courts and scholars have distinguished “historical” facts, “which address ‘who did what, when and where, and whether with or without a defined state of mind’” from “evaluative” facts, “which are addressed to question ‘whether what was done violated a legal standard for evaluating conduct.’”²⁸⁶ Although FRE 701 and 702 largely elide the distinction between historical and evaluative facts for purposes of admissibility, some distinctions still exist in, for example, the scope of deference to which findings of fact are entitled in sufficiency review.²⁸⁷ Scientific expert testimony concerning the application of scientific methodologies to specific empirical questions of legal interest is historical, though examples of scientific experts offering evaluative testimony (for example, a medical doctor testifying as an expert about whether the defendant in a medical malpractice case acted with the requisite standard of care) are common. Moreover, because FRE 704 permits, in most cases, expert witnesses to offer opinions as to ultimate issues, the historical and evaluative components of a particular expert’s testimony may be intertwined or even indistinguishable from one another.

²⁸³ Kenneth Culp Davis, *An Approach to Problems of Evidence in the Administrative Process*, 55 HARV. L. REV. 364, 402–03 (1942).

²⁸⁴ See, e.g., *U.S. v. Gould*, 536 F.2d 216, 221 (8th Cir. 1976) (trial court took judicial notice of the legislative fact that cocaine hydrochloride is derived from coca leaves and did not err in declining to instruct jury that it could disregard that judicially noticed fact).

²⁸⁵ Legislative facts can also be further typologized. For example, Robert Keeton identified a category of legislative facts, labeled premise facts, that “explicitly or implicitly serve as premises to decide issues of law.” Robert E. Keeton, *Legislative Facts and Similar Things: Deciding Disputed Premise Facts*, 73 MINN. L. REV. 1, 8–9 (1988). Because the primary concern of this chapter is with epistemic competence in deciding scientific adjudicative facts, we need not delve further into typologies of legislative facts.

²⁸⁶ Jeffrey C. Dobbins, *New Evidence on Appeal*, 96 MINN. L. REV. 2016, 2042 (2012). Again, this distinction sometimes blurs with the distinction between fact and opinion, as in *Rainey*, where the Court considered the admissibility of an “evaluative” reports drawing conclusions as to the cause of an aircraft accident under the fact/opinion rubric. *Beech Aircraft Corp. v. Rainey*, 488 U.S. 153 (1988); see *supra* note 280.

²⁸⁷ See, e.g., Andrea Roth, *Defying DNA: Rethinking the Role of the Jury in an Age of Scientific Proof of Innocence*, 93 B.U. L. REV. 1643, 1696 (2013) (“Judges should recognize on sufficiency review that jurors might have a different view of apparently ‘definitive’ evidence or the plausibility of a theory, especially where the ‘fact’ to be determined is an evaluative one... rather than a historical one.”).

2. Rules of Legal Factfinding: The Sporting Theory Lives On

As noted above, the sporting theory continues to play a prominent role in the evaluation of expert evidence after the evidence has passed the expert qualification and gatekeeping stages.²⁸⁸ When evidence has been deemed admissible and is introduced at trial, the legal system relies on the adversarial tools of common-law adjudication—primarily cross-examination, the introduction of competing evidence, and the arguments of counsel—to assist the finder of fact in determining the facts of the case.²⁸⁹ At this stage, only a few distinctions exist between the law’s treatment of expert and non-expert testimony.

Most of the FRE apply with equal force to expert and non-expert testimony. Expert testimony must be relevant,²⁹⁰ and its probative value must not be outweighed by its tendency to, among other things, cause unfair prejudice, confuse the issues, mislead the jury, or cause undue delay.²⁹¹ The hearsay rule is slightly relaxed in the context of expert testimony, in that experts may consider inadmissible evidence in forming the basis of their opinion, and such evidence may be disclosed to the jury if its value in assisting the jury with understanding the expert’s opinion “substantially outweighs” its prejudicial effect.²⁹² When the expert testimony has passed gatekeeping review, the only additional expert-specific restriction is FRE 704(b), which prohibits experts from providing an opinion as to whether a criminal defendant possessed a mental state that constitutes an element of a charged crime or defense.

The only constraints that courts place on jurors’ evaluation of admissible evidence come through limiting instructions, whereby jurors are instructed to consider evidence only for a limited purpose or to avoid drawing certain inferences.²⁹³ In the context of expert testimony, otherwise inadmissible evidence introduced pursuant to FRE 703 is usually accompanied by a limiting instruction to the effect that it is introduced only to help the jury evaluate the expert’s testimony.²⁹⁴

III. Intellectual Due Process and the Intractable Problem of Epistemic Competence

The observation that courts are generally ineffective at interpreting and applying scientific expert testimony is not new; it has been a recurring theme for decades. Jennifer Mnookin observes that “a century’s worth of writing about expert evidence circles around the same themes and consistently reaches the same conclusion: that the use of party-selected expert witnesses in an

²⁸⁸ See *supra* Part II(B)(1).

²⁸⁹ See Jack Weinstein, *Rule 702 of the Federal Rules of Evidence is Sound; It Should Not Be Amended*, 138 F.R.D. 631, 631 (1991) (“The [FRE] were designed to depend primarily upon lawyer adversaries and sensible triers of fact to evaluate conflicts”).

²⁹⁰ FRE 402; *cf.* FRE 702(a) (expert evidence must “help the trier of fact to understand the evidence or to determine a fact in issue”).

²⁹¹ FRE 403.

²⁹² FRE 703.

²⁹³ See Joel D. Lieberman & Jamie Arndt, *Understanding the Limits of Limiting Instructions: Social Psychological Explanations for the Failures of Instructions to Disregard Pretrial Publicity and Other Inadmissible Evidence*, 6 PSYCHOL. PUB. POL’Y & L. 677, 677–78 (2006).

²⁹⁴ See, e.g., *U.S. v. W.R. Grace*, 504 F.3d 745, 759 n.7 (9th Cir. 2007); FRE 703, Advisory Committee’s Notes to 2000 Amendment. On the utility of limiting instructions, see *infra* note 184 and accompanying text.

adversarial legal system is fraught with difficulties.”²⁹⁵ This section will begin with the normative foundation of the problem: the claim that due process includes an “intellectual” component that requires a minimum rationality in judicial engagement with expert evidence. It will then survey the theoretical and empirical literature describing the problems of epistemic competence in gatekeeping and factfinding,²⁹⁶ followed by a discussion of the past century’s academic conversation and reform proposals.

A. The Normative Stakes of Epistemic Competence

Why should we be concerned if courts are incapable of reliably applying scientific knowledge to the resolution of legal disputes? In a landmark article, Scott Brewer argued that the problem of epistemic competence threatens the legitimacy of the judicial process itself, a claim captured in the concept of *intellectual due process*.²⁹⁷

The “central idea” of intellectual due process “is that certain rule-of-law values require epistemic nonarbitrariness in factfinding reasoning, as in other types of reasoning.”²⁹⁸ Those values condition the legitimacy of a judicial outcome on the integrity of the process by which it was reached; *intellectual* rule-of-law values imply that “epistemic nonarbitrariness in the process of ‘finding’ scientifically discerned facts is a necessary condition of the practical legitimacy of a decision that relies on that factfinding.”²⁹⁹ If this is true, then decisions made on the basis of arbitrary factual findings lack normative legitimacy. Just as we would reject as illegitimate a verdict in which the court flipped a coin to decide whether the light was red or green, we should reject verdicts in which the factfinder lacks a warranted basis on which to discern the true facts and must either guess or, effectively the same thing, apply unreliable heuristics to adjudicate esoteric expert disagreements. This is a matter of justification rather than accuracy; although a fair coin flip will coincide with the color of the light about half the time,³⁰⁰ we do not deem this an epistemically warranted process where the correspondence between the finding of fact and the external world is only “accidental[] and arbitrar[y].”³⁰¹ For the same reasons, we should reject as illegitimate the outcome of a process in which the court lacked competence to reliably determine the scientific facts found, regardless of the substantive correctness of that outcome.³⁰²

“Intellectual due process” has the ring of Ivory Tower fastidiousness, a concern for the niceties of judicial reasoning that may sound quaint in comparison to more urgent problems of access to,

²⁹⁵ Mnookin, *supra* note 253, at 1010; cf. David L. Faigman & Claire Lesikar, *Organized Common Sense: Some Lessons from Judge Jack Weinstein’s Uncommonly Sensible Approach to Expert Evidence*, 64 DEPAUL L. REV. 421, 434 (2014) (“[T]he general state of affairs with regard to the law’s understanding of the methods of science creates substantial obstacles to the coherent use of empirical knowledge gleaned from complex research studies.”).

²⁹⁶ I omit a discussion of expert qualification because no empirical studies of judges’ competence at distinguishing qualified from unqualified experts has been undertaken, though the question of qualification is occasionally examined in studies of judicial gatekeeping.

²⁹⁷ Brewer, *supra* note 233, at 1672–77.

²⁹⁸ *Id.* at 1672.

²⁹⁹ *Id.* (emphasis omitted).

³⁰⁰ Assuming, simplistically, that the light alternates between green and red at equal intervals, and ignoring the time spent on yellow.

³⁰¹ *Id.* at 1677.

³⁰² See *id.* at 1672–73 (citing JOHN RAWLS, A THEORY OF JUSTICE 238–39 (1971)).

and quality of, legal justice. But beneath Brewer's esoteric jargon is a problem of immediate consequence: if courts aren't able to understand and rationally apply scientific evidence to the resolution of legal disputes, then we have no reason to believe that cases are being decided correctly. The ability of judges and jurors to engage rationally with scientific expertise is thus a matter of grave concern to criminal defendants facing a loss of liberty on the basis of potentially specious methods of forensic identification,³⁰³ toxic tort plaintiffs seeking compensation for injuries caused by the defendant's negligence,³⁰⁴ and civil defendants facing potentially enormous civil verdicts. Epistemic incompetence also potentially exacerbates the well documented racial, gender, and other biases in legal decision making.³⁰⁵ This is so because decision makers who lack the ability to engage with the substance of an expert disagreement must fall back on heuristic shortcuts to reach a decision; in so doing, they open the door for implicit (or at times explicit) biases to affect the process.³⁰⁶ Thus, the capacity of the legal system to engage effectively with the substance of scientific evidence is a matter of great practical import.

B. Epistemological Foundations of Epistemic Competence

Both Brewer's classical epistemological account of the problem of epistemic competence as well as recent work in the sociology of scientific knowledge on the ontology of scientific expertise arrive via distinct paths at the same conclusion: in order to make warranted judgements in matters involving scientific expertise, legal decision makers themselves must possess expertise in the relevant scientific domain. This section will briefly trace the paths by which these disciplines converge.

1. Brewer's Classical Epistemological Account

Brewer undertakes a detailed epistemological analysis of what the epistemological literature calls the "novice/2-expert" problem.³⁰⁷ He asks whether, and under what circumstances, "practical" reasoners like judges and juries can arrive at justified belief by deferring to the testimony of a "theoretical" reasoner with expertise in a scientific field.³⁰⁸ The problem is compounded by competition between adversarial experts—how can the judge or jury, as the least informed member of the triad, hope to make an epistemically justified choice between the views of the two experts? They cannot do so on the basis of substantive evaluations of the experts' positions—"ex hypothesi," Brewer notes, "nonexpert factfinders... cannot be convinced by what Aristotle called

³⁰³ See, e.g., Jennifer L. Mnookin et al., *The Need for a Research Culture in the Forensic Sciences*, 58 UCLA L. REV. 725 (2010); Michael J. Saks & David L. Faigman, *Failed Forensics: How Forensic Science Lost Its Way and How It Might Yet Find It*, 4 ANN. REV. L. & SOC. SCI. 149 (2008).

³⁰⁴ See, e.g., *Gen. Elec. Co. v. Joiner*, 522 U.S. 136 (1997); see also JOSEPH SANDERS, *BENEDICTIN ON TRIAL: A STUDY OF MASS TORT LITIGATION* (1998).

³⁰⁵ See, e.g., J.D. Levinson et al., *Implicit Racial Bias: A Social Science Overview*, in *IMPLICIT RACIAL BIAS ACROSS THE LAW* (J.D. Levinson & R.J. Smith eds., 2011); A.G. Greenwald & L.H. Krieger, *Implicit Bias: Scientific Foundations*, 94 CAL. L. REV. 945 (2006).

³⁰⁶ See *infra* Part III(C)(2) (surveying empirical literature).

³⁰⁷ Brewer, *supra* note 233; cf. Melissa Lane, *When the Experts Are Uncertain: Scientific Knowledge and the Ethics of Democratic Judgment*, 11 EPISTEME 97, 98 (2014); Alvin I. Goldman, *Experts: Which Ones Should You Trust?*, 63 PHIL. & PHENOM. RES. 85, 90 (2001).

³⁰⁸ Brewer, *supra* note 233, at 1593–96.

the reason (*logos*) behind an expert judgment because they cannot understand those substantive arguments.”³⁰⁹ Non-experts are necessarily confined to alternative methods of judgment.

Brewer considers four approaches that non-expert reasoners may take to make judgments on the basis of expert testimony, but ultimately finds that none of these approaches is sufficient to sustain a warranted judgment about the scientific domain.³¹⁰ The first of these is simply the direct second-guessing of an expert’s judgment by the lay judge. Brewer quickly discounts this “obviously unsatisfactory solution” while noting the irony that *Daubert* effectively demands such second-guessing by federal gatekeepers.³¹¹ The remaining three methods rely on proxies or “second-order” characteristics³¹² in place of substantive engagement with the scientific question. Brewer considers 1) the use of general canons of rationality; 2) evaluation of the expert’s demeanor; and 3) reliance on the expert’s credentials as an indication of genuine expertise. Canons of rationality, such as the avoidance of self-contradiction and the distinction between causation and nonprevention, are generally inadequate because “only a relatively small percentage” of failures of general rationality will be sufficiently obvious for a layperson to identify.³¹³ Demeanor is simply arbitrary; “we have no reason to believe that an expert witness’s persuasive demeanor has any particular connection to the epistemic warrant for what the witness asserts.”³¹⁴ Finally, reliance on an expert’s credentials raises the problems of *regress* and *underdetermination*. The regress problem is simply the problem of how a non-expert could identify the indicia of expertise. The obvious answer—credentials or other recognition by some acknowledged group of experts—seems question-begging: how shall that group itself be identified, other than by reference to some further group of meta-experts, and so on *ad infinitum*?³¹⁵ Even if the regress problem were solved, an additional issue is underdetermination—it is often the case that opposing experts’ credentials are more or less evenly matched, in which case this proxy cannot assist the novice in selecting the expert to whom to defer.³¹⁶

³⁰⁹ *Id.* at 1624.

³¹⁰ *Id.* at 1616–30.

³¹¹ *Id.* at 1619–20.

³¹² See Lane, *supra* note 68, at 98.

³¹³ Brewer, *supra* note 233, at 1620–21. For example, failures in rationality in an expert’s treatment of complex statistical evidence are unlikely to be apparent to the factfinder. *Id.*

³¹⁴ *Id.* at 1623.

³¹⁵ *Id.*

³¹⁶ *Id.* at 1630. Underdetermination is the more serious difficulty; regress is amenable to a solution that might be dissatisfactory to an epistemological purist, but works well enough in practice. The “sociologically minded” rely on the “conventional markers of expertise—prestigious journals, university affiliations, advanced degrees, and so on—” to break the regress. Simon A. Cole, *Don’t Shoot the Messenger by One of the Messengers: A Response to Merlino et al.*, 45 TULSA L. REV. 111, 113 (2009); see also Charlie Stiernberg, *Science, Patent Law, and Epistemic Legitimacy: An Empirical Study of Technically Trained Federal Circuit Judges*, 27 HARV. J. L. & TECH. 279, 297 n.119 (2013) (“credentials may serve as a reasonable basis for the second-order decisions regarding which individuals should be appointed to make first-order decisions (regarding competing scientific expert claims)”); Arti K. Rai, *Specialized Trial Courts: Concentrating Expertise on Fact*, 17 BERKELEY TECH. L.J. 877, 894 (2002). Brewer emphasizes underdetermination over regress—it is when the “underdetermination condition” is satisfied that non-expert judgment is effectively arbitrary. Brewer, *supra* note 233, at 1630–34, 1671.

All of this leads Brewer to a “moderately skeptical” conclusion: “when faced with competing, sincere, and roughly equally well-credentialed experts... a nonexpert will on average do no better in selecting which scientific expert to believe than one would by *tossing a coin*.”³¹⁷ In such circumstances, a judge who lacks substantive expertise in the scientific domain *cannot* reach a non-arbitrary judgment about epistemic deference.

Having diagnosed the source of the problem, Brewer offers a deceptively simple solution. If warranted judgments about matters of scientific fact can be made only by individuals with expertise in the scientific domain, then we should ensure that legal decision makers possess scientific expertise. Brewer proposes a “two-hat” model of adjudication, whereby “one and the same decisionmaker has both legal legitimacy... and epistemic competence with the basic formal tools of scientific analysis.”³¹⁸ Only by placing legal authority and epistemic competence in the same decision maker, he argues, can legal decisions satisfy the demand of intellectual due process.³¹⁹

2. Sociological Ontology of Scientific Expertise

What is expertise? What does it mean to be an expert? How can the existence of expertise be reconciled with the social component of scientific consensus building and our normative commitment to popular self-government? In a book-length treatment of the subject, Collins and Evans produced a typology of expertise and examined the gradations and functions of each type.³²⁰ Their study reveals certain necessary conditions for the acquisition and application of

³¹⁷ *Id.* at 1670–71.

³¹⁸ *Id.* at 1677.

³¹⁹ *Id.* at 1677–78. We will return to the two-hat model and its failure to resolve the problem of epistemic competence in Part IV(A).

³²⁰ COLLINS & EVANS, *supra* note 239. This project is in furtherance of what Collins and Evans describe as the “third wave” of science studies. See Harry Collins & Robert Evans, *The Third Wave of Science Studies: Studies of Expertise and Experience*, 32 SOC. STUD. SCI. 235 (2002) [hereinafter Collins & Evans, *Third Wave*]. The first wave crested during the 1940s through the early 1960s and is best characterized by the work of Robert Merton. See generally ROBERT K. MERTON, *THE SOCIOLOGY OF SCIENCE* (Norman W. Storer ed. 1973); COLLINS, *supra* note 239, at 1–3; COLLINS & EVANS, *supra* note 239, at 143–45; Collins & Evans, *Third Wave* at 237–38. The first wave imbibed the optimism of the Atomic Age; it accepted more or less uncritically scientific positivism and scientists’ claims to privileged access to truth. *Id.* at 239; COLLINS & EVANS, *supra* note 239, at 144–45. The result was a top-down model of epistemic authority in which the social contingency of scientific consensus building was ignored and scientific hegemony over questions of technical policy went unquestioned. Collins & Evans, *Third Wave* at 239. The second wave began, roughly, with the publication of Thomas Kuhn’s *The Structure of Scientific Revolutions* (1962) and is best characterized by that work. It emphasized the contingency of scientific consensus building and the social construction of scientific facts “through continual negotiation and renegotiation among relevant bodies of scientists.” Sheila Jasanoff, *What Judges Should Know About the Sociology of Science*, 77 JUDICATURE 77, 78 (1993). The second wave opened up the social dynamics of constructed scientific consensus, denied scientists’ epistemic privilege, and emphasized bottom-up forms of knowledge and expertise. See, e.g., Brian Wynne, *May the Sheep Safely Graze? A Reflexive View of the Expert-Lay Knowledge Divide*, in RISK, ENVIRONMENT AND MODERNITY: TOWARDS A NEW ECOLOGY (Scott Lash, Bronislaw Szerszynski, & Brian Wynne eds. 1996); Wynne, *supra* note 248.

The second wave punctured the myth of infallibility around science and deflated scientists’ claims to unique epistemic authority. But by the early 2000s, some second wave theorists grew concerned that the work had moved so far in the direction of demystifying science that no space remained for epistemic differentiation of any sort. See, e.g., Bruno Latour, *Why Has Critique Run out of Steam? From Matters of Fact to Matters of Concern*, 30 CRITICAL

expertise that reinforce Brewer's epistemological conclusions. Collins and Evans conclude, like Brewer, that individuals can reliably evaluate claims to scientific expertise only when they themselves possess substantive expertise in the scientific domain.

Collins and Evans identify three broad categories of expertise: *ubiquitous expertise*, which consists of the specialized skills, such as native language fluency, possessed by nearly all members of a society; *specialized expertise*, which refers to substantive expertise in esoteric areas possessed by only a relative few, including expertise in the scientific domains;³²¹ and *meta-expertise*, which refers to the ability to distinguish genuine from specious claims of specialized expertise.³²² Ubiquitous and specialized expertise require a form of "tacit knowledge," or "[t]he deep understanding one can only gain through social immersion in groups who possess it."³²³ Specialized tacit knowledge, and therefore specialized expertise, can be obtained only through social immersion in the epistemic community of experts; it cannot be achieved from a review of the domain's primary literature alone.³²⁴

Reliable application of meta-expertise also requires specialist tacit knowledge. Collins and Evans distinguish between *internal* and *external* meta-expertise, the distinction turning on whether the judge possesses expertise in the domain.³²⁵ A judge applying external meta-expertise must rely on the "social discrimination... one gains in a democratic society as one learns to choose between politicians, salespersons, service providers, and so forth" to individuals claiming scientific or technical expertise.³²⁶ This involves the application of social understanding to evaluate whether the putative expert "appears to have the appropriate scientific demeanor and/or the appropriate location within the social networks of scientists and/or not too much in the way of a political and financial interest in the claim."³²⁷ This social understanding is comparable to Brewer's "other indicia of expertise,"³²⁸ Lane's "second order criteria,"³²⁹ and the heuristic

INQUIRY 225 (2004). In inaugurating the third wave of science studies, Collins and Evans lamented that "[b]y emphasizing the ways in which scientific knowledge is like other forms of knowledge, sociologists have become uncertain about how to speak about what makes it different; in much the same way, they have become unable to distinguish between experts and non-experts." Collins & Evans, *Third Wave* at 239. The goal of the third wave was to bring the insights of both previous waves together: "to treat expertise as 'real,' and develop a 'normative theory of expertise.'" *Id.* at 237. The third wave would reclaim the conceptual space for epistemic authority that was diminished by the second wave's emphasis on social construction and demystification, but would do so without succumbing to the first wave's rigid positivism. See COLLINS & EVANS, *supra* note 239, at 15.

³²¹ *Id.* at 15–18.

³²² *Id.* at 45.

³²³ *Id.* at 6; see *id.* at 13 (significance of tacit knowledge for the development of ubiquitous expertise).

³²⁴ *Id.* at 14. Primary source knowledge is insufficient to bestow genuine expertise, according to Collins and Evans, because specialist tacit knowledge, gained through social immersion, is necessary to interpret the primary literature *as an expert*. For example, expert communities grant different weight to primary source literature with similar indicia of reliability based on tacit understandings of the author's reliability—even studies published in the same prestigious journals may be considered more or less reliable by the epistemic community based on the author's reputation and credibility within the community of experts. *Id.* at 20–22.

³²⁵ *Id.* at 45.

³²⁶ *Id.* at 15; see *id.* at 45, 69.

³²⁷ *Id.* at 45.

³²⁸ Brewer, *supra* note 233, at 1539.

³²⁹ Lane, *supra* note 68, at 97–98.

thinking discussed in the psychological literature,³³⁰ and is subject to the same limitations.³³¹ Internal meta-expertise, by contrast, is more reliable insofar as it is “based on possessing one level or another of the expertise being judged.”³³² The internal meta-expert can engage directly with the substance of the expert claim; she need not rely on proxies or heuristics. Thus we reach Brewer’s conclusion via another path: in attempting to distinguish between competing claims to scientific expertise, the non-expert must necessarily rely on loose proxies for substantive expertise that are imprecise at best, and perpetuate stereotypes and incentivize bias in the selection of partisan experts and the presentation of expert testimony at worst. Only a judge with substantive expertise in the relevant scientific domain can reliably distinguish genuine from specious claims of expertise.³³³

C. Empirical Studies of Epistemic Competence

Theoretical scholars disagree among themselves about the extent to which non-expert judges and juries possess competence to make warranted judgments concerning esoteric matters of scientific fact on the basis of the adversarial presentation of partisan expert testimony.³³⁴ The more empirically oriented will prefer a data-based approach to the dispute. This section provides an overview of the empirical literature on courts’ engagement with expert evidence, demonstrating that courts indeed struggle both as gatekeepers and factfinders where scientific expertise is involved.

1. Gatekeeping

Daubert inspired many studies assessing the effects of the decision and judges’ ability to perform the gatekeeping task reliably. The results of these studies are varied and to some extent conflicting, but taken as a whole, they support the conclusion that judges generally cannot apply the *Daubert* test with a level of competence necessary to satisfy intellectual due process. Three major themes stand out from the empirical literature on gatekeeping: 1) the adoption of *Daubert* most likely produced no long-term change in admission rates, though it did reverse a short-term uptick in the admission of questionable expert testimony that was underway in the early 1990s; 2) *Daubert* increased courts’ and parties’ attention to the issue of reliability; and 3) courts are generally incapable of applying the *Daubert* factors reliably, and often do not apply them at all when ruling on motions to exclude expert evidence.

Perhaps the most surprising result of the empirical studies, given the endless ink that has been spilled in debates between advocates of the *Frye* and *Daubert* standards, is that the *Daubert* decision appears to have made little long-term difference in rates of admissibility of scientific evidence. This statement requires a bit of qualification, but appears to hold true at least on

³³⁰ See *infra* notes 370–371 and accompanying text.

³³¹ COLLINS & EVANS, *supra* note 239, at 51 (External meta-expertise “is very unreliable because of the temptation to read too much into stereotypical appearances and stereotyped behavior.”).

³³² *Id.* at 15.

³³³ *Id.* at 45.

³³⁴ On the skeptical side, see, e.g., Brewer, *supra* note 233, at 1679–80. For more optimistic assessments of judicial competence, see Lane, *supra* note 68; Elizabeth Anderson, *Democracy, Public Policy, and Lay Assessments of Scientific Testimony*, 8 EPISTEME 144, 146–51 (2011); John Monahan & Laurens Walker, *Social Authority: Obtaining, Evaluating, and Establishing Social Science in Law*, 134 PENN. L.REV. 477, 508–12 (1986).

average over the long term. In a comprehensive study sponsored by the RAND Institute for Civil Justice, Dixon and Gill examined 399 decisions on motions to exclude expert evidence in civil cases between 1980 and 1999.³³⁵ They found that in the immediate aftermath of *Daubert*, from 1993 through 1997, rates of exclusion of expert witness testimony increased, and then began to decline.³³⁶ Billauer, however, places this upward trend into a broader context.³³⁷ She points out that in the three years prior to *Daubert*, admission rates had risen considerably as courts were increasingly allowing “junk science” into the courtroom.³³⁸ Across a 10-year time horizon, the exclusion rate settled back and even fell below mid-1980s levels.³³⁹ Most other studies reach the same conclusion.³⁴⁰ As Waters and Hodge concluded in a study of Delaware state cases, “the overall impact of *Daubert* has been minimal.”³⁴¹

If *Daubert* did not make a significant difference in rates of exclusion, it *did* play a role in focusing courts’ and litigants’ attention on issues of admissibility. Many studies find that *Daubert* increased the frequency with which motions to exclude testimony were made. Dixon and Gill found that the number of motions to exclude began increasing after the *Daubert* decision and continued to rise through each remaining year of their data set.³⁴² This is consistent with Krafka et al.’s surveys of judges and attorneys, in which a majority of respondents reported that more motions to exclude expert witness testimony were made after *Daubert*.³⁴³ It is also consistent with Gatowski et al.’s survey of 400 state judges, in which 75% of respondents agreed that one purpose of the *Daubert* decision was to exclude “junk science” from the courtroom.³⁴⁴ Commenting on the results of their own study, Cheng and Yoon note that “the power of [*Daubert*] was not so much in its formal doctrinal test, but rather in its ability to create greater awareness of the problems of junk science.”³⁴⁵

³³⁵ DIXON AND GILL, *supra* note 31.

³³⁶ *Id.* at 17–18.

³³⁷ Billauer, *supra* note 255, at 13–17.

³³⁸ *Id.* at 16; *see* HUBER, *supra* note 267.

³³⁹ Billauer, *supra* note 255, at 15–16.

³⁴⁰ *See* Edward K. Cheng & Albert H. Yoon, *Does Frye or Daubert Matter? A Study of Scientific Admissibility Standards*, 91 VA. L. REV. 471, 498 (2005) (finding that the influence of *Daubert* on removal rates was “vanishingly small” in magnitude and statistically insignificant); Jennifer L. Groscup et al., *The Effects of Daubert on the Admissibility of Expert Testimony in State and Federal Criminal Cases*, 8 PSYCHOL. PUB. POL’Y & L. 339, 345–46 (2002) (study of 693 state and federal criminal appeals cases between 1987 and 1998 found no statistically significant change in overall admissibility rates); *but see* Andrew Jurs & Scott DeVito, *The Stricter Standard: An Empirical Assessment of Daubert’s Effect on Civil Defendants*, 62 CATH. U. L. REV. 675, 679 (2012) (finding that *Daubert* is at least perceived by litigants as a stricter admissibility standard).

³⁴¹ NICOLE L. WATERS & JESSICA P. HODGE, *THE EFFECTS OF THE DAUBERT TRILOGY IN DELAWARE SUPERIOR COURT* 21 (2005).

³⁴² DIXON AND GILL, *supra* note 31, at 19.

³⁴³ Carol Krafka et al., *Judge and Attorney Experiences, Practices, and Concerns Regarding Expert Testimony in Federal Civil Trials*, 8 PSYCHOL. PUB. POL’Y & L. 309, 329 (2002).

³⁴⁴ Sophia I. Gatowski et al., *Asking the Gatekeepers: A National Survey of Judges on Judging Expert Evidence in a Post-Daubert World*, 25 L. & HUM. BEH. 433, 443 (2001).

³⁴⁵ Cheng and Yoon, *supra* note 340, at 503; *see also* David M. Flores, James T. Richardson & Mara L. Merlino, *Examining The Effects of the Daubert Trilogy on Expert Evidence Practices in Federal Civil Court: An Empirical Analysis*, 34 S. ILL. U. L.J. 533, 562–63 (2009).

Why was *Daubert*'s doctrinal test not more effective? Perhaps because judges neither understand the *Daubert* factors nor apply them consistently. Gatowski's et al.'s survey results are particularly illustrative of this point. Although 88% of respondent judges stated that falsifiability was a "useful" guideline in assessing the reliability of scientific evidence, only 6% demonstrated a clear understanding of that concept, while 35% gave answers indicating that they clearly did *not* understand it.³⁴⁶ The results for error rate were similar; 91% of judges said that error rate is a useful factor, but only 4% gave answers clearly indicating an understanding of the concept, and 10% gave responses evincing a lack of understanding.³⁴⁷ Other studies indicate that judges are not sensitive to differences in methodological reliability when evaluating admissibility. Kovera and McAuliff conducted an experiment testing state judges' sensitivity to changes in the internal validity of a description of psychological expert testimony in a sexual harassment case.³⁴⁸ They found that judges' admissibility decisions were not significantly affected by manipulations to validity—judges simply could not distinguish between the reliability of various study designs.³⁴⁹ Wingate and Thornton examined how federal judges apply the *Daubert* standard to expert witness testimony involving industrial/organizational (I/O) psychology in Age Discrimination in Employment Act (ADEA) litigation.³⁵⁰ The judges' responses showed little sensitivity to manipulations of the quality of peer-reviewed support for the expert's conclusions and a pronounced preference for *Frye*'s general acceptance test over the other *Daubert* factors.³⁵¹

Wingate and Thornton's findings comport with a body of empirical evidence showing, first, that judges often avoid applying *Daubert* to motions to exclude evidence; and second, when they do, they show a marked preference for the factors of general acceptance and peer review over falsifiability and error rate. Groscup et al.'s content analysis of state and federal criminal appeals, for example, found that, while the length of courts' discussion of *Daubert* increased with time, the length of their discussion of the individual *Daubert* factors was "relatively abbreviated."³⁵² The most influential factors affecting the decision to admit or exclude expert testimony were those grounded in other Federal Rules of Evidence—the evidence's relevance, its ability to assist the trier of fact, the potential for prejudicial impact, and the expert's qualifications.³⁵³ By Groscup et al.'s estimation, the four *Daubert* factors were the *least* influential factors on the court's decision, with error rate and falsifiability ranked last.³⁵⁴ The Groscup et al. study was

³⁴⁶ E.g., "I would want to know if the evidence was falsified," "I would look at the results and determine if they are false." Gatowski et al., *supra* note 344, at 445.

³⁴⁷ *Id.* ("I would take into account the number of mistakes that were made and consider that in my admissibility decision."). Despite having the option to ask the interviewer for definitions of each of the *Daubert* factors, only 16% of judges asked for a definition of falsifiability, and only one of 400 judges asked for a definition of error rate. *Id.* at 445, 447.

³⁴⁸ Margaret Bull Kovera & B. D. McAuliff, *The Effects of Peer Review and Evidence Quality on Judge Evaluations of Psychological Science: Are Judges Effective Gatekeepers?*, 85 J. APP. PSYCHOL. 574 (2000).

³⁴⁹ *Id.* at 576.

³⁵⁰ Peter H. Wingate & George C. Thornton, III, *Industrial/Organizational Psychology and the Federal Judiciary: Expert Witness Testimony and the "Daubert" Standards*, 28 L. & HUM. BEH. 97 (2004).

³⁵¹ *Id.* at 110–11.

³⁵² Groscup et al., *supra* note 340, at 365.

³⁵³ *Id.*

³⁵⁴ *Id.*

limited to criminal cases, but other studies have found similar effects in non-criminal cases.³⁵⁵ Dixon and Gill, for example, found that judges increasingly referred to non-*Daubert* factors in deciding motions to exclude expert evidence in the years after *Daubert*.³⁵⁶ Thus, the *Daubert* factors themselves appear to play a minimal role in the adjudication of motions to exclude expert witness testimony, apparently at least in part because judges lack epistemic competence to apply them.³⁵⁷ This, of course, raises questions about what criteria judges *are* using to adjudicate such motions, a fertile area for future research.³⁵⁸

2. Factfinding

With respect to factfinding, the empirical results are varied but, again, generally support the view that courts are not well equipped to find facts on the basis of expert evidence.³⁵⁹ Most of the empirical studies on the weighing of evidence tend to focus on jurors rather than judges,³⁶⁰ though the few studies of judges' ability to find facts on the basis of conflicting expert testimony suggest that, with a few exceptions, they do not perform significantly differently than jurors.³⁶¹ As to jurors, although some scholars argue that claims of epistemic incompetence are entirely baseless,³⁶² the empirical evidence is mixed. The available studies suggest that they are neither as incompetent as might be feared, nor as effective as might be hoped, at interpreting scientific expert testimony. While jurors show the ability to comprehend the basic substance of scientific testimony moderately well, substantial numbers of jurors are prone to cognitive fallacies; as a group, jurors also tend to under-weight statistical evidence. Moreover, jurors and judges tend to rely on heuristic shortcuts, such as the demeanor and credentials of the testifying expert, in lieu

³⁵⁵ Veronica B. Dahir et al., *Judicial Application of Daubert to Psychological Syndrome and Profile Evidence: A Research Note*, 11 PSYCHOL., PUB. POL'Y, & L. 62, 73–74 (2005) (finding a “strong tendency for judges to continue to rely on more traditional standards such as general acceptance and qualifications of the expert when assessing psychological syndrome and profile evidence... [that] probably reflects judges’ relative unfamiliarity with the technical concepts of falsifiability and error rates”); Krafka et al., *supra* note 343, at 15–16 (most common bases for exclusion were irrelevance, lack of qualification, and lack of tendency to assist the trier of fact; only 8% of exclusions cited *Daubert* factors).

³⁵⁶ DIXON AND GILL, *supra* note 31, at 40–44.

³⁵⁷ See Billauer, *supra* note 255, at 46 (describing “the current state of affairs [in which] judges just do not have the training or ability to discern the difference between good and bad science”).

³⁵⁸ See Vickers, *supra* note 275, at 143 (“By straying from the reliability factors, judges may be applying inappropriate criteria and rendering inconsistent judgments.”).

³⁵⁹ Trial judges themselves have occasionally acknowledged these difficulties, though doing so leaves them open to appellate rebuke. See, e.g., *McClain v. Metabolife Intern., Inc.*, 401 F.3d 1233, 1238 (11th Cir. 2005) (trial judge’s denial of *Daubert* motion on the ground that he lacked the scientific knowledge necessary to adjudicate the motion was abuse of discretion).

³⁶⁰ See Valerie Hans, *Judges, Juries, and Scientific Evidence*, 16 J.L. & POL'Y 19, 25 (2007) (“Although political scientists and other scholars have conducted many analyses of judicial decisions and opinions, the research literature on judicial reactions to scientific literature is modest.”).

³⁶¹ See *infra* notes 386–121 and accompanying text.

³⁶² See, e.g., Neil Vidmar & Shari Seidman Diamond, *Juries and Expert Evidence*, 66 BROOK. L. REV. 1121, 1175 (2001) (“Insofar as it can be assessed, there is no evidence that juries are incompetent to evaluate expert testimony.”); Marilee M. Kapsa & Carl B. Meyer, *Scientific Experts: Making Their Testimony More Reliable*, 35 CAL. W. L. REV. 313, 327 (1999) (“There is no hard empirical evidence supporting the argument that a lay jury cannot critically evaluate scientific evidence.”); Robert D. Myers, Ronald S. Reinstein & Gordon M. Griller, *Complex Scientific Evidence and the Jury*, 83 JUDICATURE 150, 152–53 (1999).

of substantive engagement with the testimony. Even if the worst-case predictions of jurors being overawed and incapable of critically evaluating experts' claims are exaggerations, the empirical findings suggest that jurors and judges struggle to interpret scientific expert testimony accurately.

On one hand, expert testimony has been shown to narrow the gap between judge and juror evaluations of evidence. Studies have found that the presentation of expert testimony improves the quality of juror decision making in cases involving eyewitness identification,³⁶³ child sexual abuse,³⁶⁴ and workplace sexual harassment,³⁶⁵ where "improvement" is measured by the jury's tendency to decide the case in the same way that a judge would have.³⁶⁶ Adversarial presentation has also been found to make jurors more attentive to expert testimony, in comparison to presentation by a court-appointed expert.³⁶⁷ Finally, despite some scholars' concerns that lay jurors would be overawed by the credentials of expert witnesses and the complexity of their testimony, jurors generally appear to engage critically with expert witness testimony.³⁶⁸

On the other hand, good intentions and genuine effort cannot create epistemic competence in the absence of substantive expertise. Jurors often fail to understand and apply scientific testimony correctly, even where the underlying science is itself relatively clear.³⁶⁹ They also tend to rely on specious proxies for substantive expertise. Krauss and Sales, for example, describe the "heuristic model" of juror decision making, whereby "when the message is difficult to comprehend or complex, individuals rely on cognitive shortcuts or heuristics... [that focus] the individual on the perceived expertise and trustworthiness of the communicator rather than the quality of the message."³⁷⁰ Other research is more ambiguous, finding that some jurors readily resort to

³⁶³ Brian L. Cutler, Steven D. Penrod & Hedy R. Dexter, *The Eyewitness, the Expert Psychologist, and the Jury*, 13 L. & HUM. BEH. 311 (1989); Harmon M. Hosch, *A Comparison of Three Studies of the Influence of Expert Testimony on Jurors*, 4 L. & HUM. BEH. 297, 297 (1980).

³⁶⁴ Margaret Bull Kovera et al., *Does Expert Psychological Testimony Inform or Influence Juror Decision Making? A Social Cognitive Analysis*, 82 J. APP. PSYCHOL. 178, 187–88 (1997).

³⁶⁵ Margaret Bull Kovera, Bradley D. McAuliffe & Kellye S. Hebert, *Reasoning about Scientific Evidence: Effects of Juror Gender and Evidence Quality on Juror Decisions in a Hostile Work Environment Case*, 84 J. APP. PSYCHOL. 362, 371 (1999).

³⁶⁶ *Id.* Kovera, McAuliffe, and Hebert introduce this metric in making the point that it is difficult to determine whether a measured effect on jury decision making produces more substantively just results. *Id.* Much of the literature arguing that jurors are generally competent to interpret scientific expert testimony relies on this metric in some way—jurors are not systematically worse than judges. See, e.g., Luke M. Froeb & Bruce H. Kobayashi, *Naive, Biased, yet Bayesian: Can Juries Interpret Selectively Produced Evidence*, 12 J. L. ECON. & ORG. 257, 261–62 n.22 (1996). We should be skeptical of this metric for present purposes; while jurors may be *no worse* than judges, this leaves open the question whether either is adequately competent to satisfy the demands of intellectual due process. See *infra* notes 386–121 and accompanying text; see also Brewer, *supra* note 233, at 1539.

³⁶⁷ Nancy J. Brekke et al., *Of Juries and Court-Appointed Experts: The Impact of Nonadversarial Versus Adversarial Expert Testimony*, 15 L. & HUM. BEH. 451 (1991).

³⁶⁸ Vidmar and Diamond, *supra* note 362, at 1166–67; Myers, Reinstein, and Griller, *supra* note 362, at 152 (citing studies finding "that jurors... take their fact-finding and decision-making responsibilities seriously").

³⁶⁹ See, e.g., SANDERS, *supra* note 304, at 117–42.

³⁷⁰ Daniel A. Krauss & Bruce D. Sales, *The Effects of Clinical and Scientific Expert Testimony on Juror Decision Making in Capital Sentencing*, 7 PSYCHOL. PUB. POL'Y & L. 267, 273 (2001) (citing articles); Richard C. Waites & David A. Giles, *Are Jurors Equipped to Decide the Outcome of Complex Cases*, 29 AM. J. TRIAL ADVOC. 19, 37–39 (2005); cf. Mnookin, *supra* note 253, at 1013 ("[T]he main mechanisms for assessing expertise outside of one's

heuristic modes of thinking to deal with complex testimony, while others attempt to engage in “central processing,” or what Kahneman and Tversky refer to as “System 1” processing, of such information.³⁷¹ The difference, however, is one of degree. “[A]ll jurors... regularly employ some forms of heuristic or mental shortcuts.”³⁷² Their tendency to do so is directly related to the complexity of the expert testimony at issue.³⁷³ When jurors become “overtaken” by the complexity of the evidence, they “will eventually resort to a set of simple principles that have successfully guided them for most of their lives.”³⁷⁴ Other studies confirm that such heuristics are unreliable proxies for genuine expertise.³⁷⁵

Jurors’ ability to understand probabilistic and statistical evidence also has been the subject of mixed empirical reviews.³⁷⁶ Many studies find that jurors tend to under-emphasize statistical evidence relative to the weight that an ideal Bayesian analysis would ascribe it.³⁷⁷ Saks and Kidd explain that this is due in part to an over-emphasis on case-specific information, for example the perceived credibility of a narrative witness, as compared to statistical base-rate information.³⁷⁸ Jurors also show difficulty understanding and applying econometric evidence.³⁷⁹ On the other

domain of knowledge are, by necessity, secondary indicia, proxies: demeanor, perhaps, or credentials, or superficial explanatory plausibility.”).

³⁷¹ See Vidmar and Diamond, *supra* note 362, at 1138, 1140–49 (citing studies); see generally DANIEL KAHNEMAN, THINKING, FAST AND SLOW (2011).

³⁷² Waites and Giles, *supra* note 370, at 38.

³⁷³ Krauss and Sales, *supra* note 370, at 274 (citing articles); see also Joel Cooper & Isaac M. Neuhaus, *The “Hired Gun” Effect: Assessing The Effect of Pay, Frequency of Testifying, and Credentials on the Perception of Expert Testimony*, 24 L. & HUM. BEH. 149 (2000); Joel Cooper, Elizabeth A. Bennett & Holly L. Sukel, *Complex Scientific Testimony: How Do Jurors Make Decisions?*, 20 L. & HUM. BEH. 379 (1996). Vidmar and Diamond point out that these studies ignore the fact that jurors are instructed to consider such heuristics as expert credentials in weighing experts’ testimony. Vidmar & Diamond, *supra* note 362, at 1174.

³⁷⁴ Waites and Giles, *supra* note 370, at 39.

³⁷⁵ See Vidmar and Diamond, *supra* note 362, at 1129 n.26 (citing studies); cf. Mnookin, *supra* note 253, at 1013; but see Froeb and Kobayashi, *supra* note 366, at 270–71 (formal model of jury decision making concluding that “competitively produced evidence in an adversarial setting may mitigate some of the costs attributed to decision-maker bias and to the use of simplified rules or heuristics to evaluate selectively produced information”). More generally, studies indicate that demeanor is a poor indicium of credibility, and that jurors often struggle to distinguish truthful statements from falsehoods. ALDERT VRIJ, DETECTING LIES AND DECEIT: PITFALLS AND OPPORTUNITIES (2011); Max Minzner, *Detecting Lies Using Demeanor, Bias, and Context*, 29 CARDOZO L. REV. 2557 (2007).

³⁷⁶ See William C. Thompson, *Are Juries Competent to Evaluate Statistical Evidence?*, 52 L. & CONTEMP. PROBS. 9, 41 (1989) (finding “no single or simple answer” to that question).

³⁷⁷ E.g., David H. Kaye et al., *Statistics in the Jury Box: How Jurors Respond to Mitochondrial DNA Match Probabilities*, 4 J. EMPIRICAL LEGAL STUD. 797, 801 (2007); Jason Schklar & Shari Seidman Diamond, *Juror Reactions to DNA Evidence: Errors and Expectancies*, 23 L. & HUM. BEH. 159, 178, 180 (1999); Brian C. Smith et al., *Jurors’ Use of Probabilistic Evidence*, 20 L. & HUM. BEH. 49, 79–80 (1996) (adding that, while jurors do underweigh statistical evidence, they also make use of such evidence in their decision making processes and are sensitive to variations in its quality); Jonathan J. Koehler, Audrey Chia & Samuel Lindsey, *The Random Match Probability in DNA Evidence: Irrelevant And Prejudicial?*, 35 JURIMETRICS 201 (1995); Gary L. Wells, *Naked Statistical Evidence of Liability: Is Subjective Probability Enough?*, 62 J. PERSONALITY & SOC. PSYCHOL. 739 (1992); Thompson, *supra* note 132, at 41; Michael J. Saks & Robert F. Kidd, *Human Information Processing and Adjudication: Trial by Heuristics*, 15 L. & SOC. REV. 123, 149, 155–56 (1980); cf. Krauss and Sales, *supra* note 370, at 300 (mock jurors weighed clinical opinion testimony more highly than actuarial evidence).

³⁷⁸ Saks and Kidd, *supra* note 377, at 150–51.

³⁷⁹ Richard A. Posner, *The Law and Economics of the Economic Expert Witness*, 13 J. ECON. PERSP. 91, 96 (1999); Daniel L. Rubinfeld, *Econometrics in the Courtroom*, 85 COLUM. L. REV. 1048 (1985).

hand, Thompson adds that, in cases involving forensic identification, jurors may over-value the evidence where the error rate of the forensic method is high and the defendant “was selected in a manner that renders him more likely to possess the matching characteristics than the general population.”³⁸⁰ Moreover, many (though not all) mock jurors tend to be susceptible to statistical fallacies such as the “Prosecutor’s Fallacy,” which equates the likelihood of guilt with the prior probability of a random match without taking into account the base rates,³⁸¹ or the “Defense Attorney’s Fallacy,” which deems associative evidence irrelevant because it shows, at most, that the defendant is a member of some large group.³⁸² Although jurors are capable of avoiding reasoning fallacies in familiar situations, they are unable to transfer reasoning skills to formally identical, unfamiliar situations.³⁸³

The empirical literature also casts substantial doubt on the effectiveness of the traditional tools of the adversarial model, such as the presentation of countervailing evidence or limiting instructions, to ensure against jurors’ cognitive fallibilities. Levett and Kovera find that the presentation of a defense expert pointing out flaws in the prosecution’s expert’s methodology, *regardless* of the quality of the defense expert’s testimony, renders jurors more skeptical of expert testimony overall and more likely to return a guilty verdict.³⁸⁴ Nor are limiting instructions sufficient to prevent jurors from drawing forbidden inferences where otherwise inadmissible evidence is introduced pursuant to FRE 703 to “assist” the jury with understanding the basis of an expert’s opinion. The premise that limiting instructions are generally ineffective or, worse, produce a “backlash effect” whereby jurors’ attention is focused directly on the forbidden inference is well established in the empirical literature.³⁸⁵ There is no reason to believe that limiting instructions are more effective at mitigating the prejudicial effects of otherwise inadmissible evidence introduced pursuant to FRE 703 than they are in any other context.

³⁸⁰ Thompson, *supra* note 376, at 41.

³⁸¹ See Kaye et al., *supra* note 377, at 803.

³⁸² William C. Thompson & Edward L. Schumann, *Interpretation of Statistical Evidence in Criminal Trials: The Prosecutor’s Fallacy and the Defense Attorney’s Fallacy*, 11 L. & HUM. BEH. 167 (1987); cf. Hans, *supra* note 360, at 37 (finding that jurors are significantly more prone than judges to the Defense Attorney’s Fallacy).

³⁸³ Vidmar and Diamond, *supra* note 362, at 1136 (citing Harold Kelly, *The Process of Causal Attribution*, 28 AM. PSYCHOL. 107 (1973)); cf. David L. Faigman & A.J. Baglioni, Jr., *Bayes’ Theorem in the Trial Process: Instructing Jurors on the Value of Statistical Evidence*, 12 L. & HUM. BEH. 1 (1988).

³⁸⁴ Lora M. Levett & Margaret Bull Kovera, *The Effectiveness of Opposing Expert Witnesses for Educating Jurors about Unreliable Expert Evidence*, 32 LAW AND HUMAN BEHAVIOR 363, 370–71 (2008). In a subsequent study, Levett and Kovera found “limited evidence for a sensitivity effect [i.e., prospective jurors being ‘sensitized’ to variations in the scientific validity of the plaintiff expert’s testimony via critical testimony of an opposing expert] and strong evidence for a skepticism effect of opposing expert testimony.” Lora M. Levett & Margaret Bull Kovera, *Psychological Mediators of the Effects of Opposing Expert Testimony on Juror Decisions*, 15 PSYCHOL. PUB. POL’Y & L. 124, 143 (2009). They “find little evidence that opposing experts will directly affect case outcomes; the safeguard seems to make jurors more skeptical of all expert testimony.” *Id.*

³⁸⁵ See, e.g., Nancy Steblay et al., *The Impact on Juror Verdicts of Judicial Instruction to Disregard Inadmissible Evidence: A Meta-Analysis*, 30 L. & HUM. BEH. 469 (2006); Rachel K. Cush & Jane Goodman Delahunty, *The Influence of Limiting Instructions on Processing and Judgements of Emotionally Evocative Evidence*, 13 PSYCHIATRY, PSYCHOL. & L. 110 (2006); Lieberman & Arndt, *supra* note 293; J. Alexander Tanford, *The Law and Psychology of Jury Instructions*, 69 NEB. L. REV. 71 (1990); Roselle L. Wissler & Michael J. Saks, *On the Inefficacy of Limiting Instructions: When Jurors Use Prior Conviction Evidence to Decide on Guilt*, 9 LAW & HUM. BEH. 37 (1985).

Finally, despite courts' frequent assumption that judges are more effective at interpreting complex scientific evidence than juries,³⁸⁶ the available evidence indicates that this is largely untrue. Judges and juries show high rates of agreement in outcomes, rates that are unaffected by the complexity of the evidence.³⁸⁷ Both groups sometimes perform well at basic comprehension tasks. Hans's comparative study of judges' and jurors' ability to comprehend scientific testimony regarding mitochondrial DNA, for example, found that "both judges and jurors performed reasonably well, scoring between eight and nine questions correct [on a comprehension test] on average."³⁸⁸ However, judges, as a group, are generally as susceptible to fallacious reasoning and reliance on heuristics in the face of complex testimony as are jurors.³⁸⁹ Like jurors, they also struggle to interpret probabilistic and statistical evidence.³⁹⁰ Judges, too, are generally incapable of disregarding evidence admitted for a particular purpose, or deemed inadmissible, from their holistic decision-making process.³⁹¹ For the most part, there is little reason to believe that judges acting as factfinders would process expert information better, or reach substantively different outcomes, than would juries.

D. Prior Reform Proposals

A necessarily brief survey of the century-long conversation about epistemic competence illustrates the intractability of the problem. The causes are easy to diagnose: judges and jurors lack the specialist knowledge necessary to make sense of expert evidence or to distinguish genuine expertise from pseudo-expertise or charlatanry; these problems are exacerbated by the adversarial process, which drives experts, consciously or otherwise, to bias their opinions in favor of their employer and incentivizes attorneys to "shop" not for the most knowledgeable expert, but for the most charismatic person willing to testify in support of their side. So much has been obvious to commentators from Hand and Wigmore in the early 20th century³⁹² through Faigman and Mnookin in the twenty-first.³⁹³ During the same period, a number of reforms have been proposed to mitigate the problem.³⁹⁴ This section will briefly survey the history of

³⁸⁶ See *infra* notes 61–60 and accompanying text.

³⁸⁷ See Waites and Giles, *supra* note 370, at 23–25 (citing studies).

³⁸⁸ Hans, *supra* note 360, at 38.

³⁸⁹ Chris Guthrie, Jeffrey J. Rachlinski & Andrew J. Wistrich, *Inside the Judicial Mind*, 27 CORNELL L. REV. 777 (2000); Wells, *supra* note 377, at 744–45; Hans, *supra* note 360, at 36–40 (judges and mock jurors generally performed similarly on comprehension tests, with statistically significant differences on a few questions).

³⁹⁰ Wells, *supra* note 377; see Vidmar & Diamond, *supra* note 362, at 1170 (citing THE EVOLVING ROLE OF STATISTICAL ASSESSMENTS AS EVIDENCE IN THE COURTS (Stephen E. Fienberg ed., 1989)).

³⁹¹ Andrew J. Wistrich, Chris Guthrie & Jeffrey J. Rachlinski, *Can Judges Ignore Inadmissible Information? The Difficulty of Deliberately Disregarding*, 153 U. PENN. L. REV. 1251 (2005); Wistrich, Guthrie, and Rachlinski, *supra* note 389.

³⁹² John H. Wigmore, *To Abolish Partisanship of Expert Witnesses, as Illustrated in the Loeb-Leopold Case*, 15 J. AM. INST. CRIM. L. & CRIMINOLOGY 341 (1924); Hand, *supra* note 251.

³⁹³ David L. Faigman, *Anecdotal Forensics, Phrenology, and Other Abject Lessons from the History of Science*, 59 HASTINGS L.J. 979, 983–84 (2008); Mnookin, *supra* note 253.

³⁹⁴ Judicial gatekeeping itself, of course, counts as the foremost of these measures. Because gatekeeping has been discussed extensively in Part II(B), *supra*, I exclude it from the discussion of reform proposals in this section.

proposals to improve courts' performance in evaluating scientific expertise, and will offer some brief thoughts as to why the efforts thus far have been less than completely successful.³⁹⁵

The most popular proposal has been to reintroduce non-partisan experts into the litigation process, either as a replacement for partisan expert witnesses,³⁹⁶ as supplemental witnesses to the party experts, as non-testifying technical advisors to the judge,³⁹⁷ or in some other capacity. A number of commentators, including Justice Breyer in *Joiner*, have encouraged courts to make greater use of their authority to appoint experts;³⁹⁸ others have called for a variety of systems whereby the parties jointly select non-partisan experts in lieu of partisan ones.³⁹⁹

Other proposals have looked to institutional or doctrinal changes to increase courts' ability to effectively incorporate expert knowledge into the legal decision making process. Sanders, for example, recommends the bifurcated trial process adopted by some courts in Bendectin mass tort cases, in which the issue of general causation is tried separately and prior to other issues involving liability and damages.⁴⁰⁰ Myers et al. encourage widespread adoption of Arizona's reforms to its jury system, which permit juries to "ask questions, take notes, and in civil cases allow[] jurors to discuss the evidence during the trial."⁴⁰¹ A number of courts have recognized or spoken favorably in dicta about the "complexity" exception to the Seventh Amendment's right to jury trial, whereby civil cases may be tried by a judge rather than a jury where the case is "too complex for a jury to understand and decide rationally."⁴⁰² The Supreme Court itself appeared to

³⁹⁵ A few scholars have rejected the view that courts lack epistemic competence to perform the tasks required of them. See, e.g., Waites and Giles, *supra* note 370, at 58–63 (suggesting "storytelling" innovations to convey information to jurors more effectively); Bruce Abramson, *Blue Smoke or Science - The Challenge of Assessing Expertise Offered as Advocacy*, 22 WHITTIER L. REV. 723, 766–67 (2001) (arguing that "radical reform is unnecessary" and the *Daubert* approach "requires nothing beyond the competence of any of the trial's participants").

³⁹⁶ Learned Hand, for example, called for "a board of experts or a single expert, not called by either side, who shall advise the jury of the general propositions applicable to the case which lie within his province." Hand, *supra* note 251, at 56; see also ALVIN I. GOLDMAN, KNOWLEDGE IN A SOCIAL WORLD 309–10 (1999).

³⁹⁷ E.g., Jan Beyea & Daniel Berger, *Scientific Misconceptions among Daubert Gatekeepers: The Need for Reform of Expert Review Procedures Complex Litigation at the Millennium*, 64 L. & CONTEMP. PROBS. 327, 365–66 (2001).

³⁹⁸ *General Elec. Co. v. Joiner*, 522 U.S. 136, 148 (Breyer, J., concurring); see David L. Faigman & John Monahan, *Psychological Evidence at the Dawn of the Law's Scientific Age*, 56 ANN. REV. PSYCHOL. 631, 654–55 (2005); Sofia Adroque & Alan Ratliff, *The Independent Expert Evolution: From the Path of Least Resistance to the Road Less Traveled*, 34 TEX. TECH L. REV. 843, 895–97 (2002); Laural L. Hooper, Joe S. Cecil & Thomas E. Willging, *Assessing Causation in Breast Implant Litigation: The Role of Science Panels Causation in Law and Science*, 64 L. & CONTEMP. PROBS. 139, 181–84 (2001); Gottesman, *supra* note 260, at 776–77; Joe S. Cecil & Thomas E. Willging, *Accepting Daubert's Invitation: Defining a Role for Court-Appointed Experts*, 43 EMORY L. J. 995 (1994); Berger, *supra* note 271; Samuel R. Gross, *Expert Evidence*, 1991 WIS. L. REV. 1113, 1211–30 (1991); Beyea and Berger, *supra* note 397, at 365; Wigmore, *supra* note 392, at 342.

³⁹⁹ E.g., Posner, *supra* note 379, at 96; Rubinfeld, *supra* note 379, at 1096; Mason Ladd, *Expert Testimony*, 5 VAND. L. REV. 414, 430–31 (1952).

⁴⁰⁰ SANDERS, *supra* note 369, at 203–06.

⁴⁰¹ Myers, Reinstein, and Griller, *supra* note 362, at 152.

⁴⁰² *In re Japanese Elec. Prods. Antitrust Litig.*, 631 F.2d 1069, 1090 (3d Cir. 1980); see Brewer, *supra* note 233, at 1672–77; Joseph A. Miron, *The Constitutionality Of A Complexity Exception To The Seventh Amendment*, 73 CHI.-KENT L. REV. 865 (1998); James S. Campbell, *The Current Understanding of the Seventh Amendment: Jury Trials in Modern Complex Litigation*, 66 WASH. U. L. Q. 63, 68–70 (1988); but cf. Waites and Giles, *supra* note 370, at 26–28 (arguing against complexity exception). Contrary to Waites and Giles's suggestion that the complexity exception "eliminate[s] jury decisions on issues that juries have been deciding for centuries," the exception has historical roots. *Id.* at 25–26. Golan notes that "[b]y 1875, Common Law judges were officially granted unfettered

endorse at least that general approach, noting that the question whether a claim is a “legal” (as opposed to equitable) one to which the jury trial right applies is to be determined in part by “the practical abilities and limitations of juries.”⁴⁰³ Doctrinal reforms advocated by scholars include Faigman et al.’s recent proposal,⁴⁰⁴ drawing on earlier work by Monahan and Walker,⁴⁰⁵ that gatekeeping doctrine should draw a distinction, analogous to that between “legislative” and “adjudicative” facts, between general scientific facts that apply across cases, and should therefore be found by the judge, and diagnostic facts applying general scientific knowledge to the specific case, which should be left to the jury.⁴⁰⁶

Reformers have also called for institutional reforms to place subject-matter experts in the role of legal factfinders, whether by bringing back some version of specialized juries⁴⁰⁷ or creating specialized courts to adjudicate cases in technical areas of law.⁴⁰⁸ The highly technical area of patent law has seen both doctrinal and institutional design innovations intended to enhance the epistemic competence of the tribunal. In *Markman v. Westview Instruments, Inc.*,⁴⁰⁹ the Supreme Court held that technical questions of patent construction are to be decided by the judge in a pre-trial hearing; Justice Souter’s opinion noted that the jury’s “capabilities to evaluate demeanor, to sense the mainsprings of human conduct, or to reflect community standards ... are much less significant than a trained ability to evaluate the testimony in relation to the overall structure of the patent.”⁴¹⁰ Similarly, Congress has long provided for specialized appellate review of patent decisions. Since 1982, all appeals of district court decisions in patent cases have been heard by the Federal Circuit Court of Appeals,⁴¹¹ and prior to that year were heard by the U.S. Court of

discretion in civil actions to order a trial without a jury in any matter requiring scientific evidence that, in their opinion, could not be handled by the credulous jury.” GOLAN, *supra* note 251, at 88.

⁴⁰³ *Ross v. Bernhard*, 396 U.S. 531, 538 n.10 (1970).

⁴⁰⁴ David L. Faigman, Christopher Slobogin & John Monahan, *Gatekeeping Science: Using the Structure of Scientific Research to Distinguish between Admissibility and Weight in Expert Testimony*, 110 NW. U. L. REV. 859, 887 n.145 (2016) (citing articles).

⁴⁰⁵ Monahan and Walker, *supra* note 95.

⁴⁰⁶ *Id.* at 890–99.

⁴⁰⁷ See Beyea and Berger, *supra* note 397, at 365–66; Mnookin, *supra* note 253, at 1028 n.49 (citing proposals). On the historical roots of specialized juries, see, e.g., Mnookin, *supra* note 233, at 767–68; GOLAN, *supra* note 251, at 19; Hand, *supra* note 251, at 40–43.

⁴⁰⁸ The proposed “science court,” which received much attention in the 1970s, was intended to improve courts’ ability to integrate scientific expertise into judicial decision making. See JASANOFF, *supra* note 273, at 65–66; Arthur Kantrowitz, *The Science Court Experiment: Criticisms and Responses*, 33 BULL. ATOMIC SCI. 44 (1977); Barry M. Casper, *Technology Policy and Democracy: Is the Proposed Science Court What We Need?*, 194 SCI. 29 (1976); Arthur Kantrowitz, *Proposal for an Institution for Scientific Judgment*, 156 SCI. 763 (1967). More recent scholarship continues to propose variations on the science court idea. See, e.g., Justin Sevier, *Redesigning the Science Court*, 73 MD. L. REV. 770 (2013); Rai, *supra* note 77.

On the simpler end of the spectrum, some institutional reforms would attempt to improve judges’ competence through training programs in math and science. E.g., Billauer, *supra* note 255, at 43, 56–57.

⁴⁰⁹ 517 U.S. 370 (1996).

⁴¹⁰ *Id.* at 389–90 (internal quotation marks omitted). Some scholars, however, are skeptical of generalist judges’ ability to interpret patents. See, e.g., Peter Lee, *Patent Law and the Two Cultures*, 120 YALE L.J. 2, 6 (2010) (“[N]o matter how eloquently policymakers craft patent law, if generalist judges lack the capacity to administer it, the patent system cannot fulfill its objectives.”).

⁴¹¹ 28 U.S.C. § 1295(a)(4).

Customs and Patent Appeals.⁴¹² Some scholars have argued for the creation of a specialized trial court for patent cases.⁴¹³

A third group of proposals has aimed at diminishing partisan experts' incentives to bias their testimony. Some commentators suggest that every expert witness's testimony should be made formally available to that expert's professional community, whether by publication in a professional journal, online publication, or a system of peer review.⁴¹⁴ Others suggest that American courts should consider the Australian practice of "hot tubbing," whereby partisan experts produce a joint report noting areas of agreement and disagreement.⁴¹⁵

The proposals surveyed above, to the extent they have been implemented, have met with varying degrees of success, but none has solved the perennial problem of epistemic competence. Non-partisan experts, in some form, are almost surely more effective at conveying scientific information to lay legal decision makers because their testimony is not biased by partisan incentives. But as Brewer explains, "extra-cameral" solutions involving the transfer of expertise from neutral experts to non-expert decision makers "do not resolve the problems or explain how the nonexpert practical reasoner can handle selection and competition in a nonarbitrary manner."⁴¹⁶ Specialized courts, such as the Federal Circuit, have received positive reviews of their ability to handle technical material, but they are an insufficient solution to a general problem.⁴¹⁷ Not only have specialized courts been criticized as uniquely susceptible to "capture," prone to "hide their biases behind impenetrable specialized jargon," and out of touch with legal developments occurring in generalist courts,⁴¹⁸ the problem of epistemic competence is simply too ubiquitous to be solved by the creation of specialized courts. It is not logistically possible to create a specialized institution for every area in which specialized testimony is used into a separate institution; a *general* solution is imperative.⁴¹⁹ Moves to shift technical questions from jury to judge are particularly unhelpful, as there is no reason to think that a non-expert judge is

⁴¹² Federal Courts Improvement Act of 1982, Pub. L. 97-164 §165, 96 Stat. 50 (1982); see generally GILES RICH, A BRIEF HISTORY OF THE UNITED STATES COURT OF CUSTOMS AND PATENT APPEALS (1980). Some have questioned whether lay jurors should be involved in the adjudication of patent claims at all. See, e.g., Mark A. Lemley, *Why Do Juries Decide If Patents Are Valid*, 99 VA. L. REV. 1673, 1674-77 (2013) (summarizing arguments); Jennifer F. Miller, *Should Juries Hear Complex Patent Cases?*, 2004 DUKE L. & TECH. REV. 4 (2004); Michael A. Fisher, *Going for the Blue Ribbon: The Legality of Expert Juries in Patent Litigation*, 2 COLUM. SCI. & TECH. L. REV. 1 (2001); Miron, *supra* note 61.

⁴¹³ E.g., Jay P. Kesan & Gwendolyn G. Ball, *Judicial Experience and the Efficiency and Accuracy of Patent Adjudication: An Empirical Analysis of the Case for a Specialized Patent Trial Court*, 24 HARV. J. L. & TECH. 393 (2010).

⁴¹⁴ Posner, *supra* note 379, at 98; Gross, *supra* note 398, at 1211-30.

⁴¹⁵ Gary Edmond & Joëlle Vuille, *Comparing The Use Of Forensic Science Evidence in Australia, Switzerland, and The United States: Transcending the Adversarial-Nonadversarial Dichotomy*, 54 JURIMETRICS 221 (2014); Megan A. Yarnall, *Dueling Scientific Experts: Is Australia's Hot Tub Method a Viable Solution for the American Judiciary?*, 88 OREGON L. REV. 311 (2009).

⁴¹⁶ Brewer, *supra* note 233, at 1615; see *id.* at 1614, 1681.

⁴¹⁷ See, e.g., Rochelle Cooper Dreyfuss, *The Federal Circuit: A Case Study in Specialized Courts*, 64 N.Y.U. L. REV. 1, 24-25 (1989).

⁴¹⁸ *Id.* at 3.

⁴¹⁹ See Kesan and Ball, *supra* note 173, at 402 ("Boundary problems make it difficult to determine which court should preside over the case and may force the judiciary of a specialized court to deal with areas of the law beyond its expertise.").

any better than a non-expert jury at interpreting scientific testimony.⁴²⁰ Likewise, existing programs such as judicial training and the Reference Manual of Scientific Expertise are manifestly inadequate to instill the expertise necessary to engage with scientific evidence in a non-arbitrary way; indeed, they may even be counterproductive insofar as they instill in judges a false sense of epistemic competence.⁴²¹ A full solution to the problem has yet to be found; as we will see in the next Part, it will require a shift in epistemological frame through which the problem has thus far been conceptualized.

IV. Designing Competent Courts

The previous Part described the theoretical and empirical contours of the problem of epistemic competence and surveyed many of the proposals that have been put forth over the past century to facilitate courts' engagement with scientific expertise. None of those solutions has fully solved the problem because they adhere to the individualist epistemological paradigm that has dominated the conversation thus far. Thanks to the convergence of theoretical and empirical studies of the problem of epistemic competence, we now know the form that a solution to the problem of epistemic competence must take: the legal decision maker must also possess expertise in the relevant scientific domain. But that solution appears to demand the impossible: judges and jurors who possess substantive expertise in the multitude of scientific domains with which a generalist court must interact. Because human minds are limited and the cost of acquiring expertise is substantial, how can the insights of classical epistemology and the sociology of scientific knowledge be directed toward a practical solution to the problem of epistemic competence? The answer, this Part will argue, comes from the field of social epistemology: we must extract ourselves from the atomized epistemological paradigm that has dominated the conversation for the past century to reconceive of the *court*, rather than individual judicial officers, as the epistemic agent of interest. This Part will describe a solution to the problem of epistemic competence that reforms the epistemic system of the court, as a collective epistemic agent, to possess both legal authority and scientific expertise.

A. The Failure of Brewer's Two Hat Solution

As discussed above,⁴²² Brewer proposes a "two hat" solution to the problem of epistemic competence in which legal authority and scientific expertise are held by the same individual. Brewer's two hat approach solves the epistemological problem, but suffers from implementation challenges that are obscured by a lack of descriptive detail. Brewer is too cavalier about the model's prospects, suggesting that it could be fulfilled by "administrative agencies staffed with trained scientists, scientific expert magistrate judges, or even special science courts staffed by

⁴²⁰ See *supra* notes 154–121 and accompanying text.

⁴²¹ This is a psychological phenomenon known as the "Dunning-Kruger effect," described previously in Chapter II. See Justin Kruger & David Dunning, *Unskilled and Unaware of It: How Difficulties in Recognizing One's Own Incompetence Lead to Inflated Self-Assessments*, 77 J. PERSONALITY & SOC. PSYCHOL. 1121, 1121 (1999). As Dunning explains, "[a] whole battery of studies... have confirmed that people who don't know much about a given set of cognitive, technical, or social skills tend to grossly overestimate their prowess and performance, whether it's grammar, emotional intelligence, logical reasoning, firearm care and safety, debating, or financial knowledge." David Dunning, *We Are All Confident Idiots*, PACIFIC STANDARD (Oct. 27, 2014), <https://psmag.com/we-are-all-confident-idiots-56a60eb7feb7#g5bjlsmhs>.

⁴²² See *supra* Part III(B)(1).

scientifically trained judges” without acknowledging the institutional and logistical challenges in those proposals.⁴²³ How many individuals with expertise in both law and a given scientific domain exist, and how many of those are ready, willing, and otherwise qualified to accept positions as trial court judges?⁴²⁴ Consider also the number of scientific domains with which a generalist court must interact in the course of its work; the two hat solution would require a single judge to possess expertise in *all* of those domains. Brewer’s two hats quickly become a multitude of hats—a veritable epistemic millinery—and the call for overlapping expertise reduces to a lamentation of the lack of human omniscience. Valid, so far as it goes, but not particularly helpful as a practical solution.

Brewer falls into what I will call the *atomization trap*. He remains committed to an epistemological paradigm that conceives only of individual human minds as epistemic agents.⁴²⁵ That focus is understandable; the problem of epistemic competence does indeed arise from the epistemic limitations of isolated human minds. In an ideal world, judges and jurors would possess all of the knowledge necessary to engage with the substance of all scientific expert testimony that came before the court, in which case the problem of epistemic competence would not arise. The problem is that courts operate in a non-ideal world, in which the acquisition of knowledge is costly and no single mind is capable of possessing the full sum of human knowledge. The atomization trap is the root cause of intractability in the century-long discussion of epistemic competence: because the participants in that discussion could conceive only of individual minds as epistemic agents, they were unable to identify a means of incorporating substantive expertise into legal decision making in an epistemically valid way. The problem could only be mitigated, never solved.⁴²⁶ In order to find a full solution to the problem of epistemic competence, we must find our way out of the atomization trap.

⁴²³ Brewer, *supra* note 233, at 1677. Administrative agencies and magistrate judges, as we will see below, work as solutions only when they are incorporated within a system of distributed cognition in which the substantive expert plays an equal or near-equal role in the decision making process as the trial judge. *See infra* Part IV(B)(2). Otherwise these solutions are of the extra-cameral type that Brewer recognized as insufficient. Brewer, *supra* note 233, at 1614–15, 1681 n.445.

⁴²⁴ Similarly, Mnookin explains that while scientific juries might have epistemic competence to decide cases, “[i]t simply is not realistic to bring the leading experts in as jurors time after time.” Mnookin, *supra* note 253, at 1029. The supply of experts is too low, and the demands of jury duty too high, for scientific juries to work as a practical solution. Scientific magistrate judges would solve the problem of epistemic competence only if their authority was not, as is the case with existing magistrate judges, dependent on the consent of the parties or referral by a non-expert district court. *See infra* Part IV(B)(3)(i) (discussing Article III limitations on magistrate judges’ authority).

⁴²⁵ Brewer does address the “collectivist” epistemology of John Hardwig, who articulates a theory of “epistemic dependence” to account for the fact that nearly all knowledge ultimately depends on deference to the claims of others concerning facts that we could not, or will not, independently verify. John Hardwig, *Epistemic Dependence*, 82 J. PHIL. 335 (1985); *see* Brewer, *supra* note 233, at 1608–14. But Hardwig’s “collectivist” account does not conceive of groups as distinct epistemic agents; rather, he attempts to account for justification of knowledge claims of the form “*B* knows that *A* knows that *p*, therefore *B* knows that *p*.” 82 J. PHIL. at 340.

⁴²⁶ *See* COLLINS & EVANS, *supra* note 239, at 59.

B. Social Epistemological Approaches: Avoiding the Atomization Trap

1. Institutions as Epistemic Agents

Two relatively recent developments in social epistemology offer a way out of the atomization trap, and with it, a solution to the problem of epistemic competence. The first focuses on the epistemological status of what Goldman refers to as *collective doxastic agents*,⁴²⁷ i.e., the properties of groups as epistemic agents.⁴²⁸ This includes the nature of the relationship between the knowledge of the group and the knowledge of its constituent members. *Summativists* posit a direct relationship: the knowledge of the group is the knowledge of all or most of its members.⁴²⁹ A summativist account of group knowledge is superficially appealing, but on closer examination is both under- and overinclusive. Margaret Gilbert gives an example of the latter situation, positing an institution with two committees, a Library Committee and a Food Committee, with identical membership.⁴³⁰ The members of the Library Committee know that the library contains one million volumes; the Library Committee therefore also knows that fact. But does the Food Committee know it? By a summativist account, it must: the constituents of the two committees are identical. But most reject that account; the purview of the Food Committee does not include library books, and therefore the Food Committee can't claim knowledge on that subject.⁴³¹ Summativism thus does not capture our intuitions about the relationship between constituent knowledge and group.⁴³² An alternative model better captures the epistemic dynamics of the court as collective epistemic agent.

Bird describes a *distributivist* model of group knowledge in which no individual constituent possesses all of the knowledge ascribed to the group.⁴³³ The “key feature” of that model is *distributed cognition*: “the [cognitive] task is broken down into components, which are given to different members of the group. Membership of the group... is a matter of having a particular function within the overall system.”⁴³⁴ Unlike, say, the Library Committee in which each

⁴²⁷ Alvin Goldman, *A Guide to Social Epistemology*, in *RELIABILISM AND CONTEMPORARY EPISTEMOLOGY* 226 (Alvin I. Goldman ed. 2012). While Goldman prefers the term “doxastic” agents, I will continue to use “epistemic” to retain emphasis on collective *knowledge* over belief. See Kay Mathiesen, *The Epistemic Features of Group Belief*, 2 *EPISTEME* 161, 161 (2006) (“For the purposes of epistemology the key question is whether groups can be knowers.”).

⁴²⁸ See generally Philip Pettit, *Groups with Minds of Their Own*, in *SOCIAL EPISTEMOLOGY: ESSENTIAL READINGS* 242 (Alvin I. Goldman ed. 2010) (describing collectively reasoning groups as “intentional subjects” and “institutional persons”).

⁴²⁹ See, e.g., Margaret Gilbert, *Modelling Collective Belief*, 73 *SYNTHESE* 185, 186 (1987); Anthony Quinton, *Social Objects*, 76 *PROC. ARISTOTELIAN SOC'Y* 1 (1975). Strands of methodological individualism that insist that the mental states of groups are reducible to those of constituent members are essentially summativist. See, e.g., Kenneth A. Schepsle, *Congress Is a “They,” Not an “It”: Legislative Intent as an Oxymoron*, 12 *INT'L REV. L. & ECON.* 239 (1992).

⁴³⁰ MARGARET GILBERT, *ON SOCIAL FACTS* 273 (1989).

⁴³¹ *Id.*; cf. Frederick F. Schmitt, *The Justification of Group Beliefs*, in *SOCIALIZING EPISTEMOLOGY: THE SOCIAL DIMENSIONS OF KNOWLEDGE* 270 (Frederick F. Schmitt ed. 1994).

⁴³² See, e.g., Kay Mathiesen, *The Epistemic Features of Group Belief*, 2 *EPISTEME* 161, 162 (2006) (“it is neither necessary nor sufficient for the members [of a group] to believe p in order for the group to believe that p”).

⁴³³ Alexander Bird, *When Is There a Group That Knows? Distributed Cognition, Scientific Knowledge, and the Social Epistemic Subject*, in *ESSAYS IN COLLECTIVE EPISTEMOLOGY* 44–45 (Jennifer Lackey ed. 2015).

⁴³⁴ *Id.* at 45. Bird cites Hutchins's sociological study of the navigation process of a large ship as an example of distributed cognition. See EDWIN HUTCHINS, *COGNITION IN THE WILD* 175–77 (1995). In that system, “[s]everal

member performs the same epistemic task and all possess the same knowledge, members of a distributed cognition group are nodes in a collective *epistemic system*,⁴³⁵ each of which makes a unique contribution to the generation of group knowledge. This connects the second relevant development: *systems oriented* social epistemology, which “examine[s] the [epistemic] systems in question to see whether its mode of operation is genuinely conducive to the specified epistemic ends,” and “would also identify alternative organizational structures that might be epistemically superior to the existing systems.”⁴³⁶ Bird suggests “the wider enterprise of science” as an example of a distributed epistemic model, but science is not the only system that this description fits.⁴³⁷

The institutional structure of the common law court is one that can be conceived as a system of distributed cognition. Figures 1 and 2 show schematics of the common law epistemic systems at the pretrial and trial stages.

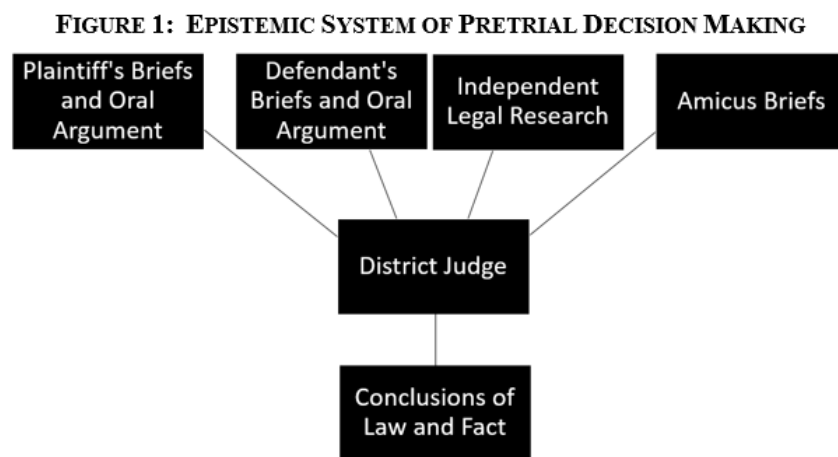


Figure 1 illustrates the pretrial system, in which all of the relevant inputs feed into the district court judge. The judge alone considers the parties’ briefs, her own (and her clerks’) independent research, and, in rare cases, any amicus briefs filed in the case, and then, drawing on her own legal expertise, produces a set of legal and, where appropriate, factual conclusions.⁴³⁸ Figure 1 omits certain complications—for example, magistrate judges may resolve non-dispositive motions or issue “reports and recommendations” on dispositive motions, but their actions are

crew members are given different landmarks whose bearings they are required to record and to communicate to a plotter who determines the ship’s position and course.” Bird, *supra* note 433, at 45. No single individual has direct access to all of the knowledge necessary to plot the ship’s position.

⁴³⁵ Goldman defines epistemic systems as “social systems [that] are to be studied in terms of their effects on epistemic outcomes.” Alvin Goldman, *A Guide to Social Epistemology*, in *RELIABILISM AND CONTEMPORARY EPISTEMOLOGY* 228 (Alvin I. Goldman ed. 2012).

⁴³⁶ *Id.* at 228–29.

⁴³⁷ Bird, *supra* note 433, at 48–51.

⁴³⁸ Judges do not “find facts” at the pretrial stage, but they *do* reach factual conclusions, for example by assuming the truth of the facts as stated in the complaint, see Fed. R. Civ. P. 12(b), or determining which facts are “material” and “undisputed” for purposes of summary judgment, see Fed. R. Civ. P. 56. Judges also determine facts as necessary to resolve motions in limine, discovery disputes, and other pretrial matters.

subject to review by the district judge.⁴³⁹ Likewise, the court may refer cases or issues to special masters for resolution, but only in “exceptional” circumstances and generally more readily for the calculation of damages than at the liability stage.⁴⁴⁰ Moreover, none of these ancillary officers can act in the absence of a grant of authority from the district court judge, who retains effective control over pretrial decision making.

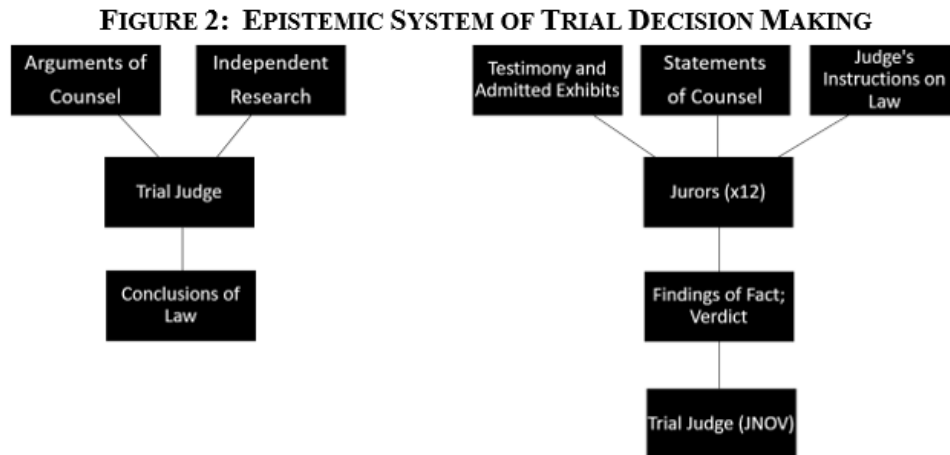


Figure 2 illustrates the distinct epistemic paths of decision making in a jury trial. Questions of law concerning the admissibility and sufficiency of evidence, the content of the jury instructions, and other legal matters are made by the trial judge on the basis of the parties’ objections, motions, and (occasionally) briefs as well as the judge’s independent research, while questions of fact, including at least the general verdict and at times specific findings in a special verdict, are made by the jurors on the basis of the testimony and exhibits introduced at trial, the arguments of counsel, and the judge’s legal instructions. Once again, the trial judge has full authority over all questions of law. The jury is responsible for finding facts and rendering a verdict; this does involve collective epistemic action, but each juror still acts essentially as an individual epistemic agent.⁴⁴¹ Finally, the trial judge retains authority to enter judgment as a matter of law either after the close of a party’s case or after the jury has returned a verdict if “a reasonable jury would not have a legally sufficient evidentiary basis to find for the party on that issue.”⁴⁴²

Goldman describes the F.B.I.’s failure to “connect the dots” between the knowledge its field agents had about 9/11 hijackers’ flight training and the agency’s control group in Washington, D.C. as “a gargantuan failure, a social-epistemic failure.”⁴⁴³ The courts’ failure, in countless cases across more than a century, to apply competently scientific expertise to the resolution of

⁴³⁹ See Fed. R. Civ. P. 72.

⁴⁴⁰ Fed. R. Civ. P. 53; see *La Buy v. Howes Leather Co.*, 352 U.S. 249 (1957); *Prudential Ins. Co. v. U.S. Gypsum Co.*, 991 F.2d 1080 (3d Cir. 1993); *Stauble v. Warrob*, 977 F.2d 690 (1st Cir. 1992); see also Part IV(B)(3), *infra* (discussing Article III limitations on delegation of decision making authority to scientific adjuncts).

⁴⁴¹ Unlike the ship’s crew in Hutchins’s study of navigation, individual jurors are not epistemically differentiated; each is given the same informational input and the same epistemic task. HUTCHINS, *supra* note 434, at 175–77.

⁴⁴² Fed. R. Civ. P. 50(a)(1); see *Everhart v. Bd. Of Ed. of Prince George’s County*, 660 Fed. App’x 228, 229–30 (4th Cir. 2016).

⁴⁴³ Alvin I. Goldman, *Group Knowledge Versus Group Rationality: Two Approaches to Social Epistemology*, 1 EPISTEME 11, 18 (2004).

legal disputes is likewise a “gargantuan” social-epistemic failure, and one that inflicts untold costs on litigants and the public interest. The cause in both cases is the same: the failure of an epistemic system inadequate to the task for which the institution applied it. The judicial process is one of distributed cognition within the institutional epistemic agent of the court, whereby constituent members contribute to *institutional* knowledge. So conceived, it is clear that the epistemic systems currently in place fail to produce epistemically valid results as applied to scientific expert testimony. But this shift in perspective creates an opportunity to move past the atomization trap that has impeded scholarly discussions for over a century. A focus on the *court*, rather than the judge or jurors in isolation, enables us to consider other modes of distributed cognition that may more effectively achieve the goals of intellectual due process.

2. Courts as Epistemic Agents: The Social Epistemological Solution to the Problem of Epistemic Competence

By reconceiving courts as institutional epistemic agents possessing internal systems of distributed cognition, we can avoid the atomization trap and apply the insights of classical epistemology and the sociology of scientific knowledge to solve the problem of epistemic competence. The *social epistemological solution* (SES) applies the social epistemological perspective to incorporate substantive scientific expertise into courts’ epistemic systems. The result is a collective epistemic agent that possesses both substantive expertise and legal authority, implementing the two hat model and thus satisfying the demands of intellectual due process.

Described at that level of generality, the SES could be implemented in countless ways, many of which would require drastic departures from existing institutional practice.⁴⁴⁴ For reasons of political viability as well as to preserve the values embedded in the existing institutional structure of the Anglo-American common law court, I attempt here to describe a method of implementing the SES that maintains as much of the existing institutional structure of the Anglo-American adversarial model as possible while establishing an epistemologically valid solution to the problem of epistemic competence. I propose the creation of a new division of the Administrative Office of the U.S. Courts, the Office of Scientific Adjuncts (OSA), staffed by individuals with at least “interactional” expertise in all of the major scientific domains that routinely come before the courts.⁴⁴⁵ The rules of evidence and procedure would be amended in two ways: first, to require parties to serve notice on the *court* of the identity of their expert witnesses within the same time frame set by the rules of civil and criminal procedure for party disclosures,⁴⁴⁶ and second, to provide that at least one scientific adjunct with expertise in each relevant scientific domain would be assigned to every case. The involvement of scientific adjuncts would be automatic and non-discretionary, and the assignment of scientific adjuncts—including the

⁴⁴⁴ For example, many scholars have proposed that the United States abandon the common-law adversarial system in favor of something akin to the inquisitorial system. See, e.g., Sevier, *supra* note 166, at 794–95. It may be the case that the inquisitorial system is epistemically superior to existing adversarial practices, but it is unlikely to be adopted in the foreseeable future.

⁴⁴⁵ Collins and Evans define interactional expertise as specialist expertise sufficient to engage in conversation on equal terms with other experts, but not to make new contributions to the discipline. COLLINS & EVANS, *supra* note 239, at 14.

⁴⁴⁶ Fed. R. Civ. P. 26(a)(2); Fed. R. Crim. P. 16(a)(1)(G).

determination of what substantive expertise is needed—would be made within the OSA by a manager possessing “referred” expertise.⁴⁴⁷ Thus, the “hats” of scientific expertise would be readily available in every case, as the OSA would have authority to retain additional experts on an *ad hoc* basis in cases involving atypical scientific domains in which no permanent staff had expertise.

The incorporation of scientific adjuncts into the epistemic system of a competent court must balance two competing concerns. The first is scientific expertise itself. The adjunct must have sufficient influence over the outcome of science-relevant decisions that her expertise may be attributed to the court as an institutional epistemic agent; she cannot be, in Brewer’s parlance, an extra-cameral advisor.⁴⁴⁸ At the same time, the process of legal decision making requires *legal* as well as scientific expertise.⁴⁴⁹ The legal expertise of the trial judge, who understands the rules of evidence, the nature of the case, and the “fit” between the scientific evidence and the substantive legal claims,⁴⁵⁰ is as essential to the competent resolution of legal questions involving the application or interpretation of scientific fact as is substantive scientific expertise. Thus, we must adopt an epistemic system that brings both forms of expertise to bear on the resolution of these questions, while also respecting the prerogatives of the jury as the ultimate finder of facts. The SES does so as follows. At the pretrial stage, scientific adjuncts would decide the issues of expert qualification and gatekeeping, subject to review for clear error by the trial judge. The parties’ *de facto* veto over review of expert qualifications and methods would be eliminated. Scientific adjuncts would review expert witnesses’ qualifications in all cases, and they would have broad authority to engage in *sua sponte* gatekeeping. Scientific adjuncts would also be given input into the scientific aspects of motions for summary judgment. Figures 3A-3C illustrate the modified epistemic system of the pretrial SES.

⁴⁴⁷ COLLINS & EVANS, *supra* note 239, at 15, 65-66 (referred expertise defined as “the use of expertise learned in one domain in another domain,” as by a manager of an interdisciplinary scientific project).

⁴⁴⁸ See *supra* note 416 and accompanying text.

⁴⁴⁹ I do not believe it necessary or practical to require that scientific adjuncts hold law degrees. On-the-job training in the legal procedures and doctrines relevant to their relatively narrow role should suffice.

⁴⁵⁰ See *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 592 (1993).

FIGURE 3A: PRETRIAL SES IN CASES NOT INVOLVING SCIENTIFIC EXPERT EVIDENCE



Figure 3A shows the implementation of the SES in cases not involving scientific expertise. It is identical to Figure 1 in that the trial judge serves as the sole authority of law and fact (again omitting such ancillary officers as magistrate judges and law clerks). Where scientific expertise is involved, however, the SES would implement a different epistemic system, as Figures 3B and 3C illustrate.

FIGURE 3B: PRETRIAL SES IN QUALIFICATION AND GATEKEEPING MOTIONS

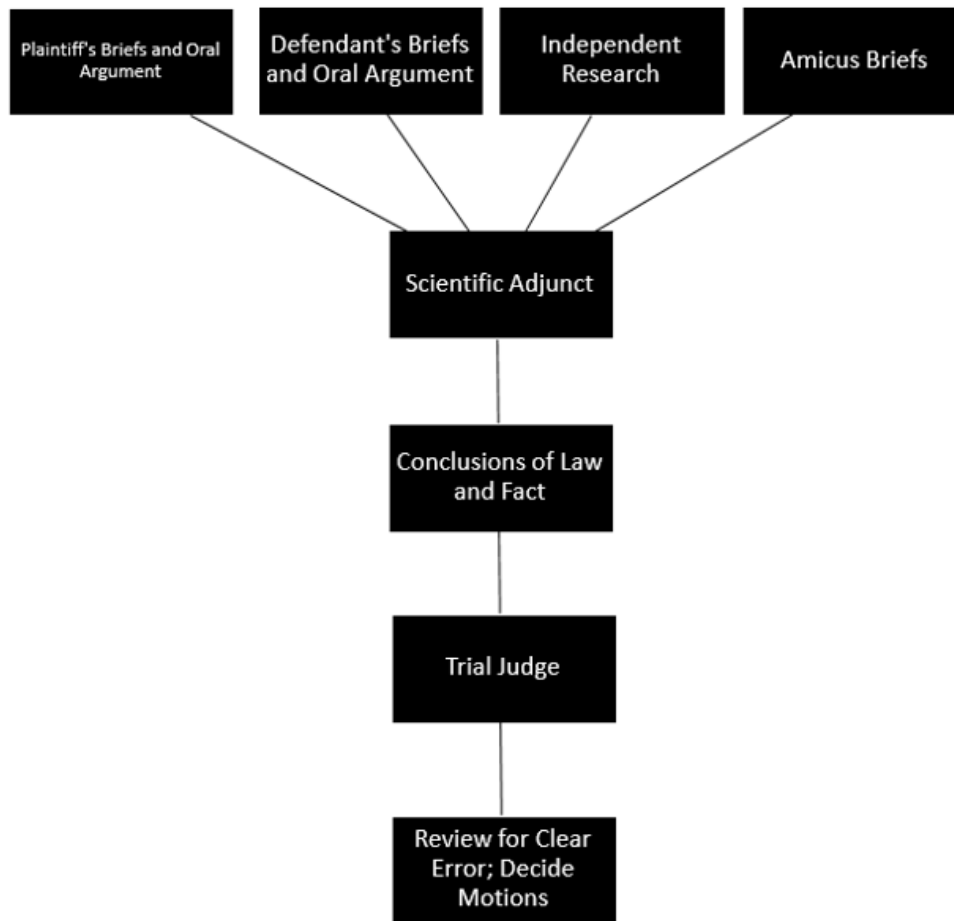


Figure 3B illustrates the epistemic system that the SES would implement for pretrial expert qualification and gatekeeping motions. All of the epistemic inputs in these motions would first pass to the scientific adjunct rather than the trial judge. This includes the parties' briefs, oral arguments, and, in the rare cases in which they are filed, amicus briefs.⁴⁵¹ Scientific adjuncts would have authority to conduct independent research and to base their decisions, as appropriate, on the results of such review. The trial judge would review that decision for clear error and either ratify or, where necessary, reverse the scientific adjunct's decision.

In the context of summary judgment motions, the technical expertise held by scientific adjuncts and the legal expertise held by trial judges are even more intertwined. Figures 3C-1 and 3C-2 illustrate the epistemic system that the SES would implement in summary judgment motions.

⁴⁵¹ Hearings on gatekeeping and expert witness qualification would require cooperation between the scientific adjunct and the trial judge. Hearings would be conducted by the trial judge. Scientific adjuncts would attend the hearings and have the opportunity to pose questions to counsel.

FIGURE 3C-1: PRETRIAL SES IN SUMMARY JUDGMENT MOTIONS (1)

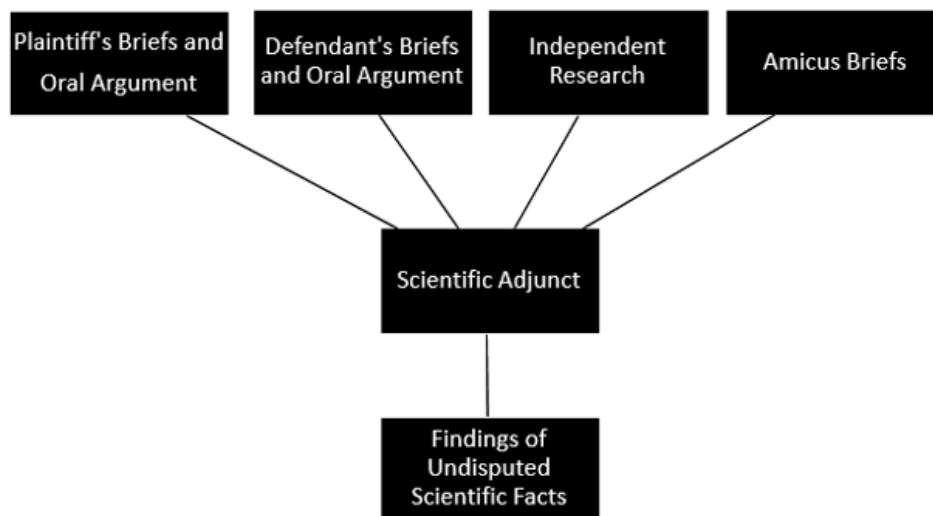
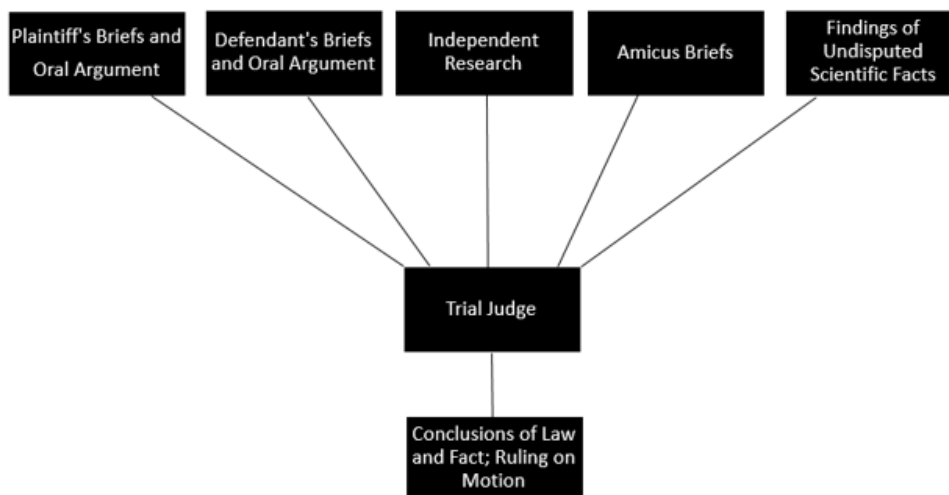


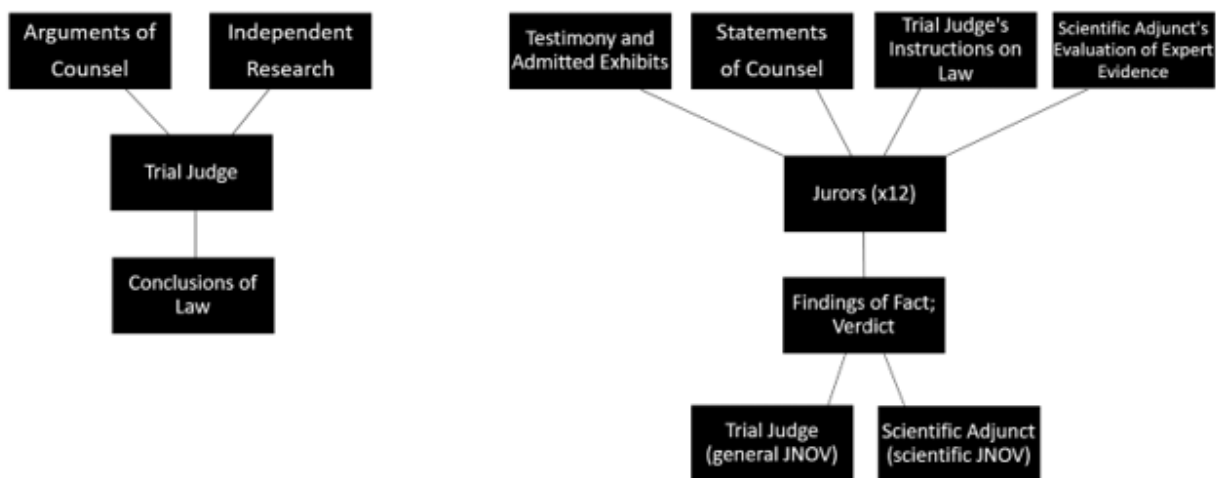
FIGURE 3C-2: PRETRIAL SES IN SUMMARY JUDGMENT MOTIONS (2)



As illustrated in Figure 3C-1, the scientific adjunct's role in summary judgment motions would be limited to determining whether scientific facts are material and genuinely disputed. The adjunct would make that decision on the basis of the parties' briefs, independent scientific research, and, where available, amicus briefs. If the scientific adjunct determines that genuine issues of material scientific fact preclude summary judgment, then the trial judge should deny the motion; otherwise, as illustrated in Figure 3C-2, the judge must consider the legal issues surrounding the Rule 56 motion in light of the undisputed scientific facts as the scientific adjunct found them.

The SES would also utilize scientific adjuncts' expertise at trial. Judges would make legal rulings on trial motions as under the existing system.⁴⁵² Parties would continue to present partisan experts,⁴⁵³ and factfinding authority would remain vested in the jury, but the scientific adjunct(s) assigned to the case would be required to present, subject to examination by both parties, their opinion of both experts' testimony, including opinions on the ultimate scientific facts. They would also have authority to overturn juries' verdicts in civil cases as contrary to scientific fact, a "scientific JNOV" analogous to district courts' authority under Federal Rule of Civil Procedure 50(b). Figure 4 illustrates the system of distributed cognition that the SES would implement at trial.

FIGURE 4: TRIAL SES



In short, the scientific adjuncts would be directly responsible for deciding the legal issues in the case pertaining to scientific evidence and for providing a neutral opinion to the factfinder as to how the partisan experts' testimony should be weighed.⁴⁵⁴ The result is a multi-node epistemic

⁴⁵² Because motions involving qualification and gatekeeping would be resolved at the pretrial stage, scientific adjuncts should not need to be involved in resolving trial motions. When parties move formally to recognize experts as qualified prior to their testimony at trial, such motions could be granted by the trial judge on a *pro forma* basis where the scientific adjunct has determined the expert to be qualified in pretrial proceedings.

⁴⁵³ Partly this is to maintain fidelity to the adversarial model, and partly because research has shown that adversarial presentation of expert testimony results in greater jury engagement than does the testimony of court-appointed experts alone. Brekke et al., *supra* note 367. Moreover, maintaining the jury as the ultimate finder of fact preserves what Froeb and Kobayashi refer to as the "Hayekian" advantages of imperfect decentralized decision makers. Froeb and Kobayashi, *supra* note 366, at 259. At the same time, reforms to the epistemic system of jury deliberations, perhaps of the sort recommended by Myers et al., are compatible with the SES and could be adopted as supplemental measures to further improve the courts' epistemic system. See Myers et al., *supra* note 362, at 154–56.

⁴⁵⁴ To be sure, the distinction between "scientific" and other evidence will be in some cases unclear. This is true in two senses: first, because the scientific adjunct regime applies to "scientific" but not "technical" or "other specialized" evidence, not all expert witnesses will trigger the involvement of a scientific adjunct. Adjudicating the distinction between "science" and other forms of specialized knowledge will require courts to face the tricky problem of demarcation, which has proven challenging to generations of philosophers of science. Second, the line between the "scientific" facts of a specific case and the "general" facts may at times be murky, resulting in a lack of clarity as to whether the trial judge or the scientific adjunct has authority to enter a JNOV. As to the former problem, I would trust the appellate process to reach workable, if theoretically unsatisfying, solutions to the problem of

system in which every decision is made by an individual with expertise in the appropriate domain—the domain of law for the legal matters decided by the judge, and the relevant scientific domain for scientific questions decided by scientific adjuncts.

To be sure, this brief sketch of the SES leaves many details unresolved. How many scientific adjuncts should be assigned to a case? What restrictions, if any, on *ex parte* communications between the scientific adjunct and the trial judge should exist? How will the court distinguish between *scientific* questions, where the involvement of scientific adjuncts would be required, and “other technical” matters, in which it would not be? I take no position on which of the conceivable permutations of the SES is the optimal one; that decision involves budgetary, logistical, and political factors beyond the scope of our epistemological focus. So long as the essential criteria outlined above are satisfied, the problem of epistemic competence is resolved. The next section will discuss a few of the most salient objections or critiques of the SES and argue that the system, while representing a significant departure from the traditional epistemic system of the common law court, is a constitutionally and normatively viable one.

3. Critiques and Objections

The sketch of the SES above is somewhat sparse insofar as I am concerned with only a single feature: the incorporation of scientific expertise into the epistemic system of the court. I nevertheless will address a few objections that might be raised against it. The list of objections below is by no means exhaustive, and my responses are necessarily brief. They are intended both to acknowledge the tradeoffs implicit in the SES and also to argue that the SES’s approach to creating epistemic competence is at least normatively and logistically plausible.

a. Is the SES Constitutional?

The SES involves the reallocation of decision making authority from the trial judge to a judicial officer—the scientific adjunct—who does not enjoy Article III status.⁴⁵⁵ The constitutional limit of delegation to non-Article III decision makers is a complex area of law, and a full analysis of the SES’s constitutional prospects would require a lengthier inquiry than space permits here. This section will make the case that most of the authority that the SES would allocate to scientific adjuncts can be plausibly analogized to tasks already performed by other non-Article III decision makers and that the allocation is justifiable when “assessed by reference to the purposes underlying the requirements of Article III.”⁴⁵⁶ To the extent the SES requires some expansion of existing precedent, it is justified by demonstrated necessity, the control that Article III judges and jurors continue to have over most dispositive issues, and by the fact that the SES

demarcation as it generally does with other philosophical conundrums that courts must resolve in the course of deciding cases. As to the latter problem, it may be necessary to adopt strategies for more clearly illuminating the jury’s factfinding processes if review of those processes is to be allocated by subject matter to more than one authority. For example, expanded use of special verdict forms could allow judges and scientific adjuncts to examine with greater specificity the epistemic path by which a jury’s verdict is reached. A process of trial and error, subject to appellate review, will no doubt be necessary to resolve unforeseen logistical details as scientific adjuncts are integrated into the legal process.

⁴⁵⁵ U.S. CONST. Art. III, § 1.

⁴⁵⁶ *CFTC v. Schor*, 478 U.S. 833, 847 (1986).

would not represent a congressional effort to “emasculat[e]” the federal courts,⁴⁵⁷ but rather an effort to improve the quality and legitimacy of their decision making process.

Several types of non-Article III officials are constitutionally permitted to participate in the adjudicative process. Special masters,⁴⁵⁸ magistrate judges,⁴⁵⁹ bankruptcy judges,⁴⁶⁰ and administrative agencies⁴⁶¹ all exercise authority to resolve disputes cognizable in Article III courts. Broadly speaking, the constitutional evaluation of non-Article III decision making turns on two interests: the personal interest in having claims resolved by an Article III adjudicator and the structural interest of “barring congressional attempts ‘to transfer jurisdiction for the purpose of emasculating’ constitutional courts and thereby prevent[ing] ‘the encroachment or aggrandizement of one branch at the expense of the other.’”⁴⁶²

Like most personal rights, the right to an Article III adjudicator is subject to waiver. Consent of the parties to the adjudication of claims by a non-Article III decision maker has been deemed sufficient in many contexts to mitigate any constitutional concerns with that arrangement.⁴⁶³ In the case of the SES, however, waiver cannot solve any Article III concerns because consent of the parties to the involvement of a scientific adjunct is not required. A consent requirement would allow parties relying on weak scientific evidence to veto a more competent gatekeeper in favor of a less competent one. On the other hand, the consent of the parties is unnecessary for the adjudication by magistrate judges of non-dispositive pretrial motions; trial judges may refer such motions without consent of the parties for decision by magistrate judges subject to review under the deferential “clearly erroneous” standard.⁴⁶⁴ Expert qualification and gatekeeping are non-dispositive motions, and while motions for summary judgment are dispositive in principle, scientific adjuncts could not directly dispose of a case; they could only direct that such a motion be *denied*.⁴⁶⁵ At the trial stage, scientific adjuncts’ testimony is analogous to the testimony already permitted by a court-appointed expert under FRE 706. The authority of the scientific adjunct to enter a scientific JNOV is potentially dispositive, but the use of such authority would presumably be rare, and this abridgement of the personal right to adjudication by an Article III judge is plausibly justified by the improvement in reliability and rationality of decisions.

⁴⁵⁷ *Wellness Int’l Network, Ltd. v. Sharif*, 135 S. Ct. 1932, 1944 (2015).

⁴⁵⁸ *See* Fed. R. Civ. P. 53; *see also* *Milik v. Sec. of Health & Hum. Serv.*, 822 F.3d 1367 (Fed. Cir. 2016); *H.L. on Behalf of A.I. v. Sec. of Health & Hum. Serv.*, 129 Fed. Cl. 165 (2016).

⁴⁵⁹ *See* 28 U.S.C. § 636; *U.S. v. Raddatz*, 447 U.S. 667 (1980).

⁴⁶⁰ 28 U.S.C. 157; *cf. Wellness Int’l*, 135 S. Ct. at 1932; *Stern v. Marshall*, 564 U.S. 462, 484 (2011); *Northern Pipeline Constr. Co. v. Marathon Pipe Line Co.*, 458 U.S. 50, 84 (1982).

⁴⁶¹ *See, e.g., Schor*, 478 U.S. at 850–51 (1986).

⁴⁶² *Wellness Int’l*, 135 S. Ct. at 1944 (quoting *Schor*, 478 U.S. at 850).

⁴⁶³ *See Wellness Int’l*, 135 S. Ct. at 1947; *Schor*, 478 U.S. at 855; *cf. Stern*, 131 S. Ct. at 2614; *Northern Pipeline*, 458 U.S. at 80 n.31 (plurality opinion), 91 (Rehnquist, J., concurring); *compare Gomez v. United States*, 490 U.S. 858 (1989) (Article III violated where magistrate judge supervised voir dire in felony trial without defendant’s consent) *with Peretz v. U.S.*, 501 U.S. 923, 932 (1991) (Article III not violated where defendant consented to magistrate judge’s supervision of felony voir dire).

⁴⁶⁴ 28 U.S.C. § 636(b)(1)(A); Fed. R. Civ. P. 72(a); *see Raddatz*, 447 U.S. at 673.

⁴⁶⁵ Scientific adjuncts could not directly *grant* a motion for summary judgment; in the event that the scientific adjunct determines that all material issues of scientific fact are undisputed, the trial judge would consider those scientific facts alongside the non-scientific facts and applicable legal doctrines in deciding the motion.

Turning to the structural interest, a principal factor in legitimizing the delegation of authority to non-Article III actors has been the discretionary reference and oversight of the ancillary decision maker.⁴⁶⁶ Here, too, the SES is something of a departure from that norm. Involvement of scientific adjuncts would be non-discretionary, and assignment of adjuncts would be handled by the OSA rather than the trial judge. This arrangement is necessary to preserve the integrity of the SES's epistemic system. Experience with FRE 706 and state court equivalents has shown that judges rarely exercise their discretion to appoint neutral experts.⁴⁶⁷ If the SES is to be effective, it cannot rely on judicial discretion for implementation. However, the trial judge does retain substantial control over case-dispositive decisions under the SES. As noted above, most of the scientific adjunct's work—deciding expert qualification and gatekeeping motions, determining the undisputed scientific facts in summary judgment motions, and offering opinion testimony at trial—is non-dispositive. The standard of review for non-dispositive motions is the same under the Federal Magistrate Act and the SES;⁴⁶⁸ in both cases, the trial judge defers to the magistrate judge's or scientific adjunct's decision unless it is clearly erroneous or contrary to law (as, for example, might be the case if the scientific adjunct misapplies the *Daubert* standard). The trial judge's authority over dispositive motions, including the decision to grant a motion for summary judgment, is disturbed only insofar as the scientific adjunct would have authority to enter a scientific JNOV. Finally, the scientific adjunct's decisions in all areas would remain subject to appellate review by Article III judges under the same standard of review as a decision made by the trial judge.⁴⁶⁹

We also must consider the SES's purpose and its relationship between Article III and subsequent amendments, specifically the Due Process Clauses of the Fifth and Fourteenth Amendments. The SES is not an attempt to “emasculat[e]” the federal courts, but rather to facilitate their mission to deliver substantive justice and procedural due process.⁴⁷⁰ If we take seriously the concept of intellectual due process,⁴⁷¹ then Article III's limitations on the reallocation of judicial power must be interpreted to comport with the demands imposed on the judicial process by subsequent amendments. If, as the epistemological and sociological analyses surveyed above have demonstrated,⁴⁷² the existing system is incapable of interpreting and applying scientific expert testimony in a manner that satisfies intellectual due process, then Article III might be deemed

⁴⁶⁶ See *Wellness Int'l*, 135 S. Ct. at 1944; *Peretz*, 501 U.S. at 937; *Schor*, 478 U.S. at 855.

⁴⁶⁷ See Stephanie Domitrovich, Mara L. Merlino & James T. Richardson, *State Trial Judge Use Of Court Appointed Experts: Survey Results And Comparisons*, 50 JURIMETRICS J. 371 (2010); FEDERAL JUDICIAL CENTER, COURT-APPOINTED EXPERTS: DEFINING THE ROLE OF EXPERTS APPOINTED UNDER FEDERAL RULE OF EVIDENCE 706 (1989); Tahirih V. Lee, *Court-Appointed Experts And Judicial Reluctance: A Proposal To Amend Rule 706 Of The Federal Rules Of Evidence*, 6 YALE L. & POL'Y REV. 480 (1988).

⁴⁶⁸ See 28 U.S.C. § 636(b)(1)(A).

⁴⁶⁹ Cf. *H.L. Behalf of A.I. v. Secretary of Health and Human Services*, 129 Fed. Cl. 165, 176 (2016) (adjudication by special master and Article I court does not deprive petitioners of right to Article III adjudicator where “Petitioners may appeal this decision to the United States Court of Appeals for the Federal Circuit.”).

⁴⁷⁰ *Wellness Int'l*, 135 S. Ct. at 1944. Measures should undoubtedly be taken in the appointment of scientific adjuncts to insure their independence and insulation from political influence. These details are indisputably important to the effective functioning of the SES, but I leave them for later consideration.

⁴⁷¹ See *infra* Part IV(B)(3)(ii).

⁴⁷² See *supra* Part III(B).

amended by the Due Process Clauses to the extent necessary to implement an epistemic system capable of doing so.⁴⁷³

To be sure, the SES does not fit perfectly into existing precedents permitting delegation to ancillary officers. Nevertheless, much of the scientific adjuncts' authority would be comparable to that of the non-Article III decision makers recognized as constitutional under existing law. To the extent that the SES relies less on the consent of the parties or the discretion of the trial judge, it does so for the purpose of vindicating weighty due process concerns, not for the purpose of undermining the independence of Article III courts. The Article III objections to the SES are not frivolous and a full constitutional defense would involve a lengthier analysis than is possible here, but plausible normative and constitutional arguments exist for extending existing precedents to permit the epistemic system contemplated by the SES.

b. Is the SES Too Costly?

Wouldn't the addition of a new group of highly educated, and concomitantly highly paid, scientific professionals to the judicial process impose a substantial cost on an already financially strained judicial system? Yes, it would.⁴⁷⁴ How, in these times of stretched budgets and overburdened taxpayers, can we entertain the idea of imposing a new financial burden onto the court system?

The short answer is that due process may demand it. Brewer does not offer a lengthy doctrinal analysis in support of an argument that the Fifth or Fourteenth Amendments contain an intellectual due process component. A full analysis is beyond the scope of this dissertation as well, but I offer some brief observations in support of the premise that epistemic competence is a necessary component of procedural due process. The leading case on procedural due process is *Mathews v. Eldridge*,⁴⁷⁵ in which the Court

emphasized that three factors should be considered in determining whether the flexible concepts of due process have been satisfied: (a) the private interests implicated; (b) the risk of an erroneous determination by reason of the process accorded and the probable value of added procedural safeguards; and (c) the public interest and administrative burdens, including costs that the additional procedures would involve.⁴⁷⁶

⁴⁷³ Cf. *Seminole Tribe of Florida v. Florida*, 517 U.S. 44, 65-66 (1996); *Fitzpatrick v. Bitzer*, 427 U.S. 445, 454 (1976).

⁴⁷⁴ Without denying that the SES would likely result in a net increase in costs of operating the court system, we should consider the mitigating effects that a more effective system would produce. Improving the epistemic competence of judicial decision making by incorporating expertise into judicial institutions would increase predictability of outcomes, allowing parties to disputes to negotiate "in the shadow of the law" with greater confidence, thus avoiding at least some lawsuits that would be filed under the current system. See Robert H. Mnookin & Lewis Kornhauser, *Bargaining in the Shadow of the Law: The Case of Divorce*, 88 YALE L.J. 950 (1979).

⁴⁷⁵ 424 U.S. 319 (1976).

⁴⁷⁶ *U.S. v. Raddatz*, 447 U.S. 667, 677 (1980); see *Nelson v. Colorado*, 137 S. Ct. 1249 (2017).

While we lack specific information on the cost of the SES—which would partly depend on details of its implementation to which we are epistemologically indifferent—we can say that the first two factors weigh heavily in favor of the SES over the status quo. Thus, at least, the cost of the SES would need to be quite high to justify rejecting it under the *Mathews* test.

The principal private interest at stake—shared by all parties to litigation—is the rational evaluation of scientific evidence. This is an interest that cuts across nearly all types of cases—the interest, in the criminal justice system, of the rational interpretation of forensic evidence;⁴⁷⁷ in toxic torts, of reliable assessment of general causation; in securities fraud, of rational evaluation of loss causation and damages, to name but a few. This is an interest of enormous importance, second perhaps only to courts’ most fundamental function of nonviolent dispute resolution. But parties desire more than a mere resolution from courts; only a certain *type* of resolution is acceptable. Thus, the process by which the court adjudicates legal disputes is of central importance to the legitimacy of case outcomes.⁴⁷⁸ If this were not so—if the *rationality* of a court’s adjudicatory process were not of essential importance—then courts could save resources simply by deciding each case by flipping a coin. Coin flips are an acceptable decision making process where the normative stakes are low. We use them to decide what to have for dinner, which movie to see, perhaps even where to go on vacation. They are extremely cheap and do carry a certain normative legitimacy, as a paradigmatic example of what Rawls called “pure procedural justice.”⁴⁷⁹ But no one would argue that courts should decide cases by flipping coins. They are, in Brewer’s parlance, “epistemically arbitrary,”⁴⁸⁰ and thus fail to address the parties’ interest in a rational adjudicatory process.

Indeed, the second prong of the *Mathews* test, the risk of “erroneous” determination under existing procedures,⁴⁸¹ presupposes the parties’ valid interest in a rational adjudicatory process. The very concept of “error” implies both the existence of a correct answer and a normative commitment to finding it.⁴⁸² As discussed in Part III, the risk of an erroneous determination under existing procedures is quite high.⁴⁸³ Brewer compares the status quo to a literal coin

⁴⁷⁷ As applied to criminal procedure, the question whether procedural due process requires an epistemically competent adjudicator would be evaluated under the standard set forth in *Medina v. California*, 505 U.S. 437 (1992), rather than the *Mathews* test. In *Medina*, the Court held that a state’s decision in matters of criminal procedure is “not subject to proscription under the Due Process Clause unless it offends some principle of justice so rooted in the traditions and conscience of our people as to be ranked as fundamental.” *Id.* at 445 (quoting *Patterson v. New York*, 432 U.S. 197, 202 (1977)). Space does not permit a lengthy application of the *Medina* test; however, I would contend, with Brewer, that the non-arbitrary evaluation of evidence is fundamental to any reasonable conception of justice. It is surely as “fundamental” as the presumption of innocence. See Nelson, 137 S. Ct. at 1256 n.9.

⁴⁷⁸ See, e.g., TOM R. TYLER, *WHY PEOPLE OBEY THE LAW* (1990).

⁴⁷⁹ JOHN RAWLS, *A THEORY OF JUSTICE* 74–75 (rev’d ed. 1999); cf. Enda Ullman-Margalit & Sidney Morgenbesser, *Picking and Choosing*, 44 SOC. RES. 757, 769–70 (1977) (describing the coin flip as a “picking situation *par excellence*”).

⁴⁸⁰ Brewer, *supra* note 233, at 1539.

⁴⁸¹ *Mathews v. Eldridge*, 424 U.S. 319, 335 (1976); cf. *Nelson*, 137 S. Ct. at 1255.

⁴⁸² See, e.g., *In re Japanese Elec. Prods. Antitrust Litig.*, 631 F.2d 1069, 1084 (3d Cir. 1980) (“A jury that cannot understand the evidence and the legal rules to be applied provides no reliable safeguard against erroneous decisions.”)

⁴⁸³ See *supra* Part III(C); cf. Part IV(B)(2).

flip,⁴⁸⁴ and empirical studies demonstrate that courts' current epistemic systems are inadequate to reliably interpret and apply scientific expertise to the resolution of legal disputes.⁴⁸⁵ Thus, the second prong also weighs heavily in favor of recognizing the SES as a procedural due process requirement.

c. Do Neutral Experts Exist?

The SES would diminish the influence of partisan experts on the judicial interpretation of scientific evidence. While parties would still retain partisan experts and the ultimate determination of scientific facts would remain with the lay factfinder, the intended effect of scientific adjuncts' presentation of their opinion of the partisan experts' testimony would be to influence the factfinder's evaluation of the partisans' claims.

We must acknowledge, however, that reducing partisanship is not a panacea. As several commentators have noted, advocates of non-partisan experts often assume too much about the ability of "settled" science to provide determinate answers to factual questions of legal interest.⁴⁸⁶ Scientific knowledge is necessarily tentative and probabilistic under even the best conditions, and litigation rarely provides the best conditions. Litigation often raises questions at the edge of human knowledge, and in a context far less suited to produce reliable knowledge than the process of peer review, publication, and criticism through which scientific consensus is constructed in the academic environment. It is thus unsurprising that ample room for reasonable disagreement exists around much scientific evidence prepared for litigation. Mnookin and Jasanoff voice legitimate concerns that a preoccupation with "non-partisan" expertise may result in concealing the range of legitimate interpretive disagreement around tentative research.⁴⁸⁷ Thus, proposals for reform must provide a space for the expression of genuine uncertainty; they must avoid fostering a false confidence around knowledge that is quite often tentative and provisional.

At the same time, Mnookin overstates her case when she suggests that "those who call for neutral experts... at least partly misunderstand the nature of scientific disputes."⁴⁸⁸ This is so, she claims, because "whenever there is a legitimate scientific disagreement at issue in a legal case, a neutral expert would either mask a legitimate dispute or else be unable to offer 'those general truths, applicable to the issue, which they may treat as final and decisive,' for which Learned Hand and others have long craved."⁴⁸⁹ Mnookin's critique conflates imprecision in scientific estimation arising from *bias* with that arising from *uncertainty*. Mnookin is correct that some measure of uncertainty—random error—surrounds all empirical inference. Inductive logic is necessarily probabilistic; scientific knowledge is always subject in principle to revision or

⁴⁸⁴ Brewer, *supra* note 233, at 1670-71.

⁴⁸⁵ See *supra* Part III(C).

⁴⁸⁶ See Mnookin, *supra* note 253, at 1021-22, 1026; JASANOFF, *supra* note 273, at 211-15; GOLAN, *supra* note 251, at 3.

⁴⁸⁷ Mnookin, *supra* note 253, at 1021-22, 1026; JASANOFF, *supra* note 273, at 211-15.

⁴⁸⁸ Mnookin, *supra* note 253, at 1027.

⁴⁸⁹ *Id.* at 1027 (quoting Hand, *supra* note 251, at 55).

even outright rejection in light of additional evidence.⁴⁹⁰ But it is possible to acknowledge uncertainty while mitigating *bias*—systemic error—in the presentation of expert knowledge to the court.⁴⁹¹

While uncertainty is intrinsic to the logic of scientific empiricism,⁴⁹² bias is not. Uncertainty in empirical estimation can arise from any number of specific sources, but fundamentally it is a consequence of the finitude of human experience. Our empirical beliefs reflect our best judgments about the nature of reality given the evidence available to us. The whole of the universe can never be observed; our inferences are thus inevitably based upon a comparatively few sample observations projected onto the entirety.⁴⁹³ Bias, on the other hand, is a wholly contingent and in principle correctable source of error, and the biasing effect of partisanship is well understood. This is not to say that all experts consciously frame their scientific assessment to support the legal claim of their client—though that does happen⁴⁹⁴—but motivated reasoning and implicit bias are well-documented sources of biased reasoning, and there is little reason to think that expert witnesses are immune from those phenomena.⁴⁹⁵ Thus, the elimination of partisan *bias* would improve courts’ capacity to interpret scientific evidence, notwithstanding the fact that the *uncertainty* intrinsic to inductive inquiry would persist.

As to the problem of uncertainty, the professional norms of the Office of Scientific Adjuncts could mitigate the problem, but not eliminate it. Scientific adjuncts should recognize their professional role as bringing the perspective of their scientific discipline to the resolution of legal disputes. This includes maintaining fluency with advances in the field and with the range of mainstream opinion within the discipline. To the extent that questions of methodology or substance remain controversial within the domain, that uncertainty should be conveyed to the

⁴⁹⁰ Stephanie Tai, *Uncertainty about Uncertainty: The Impact of Judicial Decisions on Assessing Scientific Uncertainty*, 11 U. PENN. J. CONST. L. 671, 676 (2009); see generally NATE SILVER, *THE SIGNAL AND THE NOISE: WHY SO MANY PREDICTIONS FAIL—BUT SOME DON’T* (2015); DAVID HUME, *AN ENQUIRY CONCERNING HUMAN UNDERSTANDING* (Peter Millican ed., 2008); CARL SAGAN, *THE DEMON-HAUNTED WORLD: SCIENCE AS A CANDLE IN THE DARK* (1997); KUHN, *supra* note 320.

In quantitative empiricism, uncertainty is reflected in the “confidence interval,” the range of values within which some percentage (often 95%) of data sets will contain the population value. See JEFFREY M. WOOLDRIDGE, *INTRODUCTORY ECONOMETRICS* 138–40 (4th ed. 2009). The confidence interval is a quantitative formalization of the uncertainty inherent in all empirical inference.

⁴⁹¹ DAVID FREEDMAN, ROBERT PISANI & ROGER PURVES, *STATISTICS* 103–04 (4th ed. 2007). That bias rather than uncertainty is the principal type of error with which the critics of partisanship are concerned is clear in the literature. See, e.g., GOLAN, *supra* note 251, at 81, 96, 108, 110–11, 136; Mnookin, *supra* note 233, at 772–75; Gross, *supra* note 398, at 1115; Hand, *supra* note 251, at 53.

⁴⁹² See Saks and Faigman, *supra* note 64, at 158–59.

⁴⁹³ Even in those rare instances in which all instances of a phenomenon are observed, we *still* are projecting onto the unknown insofar as we predict the occurrence of future events on the basis of presently observed regularities. This is the essence of Hume’s “problem of induction.” See generally HUME, *supra* note 490; POPPER, *supra* note 447.

⁴⁹⁴ See, e.g., FISHER, *supra* note 260, at 225. Moreover, the adversarial system encourages selection bias, permitting parties to present the testimony of a qualified expert who may represent a small minority of the scientific community. See Vidmar and Diamond, *supra* note 362, at 1133 & n.37 (citing studies).

⁴⁹⁵ See generally Dan Kahan, *Ideology, Motivated Reasoning, and Cognitive Reflection*, 8 JUDGMENT & DECISION MAKING 407 (2013); Avani Mehta Sood, *Motivated Cognition in Legal Judgments: An Analytic Review*, 9 ANN. REV. L. & SOC. SCI. 307 (2013).

court itself. Scientific adjuncts should view their role not as partisans for a particular school of thought within the domain, but rather as defining the full spectrum of mainstream perspectives within the domain as epistemically reasonable. Moreover, to the extent scientific adjuncts' evaluations remain influenced by their adherence to schools of thought within a scientific domain, this diversity of perspective is both inevitable and accepted in other contexts. Judges themselves, as legal experts, are often committed to particular, non-universal schools of legal interpretation—the controversy between originalist and living constitutionalist schools of constitutional interpretation is but one high-profile example. Judges' commitments to these idiosyncratic philosophies of judges can even be dispositive of some cases, and yet we generally accept these disagreements as being within the scope of legitimate variation of theories of judging. The same must be true of scientific adjuncts—they, like judges, must confine their reasoning to settled knowledge in “easy” cases as to which no professional disagreement exists, should adopt norms of neutrality among recognized schools of thought within their domain, and yet must also be given some intellectual autonomy to be influenced by their own views as to the correct modes of scientific thinking.

V. Conclusion

This chapter has surveyed the problem of epistemic competence in the somewhat dry terms of the literatures with which it has engaged, but the problem is neither dry nor academic: criminal defendants are at risk of wrongful conviction and civil plaintiffs are at risk of uncompensated injury because our system of dispute resolution is not up to the task of evaluating scientific evidence in a reliable way. The full scope of that problem is impossible to quantify, but given the prevalence of expert evidence across so many areas of litigation, there is every reason to believe that the costs are substantial. This failure is directly attributable to the court's epistemic system—that is, the institutional design that places full authority over legal questions in the hands of a single, scientifically untrained judge, and authority over factfinding to a lay jury.

Recent developments in epistemology and the sociology of scientific knowledge converge on the same conclusion: competent judgments on matters pertaining to scientific expertise can be made only by those who possess substantive expertise in the scientific domain. Brewer took us this far, but his prescription, like that of a century of commentators before him, was constrained by the individualist epistemological paradigm that has dominated the conversation. Seeing only individual judges and jurors as epistemic agents, Brewer's “two hat” solution would effectively require generalist judges to possess substantive expertise in *every* scientific domain that comes before the court. Such a demand is impossible, and Brewer avoided it only by avoiding detailed prescriptions for implementing the two hat solution and reliance on solutions such as extra-cameral advisors that his own epistemological analysis recognized as inadequate.

A workable solution to the problem lies in discarding the individualist epistemological paradigm for a collectivist one. The social epistemological perspective considers the *court*, not the individual judge or jurors, as the principal epistemic agent, and asks how scientific expertise might be incorporated into the judicial process at the level of institutional knowledge. Adopting that perspective, I describe a system of distributed cognition, the *Social Epistemological Solution*, that would solve the problem of epistemic competence by dividing legal authority on

matters of scientific expertise between scientific experts and the trial judge. Much like the navigation of a ship, the SES would facilitate the competent application of scientific knowledge to the resolution of legal disputes by dividing the larger epistemic task into smaller pieces, each assigned to a judicial officer with the requisite expertise. The ultimate effect is that the individual scientific adjunct's expertise becomes *institutional* expertise.

We should, however, not confuse a workable solution for an easy one. Even attempting to preserve as much of the existing adversarial system as possible, the SES would require a substantial departure from existing norms, which vest ultimate authority over all legal decisions with the trial judge and factfinding authority with the jury. In addition to raising political and possibly constitutional challenges, we should carefully consider whether such a departure is ultimately desirable in light of the broader normative goals of the judicial system. At the same time, the existing process results in arbitrary and unpredictable decision making that calls into question the legitimacy of the judicial system and imposes incalculable harm on litigants. Maintaining the status quo is not a viable option. If the institutional changes necessary to create institutions capable of evaluating scientific evidence in a rational way prove politically or logistically infeasible, then we must reevaluate the institutional mission of judicial institutions to better comport with their existing epistemic capacities.

Chapter 4

Public Reason and Political Legitimacy in Legal Factfinding: The Case of Legal Challenges to Mandatory Vaccination Policies

The last two chapters have examined methodological problems in the construction of legal knowledge: Chapter 2 examined the extent to which double standards between judge and jury decision making are justified by empirical evidence of cognitive differences between judges and laypersons, while Chapter 3 considered how generalist courts might be reformed to improve their epistemic competence to engage with scientific evidence. This chapter will move from the methodological to the normative, by considering whether, and under what circumstances, the problems of legitimacy of state action created by widespread public disagreement on matters of empirical fact might be resolved. In other words, when, and under what circumstances, can the force of law be applied to coerce compliance with some policy grounded in a controversial empirical viewpoint consistently with the moral duties owed members of the political community by the state?

Contemporary society is marked by a remarkable divergence of belief concerning matters of “objective” fact. Many policy debates are characterized by disagreement not only about questions of normative value, but also about issues of empirical fact that seem to defy resolution. Significant disagreement persists, to name but a few examples, regarding the extent to which anthropogenic carbon dioxide emissions contribute to climate change,⁴⁹⁷ the ability of fetuses to feel pain when undergoing abortion,⁴⁹⁸ and the safety of genetically modified organisms for human consumption and for the environment.⁴⁹⁹ Even the existence of a relatively stable consensus of expert opinion on these questions is insufficient to resolve the matter to the satisfaction of some groups, which adhere to dissenting views notwithstanding the agreement of experts.

This proliferation of disagreement on matters of empirical fact, which I will refer to as “epistemic pluralism,” is not a transitory or contingent phase of social development, but is an intrinsic feature of a liberal political culture and a necessary outcome of the operation of free institutions. Drawing upon John Rawls’s work on political liberalism, in which Rawls argued that pluralism of *normative* belief is an inevitable feature of a liberal society and examined the implications of that pluralism for the legitimacy of law in a liberal democratic state,⁵⁰⁰ I will argue that epistemic pluralism is also endemic to liberal democratic society and raises many of the same questions concerning the legitimacy of coercive state action. If, as Rawls claims, legitimacy is undermined when the apparatus of the state is used to impose upon an individual some policy grounded in a normative, or, in Rawls’s terminology, “comprehensive” view that she cannot reasonably accept, does the same illegitimacy arise when the dissenter’s objection

⁴⁹⁷ Compare e.g., U.S. GLOBAL CHANGE RESEARCH PROGRAM, CLIMATE CHANGE IMPACTS IN THE UNITED STATES: THE THIRD NATIONAL CLIMATE ASSESSMENT (2014); INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT (2007), http://www.ipcc.ch/publications_and_data/ar4/syr/en/main.html, with Editorial, *Rigging a Climate “Consensus,”* WALL ST. J., November 28, 2009, <http://online.wsj.com/news/articles/SB10001424052748703499404574559630382048494>.

⁴⁹⁸ Pam Belluck, *Complex Science at Issue in Politics of Fetal Pain*, N.Y. TIMES, September 16, 2013, <http://www.nytimes.com/2013/09/17/health/complex-science-at-issue-in-politics-of-fetal-pain.html>.

⁴⁹⁹ See, e.g., Editors, *Labels for GMO Foods are a Bad Idea*, 309 SCI. AM. 10 (2013); Michael Pollan, *The Year In Ideas: A to Z; Genetic Pollution*, N.Y. TIMES MAGAZINE (Dec. 9, 2001).

⁵⁰⁰ See JOHN RAWLS, POLITICAL LIBERALISM (1993).

rests not on a comprehensive viewpoint but rather on an empirical claim? If so, how might legislatures, courts, and administrative agencies, all of which are routinely called upon to make decisions privileging some empirical propositions over others, resolve the challenge posed by epistemic pluralism?

If the problem of epistemic pluralism is analogous to the problem of normative pluralism that Rawls discusses, then we might expect to address it by identifying a principle of epistemic public reason. Under such a principle, public decisions would be grounded in reasons that may be accepted by all citizens adhering to any “reasonable” epistemic viewpoint, where the bounds of epistemic reasonableness are defined by an overlapping consensus of reasonable epistemic methodologies. This approach would be directly analogous to Rawls’s solution to the problem of normative pluralism, which distinguishes between “reasonable” comprehensive views grounded in the “overlapping consensus” from those outside that consensus,⁵⁰¹ and would provide a useful distinction between the types of empirical views that the state must accommodate and those that it is free to dismiss. Ultimately, however, a principle of epistemic public reason cannot solve the problem of legitimacy raised by the phenomenon of entrenched epistemic pluralism, because reasonableness and legitimacy in Rawls’s conception are fundamentally *normative* criteria. A principle of epistemic unreasonableness lacks the normative force necessary to warrant official disregard of empirical viewpoints held by those who are normatively reasonable—that is, those empirical outliers who accept the fundamental premises of liberal democracy that define Rawls’s overlapping consensus of reasonable comprehensive views. Another solution must be found, and an examination of the law’s engagement with epistemic pluralism provides useful insight.

This chapter will examine epistemic pluralism in one context in which it has become a recurrent problem: that of legal challenges to mandatory vaccination requirements. Although a stable consensus of medical experts has held for over two centuries that vaccinations are one of the most cost-effective interventions for the protection of public health,⁵⁰² some groups have rejected this consensus and denied the effectiveness or safety of vaccinations since the earliest mass immunization programs were implemented in the nineteenth century. This disagreement of fact about the effectiveness and safety of vaccines poses a challenge to policymakers attempting to devise rational and effective public health policies and to courts called upon to resolve disputes between individuals’ claims to bodily autonomy and liberty of conscience and the state’s interest in implementing evidence-based public health policies for the benefit of the community.

A review of the responses to legal and political challenges to mandatory vaccination policies over the twentieth century reveals two significant patterns: first, courts have been almost uniformly deferential to the empirical views of medical experts concerning the safety of immunization and the effectiveness of mandatory vaccination policies; and second, state legislatures, although they have not articulated their reasoning along these lines, have generally drawn a distinction between objections to mandatory vaccination grounded in normative pluralism and those grounded in epistemic pluralism when crafting statutory exemptions to

⁵⁰¹ *Id.* at 15.

⁵⁰² See, e.g., Sandra J. Bean, *Emerging and Continuing Trends in Vaccine Opposition Website Content*, 29 VACCINE 1874, 1874 (2011); Anna Kata, *A Postmodern Pandora’s Box: Anti-Vaccination Misinformation On The Internet*, 28 VACCINE 1709, 1709 (2010) (noting that “morbidity and mortality from vaccine-preventable diseases [] hav[e] reached record lows.”); Centers for Disease Control and Prevention, *Ten Great Public Health Achievements, 1900–1999: Impact of Vaccines Universally Recommended for Children*, 48 MORB. MORTAL. WKLY. REP. 243 (1999).

mandatory vaccination policies. Legislatures have been largely willing to grant exemptions for religious or philosophical objections to vaccination, but no legislature has permitted an exemption on the basis of empirical disagreement with the prevailing expert consensus. Courts have likewise enforced this line, resisting attempts to characterize empirical objections to vaccination policies as “religious” or “philosophical” for purposes of qualifying for a statutory exemption.

The fact that the line traced by state legislatures and by courts enforcing state statutory exemptions tacitly tracks the division between normative and epistemic pluralism suggests a solution to the problem of epistemic pluralism insofar as it reveals an unspoken assumption of moral anti-realism—the belief that a categorical ontological distinction exists between normative and empirical statements. Evidence of a widespread assumption is of course not an argument for metaethical truth, but it has relevance to the extent we accept Rawls’s methodology of reflective equilibrium—that is, to the extent we believe that metaethical principles can be legitimately derived from reflection on our intuitions about specific cases. Ultimately, I shall argue that if, as Rawls does, we value the liberal principle of normative tolerance as a good in itself, the law should *assume* the truth of moral anti-realism. This resolves the legitimacy problem posed by epistemic pluralism by justifying a principle of tolerance for normative pluralism without requiring a similar principle of tolerance for epistemic pluralism. Moreover, this finding reveals a tension in Rawls’s theory of political liberalism that he himself seemed unaware of, insofar as it implies that, if a principle of tolerance of “reasonable” normative pluralism is necessary, as Rawls claims, as a matter of moral principle rather than expedience, then Rawlsian political liberalism may be, contrary to Rawls’s own claims, impossible to reconcile with moral realist comprehensive views.

Part I of this chapter introduces Rawls’s discussion of political liberalism and the problem of “reasonable” pluralism, explaining Rawls’s solution to that problem via the principle of public reason. It also elaborates upon the concept of epistemic pluralism as an omission from Rawls’s account and inquires whether the phenomenon of epistemic pluralism raises legitimacy concerns similar to those raised by the normative pluralism on which Rawls focuses. Part II discusses the history of mandatory vaccination and the normative and empirical debates surrounding that procedure, followed by an examination of judicial and legislative responses to challenges to mandatory vaccination policies. Part III assesses the extent to which the phenomenon of epistemic pluralism poses the same challenges to the legitimacy of majoritarian public policy as normative pluralism. I shall first attempt to resolve the problem of epistemic pluralism on Rawls’s own terms, inquiring whether a concept of “reasonable” epistemic pluralism might be articulated by which to distinguish the types of empirical disagreement that give rise to a problem of legitimacy from those that do not. Because the principle of epistemic reasonability ultimately fails to resolve the legitimacy problem, Part III continues to examine the division between normative and epistemic pluralism in light of the philosophical debate between moral realism and anti-realism. Ultimately, I conclude that the normative/epistemic division in law and theory is best justified by a background assumption of moral anti-realism. In conclusion, Part IV applies Rawls’s method of reflective equilibrium to reflect on how the principle of moral anti-realism, which Part III concludes we should adopt if we are morally committed to a principle of normative tolerance, might apply to other areas of the law.

I. The Problems of Normative and Epistemic Pluralism

A. Normative Pluralism and the Overlapping Consensus

In his later work, John Rawls became occupied with what he described as the fundamental question of political philosophy: “how is it possible for there to exist over time a just and stable society of free and equal citizens, who remain profoundly divided by reasonable religious, philosophical, and moral doctrines?”⁵⁰³ While he continued to believe that his own comprehensive doctrine of justice as fairness⁵⁰⁴ remained a reasonable comprehensive position, he recognized that a key assumption underlying his work in *A Theory of Justice* — that universal agreement on a single comprehensive moral or philosophical doctrine is achievable in principle in a democratic society characterized by freedom of conscience and expression — was mistaken. Following his realization that “a basic feature of democracy is the fact of reasonable pluralism — the fact that a plurality of reasonable conflicting comprehensive doctrines, religious, philosophical, and moral, is the normal result of its culture of free institutions,”⁵⁰⁵ Rawls dedicated the final years of his career to developing a theory of “political liberalism,” a political conception of justice that seeks to articulate a model for social cooperation among citizens in a society characterized by reasonable pluralism.

Rawls’s solution to the problem of reasonable pluralism is to distinguish between the political conception of liberal democracy shared by all “reasonable” members of liberal democratic society and the diverse comprehensive views in which each individual’s commitment to that political conception is ultimately grounded. He argues that, although the “burdens of judgment” in a society characterized by freedom of conscience preclude consensus on questions of ultimate moral value, there nevertheless exists an overlapping consensus of reasonable comprehensive doctrines that lead their adherents to support what Rawls identifies as a “reasonable” conception of justice.⁵⁰⁶ By emphasizing the shared values of the overlapping consensus and the family of reasonable political conceptions of justice derived from that consensus, citizens may put aside the disagreements between their comprehensive doctrines in order to create a society that embodies their shared values of mutual respect and tolerance and facilitates the goal of mutual cooperation over time.⁵⁰⁷

⁵⁰³ RAWLS, *supra* note 500, at 4.

⁵⁰⁴ See JOHN RAWLS, *A THEORY OF JUSTICE* (revised ed. 1999) [hereinafter “THEORY OF JUSTICE”]; JOHN RAWLS, *JUSTICE AS FAIRNESS: A RESTATEMENT* (Erin Kelly ed., 2001). [hereinafter *JUSTICE AS FAIRNESS*].

⁵⁰⁵ John Rawls, *The Idea of Public Reason Revisited*, in JOHN RAWLS: *COLLECTED PAPERS* 573 (Samuel Freeman ed., 2001).

⁵⁰⁶ The overlapping consensus is analogous to Rousseau’s general will. See JEAN-JACQUES ROUSSEAU, *THE SOCIAL CONTRACT* Book IV Chap. 1 (Maurice Cranston trans., 1968) (the general will “is directed towards [the] common preservation and general well-being” of the political community as a “single body”).

⁵⁰⁷ Rawls offers the work of Abdullahi Ahmed An-Na’im as an example of how the political doctrine of liberal constitutionalism may be derived from comprehensive religious doctrine. An-Na’im writes that “[t]he Qur’an does not mention constitutionalism, but human rational thinking and experience have shown that constitutionalism is necessary for realizing the just and good society prescribed by the Qur’an. An Islamic justification and support for constitutionalism is important and relevant for Muslims. Non-Muslims may have their own secular or other justifications.” Rawls, *supra* note 505, at 590–91 n.46 (quoting ABDULLAHI AHMED AN-NA’IM, *TOWARD AN ISLAMIC REFORMATION: CIVIL LIBERTIES, HUMAN RIGHTS, AND INTERNATIONAL LAW* 52–57 (1990)); cf. William R. O’Neill, *Modernity and Its Religious Discontents: Catholic Social Teaching and Public Reason*, 20 NOTRE DAME J. LAW ETHICS PUB. POL. 295 (2006) (arguing that Catholic doctrine is consistent with the overlapping consensus of reasonable comprehensive doctrines).

A problem raised by Rawls's recognition of reasonable pluralism as an inevitable and permanent feature of a liberal democratic system is that of democratic legitimacy. The fundamental idea behind Rawls's principle of public reason is that legitimate political decisions involving "constitutional essentials"⁵⁰⁸ and matters of "basic justice"⁵⁰⁹ must be justified by reasons that could be accepted by anyone who subscribes to the political ideals of liberal democracy. The principle is grounded in two related concepts essential to liberal democracy—the duty of civility⁵¹⁰ and the criterion of reciprocity⁵¹¹—that embody the fundamental principle of mutual respect among democratic citizens. It emphasizes the special realm of the political as distinct from what Rawls terms the "background culture," essentially the free-for-all marketplace of ideas in which comprehensive doctrines are free to pursue ideological hegemony with little regard for fairness toward competing views,⁵¹² and also emphasizes the special responsibility placed on citizens of a democracy as they exercise political authority through public debate and voting. A citizen engages in public reason "when he or she deliberates within a framework of what he or she sincerely regards as the most reasonable political conception of justice, a conception that expresses political values that others, as free and equal citizens might also reasonably be expected reasonably to endorse."⁵¹³ This requirement of universal justifiability rests largely upon the concept of reciprocity and Rawls's view of society as a "fair system of cooperation over time from one generation to the next, where those engaged in cooperation are viewed as free and equal citizens and normal cooperating members of society over a complete life."⁵¹⁴ While it leads to surprising conclusions in this and other contexts,⁵¹⁵ the principle of reciprocity is merely a recognition of the free and equal status of all citizens in a liberal

⁵⁰⁸ Constitutional essentials "are of two kinds: (a) fundamental principles that specify the general structure of government and the political process; the powers of the legislature, executive and the judiciary; the scope of majority rule; and (b) equal basic rights and liberties of citizenship that legislative majorities are to respect; such as the right to vote and to participate in politics, liberty of conscience, freedom of thought and of association, as well as the protections of the rule of law." RAWLS, *supra* note 500, at 227.

⁵⁰⁹ Matters of basic justice "relate to the basic structure of society and so would concern questions of basic economic and social justice and other things not covered by a constitution," Rawls, *supra* note 505, at 575 n.7, and include "such fundamental questions as: who has the right to vote, or what religions are to be tolerated, or who is to be assured of fair equality of opportunity, or to hold property." RAWLS, *supra* note 500, at 217.

⁵¹⁰ "[T]he ideal of citizenship imposes a moral, not a legal, duty—the duty of civility—to be able to explain to one another on those fundamental questions how the principles and policies they advocate and vote for can be supported by the political values of public reason." *Id.*

⁵¹¹ "The criterion of reciprocity requires that when those terms are proposed as the most reasonable terms of fair cooperation, those proposing them must also think it at least reasonable for others to accept them, as free and equal citizens, and not as dominated or manipulated, or under the pressure of an inferior political or social position." Rawls, *supra* note 505, at 576.

⁵¹² See *id.* at 576 n.1.

⁵¹³ *Id.* at 581. Ronald Dworkin formulates the principle in a manner that emphasizes its relevance to the present analysis: "Public reason requires officials to offer justifications that are based on the political values of the community and not on comprehensive religious or moral or philosophical doctrines. The doctrine, therefore, requires judges searching for a justification of the law's structure to avoid controversial religious, moral, or philosophical doctrines." Ronald Dworkin, *Rawls and the Law*, 72 *FORDHAM L. REV.* 1387, 1397 (2004).

⁵¹⁴ RAWLS, *JUSTICE AS FAIRNESS*, *supra* note 504, at 4.

⁵¹⁵ See *id.* at 64 ("What the difference principle requires, then, is that however great the general level of wealth... the existing inequalities are to fulfill the condition of benefiting others as well as ourselves. This condition brings out that even if it uses the idea of maximizing the expectations of the least advantaged, the difference principle is essentially a principle of reciprocity"); RAWLS, *THEORY OF JUSTICE*, *supra* note 504, at 88 ("[T]he difference principle expresses a conception of reciprocity. It is a principle of mutual benefit.").

society.⁵¹⁶ It is, in essence, an expression of respect for one's fellow citizens, acknowledging on the basis of their equal political standing that when decisions are made by majority vote, they should be made in a manner by which all citizens can recognize the reasonable policies behind the decision, even if they disagree with the majority's application of those policies. Rawls explains that

[t]he ideal [of public reason] is recognized whenever judges, legislators, chief executives, and other government officials, as well as candidates for public office, act from and follow the idea of public reason and explain to other citizens their reasons for supporting fundamental political positions in terms of the political conception of justice that they regard as the most reasonable.⁵¹⁷

It is this manifestation of respect for the political autonomy of dissenters that Rawls argues bestows legitimacy on the decisions of electoral majorities pertaining to constitutional essentials and matters of basic justice.⁵¹⁸ Non-public reasons, which are drawn from a comprehensive moral, religious, or philosophical doctrine, are illegitimate grounds for political action because "[t]here is no reason why any citizen... should have the right to use state power to decide constitutional essentials as that person's... comprehensive doctrine directs."⁵¹⁹ Because reasonable pluralism is a natural feature of liberal freedom of expression and of conscience, if one accepts the premise that any political action pertaining to constitutional essentials or matters of basic justice must be justified by reasons that everyone, including dissenters, could reasonably accept, the very nature of liberal democracy makes it impossible to justify any such action on the basis of a non-public reason. The failure to observe the principle of public reason effectively disenfranchises some segment of the polity by imposing upon it a legal requirement that cannot be justified on any grounds that its members might reasonably accept. This is particularly problematic when, as is often the case, the group that does not share the comprehensive view of the legislative majority is the one most burdened by the political act in question.⁵²⁰ Rawls argues that permitting such a coercive imposition of the majority's comprehensive values is antithetical to the concept of democratic government, and insists that all political decisions affecting constitutional essentials or matters of basic justice be made in accordance with the principle of public reason.

⁵¹⁶ Rawls notes that "[t]here are many liberalisms and related views, and therefore many forms of public reason specified by a family of reasonable political conceptions.... The limiting feature of these forms is the criterion of reciprocity, viewed as applied between free and equal citizens, themselves seen as reasonable and rational." Rawls, *supra* note 505, at 581.

⁵¹⁷ Rawls, *supra* note 505, at 576.

⁵¹⁸ "Thus when, on a constitutional essential or matter of basic justice, all appropriate government officials act from and follow public reason, and when all reasonable citizens think of themselves ideally as if they were legislators following public reason, the legal enactment expressing the opinion of the majority is legitimate law." Rawls, *supra* note 505, at 576; *see also* RAWLS, *THEORY OF JUSTICE*, *supra* note 504, at 253.

⁵¹⁹ *Id.* at 226.

⁵²⁰ *Cf.* THOMAS CHRISTIANO, *THE CONSTITUTION OF EQUALITY: DEMOCRATIC AUTHORITY AND ITS LIMITS* (2008) (discussing the problem of "persistent minorities" and democratic legitimacy).

B. Epistemic Pluralism: An Omission from Rawls's Account

1. Epistemic Pluralism and Legitimacy

Rawls's account of "reasonable" pluralism — which I will henceforth refer to as "normative" pluralism — addresses a dilemma in governing a complex, ideologically heterogeneous society in a morally legitimate way, but in at least one respect it significantly understates the scope of the problem. Rawls is correct that normative pluralism is an intrinsic feature of a liberal society characterized by free institutions, but his exclusive focus on the normative component overlooks a second source of pluralism, which I shall refer to as *epistemic pluralism*. Briefly put, epistemic pluralism refers to pluralism of beliefs not along the normative axis, which Rawls emphasized, but along the empirical one.⁵²¹ Not only do citizens in a liberal democracy fundamentally disagree about questions of normative value, they also disagree to a significant extent about what the empirical facts of the world as relevant to public policy are. For example, widespread public disagreement persists on factual questions such as the contribution of anthropogenic carbon dioxide emissions to climate change and the risks posed to humans and to the environment by genetically modified organisms, notwithstanding relatively broad consensus on these questions among scientific experts.⁵²² These empirical beliefs can be as deeply held, as central to personal identity, and as resistant to reconsideration as the normative views on which Rawls focuses his discussion.⁵²³

The phenomenon of epistemic pluralism raises theoretical problems concerning the legitimacy of democratic governance analogous to those that Rawls explored with respect to normative pluralism. While Rawls is certainly correct that liberal society is characterized by a remarkable pluralism of comprehensive normative views, it is also characterized by significant disagreement concerning matters of empirical fact. If Rawls is correct that the coercive apparatus of the state cannot legitimately be applied to impose policies grounded in normative views that dissenters cannot reasonably accept, then it would seem to follow that such coercion is equally illegitimate when grounded upon empirical beliefs that the dissenting group rejects. If this is true, then Rawls's exclusive focus on normative pluralism significantly understates the scope of the legitimacy problem he identifies. Thus, if we accept Rawls's conclusion that the imposition of policies grounded in normative principles on citizens who reasonably reject those principles undermines the legitimacy of the democratic state, then we must ask whether the same holds true for policies grounded in controversial empirical views.

⁵²¹ Rawls makes a passing reference to the idea of epistemic pluralism when he notes that "in making justifications [in accordance with the principle of public reason] we are to appeal only to presently accepted general beliefs and forms of reasoning found in common sense, and the methods and conclusions of science when these are not controversial." RAWLS, *supra* note 500, at 224. Rawls articulates no criterion by which to determine when the methods and conclusions of science are "controversial" and appears to underestimate the extent to which such conclusions are routinely contested among epistemic factions in the background culture.

⁵²² See *supra* notes 497–499.

⁵²³ See, e.g., Dan M. Kahan et al., *The Second National Risk and Culture Study: Making Sense of—and Making Progress in—The American Culture War of Fact* (2007), <http://ssrn.com/abstract=1017189> (finding individuals' empirical views and perceptions of risk closely aligned with their location on a 2-dimensional personality assessment measuring hierarchist/egalitarian and individualist/communitarian normative tendencies).

2. Sources and Characteristics of Epistemic Pluralism

Rawls was content simply to ascribe the inevitability of normative pluralism to the “burdens of judgment” and the operation of “free institutions” in a liberal democratic state.⁵²⁴ Without disagreeing with that ultimate conclusion, the more empirically oriented among us may wish to parse out how these mechanics in a liberal democratic state lead inevitably to a permanent state of epistemic pluralism. This section briefly surveys the sources of empirical disagreement, examining how psychological features of human cognition and institutional features of liberal democracy work together to produce entrenched divergences of belief concerning matters of empirical fact. It will also consider whether, given the psychological linkages in the formation of normative and empirical beliefs, the distinction between normative and epistemic pluralism is conceptually viable.

a. The Non-Ideal Burdens of Judgment

Asking what can account for the persistence of normative pluralism, Rawls discards the explanations that “most people hold views that advance their own more narrow interests” and that “people are often irrational and not very bright,” not because he believes those statements to be false, but because of his commitment to “always work[ing] at first within ideal theory.”⁵²⁵ But this commitment seems an ill fit to the project of *Political Liberalism*, and to those of us who do not share it, it is apparent that the idiosyncratic processes of human belief formation contribute significantly to the entrenchment of normative and epistemic pluralism. The psychology of empirical belief formation and risk assessment is influenced by non-rational factors via a suite of psychological phenomena that collectively cause the process of real-world belief formation to bear little resemblance to Rawls’s highly rationalistic ideal.

The human process of belief formation is not particularly good at proceeding in a manner calculated to converge on empirical truth. Indeed, some cognitive scientists believe that the adaptive function of human reason is not truth-seeking, but rather argumentation and persuasion.⁵²⁶ Regardless of whether this is true, cognitive psychologists have found that human cognition consists of two modes of thinking; the first (“System 1”) is automatic, quick, and intuitive, while the second (“System 2”) is slower, more deliberative, and requires the expenditure of mental effort.⁵²⁷ We rely on System 1 thinking constantly to form impressions and associations between ideas; it is fast, effortless, and often sufficient for moment-to-moment cognitive operations, but it is also prone to specious associations, flawed heuristics, and jumping to conclusions on the basis of insufficient data.⁵²⁸ System 2 reasoning can work to correct the shortcomings of System 1, but because System 2 thinking requires the expenditure of mental effort, it can become overloaded or distracted, falling back on System 1’s quick associations to fill in for the lack of available System 2 bandwidth.⁵²⁹ Moreover, even System 2 thinking is subject to cognitive biases that interfere with our ability to rationally derive valid conclusions from evidence even when we consciously attempt to do so. Among many others, cognitive

⁵²⁴ Rawls, *supra* note 500, at 36–37, 55–57.

⁵²⁵ RAWLS, *supra* note 500, at 55.

⁵²⁶ See, e.g., Hugo Mercier & Dan Sperber, *Why Do Humans Reason? Arguments for an Argumentative Theory*, 34 BEHAVIORAL & BRAIN SCI. 57 (2011).

⁵²⁷ See generally DANIEL KAHNEMAN, THINKING, FAST AND SLOW (2011).

⁵²⁸ *Id.*

⁵²⁹ *Id.*

psychologists have found that humans tend to interpret new information in such a way as to confirm their existing beliefs,⁵³⁰ to view the arguments of others more critically than their own,⁵³¹ and are irrationally influenced by the framing of identical risks.⁵³²

Where the empirical views in question are politically salient or otherwise emotionally charged, these general shortcomings are further complicated by several related psychological phenomena that I will collectively label “cognitive tribalism.” Perhaps the most significant manifestation of cognitive tribalism is “identity protective cognition,” that is, the tendency of individuals to espouse both empirical and normative views shared by some in-group with which they strongly identify.⁵³³ Individuals’ empirical beliefs are influenced by the views of social groups—religious, political, communal, or otherwise—with which they claim membership; they are motivated to adopt the prevailing beliefs of these communities and to rationalize inconsistencies.⁵³⁴ Kahan *et al.* explain the concept as follows:

Individual wellbeing, material and emotional, is bound up with membership in various self-defining groups. Rejecting factual beliefs widespread within such a group can undermine individual well-being, either by threatening to estrange a person from his peers or by forcing that person to contemplate the social incompetence of those he identifies with. As a means of psychological self-defense, then, people tend to process information in a selective fashion that bolsters beliefs dominant within their self-defining groups.⁵³⁵

⁵³⁰ *Id.*; see also Raymond S. Nickerson, *Confirmation Bias: A Ubiquitous Phenomenon in Many Guises*, 2 REV. OF GEN. PSYCHOL. 220 (1998); SCOTT PLOUS, *THE PSYCHOLOGY OF JUDGMENT AND DECISION MAKING* (1993); Charles G. Lord, Lee Ross & Mark R. Lepper, *Biased Assimilation and Attitude Polarization: The Effects of Prior Theories on Subsequently Considered Evidence*, 37 J. PERSONALITY & SOC. PSYCHOL. 2098 (1979).

⁵³¹ See, e.g., Emmanuel Trouche *et al.*, *The Selective Laziness of Reasoning*, 40 COGNITIVE SCI. 2122 (2015); Ulrike Hahn & Mike Oaksford, *The Rationality of Informal Argumentation: A Bayesian Approach to Reasoning Fallacies*, 114 PSYCHOL. REV. 704 (2007).

⁵³² KAHNEMAN, *supra* note 527; Amos Tversky & Daniel Kahneman, *The Framing of Decisions and the Psychology of Choice*, 211 SCI. 453 (1981).

⁵³³ See, e.g., Dan M. Kahan, David A. Hoffman & Donald Braman, *Whose Eyes are You Going to Believe - Scott v. Harris and the Perils of Cognitive Illiberalism*, 122 HARV. L. REV. 837, 851 (2008); Dan M. Kahan *et al.*, *Culture and Identity-Protective Cognition: Explaining the White-Male Effect in Risk Perception*, 4 J. EMPIRICAL LEGAL STUD. 465, 470 (2007)..

⁵³⁴ Robert Jervis, *Understanding Beliefs*, 27 POL. PSYCH. 641 (2006); see also Per Espen Stoknes, *Rethinking Climate Communications and the “Psychological Climate Paradox,”* 1 ENERGY RESEARCH & SOCIAL SCIENCE 161, 165 (2014).

⁵³⁵ Kahan, Hoffman, and Braman, *supra* note 32, at 852 (citing Joshua Aronson & Claude M. Steele, *When Beliefs Yield to Evidence: Reducing Biased Evaluation by Affirming the Self*, 26 PERSONALITY & SOC. PSYCHOL. BULL. 1151 (2000)); Geoffrey L. Cohen, *Bridging the Partisan Divide: Self-Affirmation Reduces Ideological Closed-Mindedness and Inflexibility in Negotiation*, 93 J. PERSONALITY & SOC. PSYCHOL. 415 (2007); Roger Giner-Sorolla & Shelly Chaiken, *Selective Use of Heuristic and Systematic Processing Under Defense Motivation*, 23 PERS. SOC. PSYCHOL. BULL. 84 (1997); see also Dan M. Kahan *et al.*, *Motivated Numeracy and Enlightened Self-Government*, 1 BEH. PUB. POL’Y 54 (2017) (“identity-protective cognition can be viewed as psychic self-defense mechanism that steers individuals away from beliefs that could alienate them from others on whose support they depend in myriad domains of everyday life”).

The psychological evidence thus bears out Upton Sinclair’s observation over a century ago that “[i]t is difficult to get a man to understand something, when his salary depends on his not understanding it.” UPTON SINCLAIR, *I, CANDIDATE FOR GOVERNOR. AND HOW I GOT LICKED* 109 (1994). To Sinclair’s observation, we might add that the need for psychological security exerts epistemically motivating force just as the need for financial security does.

Identity protective cognition poses a challenge to the distinction between normative and epistemic pluralism insofar as it suggests that our beliefs, both moral and empirical, are not formed via the purely “rational” processes that Rawls idealizes.

Cognitive tribalism also manifests in the related phenomenon of “cultural cognition,” which describes the manner in which individuals’ normative commitments affect their perceptions of risk.⁵³⁶ As Kahan *et al.* explain, “[t]his theory posits that people tend to conform factual beliefs about risk to their cultural evaluations of putatively dangerous behavior. As a result of various cognitive mechanisms, people are motivated to believe that behavior they find noble is also socially beneficial (or at least benign) and behavior they find base is also socially harmful.”⁵³⁷ The cultural cognition effect is vividly demonstrated by Kahan *et al.*’s study of the video evidence on which the Supreme Court relied in *Scott v. Harris*.⁵³⁸ *Scott* involved a claim under 42 U.S.C. § 1983 arising from injuries sustained by the respondent during a high speed car chase when the petitioner sheriff’s deputy struck Harris’s car, causing it to crash.⁵³⁹ After the Eleventh Circuit affirmed the district court’s decision denying Scott’s motion for summary judgment based on qualified immunity,⁵⁴⁰ the Supreme Court reversed, holding that Scott’s actions did not violate the Fourth Amendment because Harris’s reckless driving “posed a substantial and immediate risk of serious physical injury to others,” and, moreover, that “no reasonable jury could conclude otherwise.”⁵⁴¹ In response to Justice Stevens’s dissent, which argued that the reasonableness of the petitioner’s actions was a question of fact that should be left to the jury,⁵⁴² the majority noted that it would let the video of the chase, posted to the Court’s website, “speak for itself.”⁵⁴³

Kahan *et al.* accepted the Court’s invitation. They showed the videotape at issue in *Scott* to a sample of 1,350 individuals and asked them to rate their agreement with the statements that Harris’s driving, as depicted in the video, put “members of the public at great risk of death” and “put the police at serious risk of death.”⁵⁴⁴ Respondents were also asked whether the police’s decision to chase Harris when he refused to pull over was worth the risk that the chase created to the public, whether the use of deadly force was justified in light of the risk that Harris’s driving posed to the public and the police, and to rate the relative culpability of Harris and the police for the risk posed to the public by the chase.⁵⁴⁵ The results showed that the subjects’ assessment of the risks and of the reasonableness of the police’s actions were closely associated with their “cultural style.” Subjects displaying a “hierarchical and individualist” style were much more

⁵³⁶ Kahan sometimes treats identity protective cognition as an aspect of cultural cognition rather than a distinct psychological phenomenon. Compare Kahan, Hoffman, and Braman, *supra* note 32, at 852 with Kahan, Jenkins-Smith, and Braman, *supra* note 35, at 148–49. The distinction is semantic; however conceptualized, the concepts describe psychological phenomena in which an individual’s normative commitments influence her interpretation of empirical fact.

⁵³⁷ Kahan, Hoffman, and Braman, *supra* note 32, at 852; see also Kahan, Jenkins-Smith, and Braman, *supra* note 42, at 148 (“[t]he cultural cognition thesis asserts that individuals are psychologically disposed to believe that behavior they [and their peers] find honorable is socially beneficial and behavior they find base socially detrimental”).

⁵³⁸ 550 U.S. 372 (2007); see Kahan, Hoffman, and Braman, *supra* note 39.

⁵³⁹ *Scott*, 550 U.S. at 374–75.

⁵⁴⁰ See *Harris v. Coweta Cty.*, 433 F.3d 807 (11th Cir. 2005).

⁵⁴¹ *Scott*, 550 U.S. at 385.

⁵⁴² See *id.* at 389–97 (Stevens, J., dissenting).

⁵⁴³ *Id.* at 378 n.5.

⁵⁴⁴ Kahan, Hoffman, and Braman, *supra* note 39 at 854–57.

⁵⁴⁵ *Id.* at 858.

likely to see the risk posed by Harris’s driving as significant, to agree that the use of potentially lethal force against him was justified, and to blame Harris rather than the police.⁵⁴⁶ Those whose style aligned with the “egalitarian and communitarian” type, however, were more likely “to reject the conclusion that the police acted reasonably in using deadly force to terminate the chase.”⁵⁴⁷ Individuals’ assessment of the risks associated with Harris’s driving, therefore, were systematically influenced by their normative frameworks. As Harris *et al.* point out, this result is consistent with other studies “which show that competing cultural outlooks of these varieties dispose people to disagree about the facts of all manner of putative dangers - from climate change to gun control to HPV vaccinations for school-age girls.”⁵⁴⁸

Intelligence, access to information, and education are not correctives to cognitive tribalism; to the contrary, the polarizing effects of cultural and identity protective cognition tend to be positively associated with access to information and technical proficiency.⁵⁴⁹ As individuals become more educated on scientific issues, in other words, they become more adept at rationalizing scientific statements as compatible with their existing normative paradigms.

b. The Conceptual Viability of Epistemic Pluralism

The preceding discussion of the sources of epistemic pluralism may call into question the distinction on which my discussion is premised. Can a meaningful line be drawn between an individual’s normative views and her empirical beliefs, or are the two so inextricably intertwined as to confound any attempts to distinguish pluralism grounded in comprehensive normative views from that grounded in empirical disagreement? Can any political dispute accurately be described as pure a conflict over facts rather than values? If the answer to these questions is no, then an obvious justification for Rawls’s omission of epistemic pluralism from his account of political liberalism presents itself: epistemic pluralism is not a conceptually distinct form of the “reasonable pluralism” that Rawls discusses, and it need not be addressed separately.

It is undeniably true that the relationship between normative and epistemic pluralism is complicated by the bidirectional influence in belief formation of “ought” and “is.” As discussed above, individuals’ beliefs concerning matters of “objective” fact can be heavily influenced by their prior normative commitments. Similarly, Hume’s maxim notwithstanding,⁵⁵⁰ it is often the case that individuals’ normative conceptions of the good are informed by their beliefs about the external world. The former phenomenon poses perhaps a greater challenge to the proposed taxonomy of pluralisms into the “normative” and “epistemic” categories — if it is the case that

⁵⁴⁶ *Id.* at 862, 879.

⁵⁴⁷ *Id.* at 879.

⁵⁴⁸ *Id.* at 904 (citing Dan M. Kahan, *The Cognitively Illiberal State*, 60 STAN. L. REV. 115, 123, 134–36, 139–42 (2007)).

⁵⁴⁹ See, e.g., Brendan Nyhan & Jason Reifler, *Does Correcting Myths about the Flu Vaccine Work? An Experimental Evaluation of the Effects of Corrective Information*, 33 VACCINE 459 (2015) (finding that corrective information that the influenza vaccine cannot cause influenza paradoxically resulted in individuals with an initially high degree of concern about the vaccine self-reporting a lower probability that they would receive it); Kahan et al., *supra* note 41 (polarization of interpretation of quantitative data on politically salient issue was highest among respondents who displayed high numeracy); Dan M. Kahan et al., *The Polarizing Impact of Science Literacy and Numeracy on Perceived Climate Change Risks*, 2 NATURE CLIM. CHANGE 732, 732 (2012) (finding that “[m]embers of the public with the highest degrees of science literacy and technical reasoning capacity were not the most concerned about climate change. Rather, they were the ones among whom cultural polarization was greatest.”).

⁵⁵⁰ DAVID HUME, A TREATISE OF HUMAN NATURE Book III, Pt. I, § 1 (1739) (cautioning against the “imperceptible” change in normative argumentation from “is, and is not” to “ought, or ought not”).

individuals' normative priors can influence their very perceptions of reality, then a conceptual distinction between normative and epistemic pluralism may be impossible to sustain.⁵⁵¹ But the messiness of belief formation does not demonstrate that all disagreements are ultimately reducible to differences of value. Epistemic pluralism as a distinct category is compatible with cognitive tribalism, assuming that it is possible for individuals who are more or less in agreement about fundamental normative values to disagree about matters of fact relevant to the implementation of those values.

A plausible example of a superficially empirical disagreement that masks a deeper normative divide is the claim advanced by some pro-life advocates that human fetuses are capable of feeling pain as early as the 20th week of development, substantially earlier than the third trimester claimed by the mainstream medical consensus.⁵⁵² It seems likely that the “real” disagreement is with the moral status of abortion, with the question of fetal pain applying only a thin empirical veneer over a much deeper normative dispute. We may reasonably expect that few opponents of abortion would change their position even if they were sincerely convinced that fetuses are incapable of feeling pain until after the point of development at which most abortions occur; it is a moral assessment of the act of abortion *per se*, rather than empirical concern about fetuses' capacity for pain, that principally motivates their position. No doubt many other superficially empirical disagreements exist that simply mask deeper conflicts of normative value and are therefore more appropriately framed as instances of normative rather than epistemic pluralism.

Nevertheless, I contend that a meaningful distinction between normative and epistemic pluralism does exist, and that we can identify at least some disputes that genuinely turn on disagreements of fact rather than conflicts of values. As suggested above, a useful heuristic by which to distinguish empirical disagreements that simply mask deeper normative conflicts from those that we might characterize as genuinely empirical—and therefore instances of legitimately epistemic pluralism—is to ask whether the participants in the debate share the same set of fundamental normative commitments. If so, then a disagreement about empirical claims is unlikely to be reducible to a conflict of values, and the category of epistemic pluralism does not collapse into normative pluralism. While the question of which debates feature a broadly shared set of normative commitments is itself an empirical one as to which we have little direct evidence,⁵⁵³ I

⁵⁵¹ Kahan himself is skeptical of the normative/empirical distinction. See Kahan, *supra* note 548, at 116–17 (arguing that the liberal vision of value-neutrality is psychologically untenable because “we lack the psychological capacity... to make, interpret, and administer law without indulging sensibilities pervaded by our attachments to highly contested visions of the good”). His point is that because risk assessments are necessarily (and unconsciously) influenced by cultural alignment, we import value judgments even when we consciously attempt to restrict political discourse to “public” reasons of risk management. Kahan seems to assume that risk perception is *nothing but* cultural identity recast, but I think this goes too far. Tetlock, for example, shows that some cognitive styles are simply better at aligning predictions with available evidence whether compatible with normative preferences or not. PHILIP E. TETLOCK, *EXPERT POLITICAL JUDGMENT: HOW GOOD IS IT? HOW CAN WE KNOW?* (2005). Thus, without denying that cultural cognition influences risk perception perhaps necessarily, it appears that we can be better or worse at overcoming cultural cognition bias and can hold genuine disagreements about matters of fact.

⁵⁵² See Belluck, *supra* note 498; cf. Susan J. Lee et al., *Fetal Pain: A Systematic Multidisciplinary Review of the Evidence*, 294 J. AM. MED. ASS'N 947 (2005).

⁵⁵³ My claim that at least some empirical disagreements are not reducible to conflicts of normative value is to some degree self-affirming, insofar as I rather doubt that those who might deny it are motivated by a systematically different set of normative values than my own.

contend that the debate around the safety and efficacy of vaccination falls into this category. Notwithstanding the socially constructed and contingent nature of any normative vision of health,⁵⁵⁴ antivaccinationists and the mainstream medical community appear to broadly agree on how health is to be defined and construed; their disagreement arises only with respect to the question whether the practice of immunization is causally associated with what they mutually agree constitute “better” or “worse” health outcomes. If this is true, then it suggests that epistemic pluralism does constitute a conceptually distinct form of pluralism that Rawls does not account for. How large the domain of epistemic pluralism is—that is, how many superficially empirical disputes are not reducible to conflicts of normative value—is an open question, but I believe that the vaccination debate is not *sui generis* in this regard, and that the occurrence of genuine epistemic pluralism is sufficiently widespread to warrant an examination of its implications for the legitimacy of state action from a Rawlsian perspective.

II. Legal Challenges to Mandatory Vaccination Policies

In late December 2014 and early January 2015, the Disneyland theme park in Anaheim, California – the so-called “happiest place on Earth” – became the site of an outbreak of measles that eventually affected 125 victims across eight states and three nations.⁵⁵⁵ Nearly half (45%) of the victims of the outbreak within California were unvaccinated, including infants too young to receive the measles-mumps-rubella (“MMR”) vaccination, as well as children with medical contraindications to vaccination.⁵⁵⁶ Sixty-seven percent of the unvaccinated victims were “intentionally unvaccinated because of personal beliefs.”⁵⁵⁷

Although, in the end, the total number of reported cases of measles in the United States in 2015 was in line with previous years and was a significant dropoff from the spike of cases reported in 2014,⁵⁵⁸ the Disneyland outbreak caught the public’s attention as other outbreaks had not. Table 1 illustrates trends in searches on the Google search engine for the term “measles” from 2004 through the present. It indicates that public interest was relatively flat for nearly the entire period, with a sharp spike beginning in December 2014 and peaking in February 2015, coincident with the Disneyland outbreak. Popular attention turned to vaccine refusal as a cause of the occurrence and longevity of the Disneyland outbreak,⁵⁵⁹ and subsequent analysis confirmed that a lack of vaccination among the exposed population played a role in spreading the disease.⁵⁶⁰ Although immunization rates greater than 96% are necessary to achieve “herd immunity” against measles,

⁵⁵⁴ See generally, e.g., Stefan Timmermans & Steven Haas, *Towards a Sociology of Disease*, 30 SOCIOLOGY OF HEALTH & ILLNESS 659 (2008); MICHEL FOUCAULT, *ABNORMAL: LECTURES AT THE COLLÈGE DE FRANCE, 1974–1975* (2004); Phil Brown, *Naming and Framing: The Social Construction of Diagnosis and Illness*, J. HEALTH & SOC. BEHAVIOR 34 (1995).

⁵⁵⁵ Jennifer Zipprich et al., *Measles Outbreak – California, December 2014–February 2015*, 64 MORBIDITY & MORTALITY WEEKLY REPORT 153 (2015).

⁵⁵⁶ *Id.*

⁵⁵⁷ *Id.*

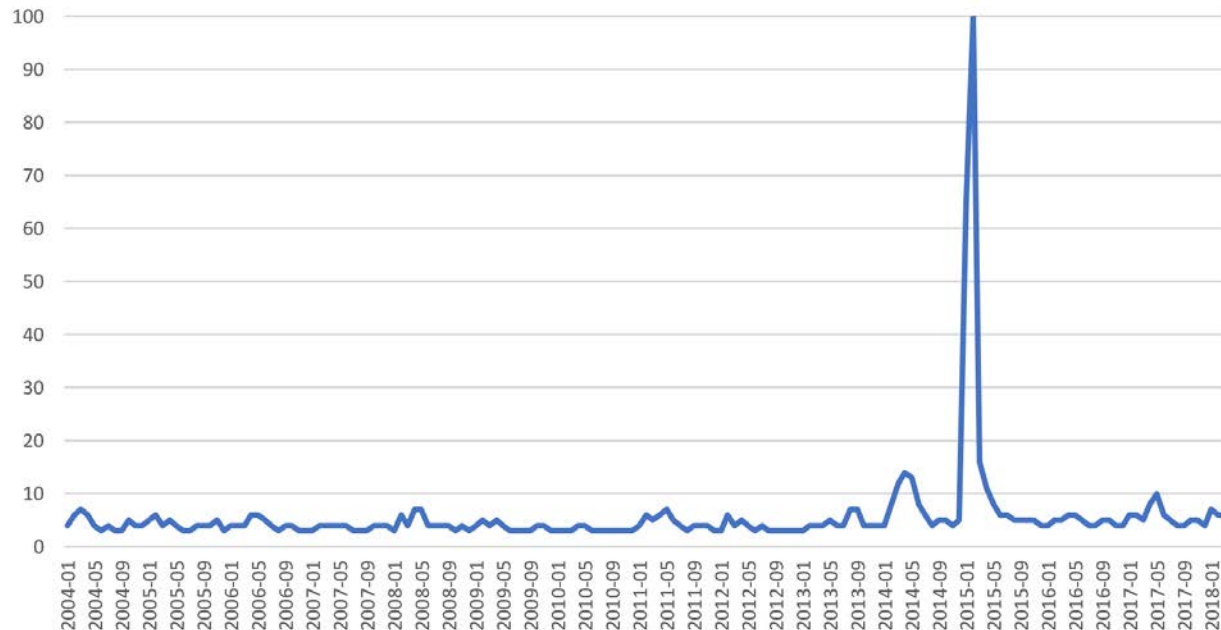
⁵⁵⁸ The Centers for Disease Control and Prevention reports the following number of measles cases in the United States for each year since 2010: 2010, 63; 2011, 220; 2012, 55; 2013, 187; 2014, 667; 2015, 159; 2016: 86; 2017: 118. Centers for Disease Control and Prevention, *Measles Cases and Outbreaks* (2018), <http://www.cdc.gov/measles/cases-outbreaks.html>.

⁵⁵⁹ See, e.g., Jack Healy & Michael Paulson, *Vaccine Critics Turn Defensive Over Measles*, N.Y. TIMES, January 30, 2015.

⁵⁶⁰ Maimuna S. Majumder et al., *Substandard Vaccination Compliance and the 2015 Measles Outbreak*, 169 JAMA PEDIATRICS 494, 494 (2015) (“substandard vaccination compliance is likely to blame for the 2015 measles outbreak”).

epidemiological analysis found that immunization rates among the exposed population were “as low as 50% and likely no higher than 86%.”⁵⁶¹

Table 1: Relative Frequency of Google.com Searches for "Measles" in the United States, 2004-Present.



The public outcry against low vaccination rates in response to the Disneyland outbreak motivated the California legislature to reconsider its longstanding statutory exemption scheme “personal belief.”⁵⁶² The California Legislature quickly passed S.B. 277, which repealed the state’s statutory exemption for religious objectors from its general requirement that children obtain certain vaccines, including against measles, in order to attend public schools.⁵⁶³ The bill incited a powerful antivaccinationist response, described as “possibly the most strident outpouring of political dissent in recent memory.”⁵⁶⁴ Nevertheless, Governor Brown signed the bill on June 30, 2015, making California only the third state to lack a religious belief exemption from its public school immunization mandate.⁵⁶⁵

The controversy surrounding S.B. 277 was but one recent skirmish in a battle between the mainstream medical establishment and antivaccinationists that has raged for nearly two hundred

⁵⁶¹ *Id.*

⁵⁶² Cal. Health & Safety Code § 120365, *repealed by* S.B. 277, Stats. 2015 c. 35 (Cal. 2015).

⁵⁶³ S.B. 277, Stats. 2015 c. 35 (Cal. 2015). In 2016, the U.S. District Court for the Southern District of California denied a motion for a preliminary injunction against enforcement of S.B. 277, holding that the plaintiffs’ constitutional challenges were unlikely to succeed. *Whitlow v. California*, 203 F. Supp. 3d 1079 (S.D. Cal. 2016); *see also* *Middleton v. Pan*, No. CV 16–5224–SVW (AGR), 2017 WL 7053936 (Dec. 18, 2017) (Rosenberg, Mag.) (magistrate judge’s report and recommendation recommending dismissal with prejudice of a group of unvaccinated individuals’ civil and criminal claims against several state official defendants arising from the enactment of S.B. 277). The *Whitlow* plaintiffs subsequently voluntarily dismissed the action.

⁵⁶⁴ Elizabeth Whitman, *California Vaccine Bill SB 277: Ban On Personal Exemptions Sparks Counter Movement Despite Recent Measles Outbreak*, INT’L BUS. TIMES, May 15, 2015.

⁵⁶⁵ *See* Phil Willon & Melanie Mason, *California Gov. Jerry Brown Signs New Vaccination Law, One of Nation’s Toughest*, L.A. TIMES, June 30, 2015; *see infra* note 691.

years. This Part will examine the history of that battle as a case study in the law's treatment of epistemic pluralism. Mandatory vaccination requirements present an ideal case study in the problem of epistemic pluralism for several reasons. The consensus of medical opinion for over two centuries has held that vaccines are effective and, although not without risk, generally safe at preventing far greater risks associated with vaccine-preventable disease. Legally mandated vaccination policies have shown great success at reducing the prevalence of diseases such as smallpox, poliomyelitis, measles, mumps, rubella, pertussis, and others, saving countless lives and dollars.⁵⁶⁶ On the other hand, vaccination involves the injection into the body of pathogenic agents;⁵⁶⁷ when legally compelled against the wishes of the recipient, this practice would seem to be in tension with the values of bodily autonomy and informed consent that are highly prized in other areas of the law.⁵⁶⁸ Many antivaccinationists have objected to compulsory immunization on religious or philosophical grounds, claiming that their beliefs forbid them to receive vaccination and that governmental policies requiring immunization violate their freedom of religion or conscience. Others, however, have rejected the medical consensus concerning the safety and efficacy of vaccines on empirical grounds.⁵⁶⁹ While the specifics of antivaccinationist empirical objections have shifted over time, they have consistently rejected either the premise that vaccines are effective in preventing disease, the premise that the medical benefits of vaccines, even if effective at prevention, outweigh the risks of harm caused by vaccination, or both.

Legal authorities' responses to antivaccinationist objections to mandatory immunization requirements have closely tracked the distinction between normative and epistemic pluralism. Although never expressed in such terms, state legislatures have proven generally willing to grant exemptions to immunization requirements to individuals whose objections are grounded in normative principles, but have uniformly denied exemptions to those who reject the expert consensus concerning vaccines' safety and efficacy on empirical grounds. Courts, while denying rights-based exemptions grounded in normative or epistemic pluralism, have nevertheless embraced that distinction insofar as they have become active enforcers of the lines drawn by legislatures, often closely examining putative claims for exemption and excluding "religious" or "philosophical" objections that are determined to be pretexts for empirical objections. Thus, legal actors' approach to the problem of mandatory vaccination and the balance of individual rights against communal benefit has, for more than a century, implicitly drawn the same distinction between normative and epistemic pluralism that Rawls does in his theory of political liberalism.

A. History of Mandatory Vaccination Policies

The modern vaccination era⁵⁷⁰ began in 1796 when Edward Jenner developed the first smallpox vaccine by injecting cowpox virus into the arm of a boy, who then exhibited immunity to

⁵⁶⁶ CDC, *Impact of Vaccines Universally Recommended for Children-- United States, 1900–1998*, 281 J. AM. MED. ASS'N 1482 (1999); James G. Jr Hodge & Lawrence O. Gostin, *School Vaccination Requirements: Historical, Social, and Legal Perspectives*, 90 KY. L.J. 831, 833 (2001).

⁵⁶⁷ "A vaccine is a suspension of attenuated or killed micro organisms (bacteria, viruses, or rickettsias) or derivative antigenic (e.g., proteins or peptides)." Hodge and Gostin, *supra* note 566, at 836.

⁵⁶⁸ See *infra* note 685 and accompanying text.

⁵⁶⁹ See generally Robert M Wolfe & Lisa K Sharp, *Anti-Vaccinationists Past and Present*, 325 BRITISH MED. J 430 (2002); Hodge and Gostin, *supra* note 566, at 844–45; Martin Kaufman, *The American Anti-Vaccinationists and Their Arguments*, 41 BULL. HIST. MED. 463 (1967).

⁵⁷⁰ Variolation against smallpox was practiced in Asia from the early second century. See Hodge & Gostin, *supra* note 566, at 837.

smallpox.⁵⁷¹ Since then vaccination has become a key component of public health policy through both voluntary and mandatory interventions. Through the principle of “herd immunity,” in which a critical mass of immunized individuals protects the entire population by preventing disease from gaining a foothold from which to spread,⁵⁷² vaccination is credited with eliminating or significantly reducing the incidence of such life-threatening diseases as smallpox, polio, measles, and pertussis.⁵⁷³ Widespread vaccination has been widely credited with saving countless lives and was recognized by the Centers for Disease Control and Prevention as one of the ten greatest public health achievements of the twentieth century.⁵⁷⁴

In the United States, state and municipal authorities have enacted mandatory vaccination requirements in response to disease outbreaks since the early nineteenth century.⁵⁷⁵ The development of routinized immunization requirements applicable in non-epidemic circumstances came a bit later, and such policies have generally been limited to three groups: public school children, health care workers, and members of the military.⁵⁷⁶ Of these, mandates pertaining to public school students have been the most controversial and have generated the most significant legal challenges. The first such requirement was imposed by the city of Boston in 1827, which required public school students to provide a certificate of immunization against smallpox.⁵⁷⁷ Hodge and Gostin survey the spread of mandatory vaccination requirements for public school attendance during the 19th century:

The Commonwealth of Massachusetts incorporated its own school vaccination law in 1855, New York in 1862, Connecticut in 1872, and Pennsylvania in 1895. Other northeast states soon passed their own requirements. The trend toward compulsory child vaccination as a condition of school attendance eventually spread to states in the Midwest (e.g., Indiana (1881), Illinois and Wisconsin (1882), Iowa (1889)), South (e.g., Arkansas and Virginia (1882)), and West (e.g., California (1888)), though not without considerable political debate.⁵⁷⁸

⁵⁷¹ LAWRENCE O. GOSTIN, *PUBLIC HEALTH LAW: POWER, DUTY, RESTRAINT* 376 (2d ed. 2008); Hodge and Gostin, *supra* note 566 at 833, 839–40; *see* EDWARD JENNER, *AN INQUIRY INTO THE CAUSES AND EFFECTS OF THE VARIOLAE VACCINAE* (1796). This, at least, is the conventional history, though some sources contend that Jenner was an “opportunist” who appropriated existing knowledge to his own credit. *See, e.g.,* Richard Horton, *Myths in Medicine: Jenner Did Not Discover Vaccination*, 310 *BRITISH MED. J.* 62, 62 (1995).

In the United States, Dr. Benjamin Waterhouse of Harvard University undertook his own experiments in vaccination and enjoyed significant influence with American presidents in the early nineteenth century, particularly Thomas Jefferson. Hodge and Gostin, *supra* note 566, at 842–43; Kaufman, *supra* note 569, at 463; HERVÉ BAZIN, *THE ERADICATION OF SMALLPOX: EDWARD JENNER AND THE FIRST AND ONLY ERADICATION OF A HUMAN INFECTIOUS DISEASE* 98 (2000).

⁵⁷² GOSTIN, *supra* note 571, at 652 n.33.

⁵⁷³ *Id.* at 376; *cf.* Willem G. van Panhuis et al., *Contagious Diseases in the United States from 1888 to the Present*, 369 *NEW ENGLAND JOURNAL OF MEDICINE* 2152–2158, 2156 (2013) (estimating that “103 million cases of childhood diseases (95% of those that would otherwise have occurred) have been prevented since 1924; in the past decade alone, 26 million cases (99% of those that would otherwise have occurred) were prevented” by vaccination).

⁵⁷⁴ CDC, *supra* note 566.

⁵⁷⁵ Hodge and Gostin, *supra* note 566, at 843.

⁵⁷⁶ *See* GOSTIN, *supra* note 571, at 379–81; CONGRESSIONAL RESEARCH SERVICE, *MANDATORY VACCINATIONS: PRECEDENT AND CURRENT LAWS* (2011).

⁵⁷⁷ GOSTIN, *supra* note 571, at 379; CONGRESSIONAL RESEARCH SERVICE, *supra* note 576, at 3.

⁵⁷⁸ Hodge and Gostin, *supra* note 566, at 851 (footnotes omitted).

By 1905, approximately half of the states required proof of smallpox vaccination for public school students,⁵⁷⁹ and by 1942, only six states lacked a smallpox vaccination requirement for public school students.⁵⁸⁰ States began imposing vaccination requirements for other diseases, such as diphtheria, in the 1930s.⁵⁸¹ The widespread use of immunization requirements in public schools began in response to measles outbreaks in the 1960s;⁵⁸² currently, all 50 states have laws mandating the immunization of public school children against a variety of diseases.⁵⁸³

B. Normative and Epistemic Pluralism in the Antivaccination Movement

1. Themes in Antivaccinationist Argument

Although the Jennerian method of immunization spread quickly through the mainstream medical establishment of the early nineteenth century, opposition quickly arose among the general public and alternative medical communities.⁵⁸⁴ Antivaccinationist sentiment has waxed and waned since then, experiencing periods of relative popularity and others in which the public consensus concurred more or less unanimously with that of the medical community that vaccines are a safe and effective method of preventing disease.⁵⁸⁵ On the whole, though, antivaccinationist sentiment for the past two centuries has been remarkably consistent in its major themes. Antivaccinationists in the nineteenth and twentieth centuries campaigned against the practice in terms that foreshadowed the claims of antivaccinationist arguments today:

[Antivaccinationists] portrayed vaccines as foreign substances, or poisons, capable of causing more harm than good. Vaccinations were described as a ‘surgical operation’, not routine medical care. The effectiveness of the vaccine itself led to a progressive, albeit apathetic, argument: since the vaccine has worked, why should individuals continue to be subjected to the harms of vaccination unless there exists an actual threat of disease in the community? Public health authorities were characterized as abusive, untrustworthy, and paternalistic. Resisting public health efforts was equated with fighting government oppression. Antivaccinationists asserted that vaccinations... were contrary to their sacred religious beliefs.⁵⁸⁶

Three major categories of argument recur in antivaccinationist opposition to the practice of immunization, mandatory or otherwise, in the nineteenth and early twentieth centuries: 1) *Medical disagreements* consisting of a) *empirical doubts* about the safety and efficacy of vaccines or about the severity of the diseases they purport to prevent, and b) *competing claims to legitimacy* between the mainstream medical establishment, represented foremost by the American Medical Association (AMA), and various “alternative” medical practitioners; 2) *moral*

⁵⁷⁹ GOSTIN, *supra* note 571, at 379.

⁵⁸⁰ William Fowler, *Principal Provisions of Smallpox Vaccination Laws and Regulations in the United States*, 56 PUBLIC HEALTH REP. 325, 325 (1942).

⁵⁸¹ William Fowler, *State Diphtheria Immunization Requirements*, 57 PUBLIC HEALTH REP. 325, 325 (1942).

⁵⁸² GOSTIN, *supra* note 571, at 379.

⁵⁸³ *Id.* at 380.

⁵⁸⁴ Hodge and Gostin, *supra* note 566, at 844.

⁵⁸⁵ Writing in 1967, Kaufman explained that “[w]ith the improvements in medical practice and the popular acceptance of the state and federal governments’ role in public health, the anti-vaccinationists slowly faded from view, and the movement collapsed.” Kaufman, *supra* note 569, at 478. Subsequent experience shows antivaccinationism to have been more resilient than Kaufman anticipated.

⁵⁸⁶ Hodge and Gostin, *supra* note 566, at 848.

or religious disagreements consisting of a) appeals to *liberty* or *human rights* against mandatory vaccination, and b) appeals to *God* or *natural law* against the introduction of “unnatural” or “unclean” matter into the body; and 3) *ad hominem attacks* on the motives of the mainstream medical establishment, generally consisting of variations on the claim that the AMA or “Big Pharma” intentionally perpetuate disease for the sake of financial gain.⁵⁸⁷ Although the contemporary vaccination debate is heavily influenced by the relatively recent assertion that vaccination is causally associated with the development of childhood autism,⁵⁸⁸ these themes guide contemporary antivaccination discourse just as they did in the nineteenth century. Details have changed, but the broad thrust of antivaccinationist rhetoric—both normative and empirical—has remained virtually unaltered for nearly 200 years. This section will survey each of the major themes in antivaccinationist argument from the earliest days through the present, while the next section will focus on recent shifts in tone brought about by Dr. Andrew Wakefield’s claim, in 1998, to have identified a causal relationship between childhood vaccination and the development of autism.

a. Empirical Doubts Concerning Vaccines’ Safety or Efficacy

The principal empirical objection that antivaccinationists raise against the practice of vaccination is that it does no good; that is, vaccination fails to prevent disease as the medical establishment claims. This was a recurrent theme of antivaccinationist advocacy against the smallpox vaccine, made somewhat more plausible by the fact that the germ theory of disease remained inconclusively established in the nineteenth century. Much of the nineteenth century antivaccinationists’ empirical objection rested on this uncertainty concerning the cause of disease; antivaccinationists tended to reject the contagion theory in favor of the “miasmatic” theory of disease, which held that diseases “spontaneously generated in dirt and filth,” and therefore argued that greater public sanitation would reduce the risk of smallpox epidemics more effectively than vaccination.⁵⁸⁹ Antivaccinationists also proposed alternative treatments for individuals infected with smallpox, as when Isaac Peebles claimed to have discovered “three infallible ways to treat smallpox. The first was to wrap the patient in a milk-soaked blanket or sheet; second, bathe him in linseed oil; finally, apply dry flour and use no drugs.”⁵⁹⁰

Like their nineteenth and twentieth century forebears, contemporary antivaccinationists assert that some, if not all, vaccines are ineffective at preventing disease,⁵⁹¹ and prescribe alternative remedies as superior to vaccination for preventing or treating disease.⁵⁹² Kata’s content analysis of antivaccinationist websites found that 88% of sites raised doubts concerning the efficacy of

⁵⁸⁷ *Id.* at 836, 844.

⁵⁸⁸ *See infra* Part II(B)(2).

⁵⁸⁹ Kaufman, *supra* note 569, at 468, 476–77; Hodge and Gostin, *supra* note 566, at 846–47.

⁵⁹⁰ Kaufman, *supra* note 569, at 476 (citing ISAAC PEEBLES, UNANSWERABLE OBJECTIONS TO VACCINATION 21 (1902)).

⁵⁹¹ *See, e.g.,* Kelly Brogan, *A Shot Never Worth Taking: The Flu Vaccine*, INTERNATIONAL MEDICAL COUNCIL ON VACCINATION (2013), <http://www.vaccinationcouncil.org/2013/11/27/a-shot-never-worth-taking-the-flu-vaccine-by-kelly-brogan-md> (asserting that the influenza vaccine “doesn’t work”); Sherry Tenpenny, *Outbreaks Proof That Whooping Cough Vaccines Don’t Work*, INTERNATIONAL MEDICAL COUNCIL ON VACCINATION (2011), <http://www.vaccinationcouncil.org/2011/01/11/2377> (“Pertussis-containing vaccines seem to have little effect on the overall incidence of the infection.”); Mike Adams, *CDC Admits Flu Vaccines Don’t Work (Which is Why You Need a New One Every Year)*, NATURAL NEWS (2011), http://www.naturalnews.com/032558_flu_shots_wear_off.html.

⁵⁹² *See infra* Part II(B)(1)(b) (discussing the division between mainstream and “alternative” medical schools concerning the treatment of vaccine-preventable disease).

vaccination, including “propositions that vaccination weakens the immune system, or that immunity is ineffective because vaccinated individuals still contract diseases.”⁵⁹³

Antivaccinationist sites also often recommend alternative treatments for or methods for developing immunity against vaccine preventable diseases.⁵⁹⁴

A second line of medical doubt commonly deployed by antivaccinationists claims that, even if a vaccine is effective at preventing the disease in question, it also causes some worse disease or condition. Antivaccinationists in the nineteenth century attributed all sorts of unwholesome effects to the smallpox vaccine. Kaufman recounts, for example, the arguments of Dr. J.F. Banton, “who wrote that vaccination introduces into the bloodstream ‘a bioplasm, death laden—carrying with it all the vices, passions and diseases of the cow,’”⁵⁹⁵ and Dr. H. Lindlahr, who claimed that “[v]accination dries up the mammary glands... and the widespread use of vaccination explains the popularity of ‘bust foods and developers.’”⁵⁹⁶ Somewhat more sophisticated was the statistical argument of antivaccinationist Henry Bergh, who correctly pointed out that “wherever vaccination is generally and rigidly enforced, the death-rate from tuberculosis is highest,” while ignoring the fact that both mandatory vaccination and tuberculosis were most common in densely populated urban centers.⁵⁹⁷ More generally, antivaccinationists claimed “that syphilis, leprosy, polio, cancer, and a host of other diseases were inoculated into the bloodstream of innocent children, and that this wholesale slaughter of the innocents must come to an end.”⁵⁹⁸

This line of argument aligns with the dominant theme of twenty-first century antivaccinationist advocacy, which maintains that vaccines cause a host of diseases and conditions far worse than the disease that the vaccine prevents. For example, Keelan *et al.*’s study of YouTube videos concerning vaccination found that substantial percentages of the anti-vaccination videos hosted on the site stated that various forms of immunization frequently caused serious adverse events, caused particular cases of permanent injury, or caused autism.⁵⁹⁹ Kata’s content analysis of antivaccinationist websites found that “every [antivaccinationist] site claimed that vaccines are poisonous and cause idiopathic illnesses,”⁶⁰⁰ which aligns with Wolfe *et al.*’s study in which

⁵⁹³ Kata, *supra* note 7 at 1712; see also Robert M. Wolfe, Lisa K. Sharp & Martin S. Lipsky, *Content and Design Attributes of Antivaccination Web Sites*, 287 J. AM. MED. ASS’N 3245, 3247 (2002) (95% of sites claimed that “vaccinations eroded or harmed the immune system,” and 81% of sites “alleged that vaccines are ineffective or produce temporary immunity”); P. Davies, S. Chapman & J. Leask, *Antivaccination Activists on the World Wide Web*, 87 ARCHIVES OF DISEASE IN CHILDHOOD 22, 24 (2002) (83% of antivaccinationist websites claimed that vaccines are ineffective, and 54% claimed that vaccines erode the immune system).

⁵⁹⁴ See *infra* note 623.

⁵⁹⁵ Kaufman, *supra* note 569, at 471 (quoting J.F. BANTON, VACCINATION REFUTED 3 (1882)). As Kaufman observes, “[s]uch an argument obviously makes one wonder exactly what are the vices and passions of the cow.” *Id.*

⁵⁹⁶ *Id.* at 472 (quoting H. Lindlahr, 1 NATURE CURE MAGAZINE 16–17 (1908)). In a similar vein, Herbert Spencer claimed that vaccination contributed to “the wholesale syphilization of society.” *Id.* at 471.

⁵⁹⁷ *Id.* at 471–72 (quoting Henry Bergh, *The Lancet and the Law*, 134 NORTH AM. REV. 163 (1882)).

⁵⁹⁸ *Id.* at 472 (citations omitted).

⁵⁹⁹ Jennifer Keelan *et al.*, *YouTube as a Source of Information on Immunization: A Content Analysis*, 298 J. AM. MED. ASS’N 2482, 2483 (2007). The principal contemporary form of this argument, the claim that childhood vaccinations are responsible for the development of autism, is discussed in greater detail in Part II(B)(2), *infra*.

⁶⁰⁰ Kata, *supra* note 7 at 1711; cf. Bean, *supra* note 8 at 1877 (76% of websites in the study sample “asserted that vaccines cause illness, damage, or death,” while 80% of sites asserted that vaccines contain “poisons”); Davies, Chapman, and Leask, *supra* note 99 at 24 (93% of sites claim that vaccines cause various idiopathic illnesses; 83% claim that they are deadly).

100% of antivaccinationist websites “included content suggesting that vaccines cause idiopathic illness.”⁶⁰¹

Another common antivaccinationist tactic has been to minimize the threat of vaccine preventable disease—to claim, in other words, that the prevention is worse than the disease itself. This tactic also originated in nineteenth-century antivaccinationist activism. Smallpox, before it was eradicated in the wild by a global vaccination campaign during the 20th century, was responsible for untold suffering and countless deaths across human history.⁶⁰² John Dryden vividly describes the death by smallpox of Henry, Lord Hastings, as follows:

Was there no milder way but the small-pox,
The very filthiness of Pandora’s box?
So many spots, like næves, our Venus soil?
One jewel set off with so many a foil;
Blisters with pride swelled, which through's flesh did sprout
Like rosebuds, stuck i' the lily-skin about.
Each little pimple had a tear in it,
To wail the fault its rising did commit;
Which, rebel-like, with its own lord at strife,
Thus made an insurrection ‘gainst his life.
Or were these gems sent to adorn his skin,
The cabinet of a richer soul within?
No comet need foretell his change drew on,
Whose corpse might seem a constellation.⁶⁰³

While Lord Macaulay, writing in the nineteenth century, referred to smallpox as “the most terrible of all the ministers of death,”⁶⁰⁴ some nineteenth century antivaccinationists took the position that the risks of vaccination outweighed the benefits because smallpox was not a serious disease. Kaufman quotes antivaccinationist J.F. Banton, who “wrote that smallpox was a ‘disease not so much to be dreaded as we are wont to believe, leaving the system in much healthier condition than most other diseases.’”⁶⁰⁵ Similarly, “Bernarr Macfadden wrote that the disease was possible only to those who ‘clothe heavily, bathe infrequently, eat very heartily and exercise rarely.’”⁶⁰⁶ Some antivaccinationists went so far as to claim that smallpox was not even contagious, as when Dr. Immanuel Pfieffer “agreed to visit a smallpox hospital in order to prove that the disease was not infectious.”⁶⁰⁷

⁶⁰¹ Wolfe, Sharp, and Lipsky, *supra* note 99 at 3246.

⁶⁰² See Abbas M. Behbehani, *The Smallpox Story: Life and Death of an Old Disease.*, 47 MICROBIOL. REV. 455, 490–500 (1983).

⁶⁰³ JOHN DRYDEN, *THE POETICAL WORKS OF JOHN DRYDEN* 3 (1865).

⁶⁰⁴ See DONALD R. HOPKINS, *PRINCES AND PEASANTS: SMALLPOX IN HISTORY* 38 (1983).

⁶⁰⁵ Kaufman, *supra* note 569, at 475 (quoting J.F. BANTON, *VACCINATION REFUTED* 3 (1882)).

⁶⁰⁶ *Id.* (quoting J.W. HODGE, *THE VACCINATION SUPERSTITION* 5 (1902)).

⁶⁰⁷ *Id.* at 476. Dr. Pfieffer subsequently “was discovered in the throes of a violent smallpox attack.” *Id.*

Contemporary antivaccinationists have continued this theme. Some of them maintain, for example, that influenza,⁶⁰⁸ chicken pox,⁶⁰⁹ or even measles⁶¹⁰ are relatively harmless, or that “natural” immunity resulting from infection with a disease is “better” than the immunity created by vaccination.⁶¹¹ Half of the antivaccinationist websites in Kata’s sample argued that vaccine preventable diseases are “trivial,” while “[s]erious complications of [vaccine preventable diseases] are not acknowledged.”⁶¹² Similarly, 44% of sites in Bean’s study of antivaccination websites included the claim that the H1N1 swine flu outbreak of 2009 was a “manufactured threat” invented to coerce vaccination through inflated fear.⁶¹³

b. Competing Claims to Legitimacy Among Rival Epistemic Communities

Since the nineteenth century, the debate over vaccination has been one front in the larger struggle for power and legitimacy between the mainstream medical community, represented most prominently by the American Medical Association,⁶¹⁴ and adherents to various alternative schools of medical theory.⁶¹⁵ Those battle lines were drawn in the nineteenth century, when opposition to the mainstream medical community’s consensus in favor of vaccination as a safe and effective preventative measure provided “irregular” physicians with an opportunity to critique the mainstream medical establishment and to challenge its legitimacy as the exclusive voice of medical expertise. Kaufman identifies four categories of irregulars, all of whom were engaged in a struggle for legitimacy against the mainstream.⁶¹⁶ All of these groups were vocally critical of the pro-vaccination consensus and were actively involved in the antivaccinationist movement and various antivaccinationist organizations and societies.⁶¹⁷

The political and commercial valence of the vaccination debate thus should not be overlooked. Many of the leading actors in the antivaccinationist movement of the nineteenth century had a professional interest in diminishing the credibility of the mainstream as well as a financial interest in marketing their own alternative treatments to smallpox. The public debates over

⁶⁰⁸ See, e.g., Joseph Mercola, *New Proof that Flu Shots are Unnecessary and Ineffective*, MERCOLA.COM (2010), <http://articles.mercola.com/sites/articles/archive/2010/11/01/flu-vaccine-and-its-side-effects.aspx>.

⁶⁰⁹ Joseph Mercola, *Chickenpox Vaccine: Is It Really Necessary?*, MERCOLA.COM, <http://articles.mercola.com/sites/articles/archive/2013/04/23/chickenpox-vaccine.aspx> (describing chicken pox as “a relatively benign childhood illness”).

⁶¹⁰ See, e.g., *Think Twice, Measles*, THINKTWICE.COM (2010), <http://thinktwice.com/measles.htm> (claiming that “Prior to the 1960s, most children in the United States and Canada caught measles. Complications from the disease were unlikely”); Edda West, *What If My Child Gets the Measles?*, VACCINATION RISK AWARENESS NETWORK NEWSLETTER (1996), <http://vran.org/alternatives/alternatives-for-specific-infections/what-if-my-child-gets-measles/> (describing measles as “an ordinary childhood disease”).

⁶¹¹ See, e.g., Mercola, *supra* note 609 (“Unlike the type of immunity acquired from experiencing the disease, the [chicken pox] vaccine provides only TEMPORARY immunity, and that immunity is not the same kind of superior, longer lasting immunity you get when you recover naturally from chickenpox.” (capitalization in original)).

⁶¹² Kata, *supra* note 8 at 1712. Indeed, antivaccinationist websites in Kata’s sample argue that even *smallpox* was “harmless under proper treatment... [a]nd not considered deadly with the use of homeopathy.” *Id.*

⁶¹³ Bean, *supra* note 502, at 1878; see also Davies, Chapman, and Leask, *supra* note 99 at 24 (38% of antivaccinationist websites claimed that vaccine preventable diseases are “trivial”).

⁶¹⁴ Kaufman, *supra* note 569, at 467. By the late 19th century, the AMA “had become, to the irregulars, a veritable bogey man trying to deny them the right to earn a living.” *Id.*

⁶¹⁵ *Id.* at 474. (“Almost every anti-vaccination argument would eventually turn into an attack on the allopath and his monopoly on medical licensure.”).

⁶¹⁶ *Id.* at 466–69.

⁶¹⁷ *Id.*

vaccination became something of a proxy war between competing visions of the medical profession and divergent institutional logics, which were further associated with disagreements concerning the legitimate role of state authority in maintaining public health. Kaufman recounts, for example, a brief history of the American Medical Liberty League, formed in 1918, which during the course of its existence “opposed vaccination, medical licensure, isolation of contagious diseases, pure food and drug laws, the testing of cattle with tuberculin, and a host of other public health programs.”⁶¹⁸ The vice president of the League was Eli G. Jones, “who had been a practitioner of every medical system, ‘allopathic, homeopathic, eclectic, physio-medical and biochemical medicine,’” while the treasurer was D.W. Ensign, “the owner and manager of Ensign Remedies, a patent medicine mail order house in Battle Creek, Michigan.”⁶¹⁹

In the twenty-first century, the nineteenth-century battle for control of the medical profession continues to rage between the mainstream and alternative medical practitioners, and the vaccination debate continues to be a significant point of engagement in that broader conflict.⁶²⁰ Modern-day irregulars, including, among others, chiropractors,⁶²¹ homeopaths, and naturopaths,⁶²² continue to challenge the mainstream medical establishment’s claim of exclusive medical expertise and to reject the medical establishment’s consensus that vaccination is a safe and effective means of preventing disease, although some disagreement on the merits of vaccination exists within the ranks of contemporary schools of alternative medicine. Contemporary antivaccinationists, like their forebears, are firmly on the side of the irregulars, as they commonly recommend methods for the prevention and cure of disease that are rejected by

⁶¹⁸ *Id.* at 466.

⁶¹⁹ *Id.* at 467. Kaufman offers an illuminating discussion of the contents of the Ensign Remedies catalog:

The catalogue consisted of an alphabetical listing of every possible ailment, “from Abdomen, Abortion, and Abscesses, down through Eczema, Irritability, and Itch, to Worms, Wrinkles, and Writer’s Cramp.” Each disease was followed by a number, corresponding to one of the many Ensign Remedies. For example, if the person had appendicitis, he would send for remedy number 758 a and b, which was found by the Michigan Board of Health to be one hundred percent sugar.

Id. (footnote omitted).

⁶²⁰ Outside the context of vaccination, the medical establishment continues to struggle for power and legitimacy against a variety of alternative models of medical expertise. *See, e.g.,* Katherine Beckett & Bruce Hoffman, *Challenging Medicine: Law, Resistance, and the Cultural Politics of Childbirth*, 39 LAW & SOC. REV. 125 (2005).

⁶²¹ *See* Dana Lawrence, *Anti-Vaccination Attitudes within the Chiropractic Profession: Implications for Public Health Ethics*, 3 TOP. INTEGR. HEALTH CARE 1 (2012); Margaret L. Russell et al., *Beliefs and Behaviours: Understanding Chiropractors and Immunization*, 23 VACCINE 372 (2004); *but see, e.g.,* Stephen M. Perle, *Vaccines and Public Health*, ACA NEWS (2013), https://www.acatoday.org/content_css.cfm?CID=5242 (lamenting the fact that the chiropractic profession’s “philosophical bias toward therapeutic conservatism and naturalism has not allowed us to see that there is a time and a place for vaccination.”); Robert Cooperstein, *Vaccination Is Both Beyond and Consistent with Chiropractic Philosophy!*, 45 J AM. CHIROP. ASSOC. 27 (2008) (“Central to virtually all renditions of chiropractic philosophy is the thought that the body heals itself and that the job of the DC is to help the body heal itself, generally by removing nerve interference. When I look at the broad expanse of medical procedures... that are available, I can think of nothing more in the spirit of this central tenet of chiropractic philosophy than vaccination procedures.”).

⁶²² Anne C.C. Lee & Kathi Kemper, *Homeopathy and Naturopathy: Practice Characteristics and Pediatric Care*, 154 ARCHIVE OF PEDIATRIC ADOLESCENT MED. 75, 79 (2000) (“Several reasons have been postulated for [opposition to vaccination among homeopathic and naturopathic practitioners]: a general antipathy with conventional medicine, apprehension of detrimental side effects of immunization, and the opinion that their own practices provide better, natural protection that ‘obviates the need for vaccination.’”).

the mainstream medical establishment.⁶²³ This epistemic divergence goes beyond professional boundary work to expose a pluralism of epistemological methodology; 38% of antivaccinationist websites in Kata's content analysis, for example, promoted "[s]ources of knowledge such as personal intuition... while biomedical information was portrayed as erroneous; parents were urged to not to allow biomedical fear-mongering to overshadow their own instincts."⁶²⁴

c. Appeals to Liberty

Opponents of mandatory vaccination policies frequently phrase their appeals in terms of bodily or intellectual freedom. In the nineteenth century, antivaccinationists invoked the specter of human slavery, analogizing the state's authority over the bodies of African-American slaves to its imposition of mandatory vaccination requirements. For example, William Tabb, a nineteenth century British antivaccinationist, lamented, upon being required to submit to shipboard vaccination while in transit to the United States, that "America was closed against the unvaccinated anti-vaccinator, and that he was fast falling into the condition of the American negro-slave who was hunted down by everybody."⁶²⁵ Tabb's sentiment was echoed by J.W. Hodge, speaking before the Western New York Homeopathic Medical Society, who contended that state-mandated immunization "'ranks with human slavery and religious persecution as one of the most flagrant outrages upon the rights of the human race.'"⁶²⁶

Contemporary antivaccinationists continue to invoke liberty and the right to bodily autonomy in opposition to state-mandated immunization. An online petition titled "Universal Declaration of Resistance to Mandatory Vaccinations," for example, declares that "as Freeman & Freewomen... [the petitioners'] bodies are sovereign territory and subject to our self-determination."⁶²⁷ Similarly, radio personality Alex Jones's website identified the fact that "the government forces us to shoot our kids full of vaccines" as among the most serious current threats to American liberty.⁶²⁸ Indeed, the rhetoric of personal liberty and bodily freedom permeates throughout antivaccinationist discourse in the twenty-first century, which depicts vaccine refusal as a matter of individual liberty of conscience against an overreaching and intrusive public health apparatus.⁶²⁹

⁶²³ Bean, *supra* note 8 at 1877 (20% of sites "specifically mentioned homeopathy, chiropractic, or other alternatives to vaccination"); Kata, *supra* note 8 at 1712 (88% of sites "endorsed treatments such as herbalism, homeopathy, chiropractics, naturopathy, and acupuncture as superior to vaccination"); Wolfe, Sharp, and Lipsky, *supra* note 99 at 3247 (70% of websites listed homeopathy as an alternative to vaccination); Davies, Chapman, and Leask, *supra* note 99 at 24 Davies, Chapman, and Leask, *supra* note 72 at 24 (45% of sites claimed that "alternative" health is superior, and 39% claimed that a "natural" lifestyle gives immunity to vaccine preventable disease).

⁶²⁴ Kata, *supra* note 8 at 1713.

⁶²⁵ Kaufman, *supra* note 569, at 466 (quoting WILLIAM TEBB, COMPULSORY VACCINATION IN ENGLAND 47–50 (1884)).

⁶²⁶ *Id.* at 473 (quoting J.W. HODGE, THE VACCINATION SUPERSTITION 49 (1902)).

⁶²⁷ VACCINE RESISTANCE MOVEMENT, UNIVERSAL DECLARATION OF RESISTANCE TO MANDATORY VACCINATION (undated), <http://www.thepetitionsite.com/1/a-universal-declaration-of-resistance-to-mandatory-vaccinations>. The petitioners, evidently unaware of Jacobson and its progeny, threaten a "Class Action Lawsuit" in response to the state's encroachment on their individual liberties through mandatory immunization.

⁶²⁸ 12 Signs That Americans Who Love Liberty and Freedom Should Watch Their Backs, INFOWARS.COM (Oct. 1, 2011), <http://www.infowars.com/12-signs-that-americans-who-love-liberty-and-freedom-should-watch-their-backs>.

⁶²⁹ Seventy-five percent of the antivaccinationist websites in Kata's study argued that mandatory vaccination was a violation of parental rights, while 63% equated mandatory vaccination with "totalitarianism." Kata, *supra* note 8 at 1712. Half of the websites in Kata's study "included the notion of 'us versus them,' where concerned parents and

d. Religious or Moral Arguments

Antivaccinationists from the nineteenth century to the present day have also invoked God and morality in their opposition to coerced immunization. These arguments take a number of specific forms. Some argue that disease and death represent God's judgment or will and therefore should be accepted; others contend that the human body's natural immune system is divinely created and is defiled by vaccination. Some religious sects oppose vaccination as a matter of formal doctrine; many antivaccinationists, however, ground their objection in personal religious principle even when the religious sect to which they adhere has no formal opposition to immunization.

Invocations of the divine plan were common to nineteenth century religious arguments. Antivaccinationists of that era debated the origin of smallpox and contended either that it was a "social condition" with an environmental solution, or, adopting the Malthusian perspective influential on much of nineteenth century social thought, argued that "the widening gap between the rich and the poor was God's will and that diseases were mechanisms for controlling the balance between the blessed and the damned."⁶³⁰ Kaufman recounts one antivaccinationist tract that involved a parable of God expelling the physicians from paradise: "Only a return to nature, the Lord proclaimed, 'will lead humanity to a more prosperous future.'"⁶³¹

These themes, minus the Malthusian trappings, continue to exist among today's antivaccinationists. Religious antivaccinationist Leonard Horowitz, for example, writes that "parents who elect to forego [the] risks" associated with vaccination, "in celebration to God and his blessings," will be rewarded by a "healthy and natural immunity."⁶³² Others raise more specific objections, for example the use of fetal cell lines in the manufacture of some vaccines.⁶³³ Religious and moral themes were less common among the antivaccinationist websites in Kata's content analyses than the other themes discussed here, but 25% of the sample nevertheless contained explicitly religious advocacy against vaccination, and 38% "associat[ed] vaccines with morally dubious actions."⁶³⁴

vaccine objectors were portrayed as battling physicians, governments, corporations, or the scientific establishment." *Id.* at 1713; see also Bean, *supra* note 8 at 1877 (44% of antivaccinationist cites referred to civil liberties); Wolfe, Sharp, and Lipsky, *supra* note 99 at 3247 (77% of antivaccination sites "mentioned civil liberty concerns associated with mandated vaccination"); Davies, Chapman, and Leask, *supra* note 99 at 24 (86% of sites cast antivaccinationism as a matter of free and informed choice; 79% compared mandatory vaccination to totalitarianism).

⁶³⁰ Hodge and Gostin, *supra* note 566, at 847.

⁶³¹ Kaufman, *supra* note 569, at 474 (quoting C. C. SCHIEFFERDECKER, DR. C. G. G. NITTINGER'S EVILS OF VACCINATION 86-88 (1856)).

⁶³² Leonard Horowitz, *Vaccination: The UnGodly Practice*, VACINFO.ORG (undated), <http://www.vacinfo.org/uploads/7/9/8/5/79856028/vaccination.pdf>; see also Megan Heimer, *God Does Not Support Vaccines*, LIVINGWHOLE.ORG (2014), <http://www.livingwhole.org/god-does-not-support-vaccines>.

⁶³³ See, e.g., Donald J. Henz, *Infant Immunization: The Catholic Parents' Guide*, CHILDREN OF GOD FOR LIFE (undated), <https://cogforlife.org/catholicguide.pdf> (distinguishing "ethical" from "unethical" vaccines based on the use of human fetal cells in their preparation).

⁶³⁴ Kata, *supra* note 7 at 1713; see also Wolfe, Sharp, and Lipsky, *supra* note 99 at 3247 (32% of antivaccinationist websites "raised the fact that viruses grown from cell cultures of aborted fetuses... are used in" several vaccines). On the other hand, a later content analysis found no reference to explicitly religious themes among its sample of antivaccinationist websites. Bean, *supra* note 8 at 1877.

e. Conspiracy Theories and Ad Hominem Arguments

As noted above, the vaccination debate can be understood in part as one battlefield in the larger struggle for legitimacy between the mainstream and alternative medical communities. It is therefore perhaps unsurprising that one strand of antivaccinationist argument, from the nineteenth century through the present day, moves beyond the empirical assessment of vaccines' safety and medical efficacy to attack the motives and intentions of vaccination proponents. This line of argument depicts proponents of vaccination, whether physicians who recommend immunization or pharmaceutical companies that manufacture and sell vaccines, as not merely factually mistaken about the safety and utility of vaccination, but rather as engaged in an active conspiracy against public health for the sake of their own financial interests. As Kaufman notes, such arguments were common in the nineteenth and early twentieth centuries:

The Pittsburgh Health Club, for example, which had become a center of anti-vaccination and anti-allopathic sentiment, published a pamphlet which stated that in 1924 the local physicians had amassed more than three million dollars by vaccinating the poor, and to add to their crime, they caused an epidemic of smallpox to strike the steel city. An American Medical Liberty League leaflet noted similarly that the vaccinators in Kansas City had "raked in over half a million dollars" in 1922, and the author commented that "considering the profits, why should not all medical doctors advocate vaccination?" Anti-vaccinationists constantly accused allopaths of starting what they called "vaccination rings," monopolies of the regular doctors formed in order to reap the financial benefits of compulsory vaccinations.⁶³⁵

Contemporary antivaccinationists continue to employ ad hominem arguments and conspiracy theories alleging that mainstream practitioners and "Big Pharma" knowingly exaggerate the effectiveness and understate the risks of vaccines in order to maximize their own wealth.⁶³⁶ Also common is the allegation of conflict of interest against researchers whose work on the safety or efficacy of vaccination is funded in part by pharmaceutical companies. These arguments at times veer into broader conspiracy theories concerning government control and the intentional infringement of individual liberties through mandatory immunization requirements. Dr. Joseph Mercola, for example, decries "Big Pharma[']s... lucrative monopoly on health care in America," through which it has "managed to steal basic human Constitutional liberties from you, especially your right to choose what is best for yourself and your children when it comes to drugs and vaccines."⁶³⁷ Kata's study included websites "staging ad hominem attacks against [Louis] Pasteur, claiming that he plagiarized [germ] theory," and lamenting that "[t]oday's

The relative rarity of religious arguments in comparison to empirical or liberty-based objections to vaccination is striking insofar as, as discussed below, most state statutory exemption schemes require a *religious* objection to qualify for exemption from vaccination in the absence of medical contraindication. See *infra* Part II(D).

⁶³⁵ Kaufman, *supra* note 569, at 474 (footnotes omitted). Kaufman further quotes Frank Blue, the secretary of the Anti-Vaccination Society of America, who claimed that "there is nothing so welcome to the health board of any town as a few cases of smallpox. There is no possible disease that can be turned into such ready cash; and that yields such perennial returns." *Id.* at 475.

⁶³⁶ See, e.g., Markus Heinze, HOW PHARMACEUTICAL COMPANIES HIDE THE DANGERS OF VACCINES FROM PARENTS VACTRUTH.COM (2013), <http://vactruth.com/2013/09/26/how-pharmaceutical-hide-dangers>.

⁶³⁷ Joseph Mercola, *Is Big Pharma Putting Your Health and Liberty on the Line?*, MERCOLA.COM (2011), <http://articles.mercola.com/sites/articles/archive/2011/11/05/health-liberty-and-forced-vaccination.aspx>.

‘science’ seems to be much less scrupulous than in earlier times.”⁶³⁸ More broadly, 75% of the antivaccinationist websites in Kata’s sample asserted that “vaccination is motivated solely by a quest for profit,” while 63% of the sites alleged collusion between vaccine manufacturers and physicians, who profit from vaccines’ harmful side effects.⁶³⁹

2. The Autism Controversy: 1998–Present

The anti-vaccination movement entered its current phase on February 28, 1998, with the publication of a study by Andrew Wakefield *et al.* in *The Lancet*.⁶⁴⁰ The Wakefield study purported to identify an association between receipt of the measles, mumps, and rubella (“MMR”) vaccination and the development of intestinal inflammation and autism in children. In a time of rising and unexplained autism diagnosis,⁶⁴¹ the study’s claim that parents and the medical establishment were inflicting neurological disorder upon infants by injecting them with pathogens and “toxins” in vaccines played upon parents’ anxieties for their children’s health and well-being and the public’s fears about the obscure and at times sinister-sounding contents of some vaccines, particularly MMR.

While the Wakefield Study immediately captured the attention of the public and the popular press, the mainstream medical community was skeptical that childhood vaccination was a likely causal agent in the development of autism. Subsequent studies called Wakefield’s conclusions into question,⁶⁴² and 10 of the study’s 12 co-authors disavowed its claimed causal association between MMR and autism.⁶⁴³ Over time, medical researchers conducted numerous studies attempting to replicate Wakefield’s results. These studies generally failed to replicate the finding of an association between immunization and autism.⁶⁴⁴ Taken together, they establish reasonably

⁶³⁸ Kata, *supra* note 8 at 1712. Wolfe *et al.* also noted that “[s]ites advocating homeopathy were often associated with statements attacking Pasteur and the germ theory of disease.” Wolfe, Sharp, and Lipsky, *supra* note 99 at 3247.

⁶³⁹ *Id.* at 1713; *cf.* Bean, *supra* note 502, at 1877 (52% of websites contained “[a]llegations of vaccination being conducted solely for financial gain or that vaccinations were promoted by those with conflicts of interest”); Wolfe, Sharp, and Lipsky, *supra* note 99 at 3247 (91% of antivaccination sites asserted that “vaccine policy is motivated by profit... which influences universal vaccination recommendations and promotes the cover-up of vaccine adverse effects”); Davies, Chapman, and Leask, *supra* note 99 at 24 (88% of antivaccination sites alleged a “cover up” of the true facts, and 62% alleged that vaccination policy was motivated by an “unholy alliance for profit”).

⁶⁴⁰ Andrew Wakefield *et al.*, *Ileal-lymphoid-nodular Hyperplasia, Non-Specific Colitis, and Pervasive Developmental Disorder in Children*, 351 THE LANCET 637 (1998) (retracted Feb. 6, 2010) [hereinafter the “Wakefield study”]. Dr. Wakefield was also involved in a second study published in 2002, which purported to identify a correlation between autism diagnosis and the presence of the measles virus genome in intestinal biopsy tissue. V. Uhlmann *et al.*, *Potential Viral Pathogenic Mechanism for New Variant Inflammatory Bowel Disease*, 55 MOL. PATHOL. 84 (2002).

⁶⁴¹ See Irva Hertz-Picciotto & Lora Delwiche, *The Rise in Autism and the Role of Age at Diagnosis*, 20 EPIDEMIOLOGY 84 (2009).

⁶⁴² See, e.g., L. Dales *et al.*, *Time Trends in Autism and in MMR Immunization Coverage in California*; 285 J. AM. MED. ASS’N 1183 (2001); B. Taylor *et al.*, *Autism and Measles, Mumps, and Rubella Vaccine: No Epidemiological Evidence for a Causal Association*, 353 THE LANCET 2026 (1999).

⁶⁴³ S.H. Murch *et al.*, *Retraction of an Interpretation*, 363 THE LANCET 750 (2004).

⁶⁴⁴ Luke E. Taylor, Amy L. Swerdfeger & Guy D. Eslick, *Vaccines are not Associated with Autism: An Evidence-Based Meta-Analysis of Case-Control and Cohort Studies*, 32 VACCINE 3623 (2014); D.A. Gust *et al.*, *Underimmunization Among Children: Effects of Vaccine Safety Concerns on Immunization Status*, 114 PEDIATRICS 16 (2004); see generally *Vaccines & Autism*, SCIENCE-BASED MEDICINE (2013) (summarizing key research), <https://sciencebasedmedicine.org/reference/vaccines-and-autism>; *cf.* Cedillo v. Secretary of Health & Hum. Serv., No. 98–916V, 2009 WL 331968, at *111 (Fed. Cl. Feb. 12, 2009) (rejecting theory of vaccine injury influenced by

conclusively, given the provisional and necessarily probabilistic nature of the inductive methodology of scientific reasoning, that childhood vaccination does *not* cause autism.

While the medical community directed its initial criticism toward the Wakefield Study's flawed methodology and the irreproducibility of its results, allegations of fraud and conflicts of interest against Wakefield personally began to surface in the mainstream press. Beginning in 2004 and continuing through 2012, the London *Times* ran a series of articles identifying a number of ethical conflicts and lapses in the conduct and reporting of the Wakefield study.⁶⁴⁵ The investigation discovered, for example, that Wakefield failed to disclose that the study was funded by lawyers representing a group of parents who believed their children's autism had been caused by the MMR vaccine or that Wakefield himself was in the process of patenting a separate measles vaccine that would compete with MMR.⁶⁴⁶ Contrary to his assurances to the research oversight board, Wakefield ordered a number of tests—including colonoscopies and lumbar punctures (*i.e.*, spinal taps)—on child test subjects that were not medically indicated.⁶⁴⁷

Most of the co-authors of the Wakefield paper eventually disavowed it, and *The Lancet* formally retracted the Wakefield study in 2010, writing that “it has become clear that several elements of the 1998 paper by Wakefield et al. are incorrect.”⁶⁴⁸ The *Times* investigation's revelations eventually led the British General Medical Council (“GMC”) to hold a 217-day “Fitness to Practise” hearing, held between 2007 and 2010, regarding allegations of unethical practices undertaken in connection with the Wakefield Study, which concluded with the revocation of Wakefield's license to practice medicine in the United Kingdom. The GMC wrote that it “is profoundly concerned that Dr Wakefield repeatedly breached fundamental principles of research medicine.”⁶⁴⁹ At the same time the GMC hearing was proceeding, the *Sunday Times* and *British Medical Journal* published additional allegations of fraud against Wakefield's 1998 study,⁶⁵⁰ and the *British Medical Journal* soon thereafter published an editorial describing the Wakefield study as “fraudulent.”⁶⁵¹ Wakefield eventually relocated to Texas and filed a number of libel suits against the journalists who had reported the fraud. He voluntarily dismissed three cases in the United Kingdom after the High Court, criticizing his litigation tactics, refused to stay the

Wakefield's theory of autistic enterocolitis, recognizing that “that theory, and Dr. Wakefield's role in its development, have been strongly criticized as constituting defective or fraudulent science”).

⁶⁴⁵ See generally Brian Deer, *The Lancet Scandal*, BRIANDEER.COM, <http://briandeer.com/mmr-lancet.htm> (last visited March 21, 2018) (providing links to all articles and overview of underlying research).

⁶⁴⁶ Brian Deer, *How Lawyers Paid for Vaccine Research*, BRIANDEER.COM, <http://briandeer.com/wakefield/wakefield-deal.htm> (last visited March 21, 2018).

⁶⁴⁷ GENERAL MEDICAL COUNCIL, DETERMINATION ON SERIOUS PROFESSIONAL MISCONDUCT (SPM) AND SANCTION 4 (May 24, 2010).

⁶⁴⁸ The Editors of *The Lancet*, *supra* note 6, at 445 (footnote omitted).

⁶⁴⁹ GENERAL MEDICAL COUNCIL, *supra* note 647, at 4.

⁶⁵⁰ See, e.g., Brian Deer, Wakefield's “Autistic Enterocolitis” under the Microscope, 340 BRITISH MED. J. 340 (2010); Brian Deer, *MMR Doctor Fixed Data on Autism*, SUNDAY TIMES, Feb. 8, 2009; see generally Brian Deer, *The Award-Winning Sunday Times and BMJ Reports*, BRIANDEER.COM, <http://briandeer.com/mmr/st-mmr-reports.htm> (chronology of *Sunday Times* and *British Medical Journal* articles) (last visited March 21, 2018).

⁶⁵¹ F. Godlee, J. Smith & H. Marcovitch, *Wakefield's Article Linking MMR Vaccine and Autism Was Fraudulent*, 342 BRITISH MED. J. 7452 (2011).

proceedings;⁶⁵² a case filed in Texas was dismissed for lack of personal jurisdiction over the defendants.⁶⁵³

Notwithstanding the scientific community's rapid rejection of the Wakefield Study's hypothesized connection between MMR vaccination and autism, the claim that vaccination is causally associated with the development of autism was widely adopted by the antivaccination movement and worked its way into popular consciousness.⁶⁵⁴ Since 1998, the claim that immunization increases the risk of childhood autism (or, in more recent years, that such a link has not been definitively disproved notwithstanding the scientific response to the Wakefield Study) has been repeated in blog posts,⁶⁵⁵ television reporting, and alternative medical news sources.⁶⁵⁶ Although the mainstream press has generally rejected the claims of

⁶⁵² *Wakefield v. Channel Four Television Corp.*, 2005 EWHC 2410 (QB) (2005).

⁶⁵³ *Wakefield v. British Med. J. Pub. Group, Ltd.*, 449 S.W.3d 172, 189 (Tex. App. 2014) (affirming dismissal for lack of personal jurisdiction over British defendants).

⁶⁵⁴ See Allison Kennedy *et al.*, *Confidence about Vaccines in the United States: Understanding Parents' Perceptions*, 30 HEALTH AFFAIRS 1151 (2011).

⁶⁵⁵ See, e.g., David Kirby, *THE AUTISM-VACCINE DEBATE: WHY IT WON'T GO AWAY* HUFFINGTON POST (2011), http://www.huffingtonpost.com/david-kirby/autism-vaccine-_b_817879.html; Leo Rebello, *Vaccines: Untested, Unsafe and Unnecessary*, HPATHY.COM (Nov. 2008), <http://hpathy.com/homeopathy-papers/vaccines-untested-unsafe-and-unnecessary> (asserting that “doctors watched perfectly normal children turn into grotesque zombies after receiving the [MMR] vaccines”).

⁶⁵⁶ See, e.g., Sarah Pope, *Two Autistic Children Awarded Millions by Vaccine Court*, THE HEALTHY HOME ECONOMIST (Jan. 25, 2018), <http://www.thehealthyhomeeconomist.com/two-autistic-children-awarded-millions-by-vaccine-court>; Sarah Pope, *Baby Dies after Routine Vaccination for Hep B, Polio, and DPT*, THE HEALTHY HOME ECONOMIST (Jan. 25, 2018), <http://www.thehealthyhomeeconomist.com/baby-dies-after-routine-vaccination-for-hep-b-polio-and-dpt>; Jonathan Benson, *Breaking: Courts Discreetly Confirm MMR Vaccine Causes Autism*, NATURAL NEWS (Sept. 3, 2013), http://www.naturalnews.com/041897_MMR_vaccines_autism_court_ruling.html; Arjun Walla, *Scientific Evidence Suggests The Vaccine-Autism Link Can No Longer Be Ignored*, COLLECTIVE EVOLUTION (Sept. 12, 2013), <http://www.collective-evolution.com/2013/09/12/22-medical-studies-that-show-vaccines-can-cause-autism>.

antivaccinationists,⁶⁵⁷ the contemporary antivaccination movement has enjoyed considerable public support from entertainment celebrities,⁶⁵⁸ talk show hosts,⁶⁵⁹ and politicians.⁶⁶⁰

⁶⁵⁷ See, e.g., Yamiche Alcindor, *Anti-Vaccine Movement is Giving Diseases a 2nd Life*, USA TODAY, Apr. 8, 2014; Richard Conniff, *A Forgotten Pioneer of Vaccines*, N.Y. TIMES May 7, 2013, at D1; Seth Berkley, *Stick With the Science*, INT'L HERALD TRIBUNE, January 13, 2013; Liz Szabo, *Full Vaccine Schedule Safe for Kids, No Link to Autism*, USA TODAY, March 29, 2013; Sabrina Tavernise, *Vaccine Rule Is Said to Hurt Health Efforts*, N.Y. TIMES, December 17, 2012; Sandra G. Boodman, *Inside the Vaccine-Autism Scare*, WASHINGTON POST, January 16, 2011 (noting that “immunizations have become victims of their own success, eradicating from public memory the devastating aftermaths of once-common pediatric illnesses: deafness caused by mumps, blindness after measles and paralysis brought on by polio”); *The Autism Vaccine Hoax; A Tragic Scare Campaign is Exposed as “Fraud,”* WALL STREET JOURNAL, January 8, 2011; *Vaccines Exonerated on Autism*, N.Y. TIMES, Feb. 13, 2009, at A30.

⁶⁵⁸ Prominent celebrity antivaccinationists include Jim Carrey, Rob Schneider, and Dr. Mayim Bialik. See, e.g., Kristin Cavallari, *Mayim Bialik Talks Attachment Parenting with CBB*, PEOPLE.COM (June 4, 2009), <http://celebritybabies.people.com/2009/06/04/mayim-bialik-talks-attachment-parenting-with-cbb>; Jim Carrey, *The Judgment on Vaccines Is In???*, HUFFINGTON POST (Nov. 17, 2011), http://www.huffingtonpost.com/jim-carrey/the-judgment-on-vaccines_b_189777.html; *Rob Schneider Speaks Out on Vaccination Rights in Canadian Mag*, AGE OF AUTISM (May 7, 2013), <http://www.ageofautism.com/2013/05/rob-schneider-speaks-out-on-vaccination-rights-in-canadian-mag.html>; Recently, Robert De Niro stirred controversy by agreeing to screen, and subsequently withdrawing, the pro-Wakefield documentary film *Vaxxed* at the 2016 TriBeCa Film Festival. See Melena Ryzik, *Anti-Vaccine Film, Pulled From Tribeca Film Festival, Draws Crowd at Showing*, N.Y. TIMES, April 2, 2016, at A14.

Perhaps most prominent among celebrity antivaccinationists has been Jenny McCarthy, whose son was diagnosed with autism in 2005. See Jenny McCarthy, *The Day I Heard My Son Had Autism*, CNN.COM (Sept. 24, 2007), <http://www.cnn.com/2007/US/09/24/jenny.autism>. McCarthy has become a prominent spokesperson for the antivaccination movement, authoring a number of books — including one co-authored with Wakefield — promoting her views that her son’s autism was caused by the MMR vaccine and that his condition was “cured” by natural remedies. See ANDREW J. WAKEFIELD & JENNY MCCARTHY, *CALLOUS DISREGARD: AUTISM AND VACCINES — THE TRUTH BEHIND A TRAGEDY* (2011); JENNY MCCARTHY & JERRY KARTZINEL, *HEALING AND PREVENTING AUTISM: A COMPLETE GUIDE* (2010); JENNY MCCARTHY, *MOTHER WARRIORS: A NATION OF PARENTS HEALING AUTISM AGAINST ALL ODDS* (2008) [hereinafter “MOTHER WARRIORS”]; JENNY MCCARTHY, *LOUDER THAN WORDS: A MOTHER’S JOURNEY IN HEALING AUTISM* (2007).

⁶⁵⁹ See, e.g., Bill Maher, *Vaccination: A Conversation Worth Having*, HUFFINGTON POST (Nov. 17, 2011), http://www.huffingtonpost.com/bill-maher/vaccination-a-conversatio_b_358578.html. Similarly, talk show host and activist Robert Kennedy, Jr., asserted in a 2005 article that the government had actively conspired with the pharmaceutical industry to conceal the risks of thimerosal, a mercury-containing preservative that had been used in vaccines since the 1930s. See Robert Kennedy, Jr., *Deadly Immunity*, ROLLING STONE, July 14, 2005.

⁶⁶⁰ In a September 2015 debate between candidates for the Republican presidential nomination, front-runner Donald Trump suggested that vaccination causes autism. Amanda Marcotte, *Donald Trump Uses GOP Debate to Push Anti-Vaccination Myths*, SLATE (Sept. 16, 2015), http://www.slate.com/blogs/xx_factor/2015/09/16/donald_trump_suggested_vaccines_cause_autism_during_the_cn_n_gop_debate_he.html; see also CNN Political Unit, *Trump Weighs in on Vaccine-autism Controversy*, POLITICAL TICKER (Mar. 28, 2014), <http://politicalticker.blogs.cnn.com/2014/03/28/trump-weighs-in-on-vaccine-autism-controversy> (quoting Donald Trump’s statement on Twitter that “[i]f I were President I would push for proper vaccinations but would not allow one time massive shots that a small child cannot take – AUTISM.”). Dan Burton (R-IN) was a vocal advocate of the link between vaccination and autism during his tenure in Congress. See, e.g., Gardiner Harris & Anahad O’Connor, *On Autism’s Cause, It’s Parents vs. Research*, N.Y. TIMES, June 25, 2005, <http://www.nytimes.com/2005/06/25/science/25autism.html>; Philip J. Hilts, *House Panel Asks for Study of a Vaccine*, N.Y. TIMES, April 7, 2000, <http://www.nytimes.com/2000/04/07/us/house-panel-asks-for-study-of-a-vaccine.html>. Representative Michele Bachmann (R-MN) similarly suggested that the human papillomavirus (HPV) vaccine may cause mental retardation. See e.g., Rachel Weiner, *Bachmann Claims HPV Vaccine Might Cause “Mental Retardation,”* WASHINGTON POST, SEPT. 13, 2011, <http://www.washingtonpost.com/blogs/the-fix/post/michele-bachmann-continues-perry-attack-claims-hpv-vaccine-might-cause-mental->

The considerable attention focused on this issue by anti-vaccinationists and their allies appears to be influencing public opinion to a significant degree.⁶⁶¹ Although medical studies demonstrate no association between vaccination and childhood autism,⁶⁶² public doubts persist. As recently as 2009, 25% of parents surveyed believed that “[s]ome vaccines cause autism in healthy children.”⁶⁶³ Increased concern about the safety and efficacy of vaccination within some segments of the public has led to substantial declines in immunization uptake among children,⁶⁶⁴ which are believed to have contributed to recent resurgences in vaccine-preventable diseases.⁶⁶⁵

C. Judicial Responses to Legal Challenges to Mandatory Vaccination Policies

Mandatory vaccination policies proved controversial from an early stage, and lawsuits challenging vaccination requirements have been a feature of public health law since the nineteenth century.⁶⁶⁶ “Vaccination programs have been legally challenged as (1) inconsistent with federal constitutional principles of individual liberty and due process; (2) as unwarranted governmental interference with individual autonomy; and (3) an infringement of personal religious beliefs under First Amendment principles.”⁶⁶⁷ The most significant feature of the body of law addressing these claims is that courts—state and federal, regardless of time or place—have uniformly upheld the government’s right to impose vaccination obligations in the name of public health, and have generally rejected claims of constitutional or other rights against compliance with such policies, whether grounded in normative or epistemic pluralism. A survey of judicial responses to legal challenges to mandatory vaccination policies over the twentieth century reveals a number of themes that recur frequently in courts’ treatment of individual rights-based objections to mandatory vaccination policies. The first of these is an emphasis, somewhat

retardation/2011/09/13/gIQAbJBcPK_blog.html; Denise Grady, *One Statement from Bachmann, Two Steps Back for HPV Vaccine*, N.Y. TIMES, September 19, 2011, <http://www.nytimes.com/2011/09/20/health/20hvpv.html>. Carolyn Maloney (D-NY) introduced legislation to direct the CDC to study the vaccine-autism link, before ultimately concluding in 2018 that vaccines do not cause autism. See Carl Campanile, *Maloney Backs Away from Questioning If Vaccines Cause Autism*, N.Y. POST, Mar. 18, 2018, <https://nypost.com/2018/03/11/maloney-no-longer-believes-vaccines-cause-autism/>; Curtis Brainerd, *Sticking with the Truth*, COLUM. JOURNALISM REV. (2013) (describing Maloney’s proposed legislation).

⁶⁶¹ L. Mercer et al., *Parental Perspectives on the Causes of an Autism Spectrum Disorder in Their Children*, 15 J. GENETIC COUNSELING 41 (2006).

⁶⁶² See *supra* note 644.

⁶⁶³ Gary L. Freed et al., *Parental Vaccine Safety Concerns in 2009*, 1962 PEDIATRICS 656 (2010).

⁶⁶⁴ See Jason M. Glanz et al., *A Population-Based Cohort Study of Undervaccination in 8 Managed Care Organizations Across the United States*, 167 JAMA PEDIATRICS 274, 278–80 (2013) (49% of sample drawn from 2004–2008 birth cohorts was undervaccinated, at least 13% of whom were undervaccinated due to parental choice; trend of undervaccination is increasing); Saad B. Omer et al., *Vaccination Policies and Rates of Exemption from Immunization, 2005–2011*, 367 NEW ENGL. J. MED. 1170, 1171 (2012) (concluding that “nonmedical exemptions have continued to increase, and the rate of increase has accelerated”); Saad B. Omer et al., *Nonmedical Exemptions to School Immunization Requirements: Secular Trends and Association of State Policies with Pertussis Incidence*, 296 J. AM. MED. ASS’N 1757 (2006).

⁶⁶⁵ Varun K. Phadke et al., *Association Between Vaccine Refusal and Vaccine-Preventable Diseases in the United States: A Review of Measles and Pertussis*, 315 J. AM. MED. ASS’N 1149 (2016) (ascribing outbreaks of measles and pertussis to antivaccinationism); van Panhuis et al., *supra* note 573, at 2157 (linking outbreaks of vaccine-preventable disease to low vaccination rates).

⁶⁶⁶ The first recorded case challenging a mandatory vaccination policy was *Hazen v. Strong*, 2 Vt. 427 (1830), in which the Vermont Supreme Court upheld a municipality’s authority to impose a smallpox vaccination requirement even in the absence of reported cases of smallpox.

⁶⁶⁷ Hodge and Gostin, *supra* note 566, at 834 (footnotes omitted).

at odds with the dominant strain of libertarian individualism in American politics,⁶⁶⁸ on the authority of the community to impose obligations on individuals for the sake of the good of the group. Second, courts almost uniformly defer to legislative or municipal expertise and consistently refuse to entertain challenges to the empirical bases of a mandatory vaccination policy. Empirical disagreements are consistently resolved in favor of the state and its designated public health experts; individuals' rejection of those experts' consensus that vaccines are safe and effective at preventing disease is typically regarded by courts as irrational and illegitimate, or at least undeserving of judicial validation. This section will explore each of these themes in the body of judicial decisions addressing challenges to mandatory vaccination policies in the twentieth century, beginning with the Supreme Court's landmark decision in *Jacobson v. Massachusetts*.⁶⁶⁹ While it was neither the first nor the last case to address a constitutional challenge to a mandatory vaccination requirement, *Jacobson* set the tone for the next century of litigation on this issue by articulating a broad view of the state's power to preserve public health through mandatory vaccination requirements.

The *Jacobson* case began with a smallpox outbreak in Cambridge, Massachusetts, in 1902. On February 27 of that year, the city's board of health, acting under authority delegated by statute, adopted a resolution requiring all residents "who have not been successfully vaccinated since March 1st, 1897, to be vaccinated or revaccinated."⁶⁷⁰ The statute delegating authority to the board of health to adopt a vaccination requirement also prescribed a fine of five dollars for refusal to comply.⁶⁷¹ One such refusal was by the Reverend Henning Jacobson, a Swedish immigrant and pastor of a Lutheran church in Cambridge.⁶⁷² Jacobson, who claimed to have suffered a severe illness from a previous vaccination and to have witnessed a similar reaction in his son,⁶⁷³ refused to comply with the vaccination ordinance and was, in July 1902, charged with violating the applicable statute. At trial, Jacobson made 14 offers of proof, seeking to introduce facts pertaining to the purported lack of safety or effectiveness of the smallpox vaccine generally as well as his and his son's prior adverse reactions to vaccination.⁶⁷⁴ The trial court rejected each of Jacobson's offers of proof, and Jacobson was convicted by the jury and sentenced to pay the \$5 fine.⁶⁷⁵ On appeal, the Massachusetts Supreme Judicial Court affirmed Jacobson's conviction and rejected his constitutional challenges the statute empowering the board of health to impose the requirement.⁶⁷⁶

Jacobson then presented his case to the Supreme Court, asserting a number of constitutional objections to Massachusetts's mandatory vaccination policy. Most significantly, he claimed that the mandatory vaccination requirement constituted "an assault upon his person" in violation of the "right of every freeman to care for his own body and health in such way as to him seems best," as guaranteed by the Fourteenth Amendment's Privileges and Immunities, Due Process,

⁶⁶⁸ See generally LOUIS HARTZ, *THE LIBERAL TRADITION IN AMERICA* (1955).

⁶⁶⁹ *Jacobson v. Massachusetts*, 197 U.S. 11 (1905).

⁶⁷⁰ *Id.* at 13.

⁶⁷¹ *Id.* at 12 (quoting 75 Mass. Rev. L. § 137).

⁶⁷² JAMES KEITH COLGROVE, *STATE OF IMMUNITY: THE POLITICS OF VACCINATION IN TWENTIETH-CENTURY AMERICA* 38–39 (2006).

⁶⁷³ *Id.*

⁶⁷⁴ *Id.*

⁶⁷⁵ *Id.*

⁶⁷⁶ *Massachusetts v. Jacobson*, 183 Mass. 242 (1903); see COLGROVE, *supra* note 672, at 38–39.

and Equal Protection Clauses.⁶⁷⁷ In a 7-2 decision written by Justice Harlan from which Justices Brewer and Peckham dissented, the Court rejected Jacobson's constitutional claims and affirmed that the state's police power included the authority to impose vaccination requirements in the name of public health. In doing so, Justice Harlan's opinion invoked a number of themes on which subsequent decisions have elaborated.

Particularly in light of the historical moment in which it was decided,⁶⁷⁸ *Jacobson's* strong vision of the state's authority to regulate private behavior for the sake of a communal benefit is striking. If undertones of individualism and classical liberalism with which American political theory is most commonly associated⁶⁷⁹ are present in the *Jacobson* decision, the overriding theme is the state's authority to regulate private behavior for the sake of a public good. The decision does not so much deny the existence of a right of "every freeman" to bodily autonomy as simply state that any such right, if it exists, is subordinate to the right of the community to protect itself against significant threats. In a jurisprudential era best remembered as hostile to governmental regulation of private conduct,⁶⁸⁰ the Court's language in *Jacobson* is striking in its recognition of the broad power of the state to impose immunization obligations for the purpose of preserving public health and safety, without regard to the rights-based objections of individual dissenters.⁶⁸¹ The Court presented this sublimation of individual liberty claims to common interest as a practical necessity of governance and a bulwark against anarchy:

There are manifold restraints to which every person is necessarily subject for the common good. On any other basis organized society could not exist with safety to its members. Society based on the rule that each one is a law unto himself would soon be confronted with disaster and anarchy. Real liberty for all could not exist under the operation of a principle which recognizes the right of each individual person to use his own, whether in respect of his person or his property, regardless of the injury that may be done to others.⁶⁸²

⁶⁷⁷ *Jacobson*, 197 U.S. at 26. Jacobson also claimed that the vaccination requirement violated the Preamble and "spirit" of the Constitution, arguments that the Supreme Court quickly rejected. *Id.* at 22.

⁶⁷⁸ The Court's decision in *Jacobson* was issued about two months before its decision in *Lochner v. New York*, 198 U.S. 45 (1905), which invalidated a New York state law limiting the number of hours that bakers were permitted to work. The distribution of votes in *Jacobson* and *Lochner* illuminates the tension between the two decisions' visions of the scope of the state police power to enact regulations in furtherance of public health and welfare. Justice Peckham, one of the two dissenters in *Jacobson*, was the author of the Court's decision in *Lochner*, in which Justice Brewer, the other *Jacobson* dissenter, joined. Justices Harlan and Holmes, both members of the majority in *Jacobson*, dissented separately in *Lochner*, each citing *Jacobson* in support of his argument that *Lochner* was wrongly decided. 198 U.S. at 75 (Holmes, J., dissenting), 78 (Harlan, J., dissenting).

⁶⁷⁹ See HARTZ, *supra* note 668.

⁶⁸⁰ See, e.g., *Carter v. Carter Coal Co.*, 298 U.S. 238 (1936); *Hammer v. Dagenhart*, 247 U.S. 251 (1918); see generally Larry D. Kramer, *Putting the Politics Back into the Political Safeguards of Federalism*, 100 COLUM. L. REV. 215 (2000); Edward S. Corwin, *The Passing of Dual Federalism*, 36 VA. L. REV. 1 (1950).

⁶⁸¹ The Court noted, for example, that "it was the duty of the constituted authorities primarily to keep in view the welfare, comfort, and safety of the many, and not permit the interests of the many to be subordinated to the wishes or convenience of the few." *Jacobson*, 197 U.S. at 29. In its robust conception of state police power to regulate public health and welfare, *Jacobson* is more reminiscent of the Court's nineteenth-century decisions in, for example, *The Slaughter-House Cases*, 83 U.S. 36 (1873), or *Munn v. Illinois*, 94 U.S. 113 (1877), than of the *Lochner* era in which it was decided.

⁶⁸² *Id.* at 26. The Court analogized mandatory vaccination to the military draft, in which a citizen may be compelled "against his will and without regard to his personal wishes or his pecuniary interests, or even his religious or

The Court's response to the petitioner's challenge to the prevailing medical consensus is a model of deference to expert consensus over individual dissent. The Court rejected the petitioner's offers of proof that some medical professionals doubted the safety or efficacy of the smallpox vaccine, observing that "an opposite theory accords with the common belief, and is maintained by high medical authority."⁶⁸³ Choosing between competing theories of epidemiology, the Court concluded, was a matter for legislative rather than judicial expertise.⁶⁸⁴

Jacobson set the tone for the judiciary's response to all future cases involving challenges to mandatory vaccination policies. *Jacobson*'s prioritization of communal welfare over individual rights claims has remained a consistent theme of judicial analyses of mandatory vaccination requirements even as rights-based notions of bodily autonomy and informed consent⁶⁸⁵ gained broader influence during the 20th century. This theme of judicial deference to legislative expertise on disputed empirical questions concerning the safety or efficacy of vaccinations is nearly universal throughout the body of case law concerning legal challenges to mandatory vaccination policies.⁶⁸⁶ Although the petitioner in *Jacobson* did not present a Free Exercise claim or rely significantly on religious or philosophical objections in support of his claim for a constitutional exemption, such claims have fared no better before other courts than did the empirical objections in *Jacobson*.⁶⁸⁷ In short, courts have generally recognized neither normative

political convictions, to take his place in the ranks of the army of his country, and risk the chance of being shot down in its defense." *Id.* at 29.

⁶⁸³ *Id.* at 30.

⁶⁸⁴ *Id.* ("It is no part of the function of a court or a jury to determine which one of two modes was likely to be the most effective for the protection of the public against disease. That was for the legislative department to determine in the light of all the information it had or could obtain.").

⁶⁸⁵ See, e.g., Michael H. Shapiro, *Updating Constitutional Doctrine: An Extended Response to the Critique of Compulsory Vaccination*, 12 YALE J. HEALTH POL'Y L. & ETHICS 87 (2012); Mary Holland, *Compulsory Vaccination, the Constitution, and the Hepatitis B Mandate for Infants and Young Children*, 12 YALE J. HEALTH POL'Y L. & ETHICS 39, 59–65 (2012); Timothy J. Aspinwall, *Religious Exemption to Childhood Immunization Statutes: Reaching for a More Optimal Balance between Religious Freedom and Public Health*, 29 LOYOLA UNIV. CHIC. L.J. 109 (1997); Kristine M. Severyn, *Jacobson v. Massachusetts: Impact on Informed Consent and Vaccine Policy*, 5 J. PHARM. L. 249, 255–56 (1995); Vincent A. Fulginiti, *Informed Consent in Immunization Practice*, in IMMUNIZATION IN CLINICAL PRACTICE (Vincent A. Fulginiti ed., 1982); Thomas E. Dover, *An Evaluation of Immunization Regulations in Light of Religious Objections and the Developing Right of Privacy*, 4 U. DAYTON L. REV. 401 (1979).

⁶⁸⁶ See, e.g., *Rempfer v. Von Eschenbach*, 535 F. Supp. 2d 99 (D.D.C. 2008) (deferring to FDA's determination that the vaccine in question was effective for immunization against anthrax); *Mosier v. Barren County Bd. of Health*, 308 Ky. 829 (1948) (deferring to "health authorities[']" expertise over the "whims of laymen"); *In re Whitmore*, 47 N.Y.S.2d 143, 145 (1945) ("In a democracy laws are not made to meet the predilections of individuals, nor to feed mistaken views which an individual might hold, when that view is detrimental to the people as a whole."); *Vonnegut v. Baun*, 206 Ind. 172 (1934) (conclusion of board of health that epidemic existed is binding absent fraud or bad faith); *Cram v. School Board of Manchester*, 82 N.H. 495, 497 (1927) (noting that it is "not for the court to inquire into the wisdom or unwisdom of" a mandatory vaccination requirement); *Viemeister v. White*, 179 N.Y. 235 (1904) (upholding NY statute requiring vaccination for public school attendance).

⁶⁸⁷ See, e.g., *Whitlow v. California*, 203 F. Supp. 3d 1079 (S.D. Cal. 2016) (denying motion for preliminary injunction against enforcement of California statute repealing personal belief exemption); *Workman v. Mingo County Bd. of Educ.*, 419 Fed. App'x 348 (4th Cir. 2011) (rejecting Free Exercise challenge to immunization requirement for public school attendance); *U.S. v. Chadwell*, 36 C.M.R. 741 (1965) (upholding mandatory troop vaccination against religious objections); see also *Prince v. United States*, 352 U.S. 322 (1957). Although *Prince* did not concern vaccination, it supports the view that the Free Exercise Clause does not provide a constitutional right to exemption from mandatory immunization requirements for religious objectors. *Id.* at 167 (noting that "the state has a wide range of power for limiting parental freedom and authority in things affecting the child's welfare; and ... this includes, to some extent, matters of conscience and religious conviction").

nor empirical objections to vaccination as establishing individual rights, constitutional or otherwise, against mandatory immunizations, and have deferred to legislative and, later, agency expertise in crafting public health policies including mandatory vaccinations.⁶⁸⁸

D. Legislative Accommodation of Normative Pluralism

While their claims for exemptions grounded in legal right have been resoundingly rejected by courts, opponents to mandatory vaccination have enjoyed a greater measure of success before state legislatures. Such success, however, has been completely restricted to objections grounded in normative rather than epistemic pluralism.⁶⁸⁹ Antivaccination advocates have had significant success in obtaining exemptions grounded in religious or philosophical objections to immunization.⁶⁹⁰ 47 states allow religious exceptions to mandatory vaccination policies,⁶⁹¹ and 18 states allow exceptions for sincerely held “philosophical” objections.⁶⁹² No state, however, provides exemptions from mandatory vaccination policies on the grounds of empirical disagreement with the medical or scientific consensus concerning the safety or efficacy of vaccines. Thus, although no state has articulated the distinction in these terms, the structure of statutory exemptions follows the same divide between normative and epistemic pluralism that Rawls’s work on political liberalism does.

Although, as previously noted,⁶⁹³ courts have refused to recognize a constitutional right to exemption from immunization requirements grounded in the Free Exercise Clause or any other constitutional provision, they have generally upheld statutory religious and philosophical exemptions as constitutional, subject to some caveats. Most notably, several courts have overturned requirements that vaccination objectors be members of an organized religious group, or that opposition to immunization be a part of the objector’s church’s official doctrine.⁶⁹⁴ In *McCarthy v. Boozman*,⁶⁹⁵ for example, the district court invalidated Arkansas’s religious exemption, which allowed exemption only to individuals whose objections were grounded in

⁶⁸⁸ Litigants seeking to nullify mandatory immunization requirements have succeeded only in the narrow class of cases in which courts have occasionally held that the state or municipal agency that enacted the challenged provision lacked statutory authority to do so. See *Burroughs v. Mortenson*, 312 Ill. 163 (1924) (board of education lacked authority to adopt mandatory vaccination requirement); *Rhea v. Bd. of Ed. of Devils Lake Sp. Sch. Dist.*, 41 N.D. 449 (1919) (same); cf. *Pierce v. Board of Ed. of City of Fulton*, 30 Misc.2d 1039 (N.Y. Sup. 1961) (school board had authority to adopt requirement); *State ex rel. Dunham v. Board of Ed. of City School Dist. of Cincinnati*, 154 Ohio St. 469 (1951) (same). Even these courts, however, accept that the adoption of a mandatory vaccination requirement is a valid exercise of the state legislature’s police power; the issue in these cases is simply whether that power has been effectively delegated to the agency that purports to exercise it.

⁶⁸⁹ This excludes exemptions for medical contraindication, which are provided by statute in every state.

⁶⁹⁰ See Linda E. LeFever, *Religious Exemptions from School Immunization: A Sincere Belief or a Legal Loophole?*, 110 PENN ST. L. REV. 1047 (2006).

⁶⁹¹ The exceptions are West Virginia, Mississippi, and California. In Mississippi, the state supreme court struck down a religious exemption on the ground that it violated the equal protection clause of the state constitution in *Brown v. Stone*, 378 So. 2d 218 (Miss. 1979). California repealed its religious exemption following the Disneyland outbreak. See *supra* notes 555–561.

⁶⁹² GOSTIN, *supra* note 571, at 380, 654 n.54.

⁶⁹³ See *supra* Part II(C).

⁶⁹⁴ See, e.g., *Sherr v. Northport-East Northport Union Free School Dist.*, 672 F. Supp. 81 (E.D.N.Y. 1987) (pantheistic objection entitled to religious exemption); *Dalli v. Board of Ed.*, 358 Mass. 753 (1971); *Davis v. Maryland*, 294 Md. 370 (1982) (requirement of membership in recognized religion violated Establishment Clause); *Kolbeck v. Kramer*, 84 N.J. Super. 569 (1964); *Maier v. Besser*, 73 Misc. 2d 241 (N.Y. Sup. 1972) (membership in a recognized group not required).

⁶⁹⁵ 212 F. Supp. 2d 945 (W.D. Ark. 2002).

“the religious tenets and practices of a recognized church or religious denomination of which the parent ... is an adherent or member.”⁶⁹⁶ The court upheld Arkansas’s statutory immunization requirement for public school children⁶⁹⁷ as constitutional,⁶⁹⁸ but further held that the statutory religious exemption violated the Establishment and Free Exercise Clauses of the First Amendment as well as the Equal Protection Clause of the Fourteenth Amendment insofar as it “benefit[ed] only those who are members or adherents of a church or religious denomination recognized by the State.”⁶⁹⁹ Similarly, courts have ruled that states may, but need not, require that a religious belief be sincerely held in order to qualify for the exemption; where the statute does not impose a sincerity requirement, state authorities may not inquire into the sincerity of the objector’s asserted religious belief.⁷⁰⁰

Courts have played a secondary but essential role in maintaining this line between normative and epistemic pluralism in legal exemptions to vaccination policy by enforcing statutory requirements that an objection be grounded in normative opposition to vaccination rather than empirical doubts about the procedure’s safety or efficacy.⁷⁰¹ In *Galinsky v. Board of Education of New York*, for example, the Second Circuit affirmed the denial of a religious exemption based on the district court’s determination that the parents’ “opposition to immunization is not motivated by religious beliefs, but rather, by plaintiffs’ personal fears for their daughters’ well being.”⁷⁰² In so doing, courts have reinforced—the normative/epistemic divide in the structure of statutory exemptions and further entrenched the law’s tacit commitment to accommodation of objections to generally applicable legal requirements grounded in normative principle and concomitant lack of accommodation to objections grounded in epistemic pluralism.⁷⁰³

⁶⁹⁶ *Id.* at 947 (quoting ARK. CODE § 6-18-702(d)(2)). The court noted that in assessing a request for a religious exemption, the state health department considered “several factors including the permanent address of the applicant’s church; the number of church members; the times and places of regular meetings; the written church constitution or plan of organization; the written theology or statement of beliefs; and any legal documents the church has filed with governmental entities.” *Id.*

⁶⁹⁷ ARK. CODE § 6-18-702(a).

⁶⁹⁸ 212 F. Supp. 2d at 948 (noting that 1) “[i]t has long been settled that individual rights must be subordinated to the compelling state interest of protecting society against the spread of disease”; and 2) “a state is not required to provide a religious exemption from its immunization program”).

⁶⁹⁹ *Id.*

⁷⁰⁰ Compare *Friedman v. Clarkstown Cent. School Dist.*, 75 Fed. App’x 815 (2d Cir. 2003) (mother failed to demonstrate sincerity of religious objection); *Turner v. Liverpool Cent. School* 186 F. Supp. 2d 187 (N.D.N.Y. 2002) (no exemption where mother’s religious belief was not sincere); *Maier v. Besser*, 73 Misc. 2d 241 (N.Y. Sup. 1972) (religious exemption applies for sincerely held belief) with *In re LePage*, 18 P.3d 1177 (Wy. 2001) (Department of Health exceeded its statutory authority by inquiring into sincerity of mother’s religious beliefs).

⁷⁰¹ See, e.g., *Mason v. General Brown Cent. School Dist.* 851 F.2d 47 (2d Cir. 1988) (Parents’ belief that immunization was contrary to “genetic blueprint,” was not religious belief for purposes of religious exemption); *Farina v. Board of Educ. of City of New York*, 116 F. Supp. 2d 503 (S.D.N.Y. 2000) (religious exemption does not apply to moral, scientific, or philosophical objections); *Berg v. Glen Cove City School Dist.*, 853 F. Supp. 651 (E.D.N.Y. 1994) (noting that medical, scientific, or philosophical objections are insufficient); *Matter of Christine M.*, 157 Misc. 2d 4 (N.Y. Fam. Ct. 1992) (objections grounded in scientific or medical doubt do not qualify for religious exemption).

⁷⁰² 213 F.3d 636 (2d. Cir. 2000) (Table).

⁷⁰³ Cf. *Mosier v. Barren County Bd. of Health* 308 Ky. 829 (1944) (deferring to “health authorities[’]” expertise over the “whims of laymen”).

III. Pluralism and Realism: Rationalizing the Normative/Epistemic Divide in Law and Theory

Although the law has not explicitly recognized a distinction between objections grounded in normative pluralism and those grounded in epistemic pluralism when evaluating objections to mandatory vaccination policies, that distinction is tacitly drawn by most states' statutory exemption schemes. The vast majority of states permit exemption from immunization requirements for individuals with sincerely held religious objections to vaccination, and a large minority of states allows exceptions for non-religious "philosophical" objections. As we have seen, state and federal courts actively police the line between objections grounded in normative principle and those grounded in other factors, including, significantly, concerns regarding the safety or medical efficacy of required vaccinations. While exemptions are routinely permitted for individuals whose sincerely held normative beliefs forbid vaccinations, the law recognizes no similar exception for people whose objections are grounded not in religious or philosophical principle but rather in an empirical conviction that rejects the assurances of medical and scientific experts that vaccination is a safe and effective procedure.

A. Mandatory Vaccination and the Rawlsian Legitimacy Problem: The Failure of Epistemic Reasonableness

If Rawls is correct that the coercive imposition through law of normative values upon dissenters who reject the majority's normative commitments constitutes a violation of the duty of reciprocity and thus undermines the legitimacy of law in a liberal democracy,⁷⁰⁴ then we may ask why the same problem of legitimacy does not arise when the state imposes policies grounded in the empirical views of the majority upon dissenters in the same manner. Liberal society is characterized by widespread popular disagreement concerning questions of empirical fact, and epistemic pluralism is likely driven, at least in part, by the same liberal freedom of conscience and free institutions that Rawls identified as a source of persistent normative pluralism. The omission of epistemic pluralism from Rawls's account therefore seems a curious oversight, and suggests that the challenges to legitimate governance in a liberal democracy are even greater than Rawls acknowledged. The state of the law concerning mandatory vaccination places this problem in a concrete context: to what degree does the existence of empirical disagreement regarding the safety and medical efficacy of vaccinations challenge the legitimacy of state policies requiring immunization? Under a Rawlsian analysis, can a meaningful distinction be drawn between the imposition upon an unwilling citizen of policies grounded in normative commitments that the citizen rejects, and the same imposition grounded in empirical conclusions that the citizen may deny with equal vehemence? Why, in other words, does the state exceed the scope of democratic legitimacy in, for example, forbidding access to abortion because the Christian majority deems it sinful, but not in requiring citizens to expose their children to a medical procedure that they sincerely believe poses serious health risks?

One approach to rationalizing the distinction between moral and epistemic pluralism on which the vaccination exemption scheme rests might involve adapting Rawls's concept of "reasonableness" to the context of epistemic pluralism. Rawls recognized definite boundaries to the overlapping consensus of comprehensive views and explicitly acknowledged that the duty of

⁷⁰⁴ This proposition is, of course, far from universally accepted; Rawls's discussion of reasonable pluralism and the overlapping consensus has been criticized from a variety of perspectives. My purpose in this chapter is not to endorse Rawls's view but simply to explore the implications it may have for the phenomenon of epistemic pluralism.

reciprocity extends only to “reasonable” comprehensive views; those with “unreasonable” normative commitments—i.e., individuals who reject the core values of democratic liberalism—are simply excluded from consideration.⁷⁰⁵ Rawls’s concept of reasonability has been criticized as both circular and excessively exclusive,⁷⁰⁶ but it has at least the virtue of establishing a line beyond which the existence of normative pluralism ceases to present a problem of legitimacy—the Rawlsian state need not concern itself with *all* types of normative pluralism, but only with pluralism among groups whose fundamental moral commitments reflect the state’s own. The existence of distant outliers from the mainstream moral consensus can, according to Rawls, safely be ignored; such outliers are simply not “reasonable” and need not be accommodated. Thus, if the concept of reasonableness could be translated into the context of epistemic pluralism, it might provide a basis for distinguishing instances of epistemic pluralism that give rise to a problem of legitimacy analogous to that described by Rawls from other instances in which the state can safely ignore the protestations of epistemic outliers without diminishing the legitimacy of its policies.

Analogizing to the problem of normative pluralism is superficially straightforward. A principle of epistemic reasonableness would be grounded in the fundamental ideas of the liberal tradition’s epistemic methodologies, and assessing whether antivaccinationism or any other epistemic viewpoint comes within the scope of those accepted traditions would be a relatively straightforward undertaking.⁷⁰⁷ The contours of such a principle are easy enough to discern. A principle of “epistemic reasonableness” would begin with the Enlightenment’s commitment to methodological naturalism.⁷⁰⁸ It would acknowledge the limits of scientific reasoning, particularly the problems of induction and causality noted by Hume,⁷⁰⁹ as well as the efforts to respond to those problems, particularly the critical rationalism of Popper⁷¹⁰ and the logical empiricism of Hempel.⁷¹¹ It would encompass the “heroic” vision of science as a truth-seeking

⁷⁰⁵ In defending his view that public policies should be grounded in “public reason,” Rawls concedes that “[t]hose who reject constitutional democracy... will of course reject the very idea of public reason,” but quickly dismisses this objection, noting that “[p]olitical liberalism does not engage those who think this way.” RAWLS, *supra* note 10, at 574.

⁷⁰⁶ See, e.g., Marilyn Friedman, *John Rawls and the Political Coercion of Unreasonable People*, in THE IDEA OF POLITICAL LIBERALISM: ESSAYS ON RAWLS 16 (Victoria Davion & Clark Wolf eds., 2000); Stephen Mulhall and Adam Swift, *Rawls and Communitarianism*, in THE CAMBRIDGE COMPANION TO RAWLS 483 (Samuel Richard Freeman ed., 1997) (“By defining ‘the reasonable’ as including a commitment to a politically liberal vision of society, Rawls defines anyone who queries or rejects that vision as ‘unreasonable’, but he offers no independent reason for accepting that morally driven and question-begging definition.”).

⁷⁰⁷ Elizabeth Anderson offers one such articulation of epistemic reasonableness in the form of a set of “second-order” criteria by which she argues that laypersons may evaluate the claims of putative scientific experts. Elizabeth Anderson, *Democracy, Public Policy, and Lay Assessments of Scientific Testimony*, 8 EPISTEME 144 (2011). According to Anderson, laypersons may assess a putative expert’s *expertise*, *honesty*, and *epistemic responsibility* on the basis of criteria that are readily apparent to a scientifically untrained observer. *Id.* at 147.

⁷⁰⁸ See FRANCIS BACON, THE NEW ORGANON (Michael Silverthorne trans., 2000).

⁷⁰⁹ See generally DAVID HUME, AN ENQUIRY CONCERNING HUMAN UNDERSTANDING (1748); DAVID HUME, A TREATISE OF HUMAN NATURE (1738).

⁷¹⁰ POPPER, *supra* note 447. Popper himself was not a logical positivist, but to the contrary wrote in opposition to the orthodox positivism of the Vienna Circle. This point is often lost on anti-Popperian critics. See Sean O’Connor, *The Supreme Court’s Philosophy of Science: Will the Real Karl Popper Please Stand Up?*, 35 JURIMETRICS 263 (1995).

⁷¹¹ See, e.g., CARL HEMPEL, ASPECTS OF SCIENTIFIC EXPLANATION (1965); see also LOGICAL EMPIRICISM: HISTORICAL AND CONTEMPORARY PERSPECTIVES (Paolo Parrini, Wesley C. Salmon, & Merrilee H. Salmon eds., 2003).

methodology presented by Robert Mertron⁷¹² and more contemporary popularizers of science such as Carl Sagan⁷¹³ and E.O. Wilson,⁷¹⁴ but would also incorporate the insights into the social contingency of scientific consensus building by scholars such as Thomas Kuhn,⁷¹⁵ Harry Collins and Robert Evans,⁷¹⁶ and Bruno LaTour,⁷¹⁷ and even the more methodologically anarchic critiques of, e.g., Paul Feyerabend.⁷¹⁸

If a principle of epistemic reasonableness exists, the boundary between reasonable and unreasonable epistemic pluralism must be defined by the scope of expert consensus on the empirical question under consideration.⁷¹⁹ If we accept the epistemology of scientific naturalism and its associated empiricist methodology, then non-experts lack epistemic standing to rationally reject the consensus of experts—where “experts” are loosely defined as the set of individuals who possess the highest degree of understanding of the current state of knowledge concerning the empirical question at issue. This is true because non-experts, by definition, lack access to the full body of information on which the expert consensus is grounded and, as such, lack an epistemically valid basis on which to reject that consensus. It is also true notwithstanding the facts that the inductive process of empirical inquiry is capable of producing only probabilistic results in which uncertainty persists under even the best of circumstances, and that scientific consensus can and does change, sometimes dramatically, as uncertainty is diminished and paradigms are shifted in response to unanticipated breakthroughs. That scientific consensus is necessarily tentative, uncertain, and prone to error is simultaneously beyond dispute and irrelevant to the point that, however unreliable the expert consensus may be, it nevertheless occupies a privileged position in proximity to empirical truth in comparison to the views of non-experts.⁷²⁰ These observations suggest a measure of the scope of reasonable epistemic pluralism: where the relevant experts lack a clear consensus on a particular point, the room for reasonable disagreement is comparatively broad and reasonable positions may be taken anywhere within the wide range of expert uncertainty; in such circumstances, proponents of a principle of epistemic reasonableness might argue, the state should defer to reasonable epistemic pluralism and should

⁷¹² See Robert K. Merton, *The Normative Structure of Science*, in *THE SOCIOLOGY OF SCIENCE: THEORETICAL AND EMPIRICAL INVESTIGATIONS* 183 (Robert K. Merton ed., 1973) (identifying “universalism, communalism, disinterestedness, and organized skepticism” as the “ethos of modern science”).

⁷¹³ See, e.g., CARL SAGAN, *THE DEMON-HAUNTED WORLD, SCIENCE AS A CANDLE IN THE DARK* (1995).

⁷¹⁴ See, e.g., EDWARD O. WILSON, *CONSILIENCE: THE UNITY OF KNOWLEDGE* (1998).

⁷¹⁵ THOMAS KUHN, *THE STRUCTURE OF SCIENTIFIC REVOLUTIONS* (1962).

⁷¹⁶ See, e.g., HARRY COLLINS & ROBERT EVANS, *RETHINKING EXPERTISE* (2007); Harry Collins & Robert Evans, *The Third Wave of Science Studies: Studies of Expertise and Experience*, 32 *SOC. STUD. SCI.* 235 (2002); cf. HARRY COLLINS, *ARE WE ALL SCIENTIFIC EXPERTS NOW?* (2013).

⁷¹⁷ See, e.g., BRUNO LATOUR, *REASSEMBLING THE SOCIAL: AN INTRODUCTION TO ACTOR-NETWORK-THEORY* (2005); BRUNO LATOUR, *SCIENCE IN ACTION* (1987);

⁷¹⁸ PAUL FEYERABEND, *AGAINST METHOD: OUTLINE OF AN ANARCHIST THEORY OF KNOWLEDGE* (1975).

⁷¹⁹ As recent experience in the public debate concerning climate science demonstrates, the existence and scope of an expert consensus can itself be a matter of empirical disagreement. Questions such as how expertise is to be defined, what subject matters are relevant to the empirical question at issue, and how “consensus” is to be identified present challenges that, while not insurmountable, must be acknowledged if a theory of epistemic reasonableness grounded in expert consensus is to succeed. While these questions, as well as the concept of epistemic reasonableness as defined by the scope of expert consensus in general, raise interesting points of departure for further research, I do not pursue them at length here because I conclude, as discussed below, that a principle of epistemic reasonableness cannot resolve the challenge to state legitimacy posed by the phenomenon of epistemic pluralism even if these concerns are disregarded.

⁷²⁰ See generally SAMUEL ARBESMAN, *THE HALF-LIFE OF FACTS: WHY EVERYTHING WE KNOW HAS AN EXPIRATION DATE* (2012), KUHN, *supra* note 715 (discussing paradigm shifts in scientific consensus).

avoid imposing policies grounded in a controversial empirical perspective onto dissenters who reasonably reject that empirical view. On the other hand, where the relevant experts share a wide consensus with respect to an empirical question—whether the age of the Earth is closer to 4 billion or 10 thousand years, for example—that consensus constrains the scope of epistemic reasonability such that the views of empirical dissenters may legitimately be disregarded as unreasonable. In that case, the proponent of a principle of epistemic reasonableness might argue, the state may legitimately impose policies grounded in the empirical consensus of the relevant experts without regard to the dissenting views of epistemic outliers. This presents a potential solution to the problem of legitimacy raised by the phenomenon of epistemic pluralism in the vaccination context. For over two hundred years, medical experts have shared a broad consensus regarding the safety and efficacy of vaccination as a preventative intervention; although groups of epistemic dissenters have challenged that consensus since the early 19th century, the state is free to disregard those outlier view and adopt a policy of mandatory vaccination grounded in the medical consensus without incurring a legitimacy cost. Thus, if the principle of epistemic reasonableness sketched in this discussion is valid, then the legitimacy problem posed by the phenomenon of epistemic pluralism is largely illusory, so long as state policies are grounded in scientific expertise.

Unfortunately, the principle of epistemic reasonableness is not valid, and therefore fails to resolve the legitimacy problem posed by epistemic pluralism. Rawls's theory of political liberalism is fundamentally a normative theory and the principle of reasonableness cannot perform an analogous exclusive function in the context of epistemic pluralism if excised from its normative component.⁷²¹ Although the principle of reasonableness has been subjected to significant criticism even in the context of normative pluralism in which Rawls introduces it, Rawls's usage at least establishes a normative connection between the lack of reasonableness—*i.e.*, the adherence to a comprehensive view that rejects constitutional democracy—and the claim that unreasonable comprehensive views can be excluded from the overlapping consensus on which public policy is to be grounded. No such connection appears possible in the case of epistemic pluralism. Although anti-vaccinationists, for example, may be *epistemically* unreasonable, this does not equate with the *normative* unreasonableness that Rawls finds sufficient to exclude groups from consideration. It is quite likely that many epistemically unreasonable individuals do share the commitments to liberal democracy that Rawls identifies as hallmarks of normative reasonableness; indeed, anti-vaccinationist arguments are often explicitly framed in terms of democracy and political equality.⁷²² It is impossible to argue that the epistemically unreasonable, categorically, are outside the overlapping consensus of reasonable comprehensive views, and if they are not, then it is unclear on what basis the state may impose coercive measures grounded on empirical beliefs that anti-vaccinationists cannot accept. In other words, epistemic unreasonableness, even if we accept the principle described above and its

⁷²¹ In distinguishing the overlapping consensus from “mere” *modus vivendi*, Rawls explains that the object of consensus, the political conception of justice, is itself a moral conception.... [I]t is affirmed on moral grounds, that is, it includes conceptions of society and of citizens as persons, as well as principles of justice.... The fact that people affirm the same political conception on [the grounds of their individual comprehensive viewpoints] does not make their affirming it any less religious, philosophical, or moral... since the grounds sincerely held determined the nature of their affirmation.

RAWLS, *supra* note 500, at 147.

⁷²² See *supra* Part II(B)(1)(c).

application to the anti-vaccinationist movement, is insufficient to resolve the fundamentally *moral* problem of state legitimacy where the epistemically unreasonable may, and often do, share normative commitments to democratic liberalism that place them well within the overlapping consensus of reasonable comprehensive doctrines. If we are to rationalize the distinction between moral and empirical claims that the current state of vaccination law currently adopts, we must do so in a manner that justifies that distinction on normative grounds, an endeavor in which the principle of epistemic reasonableness cannot succeed.

B. Moral Realism and Anti-Realism in Law and Theory: Alternative Rationales for Normative and Empirical Accommodation

If the principle of reasonable epistemic pluralism does not provide a basis for rationalizing the distinction between normative and epistemic pluralism tacitly drawn by the state of vaccination law and by Rawls's work on political liberalism, how might that distinction be explained? I believe that the answer to that question lies in the tacit commitment to moral anti-realism that underlies both Rawls's articulation of the problem of reasonable pluralism as well as the structure of statutory exemptions from mandatory vaccination policies in most states. Briefly stated, moral realism is the claim that moral propositions 1) purport to state facts that exist independently of the mind of the speaker; and 2) can be assessed as true or false depending on the degree of correspondence between the proposition in question and some external state of the world.⁷²³ If moral realism is true, then the epistemological distinction between the types of propositions that I have classified thus far as "normative" and "empirical" appears to diminish, if not disappear entirely.⁷²⁴ Both types of claims purport to assert facts about the world that possess a truth value. In other words, the statement "It is raining outside" is, from the perspective of moral realism, epistemically equivalent to the statement "Murder is wrong" insofar as both purport to describe a feature of the world that exists outside the mind of the speaker, and both, in principle, are either true or false, regardless of whether the truth value of either can readily be determined. More to the point for present purposes, if moral realism is true, then the statements "Vaccination is a sin" and "Vaccination causes autism" are epistemically equivalent insofar as both purport to describe some intersubjectively testable state of the world.

The truth of moral realism is a matter of broad debate among moral philosophers. The tenets of moral realism have been subjected to significant criticism by various anti-realist perspectives, most prominently the schools of noncognitivism and error theory. These perspectives deny, respectively, the two fundamental principles of moral realism noted above; that is, they claim that moral propositions either do not purport to state mind-independent facts, or that, if they do, that such statements either lack a truth value or that the truth value is unknowable. Noncognitivism claims that moral propositions do not purport to express facts at all, but rather are a form of emotive expression declaring the speaker's approval or disapproval of the behavior at issue.⁷²⁵ Moral propositions are therefore neither mind-independent nor intersubjectively testable, but rather are simply a dialect of subjective value judgment; the statement "X is

⁷²³ See, e.g., TORBJÖRN TÄNNISJÖ, *MORAL REALISM* (1990).

⁷²⁴ This claim presupposes a principle of empirical realism—i.e., that statements about empirical propositions do purport to state intersubjectively valid propositions that can, in principle, be assessed as true or false. While the principle of empirical realism is not uncontroversial, see, e.g., Nick Bostrom, *Are We Living in a Computer Simulation?*, 53 *PHILOSOPHICAL Q.* 243–255 (2003) (discussing the hypothesis that the perceived world is a computer simulation created by advanced beings), I shall hereinafter assume it to be true.

⁷²⁵ See, e.g., A.J. AYER, *LANGUAGE, TRUTH AND LOGIC* (2d ed. 1952).

immoral,” the noncognitivist maintains, is epistemically identical to the emotive expression “Boo X!”⁷²⁶ Error theories, on the other hand, do not deny that moral propositions purport to state mind-independent facts, but rather deny that moral propositions are capable of doing so.⁷²⁷ A proposition such as “X is immoral,” error theorists contend, is properly understood as *intending* to make a mind-independent and intersubjectively testable claim about the world, but as failing to do so. Moral statements are neither true nor false, according to error theory, but lack a truth value although they purport to state a fact—the speaker is simply in error in her belief that truth or falsity is a characteristic of a moral assertion.

The distinction between normative and empirical propositions that underlies both the structure of vaccination exemption law as well as Rawls’s articulation of the problem of reasonable pluralism is best understood as adopting a tacit commitment to some form of moral anti-realism, whether noncognitivism or error theory.⁷²⁸ Although, as discussed at greater length below,⁷²⁹ a commitment to anti-realism is not logically necessary to sustain a distinction between normative and empirical claims for purposes of legal accommodation, it nevertheless offers the most principled way of doing so insofar as anti-realism recognizes a distinction in epistemic status exactly at the point of division between propositions granted privileged accommodation in vaccine exemption law and those propositions to which accommodation is uniformly denied.⁷³⁰ Thus, while the distinction between normative and empirical propositions that underlies both Rawls’s formulation of the problem of reasonable pluralism as well as the structure of vaccine exemption law in the United States can be rationalized under both moral realist and anti-realist assumptions, the more principled approach requires adopting a principle of anti-realism as a background assumption. The remainder of this Part explores the justifications for a normative/epistemic divide in law and theory against both realist and anti-realist assumptions.

1. The Realist Position: Normative Tolerance as *Modus Vivendi*

If moral realism were true, then there would appear to be no epistemological distinction between normative and empirical propositions sufficient to justify the disparate treatment that those propositions receive both in Rawls’s theory of political liberalism and in the scheme of statutory exemptions to mandatory vaccination provisions in nearly all states. Both types of propositions purport to state mind-independent and intersubjectively testable claims about the universe that can be classified as true or false; nothing about the epistemological status of moral propositions

⁷²⁶ *Id.* at 102–120; Lawrence B. Solum, *Public Legal Reason*, 92 VA. L. REV. 1449, 1461 (2006).

⁷²⁷ J.L. MACKIE, *ETHICS: INVENTING RIGHT AND WRONG* (1977).

⁷²⁸ This is not to claim that Rawls, in the totality of his work, is best characterized as an anti-realist. An assessment of Rawls’s moral psychology is, unsurprisingly, a complex and nuanced undertaking. *See, e.g.*, RAWLS, *supra* note 9, at 429–34 (section titled “The Principles of Moral Psychology”); Thomas Baldwin, *Rawls and Moral Psychology*, in *OXFORD STUDIES IN METAETHICS: VOL. 3* at 247 (Russ Shafer-Landau ed., 2008). My claim here is much narrower: simply that Rawls’s tacit distinction between normative and empirical claims in articulating the problem of reasonable pluralism only makes sense in light of a background assumption of moral anti-realism, particularly given Rawls’s claim that commitment to the principle of public reason is necessary as a matter of normative principle rather than as a *modus vivendi*.

⁷²⁹ *See infra* Part III(B)(1).

⁷³⁰ In adopting this characterization, I am treating objections grounded in religious principle as “moral” notwithstanding the fact that religious doctrine tends in almost all cases to incorporate elements of empirical fact as well as moral principle. When religious principles such as the need for bodily purity or a deference to the divine will in matters of health are asserted as grounds for exemption from mandatory vaccination policies, the moral component of religion dominates the empirical component.

would justify the privileged position that they occupy as objects of tolerance and accommodation. In the absence of a distinction grounded in epistemological principle, the best justification for the special tolerance of normative pluralism is grounded in social and political pragmatism: tolerance as a *modus vivendi*, a way of avoiding otherwise irresolvable and potentially violent disputes over matters of normative principle that would otherwise threaten to disrupt a society characterized by some non-negligible degree of normative pluralism. Against a background assumption of moral realism, the *modus vivendi* argument for normative tolerance offers the most plausible justification for a legal distinction between normative and epistemic pluralism.

The *modus vivendi* argument for granting greater accommodation to normative as compared to epistemic pluralism has a degree of intuitive appeal. Practical experience shows that normative beliefs—particularly religious and philosophical views—are often central to their adherents’ conceptions of themselves as social and political agents and to their construction of the sociopolitical context in which they exist.⁷³¹ Moreover, notwithstanding the fact that, from a realist perspective, moral and religious disputes have a determinate correct answer, adversaries in moral and religious disputes are at times unwilling or incapable of revising their views in response to reasoned argumentation.⁷³² This may particularly be the case where adherents’ religious or philosophical views are requisites of membership in a community or subculture with which the adherent identifies; it is also true, of course, that racial and ethnic identities are at times inextricably linked with affirmation of particular religious or philosophical positions.⁷³³ And it is undeniably true, from a legal perspective, that many of the Supreme Court’s most enduringly controversial decisions in areas including slavery, racial segregation, school prayer, and abortion have provoked opposition on the basis of deeply-felt moral or religious convictions that adherents were unwilling to compromise.⁷³⁴ Although we are here concerned with accommodation of normative pluralism that goes beyond that required by the Free Exercise Clause, historical evidence suggests that at least part of the motivation for the constitutional protection of religious liberty arose from the conscious desire to avoid the internecine sectarian conflicts that recurred throughout European history.⁷³⁵ Thus, a case for accommodation of

⁷³¹ See *supra* Part I(B)(2).

⁷³² *Id.*

⁷³³ See, e.g., Kelly H. Chong, *What It Means to be Christian: The Role of Religion in the Construction of Ethnic Identity and Boundary Among Second-Generation Korean Americans*, 59 SOC. OF RELIGION 259 (1998); PAUL RUTLEDGE, *THE ROLE OF RELIGION IN ETHNIC SELF-IDENTITY: A VIETNAMESE COMMUNITY* (1985); Frank W. Lewins, *Australia: Religion and Ethnic Identity*, in *IDENTITY AND RELIGION: INTERNATIONAL, CROSS-CULTURAL APPROACHES* 19 (Hans Mol ed., 1978).

⁷³⁴ The Supreme Court’s decisions in *Dred Scott v. Sandford*, 60 U.S. 393 (1857); *Brown v. Board of Education of Topeka, Shawnee County, Kan.*, 347 U.S. 483 (1954); *Engel v. Vitale*, 370 U.S. 421 (1962); *Abington School District v. Schempp*, 374 U.S. 203 (1963); and *Roe v. Wade*, 410 U.S. 113 (1973) provoked intense and longstanding opposition grounded in moral or religious objection to the Court’s ruling. See, e.g., Lauren Maisel Goldsmith & James R. Dillon, *The Hallowed Hope: The School Prayer Cases and Social Change*, 59 ST. LOUIS U. L.J. 409 (2015) (discussing persistent popular opposition to the Supreme Court’s school prayer decisions); MICHAEL J. KLARMAN, *FROM JIM CROW TO CIVIL RIGHTS: THE SUPREME COURT AND THE STRUGGLE FOR RACIAL EQUALITY* (2006) (discussing massive resistance to the Supreme Court’s school desegregation decisions); MARK A. GRABER, *DRED SCOTT AND THE PROBLEM OF CONSTITUTIONAL EVIL* (2006); DON EDWARD FEHRENBACHER, *THE DRED SCOTT CASE: ITS SIGNIFICANCE IN AMERICAN LAW AND POLITICS* (1978).

⁷³⁵ See, e.g., THOMAS JEFFERSON, *NOTES ON THE STATE OF VIRGINIA* (Penguin Classics ed. 1998); see also Kurt T. Lash, *Power and the Subject of Religion*, 59 OHIO ST. L.J. 1069 (1998); Douglas Laycock, *Continuity and Change*

normative but not epistemic pluralism as a *modus vivendi* might be made on the ground that even if normative and empirical propositions are epistemologically identical from a moral realist perspective, experience nonetheless demonstrates that conflicts grounded in normative pluralism are uniquely likely to create entrenched social divisions, diminishing the shared conception of liberal political society as “as a fair system of cooperation over time, from one generation to the next.”⁷³⁶

Several objections might nevertheless be raised to the *modus vivendi* justification for tolerance of normative but not epistemic pluralism. Rawls himself explicitly rejected pragmatic justifications for normative tolerance as insufficient. He distinguished a “mere *modus vivendi*” from a true overlapping consensus in which citizens share a deontological commitment to toleration as a good in itself, rather than as merely a principle adopted of necessity to avoid internecine civil strife when the balance of power is divided among competing groups sufficiently closely that no one group can readily dominate the others.⁷³⁷ The *modus vivendi* rationale for tolerance of competing comprehensive views, Rawls writes, is justified only as a transitory phase during which, over generations, society moves from an illiberal position of intolerance among competing comprehensive views to a liberal position in which tolerance of reasonable comprehensive views is accepted for reasons of moral principle rather than pragmatism.⁷³⁸

Rawls’s rejection of normative tolerance as *modus vivendi* is, of course, deontological. Just as Kant’s ethics were grounded in moral duty rather than inclination,⁷³⁹ for Rawls, a principle of normative tolerance is not truly just unless it is grounded in a moral commitment to tolerance of reasonable pluralism.⁷⁴⁰ However, even if we reject Rawls’s objection to the *modus vivendi* rationale as incompatible with the moral realist perspective that we have provisionally adopted, it remains unclear that the *modus vivendi* rationale is sufficient to justify the sharp distinction drawn by vaccination law between objections grounded in normative pluralism, which receive a significant degree of accommodation, and those grounded in epistemic pluralism, which receive none. While it is undeniably true that individuals are often passionately committed to their moral and philosophical beliefs and, at times, prone to seek violent solutions to otherwise irresolvable conflicts between fundamental comprehensive views, passion and the potential for violent confrontation between incompatible views are by no means exclusive to the realm of normative pluralism. Indeed, the history of the antivaccinationist movement itself is replete with instances in which individuals’ passionately held empirical beliefs concerning the risks of vaccination caused them to risk criminal convictions for failure to comply with immunization requirements⁷⁴¹ and occasionally to violently resist attempts to enforce mandatory vaccination policies.⁷⁴² If pluralist tolerance is valued as a tool for the maintenance of social cohesion and

in the Threat to Religious Liberty: The Reformation Era and the Late Twentieth Century, 80 MINN. L. REV. 1047 (1995); Arlin M. Adams & Charles J. Emmerich, *A Heritage of Religious Liberty*, 137 U. PA. L. REV. 1559 (1989).

⁷³⁶ RAWLS, *supra* note 500, at 14.

⁷³⁷ See RAWLS, *supra* note 500, at 144–45, 147–48.

⁷³⁸ *Id.* at 148–49.

⁷³⁹ See IMMANUEL KANT, *GROUNDWORK OF THE METAPHYSICS OF MORALS* § 1 (Mary Gregor *et al.* eds., 2012).

⁷⁴⁰ RAWLS, *supra* note 500, at 148–49.

⁷⁴¹ See, e.g., *Jacobson v. Massachusetts*, 197 U.S. 11 (1905).

⁷⁴² Kaufman, for example, reports an incident in the nineteenth century in which “a Negro worker ‘refused to be vaccinated and gave the doctors a good fight, shooting at them.’” Kaufman, *supra* note 31, at 473 (quoting R. SWYBURNE CLYMER, *VACCINATION BROUGHT HOME TO YOU* 78–81 (1905)). Antivaccination sentiment erupted into

the avoidance of irresolvable differences in which violent confrontation is prone to occur, then the distinction between normative and epistemic distinction seems, at best, a very rough proxy by which to identify the types of conflicts in which tolerance is justified as a *modus vivendi* and those in which it is not.

Thus, moral realism would appear to fail to provide a principled basis on which to adopt a principle of normative, but not epistemic, accommodation. This creates a conundrum for the Rawlsian moral realist, insofar as an unconstrained principle of epistemic accommodation would make governance impossible. Every policy that the state adopts is grounded in some factual propositions, explicit or otherwise, with which some citizen disagrees. A requirement of epistemic unanimity among all adherents to reasonable comprehensive viewpoints before official action could be taken threatens to undermine the state's ability to act at all. If a principle of epistemic reasonableness cannot exclude normatively reasonable citizens from the scope of legitimate consideration, and the principle of normative tolerance is necessary as a matter of moral first principles rather than as a *modus vivendi*, then some ontological distinction between normative and epistemic principles must be found in order to avoid this result.

2. The Anti-Realist Position: Normative Tolerance as Epistemological Principle

As explained above, the sharp divide between normative and epistemic pluralism for purposes of pluralist tolerance is a poor fit against an underlying assumption of moral realism. Rawls explicitly rejected the *modus vivendi* rationale for normative tolerance, and even if state legislators are more open to pragmatic solutions to preserve social peace than was Rawls, the *modus vivendi* rationale fails to justify the sharp normative/epistemic distinction drawn by vaccination exemption statutes because beliefs grounded in epistemic pluralism, including antivaccinationism, can be as entrenched and divisive as beliefs grounded in religious or philosophical comprehensive views. The better interpretation, then, is that both law and theory are operating upon a tacit assumption of moral anti-realism in distinguishing between normative and epistemic pluralism. From an anti-realist perspective, the categorical distinction between normative and epistemic pluralism drawn by vaccination exemption law is more readily justified by the distinctions in epistemological form between normative and empirical propositions.

Rawls's rejection of the *modus vivendi* rationale for normative tolerance makes moral anti-realism the only plausible basis for the tacit distinction between normative and epistemic

violent riots against mandatory vaccination laws in Montreal in 1885 and in Milwaukee in 1894. Judith Walzer Leavitt, *Public Resistance or Cooperation? A Tale of Smallpox in Two Cities*, 1 *BIOSECURITY BIOTERRORISM: BIODEFENSE STRATEGY PRACT. SCI.* 185, 185 (2003) (noting that in Milwaukee, "[t]he health department mainstays of vaccination and isolation were resisted by the public in a context of political wrangling and medical dissension, and resulted in almost a month of rioting in the city streets, during which time smallpox spread widely and killed many who were exposed only because of the social disorder"); *French Against English; A Riot in Montreal Caused by Compulsory Vaccination*, N.Y. TIMES, September 29, 1885, <http://query.nytimes.com/mem/archive-free/pdf?res=9502E2DE1E39E533A2575AC2A96F9C94649FD7CF>. Another recent example of violence grounded in epistemic pluralism occurred in the Philippines on August 8, 2013, when a group of approximately 400 activists destroyed 1,000 acres of "Golden Rice," an experimental strain of rice genetically modified to produce Vitamin A. See Amy Harmon, *Golden Rice: Lifesaver?*, N.Y. TIMES, August 24, 2013, <http://www.nytimes.com/2013/08/25/sunday-review/golden-rice-lifesaver.html>. The violence was motivated by protesters' fears that "Golden Rice could pose unforeseen risks to human health and the environment, [and] that it would ultimately profit big agrochemical companies." *Id.*

pluralism in his theory of political liberalism. Moral anti-realism offers the cleanest solution to the problem of legitimacy in the context of epistemic pluralism: it is simply not the case, Rawls might contend, that a problem of legitimacy arises in the first place in the context of epistemic pluralism because the principle of reciprocity does not require accommodation of empirical disagreement. Why not? Because, the Rawlsian anti-realist might say, it is the unique epistemological character of normative propositions ascribed to them by anti-realism—their lack of mind-independence and a truth value—that gives rise to the obligation of mutual tolerance of reasonable comprehensive views among citizens of a liberal democratic state and, ultimately, the principle of public reason. From an anti-realist perspective, this argument makes sense: it may diminish the central position that comprehensive moral, religious, and philosophical views may hold in citizens' lives to characterize them as mere "opinions," but they are also not "facts." The lack of intersubjective testability of normative propositions ensures that a pluralism of comprehensive views will arise in a culture of free institutions in which moral homogeneity is not actively enforced by state-sponsored enforcers of orthodoxy. On this view, the causes of normative and epistemic pluralism are quite different, as are the implications of the two types of pluralism for the normative legitimacy of state action. Adopting the anti-realist perspective, comprehensive normative views represent individuals' best answers to questions of ultimate normative value to which no single "correct" answer can exist; it therefore follows naturally to adopt, as Rawls does, a principle of toleration under which all "reasonable" answers to such questions are equally respected—where "reasonable" is defined, perhaps circularly, as those answers that reaffirm that core values of the good society as mainstream public opinion conceives it.

On the other hand, epistemic pluralism—disagreements about matters of mind-independent, intersubjectively testable empirical propositions that are either true or false—involves a radically different epistemological context in which the principle of reciprocity applies quite differently. Consider again the two statements concerning vaccination that we examined briefly above:

- A. "Vaccination is a sin"; and
- B. "Vaccination causes autism"

While both statements appear to be simple declarations of fact, the moral anti-realist interprets them quite differently. Statement (A), according to the noncognitivist, is an emotive disapproval of the practice of vaccination expressed in the moral vernacular, identical in substance to the exclamation "Boo vaccination!" According to the error theorist, the speaker of Statement (A) *intends* to be expressing a mind-independent, true statement about vaccination but fails to do so because of a category error—"sin" is simply not a category about which mind-independent true or false statements can be made. In either case, the anti-realist does not interpret Statement (A) as successfully expressing a declaratory claim about any empirically testable condition. Statement (B), on the other hand, is a declaration of empirical fact that is subject to testing via the usual methods of scientific naturalism. It is either true or false and we can arrive at reliable, albeit necessarily uncertain and probabilistic, estimates of its truth value through controlled empirical testing—exactly what was done in response to the Wakefield study.⁷⁴³ Because of the significant distinctions in epistemological form and content between normative and empirical claims, the moral anti-realist would maintain, we should not expect the duty of reciprocity to apply in the

⁷⁴³ See *supra* note 644.

same way to empirical claims that it does to moral or philosophical positions; indeed, the intuition that the problem of legitimacy might apply in the context of epistemic pluralism in a manner analogous to its application in the area of moral pluralism is due only to a confusion caused by the superficially similar form of normative and empirical propositions, a superficial similarity that masks deep ontological distinctions. Indeed, from the perspective of moral anti-realism, this distinction appears so obvious that it is unsurprising that Rawls neglected to discuss the phenomenon of epistemic pluralism or to distinguish between normative and epistemic forms of “reasonable” pluralism.

3. Realism and Constructivism

If the above analysis is correct, then moral realism, in all of its myriad forms, is incompatible with Rawls’s insistence that the principle of tolerance of moral pluralism be accepted as a matter of moral principle and not “mere” *modus vivendi*, and is thus an unreasonable comprehensive viewpoint. This would surely come as a surprise to Rawls, who expressly argued that the political constructivist methodology on which political liberalism is grounded is compatible with moral realist principles.⁷⁴⁴ But Rawls never explicitly considered the phenomenon of epistemic pluralism, and thus never attempted to explain how a principle of accommodation of reasonable normative pluralism could be reconciled with one permitting the state to privilege specific, controversial empirical views over others in policy making. Indeed, his very omission of empirical propositions from his account of “reasonable” pluralism suggests that, notwithstanding his explicit claim that political liberalism is compatible with moral realism, Rawls was operating on fundamentally anti-realist assumptions insofar as he tacitly assumed that normative and empirical views could be meaningfully distinguished.

Rawls is quite clear that political liberalism is a constructivist theory that defines the “reasonable” comprehensive view not in terms of its truth or approximation thereof, but rather in terms of its compatibility with the values of the overlapping consensus.⁷⁴⁵ Indeed, he insists that political constructivism does not rely on a notion of truth at all.⁷⁴⁶ We are the tribe of the Liberal Democrats, Rawls effectively argues, and our political values and traditions have value not because they are *true*, but because they are *ours*. Rawls is equally clear, and goes to great lengths to argue, that political constructivism is compatible with moral realism.⁷⁴⁷ Although political liberalism does not presume the truth of moral realism, it is compatible with rational intuitionism insofar as political constructivism is agnostic as to the nature and content of the moral order. The reasonable moral realist believes that the order of moral values is mind-independent and

⁷⁴⁴ RAWLS, *supra* note 500, at 89–125; see Jody S. Kraus, *Political Liberalism and Truth*, 5 LEGAL THEORY 45 (1999).

⁷⁴⁵ RAWLS, *supra* note 500, at 90 (“The reason that [a constructivist political conception] may be the focus of an overlapping consensus of comprehensive doctrines is that it develops the principles of justice from public and shared ideas of society as a fair system of cooperation and of citizens as free and equal by using the principles of their common practical reason.”).

⁷⁴⁶ *Id.* at 93 (“[W]ithin itself the political conception does without the concept of truth.... [I]t is up to each comprehensive doctrine to say how its idea of the reasonable connects with its concept of truth, should it have one.”); Kraus, *supra* note 744, at 53 (“[W]hile mathematical constructivism [denies] that there is a mind-independent mathematical reality, political constructivism refuses to affirm or deny a mind-independent moral reality”).

⁷⁴⁷ RAWLS, *supra* note 500, at 95. Comparing political constructivism to the realist comprehensive view of rational intuitionism, Rawls explains that “[i]t is crucial for political liberalism that its constructivist conception does not contradict rational intuitionism.” *Id.*

intersubjectively valid, and accepts the values of the overlapping consensus as corresponding to the correct order of values;⁷⁴⁸ the political liberal is indifferent as to why the realist (or anyone else) subscribes to a reasonable political conception of justice. “Justice as fairness does not deny what [rational intuitionists] want to assert,” writes Rawls: “namely, that the order of values displayed by constructivism is backed by an independent order of values that constitutes itself.”⁷⁴⁹ Thus, political constructivism neither requires nor forbids a realist conception of moral truth; it is simply unconcerned with the moral ontology underlying a reasonable comprehensive view’s acceptance of the values of the overlapping consensus.

From the perspective of reasonable pluralism as Rawls conceives it, there is no apparent tension between his contention that moral realism is compatible with constructivist political liberalism and his insistence that a commitment to normative tolerance as a moral good in itself is a defining feature of a reasonable comprehensive view. Broadening our perspective to consider the phenomenon of epistemic pluralism, however, reveals a tension that was not obvious to Rawls. Rawls restricted the universe of pluralism with which he was concerned to normative comprehensive views, but he offered no justification for excluding pluralism grounded in empirical viewpoints. Indeed, the problem of epistemic pluralism apparently did not occur to Rawls at all. Rawls’s commitment to normative tolerance as a necessary component of political liberalism thus creates a dilemma: either 1) a similar principle of tolerance must extend to diversity of empirical belief as well, in which case no principle of reasonableness grounded in acceptance of the normative foundations of the liberal democratic tradition can resolve the legitimacy problem imposed by the state’s imposition of policies grounded in empirical views that some dissenters reject,⁷⁵⁰ or 2) some ontological distinction between normative and empirical propositions exists such that a moral principle of normative tolerance does not extend to include empirical views. The first option, an unconstrained principle of epistemic deference, would make governance impossible; nearly all, if not literally all, public policy takes place against a backdrop of explicit and implicit empirical views, many of which are likely rejected by some epistemic communities.⁷⁵¹ If the dilemma is to be avoided without sacrificing the legitimacy of the state, we must therefore pursue the second option. What ontological principle might serve to distinguish normative and empirical propositions such that a principle of deference and accommodation of normative pluralism would not give rise to a complementary principle in the case of epistemic pluralism? As discussed above, moral anti-realism fits the bill nicely.⁷⁵² If this is true, however, then Rawls’s conclusion that political constructivism is compatible with moral realism was grounded in too narrow a conception of the scope of the pluralism endemic to the liberal democratic state. Once Rawls’s blinders are removed and the problem of epistemic pluralism is examined, it is apparent that moral realism *cannot* be deemed a “reasonable” comprehensive viewpoint if the overlapping consensus is deemed to include a commitment to tolerance as a matter of moral principle rather than “mere” *modus vivendi*. Thus,

⁷⁴⁸ *Id.*

⁷⁴⁹ *Id.*

⁷⁵⁰ See *supra* Part III(A).

⁷⁵¹ For example, most public acts at least tacitly deny the premise that “alien lizards conspiratorially control the Earth and with it human destiny,” or that President Obama was “a gay Muslim from Kenya working to undermine the United States,” both views that are held within some epistemic communities. Stephanie McCrummen, “*Finally, Someone Who Thinks Like Me*,” WASHINGTON POST, October 1, 2016; Tyson Lewis & Richard Kahn, *The Reptoid Hypothesis: Utopian and Dystopian Representational Motifs in David Icke's Alien Conspiracy Theory*, 16 UTOPIAN STUDIES 45 (2005).

⁷⁵² See *supra* Part III(B)(2).

expanding our view to encompass the epistemic component of liberal pluralism not only offers insight into the state's relations with epistemic outliers; it also reveals implications of Rawls's principles of political liberalism with respect to normative pluralism of which he himself was unaware.

IV. Conclusion

The aim of this chapter has been twofold: first, to focus attention on the distinct sphere of epistemic pluralism as an omission from Rawls's account of "reasonable" pluralism; and second, to assess whether the inevitable fact of epistemic pluralism in a liberal society characterized by free institutions creates the same challenges for the legitimacy of the democratic state as does normative pluralism, and if so, whether it is amenable to a solution analogous to that of Rawls's principle of public reason. The examination of legal challenges to mandatory vaccination requirements provides a useful perspective on these questions for several reasons. First, the question of the safety or efficacy of vaccines is one on which the epistemic battle lines have been, subject to minor variations with the changing times, relatively stable for two centuries. During that time, the pro-vaccination side has enjoyed the support of the mainstream medical community as well as the imprimatur of the state in the form of recommended or, frequently, mandatory vaccination requirements. The medical establishment and state authorities have enjoyed almost complete deference from the courts, which have uniformly upheld the imposition of vaccination requirements as a legitimate exercise of states' police power, and have rejected any claims to constitutional exemption from vaccination requirements on the grounds of religious freedom or otherwise. Yet the epistemic dissensus has persisted in the face of such opposition, at times attracting a substantial minority of public sentiment and occasionally erupting into civil disobedience or even violent opposition to state-mandated immunization policies.

As we have seen, the structure of statutory exemptions from otherwise mandatory immunization requirements tracks exactly the division between normative and epistemic pluralism. I do not believe this is a coincidence; rather, it reflects an unspoken, perhaps unexamined commitment in American legal theory to moral anti-realism as a foundational premise of normative tolerance. Whereas law and theory assume the existence and legitimacy of expertise in matters concerning "objective" empirical fact, they do not generally recognize the existence of moral expertise; as a result,⁷⁵³ American liberalism values tolerance and accommodation of "reasonable" diversity in matters concerning normative questions, while tacitly favoring deference to expertise on matters of empirical fact.⁷⁵⁴

My goal in conclusion is to engage in a bit of Rawlsian "reflective equilibrium"⁷⁵⁵ to consider the broader implications of my argument on other legal discussions. The principal normative

⁷⁵³ Or perhaps as a cause; I take no position on the direction of causality, but simply note that the two phenomena are associated.

⁷⁵⁴ This is not to say, of course, that controversies concerning *which* experts are legitimate, and therefore entitled to deference, do not routinely present vexing challenges to courts. The extent to which legal procedures, particularly the certification of experts under state or federal rules of evidence, require courts to mediate claims to legitimacy among competing epistemic communities is a fertile area for further research.

⁷⁵⁵ Rawls describes "reflective equilibrium" as "the proper method of ethics," which involves "testing theories against judgments about particular cases, but also testing judgments about particular cases against theories, until equilibrium is achieved." See RAWLS, *supra* note 9 at 8, 24, 45, 95–97. For further elaboration, see Lawrence B. Solum, *Situating Political Liberalism*, 69 CHI.-KENT L. REV. 549, 558–59 (1994); Kai Nielsen, *In Defense of Wide*

implication that I wish to explore is that, if we value the principle of normative tolerance as a moral good in itself rather than a mere *modus vivendi*, then the legal system should adopt an explicit presumption of moral anti-realism, which is necessary to justify normative tolerance as a matter of principle rather than expedience.⁷⁵⁶ As a further benefit, the express adoption of a principle of anti-realism could serve to clarify the theoretical frameworks through which the law seeks to resolve a wide range of other controversies.

Perhaps most obviously, a legal principle of moral anti-realism would provide a principled basis to distinguish normative from empirical propositions in applications of the First Amendment's religion clauses, either in lawsuits seeking accommodations for religious belief under the Free Exercise Clause or those challenging some state policy under the Establishment Clause. It could, for example, serve to rationalize the holdings in *Epperson v. Arkansas*,⁷⁵⁷ *Edwards v. Aguillard*,⁷⁵⁸ *Kitzmiller v. Dover Area School District*,⁷⁵⁹ and similar cases in which the courts have invalidated statutes prohibiting the teaching of biological evolution via natural selection in public classrooms or requiring or permitting teaching the theory of creationism/"intelligent design"⁷⁶⁰ alongside evolution. Similar to Stephen Jay Gould's concept of "non-overlapping magisteria,"⁷⁶¹ the principle of moral anti-realism (along with its inverse, the principle of empirical realism) would support a legal principle of deference to scientific expertise on empirical matters such as the evolution of life and the age of Earth; in such matters, in which a mind-independent and intersubjectively falsifiable correct answer exists, demands of religious objectors to accommodation in the name of pluralism would be unjustified and therefore could legitimately be denied without violating the principle of normative tolerance. At the same time, matters pertaining to questions of normative value rather than empirical fact—for example, whether religious institutions must comply with state anti-discrimination laws in hiring clergy or non-clergy support staff⁷⁶²—might be subjected to a "reasonableness" test under the Free

Reflective Equilibrium, in *ETHICS AND JUSTIFICATION* 19 (Douglas Odegard ed., 1988); Richard Rorty, *The Priority of Democracy to Philosophy*, in *THE VIRGINIA STATUTE FOR RELIGIOUS FREEDOM: ITS EVOLUTION AND CONSEQUENCES IN AMERICAN HISTORY* 257, 271 (Merrill D. Peterson & Robert C. Vaughan eds., 1988); Joseph Raz, *The Claims of Reflective Equilibrium*, 25 *INQUIRY* 307 (1982); Norman Daniels, *Wide Reflective Equilibrium and Theory Acceptance in Ethics*, 76 *J. PHIL.* 256 (1979).

⁷⁵⁶ To be clear, this is a contingent imperative grounded in the assumption that the principle of moral tolerance is, in fact, morally valuable in itself, an inference drawn not from first principles but from my study of the structure of vaccination exemption law as well as Rawls's own work.

⁷⁵⁷ 393 U.S. 97 (1968).

⁷⁵⁸ 482 U.S. 578 (1987).

⁷⁵⁹ 400 F. Supp. 2d 707 (M.D. Pa. 2005).

⁷⁶⁰ *Kitzmiller* held on the basis of substantial evidence introduced at trial that "Intelligent Design" theory is "nothing less than the progeny of creationism." *Id.* at 721.

⁷⁶¹ See STEPHEN JAY GOULD, *ROCKS OF AGES: SCIENCE AND RELIGION IN THE FULLNESS OF LIFE* (1999). Gould's conceptual framework has been criticized for its failure to acknowledge that religious claims often include empirical assertions; creationism is a classic example of a religious claim with a predominantly empirical component. The principle of moral anti-realism, as I conceive it here, avoids that criticism by distinguishing between claims that are primarily normative and those that are primarily empirical, regardless of whether the claims can be classified as "religious."

⁷⁶² See *Hosanna-Tabor Evangelical Lutheran Church & Sch. v. E.E.O.C.*, 132 S.Ct. 694, 705 (2012) (citing *Natal v. Christian and Missionary Alliance*, 878 F.2d 1575, 1578 (1st Cir. 1989); *Rweyemamu v. Cote*, 520 F.3d 198, 204–209 (2d Cir. 2008); *Petruska v. Gannon Univ.*, 462 F.3d 294, 303–307 (3d Cir. 2006); *EEOC v. Roman Catholic Diocese*, 213 F.3d 795, 800–801 (4th Cir. 2000); *Combs v. Central Tex. Annual Conference*, 173 F.3d 343, 345–350 (5th Cir. 1999); *Hollins v. Methodist Healthcare, Inc.*, 474 F.3d 223, 225–227 (6th Cir. 2007); *Schleicher v. Salvation Army*, 518 F.3d 472, 475 (7th Cir. 2008); *Scharon v. St. Luke's Episcopal Presbyterian Hospitals*, 929

Exercise Clause to determine whether such principles are broadly consistent with the fundamental normative commitments of liberal democracy; if so, accommodation should generally be granted.

An illustrative example of the doctrinal confusion introduced by the failure to explicitly articulate a principle of moral anti-realism can be seen in the Supreme Court's recent decision in *Burwell v. Hobby Lobby Stores, Inc.*, in which the Court held that closely held for-profit corporations may be entitled to an accommodation under the Religious Freedom Restoration Act of 1993⁷⁶³ from compliance with the regulations promulgated under the Patient Protection and Affordable Care Act of 2010⁷⁶⁴ that would require them to provide their employees with health insurance covering access to "abortifacient" technologies where the provision of such technologies violated the corporations' religious objections to abortion.⁷⁶⁵ The technologies to which the respondents objected included "two forms of emergency contraception commonly called 'morning after' pills and two forms of intrauterine devices [IUDs]."⁷⁶⁶ The Court stated that these technologies "may have the effect of preventing an already fertilized egg from developing any further by inhibiting its attachment to the uterus,"⁷⁶⁷ and because the *Hobby Lobby* respondents held a "sincere Christian belief that life begins at conception," they deemed this prevention of implantation to be a form of abortion.⁷⁶⁸ In fact, however, this account of the technologies' function departs in two ways from the mainstream medical community's current understanding. First, the medical community defines pregnancy as commencing with the implantation of a fertilized egg in the uterus, not the moment of fertilization.⁷⁶⁹ Even if the technologies at issue operate to prevent the implantation of a fertilized egg as the *Hobby Lobby* respondents believed, they still would not terminate a "pregnancy" and thus would be properly labeled contraceptives rather than abortifacients. Second, and more fundamentally, the Court's (and the *Hobby Lobby* respondents') account of how the contraceptive devices at issue function is likely factually incorrect. Although there is, as evidenced by the Court's use of the word "may," some uncertainty on the matter, the most current understanding holds that these devices do *not* prevent the implantation of a fertilized egg, but either, in the case of the morning after pills, inhibit ovulation, or, in the case of IUDs, prevent sperm from reaching the egg.⁷⁷⁰ As a

F.2d 360, 362–363 (8th Cir. 1991); *Werft v. Desert Southwest Annual Conference*, 377 F.3d 1099, 1100–1104 (9th Cir. 2004); *Bryce v. Episcopal Church*, 289 F.3d 648, 655–657 (10th Cir. 2002); *Gellington v. Christian Methodist Episcopal Church, Inc.*, 203 F.3d 1299, 1301–1304 (11th Cir. 2000); *EEOC v. Catholic Univ.*, 83 F.3d 455, 460–463 (D.C. Cir. 1996)).

⁷⁶³ 107 Stat. 1488, 42 U.S.C. § 2000bb *et seq.*

⁷⁶⁴ 124 Stat. 119.

⁷⁶⁵ 134 S. Ct. 2751, 2760 (2014).

⁷⁶⁶ *Id.* at 2765.

⁷⁶⁷ *Id.* at 2762–63.

⁷⁶⁸ *Id.* at 2755.

⁷⁶⁹ *See, e.g.*, AMERICAN COLLEGE OF OBSTETRICIANS & GYNECOLOGISTS, FACTS ARE IMPORTANT: EMERGENCY CONTRACEPTION (EC) AND INTRAUTERINE DEVICES (IUDS) ARE NOT ABORTIFACIENTS (2014) (pregnancy "[i]s established only at the conclusion of implantation of a fertilized egg"), available at <http://www.acog.org/-/media/Departments/Government-Relations-and-Outreach/FactsAreImportantEC.pdf>. The law also conceives of pregnancy as commencing at implantation rather than fertilization. *See, e.g.*, 45 C.F.R. § 46.202(f) ("Pregnancy encompasses the period of time from implantation until delivery.").

⁷⁷⁰ *See* Brief of *Amici Curiae* Physicians for Reproductive Health, American College of Obstetricians and Gynecologists, American Society for Emergency Contraception, Association of Reproductive Health Professionals, American Society for Reproductive Medicine, Society for Adolescent Health and Medicine, American Medical Women's Association, National Association of Nurse Practitioners in Women's Health, Society of Family Planning,

factual matter based on the medical community’s current state of knowledge, therefore, the Hobby Lobby respondents were simply incorrect in their belief that the contraceptive technologies at issue cause the “death” of a fertilized egg.

The *Hobby Lobby* majority’s opinion glossed over the respondents’ factual errors by characterizing their objection as a “religious” one and thus entitled to accommodation under RFRA. The Court wrote that “[t]he [respondents] believe that providing the coverage demanded by the HHS regulations is connected to the destruction of an embryo in a way that is sufficient to make it immoral for them to provide the coverage,” and criticized the HHS and the principal dissent for purporting to tell the respondents that their beliefs concerning this “religious and philosophical question... are flawed.”⁷⁷¹ By conflating the epistemic issues with the normative one, the Court ignored the distinction between moral anti-realism and epistemic realism necessary to rationalize RFRA’s accommodationist policy. By the *Hobby Lobby* Court’s logic, antivaccinationists’ opposition to mandatory vaccination policies could easily be recast as a “religious” objection to injecting children with a substance that “may” cause autism. Should the mainstream medical community respond that the best available evidence strongly indicates that vaccines do *not* cause autism, the *Hobby Lobby* Court would contend that “the federal courts have no business addressing whether the religious belief asserted in a RFRA case is reasonable.”⁷⁷² Lest the principle of normative deference under RFRA and the Establishment Clause collapse into one of epistemic nihilism by which rational governance is impossible, it is essential to maintain the distinction between empirical and normative questions in addressing claims to religious accommodation. The law, for the most part, has maintained that distinction in most contexts, including in response to legal challenges to mandatory vaccination policies; the *Hobby Lobby* Court’s failure to do so highlights the need for a more explicit articulation of the ontological principles upon which legal and moral paradigms of normative accommodation are founded.⁷⁷³

International Association of Forensic Nurses, American College of Nurse-Midwives, James Trussell, Susan F. Wood, Don Downing And Kathleen Besinque in Support of Petitioners, *Sebilus v. Hobby Lobby Stores, Inc.*, No. 13-354, 2013 WL 5740263, at *17–19 (Oct. 21, 2013) [hereinafter *PRH Amicus*]; see also Brief of *Amici Curiae* American College of Obstetricians and Gynecologists, Physicians for Reproductive Health, American Academy of Pediatrics, American Nurses Association, et al. in Support of the Government, *Sebelius v. Hobby Lobby Stores, Inc.*, Nos. 13-354, 13-356, 2014 WL 333893, at *25 n.5 (U.S. Jan. 28, 2014) (“None of the FDA-approved emergency contraceptives or IUDs cause abortion; rather, they prevent unintended pregnancy from occurring and thereby prevent situations in which a woman may consider abortion.”). The *PRF Amicus* explains that “[t]here is no scientific evidence showing that either [of the two ‘morning after pills’ at issue] are able to prevent implantation of a fertilized egg.” *Id.* at 17; see *id.* at 16 (noting that earlier indications that the morning after pill “may inhibit implantation (by altering the endometrium)... does not reflect the most current research” (emphasis omitted)). Rather, both pills likely function by “preventing or disrupting ovulation.” *Id.* at 15–16. The same is true for the two types of IUD to which the *Hobby Lobby* respondents objected. The hormonal IUD “works primarily by thickening the cervical mucus, thereby preventing sperm from reaching the egg.” *Id.* at *18 (citing studies). The copper IUD “affects the motility and viability of sperm and impairs their fertilizing capability.” *Id.* at *19.

⁷⁷¹ 134 S.Ct. at 2778.

⁷⁷² *Id.* (parentheses omitted).

⁷⁷³ The most recent chapter in the Court’s post-*Hobby Lobby* jurisprudence does not appear to create the same problem of conflation of empirical and normative issues. In *Zubik v. Burwell*, 136 S.Ct. 1557, 1559 (2016) (per curiam), the petitioners argued that the regulatory obligation to submit a form stating their religious objection to providing contraceptive coverage to their employees in order to obtain an exemption from the requirement to provide such coverage was itself a substantial burden on the petitioners’ exercise of religion in violation of RFRA. Although the *Zubik* petitioners persisted in the factual error of labeling some of the contraceptive devices to which

An explicit stance of moral anti-realism could also be of use in clarifying and resolving controversies concerning the interpretation and application of the Fourteenth Amendment's Equal Protection Clause. The Supreme Court's decision in *Lawrence v. Texas*⁷⁷⁴ raised the question whether the preservation of traditional notions of morality is a legitimate state interest sufficient to satisfy rational basis review.⁷⁷⁵ Under Rawls's conception of the principle of normative tolerance, the state would be obliged to tolerate departures from "traditional" moral principles up to the "reasonableness" boundary—that is, to accommodate all moral variations that remain consistent with the fundamental normative premises of liberal democracy. Because this question, unlike that of the functional mechanics of the contraceptive technologies at issue in *Hobby Lobby*, involves normative rather than empirical principles, the principle of empirical realism has no direct application here; nevertheless, explicitly recognizing the principle of moral anti-realism would enable courts to justify the application of normative tolerance and to apply it more rationally and predictably than has previously been the case. Such clarification would obviously have had application, for example, to the Supreme Court's recent decision invalidating state restrictions of marriage to opposite-sex couples.⁷⁷⁶

In short, an examination of the phenomenon of epistemic pluralism from a Rawlsian perspective reveals a glaring omission from Rawls's own account of "reasonable" pluralism in his work on political liberalism, an omission which suggests a significant challenge to the legitimacy of state action that Rawls himself failed to address. Due to the ontological distinctions between normative and empirical claims, the challenge posed by epistemic pluralism cannot be resolved by the method Rawls adopts for normative pluralism; an analogous principle of epistemic "reasonableness" is insufficient because the problem of legitimacy is fundamentally a normative one, and epistemic dissenters may well be normatively reasonable insofar as they accept the fundamental normative commitments of liberal democracy. A more successful approach, however, is suggested by a study of the legal system's response to challenges to mandatory vaccination requirements, where the structure of statutory exemptions replicates the tacit distinction between normative and epistemic pluralism found in Rawls's own work. The recurrence of this distinction suggests an unspoken commitment to the principle of moral anti-realism, which is necessary to justify a commitment to normative tolerance as a good in itself rather than a mere *modus vivendi*. If we do in fact value normative tolerance as a good in itself, then the process of reflective equilibrium implies that we should adopt moral anti-realism as an

they objected "abortifacients," they also made clear that their religious objection extended to providing coverage for contraceptive and sterilization devices. See Brief for Petitioners in Nos. 14-1418, 14-1453, & 14-1505, *Zubik v. Burwell*, 2016 WL 93988, at *1 (Jan. 4, 2016); Brief for Petitioners in Nos. 15-35, 15-105, 15-119, & 15-191, *Zubik v. Burwell*, 2016 WL 93989, at *2 (Jan. 4 2016). Thus, the empirical classification of these devices as "contraceptives" or "abortifacients" was immaterial in *Zubik*; the case turned only on the petitioners' religious objection to providing coverage for both types of devices. The Court disposed of the case without reaching the merits of the petitioners' claims, remanding the consolidated cases to their respective circuit courts with instructions to "afford[] an opportunity to arrive at an approach going forward that accommodates petitioners' religious exercise while at the same time ensuring that women covered by petitioners' health plans receive full and equal health coverage, including contraceptive coverage." *Zubik*, 136 S.Ct. at 1560 (internal quotation marks omitted).

⁷⁷⁴ 539 U.S. 558 (2003).

⁷⁷⁵ See, e.g., Manuel Possolo, Note, *Morals Legislation after Lawrence: Can States Criminalize the Sale of Sexual Devices?*, 65 STAN. L. REV. 565 (2013); Daniel F. Piar, *Morality as a Legitimate Government Interest*, 117 PENN. ST. L. REV. 139 (2012).

⁷⁷⁶ *Obergefell v. Hodges*, 135 S. Ct. 2071 (2015).

organizing principle of law and political theory.⁷⁷⁷ The most significant consequence of that principle for purposes of the current discussion would be a justification of deference to expertise with respect to matters of empirical fact sufficient to negate the legitimacy problem raised by the fact of epistemic pluralism—no legitimacy problem exists where the state is entitled to grant the voices of some individuals greater weight than those of others in making policy, even when the result is the imposition on dissenters of a policy grounded in empirical views anathema to their deeply-held empirical beliefs. A further consequence would be the rationalization of other areas of law in which conflicts between normative and empirical propositions have arisen. Further implications will no doubt present themselves.

V. Post Script: A Note of Caution

This is a dissertation about law, and thus about violence and coercion.⁷⁷⁸ My thesis has been that the phenomenon of epistemic pluralism—of sincere disagreement about matters of empirical fact—does not, under a Rawlsian analysis, give rise to the same problems of legitimacy or demand application of the same principles of tolerance and forbearance as does the phenomenon of normative pluralism. The state is free, from the perspective of Rawlsian legitimacy, to apply the coercive force of law to bring epistemic outliers into compliance with official policies grounded in matters of empirical fact as the state understands it. In the case of vaccine refusal, there may be good reasons to apply that force. Antivaccinationists expose their own children, the children of others, and the community at large to serious risks of vaccine-preventable disease. Centuries of experience with vaccination have shown the procedure to be an extraordinarily effective means of controlling the spread of disease, and the medical community has long since resolved any reasonable doubts concerning vaccines' safety relative to the medical benefits the procedure creates. The benefits of imposing a vaccination requirement with only a narrow medical exception would thus appear to easily outweigh the harm, if any, of compelling parents against their will to submit their children to a beneficial medical procedure.

Nevertheless, I end on a note of caution. Before advocating a policy of legal coercion—however “legitimate” that policy may be from Rawls’s rather abstract perspective—it is wise to consider the effects of that policy in the real world. Who, demographically speaking, *are* the children who fail to receive their recommended vaccinations, and what consequences might a more rigid immunization policy produce? Empirical studies show a clear demographic division between the “non-vaccinated,” whose mothers reject vaccination entirely on ideological grounds, and the “under-vaccinated,” who have received some but not all recommended immunizations.⁷⁷⁹ Under-vaccinated children are more likely to be African American, to live in a central city, and to have a mother who is young, unmarried, lacks a college degree, and has an annual household income

⁷⁷⁷ This does not imply that moral anti-realism is in some ontological sense *true*, but merely that it is consistent with the commitment to normative tolerance that we have embraced, at least hypothetically, for purposes of this discussion.

⁷⁷⁸ See Robert M. Cover, *Violence and the Word*, 95 YALE L.J. 1601 (1985) (“Legal interpretation takes place on a field of pain and death.”).

⁷⁷⁹ See Jennifer A. Reich, *Neoliberal Mothering and Vaccine Refusal: Imagined Gated Communities and the Privilege of Choice*, 20 GEND. & SOC. 1 (2014); Philip J. Smith, Susan Y. Chu & Lawrence E. Barker, *Children Who Have Received No Vaccines: Who Are They and Where Do They Live?*, 114 PEDIATRICS 187 (2004). I use the word “mothers” advisedly, as these studies indicate that decisions concerning childhood health care are predominantly the province of the female parent. Reich, 20 GEND. & SOC. at 7; ALINA SALGANICOFF, USHA R. RANJANI & ROBERTA WYN, *WOMEN AND HEALTH CARE: A NATIONAL PROFILE* 40 (2005).

at or near the poverty line.⁷⁸⁰ In contrast, mothers of the non-vaccinated are more likely to be white, married, college-educated, and with an annual household income over \$75,000.⁷⁸¹ Under-vaccination is, at least to a considerable degree, a problem of inaccessible health care infrastructure rather than ideological opposition.⁷⁸² The affluent non-vaccinated—the true antivaccinationists—are motivated by a different set of concerns. Jennifer Reich’s study of mostly white, affluent mothers in Colorado who reject the recommended vaccination schedule found three broad areas of shared belief: 1) that the mothers themselves are more capable of assessing the risks and benefits of vaccines than experts such as medical professionals and state agencies;⁷⁸³ 2) that alternative resource- and time-intensive mothering practices, particularly involving breastfeeding and “organic” diets, will maintain their children’s health without the need for vaccination;⁷⁸⁴ and 3) that risk of infection can be effectively managed through what Reich calls “imagined gated communities”—careful and active management of their children’s social networks to exclude perceived vectors of disease.⁷⁸⁵ One might readily expect, then, that these mothers—ideologically opposed to vaccination and with abundant time and resources to invest in the pursuit of what they believe to be the best interests of their children—will find more effective means of resistance than the mothers of under-vaccinated children on whom the burden of punitive enforcement would fall most heavily.⁷⁸⁶

This post-script should not be read as advocating against narrowing the scope of vaccination exemptions, or in favor of accommodation of epistemic outliers when public health is at stake. To the contrary, I believe that SB 277 was fully justified and that public health would be greatly improved were more states to follow California’s lead by eliminating the religious and philosophical exemptions. My purpose here is simply to point out that the abstract question of moral legitimacy in the Rawlsian sense does not fully exhaust—indeed, does not tell us very much at all about—the question of whether the application of legal coercion in a particular context is advisable, wise, or even intuitively “fair.” It is also to remind us of the unintended consequences that can arise in the familiar gap between “law on the books” and “law in action.”⁷⁸⁷ Where a coercive vaccination policy is justified on the basis of the health benefits accruing to the entire community from a vaccination rate sufficient to establish herd immunity, it is imperative that we ensure compliance not only with the threat of punitive sanctions, but also by providing resources sufficient to enable meaningful access. As vaccination is a matter of communal health, it is essential—even if one rejects Rawlsian egalitarianism—that the

⁷⁸⁰ Reich, *supra* note 285 at 2; Smith, Chu, and Barker, *supra* note 285 at 187.

⁷⁸¹ Reich, *supra* note 285 at 2; Smith, Chu, and Barker, *supra* note 285 at 187.

⁷⁸² See, e.g., Lauren M. Whaley, *Majority at Some LAUSD Kindergartens are Under-Vaccinated*, LOS ANGELES DAILY NEWS, January 30, 2015, <http://www.dailynews.com/health/20150130/majority-at-some-laUSD-kindergartens-are-under-vaccinated>.

⁷⁸³ This belief resembles the “mommy instinct” to which Jenny McCarthy refers in defense of her own antivaccinationism. McCarthy, *MOTHER WARRIORS*, *supra* note 658, at 93; see also Emily Chivers Yochim & Vesta T. Silva, *Everyday Expertise, Autism, and “Good” Mothering in the Media Discourse of Jenny McCarthy*, 10 COMM. & CRITICAL/CULTURAL STUD. 406 (2013).

⁷⁸⁴ *Id.* at 14–16.

⁷⁸⁵ *Id.* at 17–20.

⁷⁸⁶ Reich notes that the affluent mothers of her study sample “feel entitled to address experts as consultants and refuse their advice without fear of reprisal, choices less readily available to less privileged families, whose rejection of expert advice more easily results in state intervention.” Reich, *supra* note 285 at 12.

⁷⁸⁷ See Roscoe Pound, *Law in Books and Law in Action*, 44 AM. L. REV. 36 (1910).

community take the necessary steps to ensure that all members may avail themselves of its benefits.

Chapter 5

An Agenda for the Study of Legal Knowledge Construction

This dissertation has examined several facets of the construction of legal knowledge. In each chapter, I have shown that adopting an interdisciplinary perspective drawing on recent developments and insights from other fields can contribute fruitfully to identifying and resolving practical and normative challenges to the construction of legal knowledge. The specific challenges addressed in these chapters can be resolved, or at least mitigated, by a close examination of the processes of legal knowledge construction and an attentiveness to the cognitive and social dynamics of human belief formation.

In closing, I will return to three themes that recur throughout the previous chapters: 1) the epistemic limitations of human decision makers; 2) the social entrenchment of empirical disagreement; and 3) the promise and limitations of systems-based reforms to improving the veridicality of legal knowledge. Taken together, these themes account for many of the challenges that courts face in constructing legal knowledge and suggest a promising direction for future research.

I. The Epistemic Limitations of Human Decision Makers

Legal knowledge, although the product of collective epistemic agents, is ultimately constructed by human minds, and many of the recurrent pathologies in legal factfinding arise from the contingencies of the human epistemic process. Although cognitive psychologists have been aware for decades that the actual processes of human decision making, risk perception, and belief formation depart substantially from the idealized models employed by other disciplines, these insights are only recently beginning to influence other social sciences and legal scholarship. Going forward, legal scholarship must incorporate these more richly descriptive accounts of human cognition into its efforts to understand and improve the processes of legal knowledge construction.

The principal feature of human cognition—so obvious as to be often overlooked—is its solitary nature. The formation of knowledge takes place in individual human brains to which others have access only through the imperfect and often inadequate medium of language. In the science fiction novel *Ender's Game*, Earth is attacked by insect-like alien beings; in retaliation, Earth's military destroys the aliens' world and nearly extinguishes their race.⁷⁸⁸ Only late in the novel does the protagonist discover the motive—or lack thereof—for the aliens' attack: their collective consciousness did not recognize that sentience could occur in humans' isolated, individual minds, and thus they did not perceive their invasion of Earth as an act of aggression.⁷⁸⁹ Indeed, many epistemic difficulties would be obviated if humanity shared a collective consciousness. Our *epistemic insularity*—the fact that knowledge produced in one brain is transferrable only indirectly to others—imposes substantial limitations on humans' epistemic capacity at both the individual and collective levels. Although human knowledge is collectively cumulative insofar

⁷⁸⁸ ORSON SCOTT CARD, *ENDER'S GAME* (1985).

⁷⁸⁹ *Id.* at 249 (the aliens “never [dreamed] that thought could arise from the lonely animals who cannot dream each other's dreams”).

as, e.g., the natural sciences make progress toward a comprehensive account of nature through the accumulation of recorded knowledge over generations, epistemic insularity constrains the development of that collective knowledge. Individual brains must become imprinted with the existing state of cumulative knowledge, at substantial cost, in order to be capable of extending it. Moreover, knowledge is unequally distributed; the sum of collective knowledge is vast and, given current methods of knowledge transfer, it is impossible for any individual human brain to contain all or even a substantial part of it. This fact alone accounts for some of the entrenched disagreement about matters of empirical fact that we will discuss later, but it is also an epistemic limitation in its own right. Inequalities in access to education and learning proficiency further contribute to the substantial disparities of knowledge distribution.

Even aside from the epistemic insularity that fundamentally shapes our experience, the cognitive apparatus by which our beliefs are formed itself constitutes a further limitation on humans' epistemic capacity. Human brains are not optimal truth-maximizing devices, and human cognition does not follow the optimally rational paths of the "Econs" of classical economic theory.⁷⁹⁰ Brains are central processing units evolved via natural selection for the "purpose," if we may indulge a teleological metaphor, of maximizing reproduction. Veridicality of belief is adaptive insofar, and only insofar, as it tends to facilitate survival and reproduction.⁷⁹¹ And we know from everyday experience and from the lessons of psychology that the mental models on which human cognition operates are, at most, only partially truth-convergent. We tend to conflate our empirical beliefs with our normative preferences, and to adopt professions of empirical belief as markers of ingroup status. Our brains generally prefer to operate on a low-effort "fast" setting, relying on heuristic shortcuts that, while often reliable on average, too often produce biased and truth-divergent beliefs. Indeed, human cognition is susceptible to a suite of biases and cognitive illusions that affect belief formation in predictable but often subjectively invisible ways. Some—perhaps many—of these insights have been intuitively grasped by the law of evidence since well before they were supported and articulated by cognitive psychology, but judges and scholars should take greater care to ensure that the models of human cognition on which discussions of legal knowledge construction are based accurately reflect the empirically validated conclusions of contemporary cognitive psychology.

II. The Social Entrenchment of Empirical Disagreement

Since at least the nineteenth century, judges, lawyers, and scholars have blamed "hired gun" experts for obfuscating the truth in service to partisan interests,⁷⁹² and while many experts' testimony is surely influenced by the interests of their patron, the phenomenon of endlessly contending experts in litigation is to some degree simply a manifestation of the deeply entrenched disagreement over matters of basic fact that characterize contemporary society. Far from being limited to complex questions at the edge of human knowledge like the oncogenetic potential of PCBs, or even highly politicized issues like the reality and magnitude of anthropogenic climate change, substantial numbers of contemporary Americans are divided over

⁷⁹⁰ See generally THALER, *supra* note 74.

⁷⁹¹ See Mark et al., *supra* note 76; see generally RICHARD DAWKINS, *THE SELFISH GENE* (1976).

⁷⁹² See generally GOLAN, *supra* note 251.

the question of whether the Earth is flat,⁷⁹³ whether the gold fringe around federal courtroom flags denotes that they are courts of admiralty applying martial law,⁷⁹⁴ or whether government is run by a secret cabal of lizard people.⁷⁹⁵ These are extreme examples held by relatively few epistemic outliers, but the broader point is that we disagree fundamentally on many of the basic empirical facts about the world. While there is some reason to believe that social media have accelerated the dispersion of non-mainstream empirical beliefs,⁷⁹⁶ this seems to be merely an acceleration of a trend—the loss of public confidence in mainstream institutions of knowledge production—that has been underway for decades.⁷⁹⁷ In any event, my concern at the moment is neither with the origin of this division nor with the veridicality of any particular viewpoint; it is that the partisan battles of experts playing out in courtrooms mirror the fraying of our shared conceptions of social knowledge.

While this trend—Collins’s “zeitgeist”—will not be reversed by the actions of legal institutions, it should inform our aspirations for, and expectations of, the construction of legal knowledge. Courts must make findings of fact to resolve legal disputes, and in so doing, they invariably must privilege the empirical views of one epistemic community—in some cases, a community of one—over the views of others. This is inevitable, and, insofar as we accept empirical realism, legitimate, provided that courts employ factfinding processes that are reasonably well calculated to produce more or less veridical results in most cases. But the entrenchment of widespread social disagreement about nearly every empirical claim nevertheless should sound a note of caution for courts and legal scholars and lend further support to the need for a norm of judicial epistemic humility. We cannot expect courts to definitively resolve empirical controversies in the background culture any more successfully than they can resolve moral controversies around, for example, abortion or same-sex marriage. They inevitably must take positions on disputed questions of fact—the light was red, the available evidence does not establish that PCBs are oncogenetic in humans, the securities fraud perpetrated by Martin Shkreli created a loss of \$10.5 million rather than \$0⁷⁹⁸—and those positions will become legal reality backed by coercive force, but the fact will remain that entrenched social disagreements will not be resolved by judicial fiat.

In practical terms, this suggests a need for greater judicial appreciation of *epistemic passive virtues*. Alexander Bickel famously urged the Supreme Court to make greater use of jurisdictional and discretionary tools to avoid deciding matters better left to the democratic process.⁷⁹⁹ Similar concerns apply to legal factfinding, particularly in cases tapping into broader

⁷⁹³ *America’s Flat-Earth Movement Appears to Be Growing*, THE ECONOMIST, 2017, <https://www.economist.com/blogs/graphicdetail/2017/11/daily-chart-21>.

⁷⁹⁴ See Charles E. Loeser, Note, *From Paper Terrorists to Cop Killers: The Sovereign Citizen Threat*, 93 N.C. L. REV. 1106, 1123 (2014).

⁷⁹⁵ See Lewis & Kahn, *supra* note 751.

⁷⁹⁶ See Soroush Vosoughi, Deb Roy & Sinan Aral, *The Spread of True and False News Online*, 359 SCIENCE 1146 (2018).

⁷⁹⁷ See generally COLLINS, *supra* note 239, at 49–79 (arguing that the “zeitgeist” since the 1960s has been one of increasing skepticism toward experts’ claims of epistemic authority).

⁷⁹⁸ See *U.S. v. Shkreli*, No. 15-cr-637(KAM) (E.D.N.Y. Feb. 26, 2018).

⁷⁹⁹ Alexander M. Bickel, *Foreword: The Passive Virtues*, 75 HARV. L. REV. 40 (1961); see also ALEXANDER M. BICKEL, *THE LEAST DANGEROUS BRANCH: THE SUPREME COURT AT THE BAR OF POLITICS* (1962).

social or scientific disputes that courts are ill-suited to resolve or seeking judicial resolution of contentious social controversies around questions of scientific or other empirical fact. These thoughts are necessarily tentative, but the idea that courts, in recognition of their relatively poor track record as factfinders particularly in complex scientific or other technical areas, should adopt a Bickelian strategy of minimizing judicial pronouncements of fact in cases involving such disputes is one that I hope to further develop in future work.

III. The Utility and Limitations of Systems-Based Reforms to Improving the Veridicality Of Legal Knowledge

If human minds are epistemically insular and our cognition is prone to truth-divergent biases and cognitive illusions, how is it the case that we have nevertheless, so I will maintain, built up a store of reliable collective knowledge that, to all appearances, accurately describes the external world in fine detail? In large part, I believe the answer lies in formalized epistemic systems subjecting individual knowledge claims to collective scrutiny. It may no longer be fashionable to accept Merton's account of "universalism, communalism, disinterestedness, and organized skepticism" as the "ethos of modern science," but those values serve well as aspirational goals for collective epistemic systems even if the work of subsequent decades has produced a messier descriptive account of scientific consensus building.⁸⁰⁰ The legal adversarial system itself is an epistemic system designed to produce knowledge by subjecting partisan claims to well incentivized scrutiny. While the adversarial system's false assumptions, including that both parties will have roughly equal resources with which to develop their case and that the neutral factfinder will possess epistemic competence to engage with all relevant evidence in a warranted way, undermine its ability to produce reliable outcomes in many cases, the system's fundamental instinct to construct knowledge via a process of formalized scrutiny is a sound one. What is needed is closer attention to *how* an epistemic system can produce reliable knowledge by mitigating the effects of individual minds' insularity and biases. Systems-oriented social epistemology explores this topic outside the legal context, and I have attempted to address the narrow issue of judicial engagement with scientific expertise from a systems-oriented perspective in this dissertation. More work remains to be done.

At the same time, systems-oriented approaches to knowledge production have limitations. The adversarial system illustrates this point—an epistemic system built on flawed assumptions will often fail to produce reliable knowledge. And even under the best of circumstances, epistemic systems are comprised of individual human nodes on whose integrity and competence the system depends—this is one lesson of "second wave" science studies scholarship.⁸⁰¹ The implementation of a practical and reliable epistemic system is perhaps a necessary condition to the production of high-quality legal knowledge, but it is not sufficient. As I have suggested, judicial culture—particularly a greater appreciation among judges of the cognitive illusions to which they, like all humans, are susceptible—is important to the effective implementation of an epistemic system. And while we should expect an emphasis on reforming the epistemic systems of the legal system to improve the veridicality of legal knowledge construction, the challenges

⁸⁰⁰ See Merton, *supra* note 712.

⁸⁰¹ See *supra* note 320.

intrinsic to human cognition will never be fully resolved by the adoption of a particular epistemic system. Nevertheless, the systems-based approach seems a potentially fruitful perspective for improving the existing quality of legal knowledge construction.

* * *

Where does this leave us? We know from a review of the empirical evidence that courts are not the supremely competent, objective factfinders that judges, particularly appellate judges, portray them as being. On the whole, judges are susceptible to biases, cognitive illusions, and fallacious thinking to more or less the same degree as laypersons, and they particularly struggle—as all non-experts do—to engage with the substance of expert disagreement sufficiently to adjudicate technical disagreements between partisan experts on questions of scientific or technical fact relevant to the resolution of legal claims. We also know that judicial factfinding in a society characterized by entrenched epistemic pluralism risks creating a state-backed orthodoxy on hotly contested empirical questions that seems, at first glance, to contravene the liberal value of state neutrality. This dissertation has attempted to resolve these issues, but many practical and normative questions persist around the construction of legal knowledge in judicial institutions. In future work, I hope to explore, among other things, the role of scientific uncertainty in legal factfinding—how the legal system should respond, for example, when a plaintiff presents a plausible toxic tort claim as to which the scientific consensus is insufficiently developed to demonstrate the element of general causation by a preponderance of the evidence. I also hope to examine more closely the normative implications of judges’ lack of expertise in science and philosophy on the optimal gatekeeping regime. Putting aside whether its criteria embody a defensible principle of demarcation between science and non-science from a philosophy of science perspective, it is clear that they demand too much philosophical expertise from judges. An effective gatekeeping regime must keep in mind the epistemic limitations of the individuals tasked with applying it, and *Daubert*—the Court’s assurances to the contrary notwithstanding—fails to do this. Other questions will no doubt present themselves; the challenges associated with the construction of legal knowledge present a promising area for future research.

References

- Abrams, D. S., Bertrand, M., & Mullainathan, S. (2012). Do Judges Vary in Their Treatment of Race? *Journal of Legal Studies*, 41(2), 347.
- Abramson, B. (2001). Blue Smoke or Science - The Challenge of Assessing Expertise Offered as Advocacy. *Whittier Law Review*, 22, 723.
- Adams, A. M., & Emmerich, C. J. (1989). A Heritage of Religious Liberty. *University of Pennsylvania Law Review*, 137(5), 1559.
- Adroque, S., & Ratliff, A. (2002). The Independent Expert Evolution: From the Path of Least Resistance to the Road Less Traveled. *Texas Tech Law Review*, 34, 843.
- Albonetti, C. A. (1997). Sentencing under the Federal Sentencing Guidelines: Effects of Defendant Characteristics, Guilty Pleas, and Departures on Sentence Outcomes for Drug Offenses, 1991-1992. *Law & Society Review*, 31, 789.
- Anca M. Miron, Nyla R. Branscombe, & Monica Biernat. (2010). Motivated Shifting of Justice Standards. *Personality & Soc. Psych. Bull.*, 36(6), 768.
- Anderson, E. (2011). Democracy, Public Policy, and Lay Assessments of Scientific Testimony. *Episteme*, 8(02), 144.
- Anderson, J. C., Lowe, D. J., & Reckers, P. M. J. (1993). Evaluation of Auditor Decisions: Hindsight Bias Effects and the Expectation Gap. *Journal of Economic Psychology*, 14(4), 711.
- Arbesman, S. (2012). *The Half-life of Facts: Why Everything We Know Has an Expiration Date*. New York, New York, U.S.A: Current Hardcover.
- Arnold, M. S. (1979). Historical Inquiry Into the Right to Trial by Jury In Complex Civil Litigation. *University of Pennsylvania Law Review*, 128, 829.
- Aspinwall, T. J. (1997). Religious Exemption to Childhood Immunization Statutes: Reaching for a More Optimal Balance between Religious Freedom and Public Health. *Loyola University Chicago Law Journal*, 29, 109.
- Ayer, A. J. (1952). *Language, Truth and Logic* (2d ed.). New York: Dover Publications.
- Bacon, F. (2000). *The New Organon*. (L. Jardine & M. Silverthorne, Eds.). New York: Cambridge University Press.
- Baer, H. J. (2001). History, Process, and a Role for Judges in Mediating Their Own Cases. *New York University Annual Survey of American Law*, 58, 131.
- Baldwin, T. (2008). Rawls and Moral Psychology. In *Oxford Studies in Metaethics* (p. 247). New York: Oxford University Press.
- Bazin, H. (2000). *The Eradication of Smallpox: Edward Jenner and The First and Only Eradication of a Human Infectious Disease*. San Diego, Calif: Academic Press.
- Bean, S. J. (2011). Emerging and Continuing Trends in Vaccine Opposition Website Content. *Vaccine*, 29, 1874.
- Beard, M. (2009). *The Roman Triumph*. Cambridge, Mass.: Belknap Press.
- Beckett, K., & Hoffman, B. (2005). Challenging Medicine: Law, Resistance, and the Cultural Politics of Childbirth. *Law & Society Review*, 39(1), 125.
- Behbehani, A. M. (1983). The Smallpox Story: Life and Death of an Old Disease. *Microbiological Reviews*, 47(4), 455.
- Bennett, M. W. (2014). Confronting Cognitive Anchoring Effect and Blind Spot Biases in Federal Sentencing: A Modest Solution for Reforming a Fundamental Flaw Criminal Law. *Journal of Criminal Law and Criminology*, 104, 489.
- Berger, M. (2011). The Supreme Court's Trilogy on the Admissibility of Expert Testimony. In F.

- J. Center, *Reference Manual on Scientific Evidence* (3d ed.).
- Bergh, H. (1882). The Lancet and the Law. *The North American Review*, 134(303), 161–169.
- Berlin, I. (1997). The Hedgehog and the Fox. In H. Hardy & R. Hausheer (Eds.), *The Proper Study of Mankind: An Anthology of Essays*. London: Chatto & Windus.
- Bernstein, M. I. (1995). Expert Testimony in Pennsylvania. *Temple Law Review*, 68, 699–724.
- Beyea, J., & Berger, D. (2001). Scientific Misconceptions among Daubert Gatekeepers: The Need for Reform of Expert Review Procedures Complex Litigation at the Millennium. *Law & Contemporary Problems*, 64, 327.
- Bickel, A. M. (1961). Foreword: The Passive Virtues. *Harvard Law Review*, 75, 40–79.
- Bickel, A. M. (1986). *The Least Dangerous Branch: The Supreme Court at the Bar of Politics* (2d ed.). New Haven: Yale University Press.
- Billauer, B. P. (2016a). Admissibility of Scientific Evidence under Daubert: The Fatal Flaws of Falsifiability and Falsification. *Boston University Journal of Science and Technology Law*, 22, 21.
- Billauer, B. P. (2016b). Daubert Debunked: A History of Legal Retrogression and the Need to Redefine “Science” in Law. *Suffolk Journal of Trial & Appellate Advocacy*, 21, 1.
- Bird, A. (2015). When Is There a Group That Knows? Distributed Cognition, Scientific Knowledge, and the Social Epistemic Subject. In J. Lackey (Ed.), *Essays in Collective Epistemology*.
- Bostrom, N. (2003). Are We Living in a Computer Simulation? *The Philosophical Quarterly*, 53(211), 243–255.
- Braman, E., & Nelson, T. E. (2007). Mechanism of Motivated Reasoning? Analogical Perception in Discrimination Disputes. *Am. J. Pol. Sci.*, 51(4), 940.
- Brekke, N. J., Enko, P. J., Clavet, G., & Seelau, E. (1991). Of Juries and Court-Appointed Experts: The Impact of Nonadversarial Versus Adversarial Expert Testimony. *Law & Human Behavior* 15(5), 451.
- Brewer, S. (1997). Scientific Expert Testimony and Intellectual Due Process. *Yale Law Journal*, 107, 1535.
- Brown, P. (1995). Naming and Framing: The Social Construction of Diagnosis and Illness. *Journal of Health and Social Behavior*, 34.
- Campbell, J. S. (1988). The Current Understanding of the Seventh Amendment: Jury Trials in Modern Complex Litigation. *Washington University Law Quarterly*, 66, 63.
- Campbell, J. S., & Le Poidevin, N. (1979). Complex Cases and Jury Trials: A Reply to Professor Arnold. *University of Pennsylvania Law Review*, 128, 965.
- Card, O. S. (1994). *Ender’s Game*. New York: Tor Science Fiction.
- Cardozo, B. N. (1921). *The Nature of the Judicial Process*. New Haven: Yale University Press.
- Carrington, P. D. (1992). One Law: The Role of Legal Education in the Opening of the Legal Profession Since 1776. *Florida Law Review*, 44, 501.
- Casper, B. M. (1976). Technology Policy and Democracy: Is the Proposed Science Court What We Need? *Science*, 194, 29.
- Casper, J. D., Benedict, K., & Perry, J. L. (1989). Juror Decision Making, Attitudes, and the Hindsight Bias. *Law & Human Behavior*, 13, 291–310.
- Casscells, W., Schoenberger, A., & Graboys, T. B. (1978). Interpretation by Physicians of Clinical Laboratory Results. *New England Journal of Medicine*, 299(18), 999–1001.
- Caudill, D. S., & Redding, R. E. (2000). Junk Philosophy of Science?: The Paradox of Expertise and Interdisciplinarity. *Washington and Lee Law Review*, 57, 685.

- Cecil, J. S. (1987). *Jury Service in Lengthy Civil Trials*. Washington, D.C.: Federal Judicial Center.
- Cecil, J. S., Hans, V. P., & Wiggins, E. C. (1990). Citizen Comprehension of Difficult Issues: Lessons from Civil Jury Trials Symposium Issue on the Selection and Function of the Modern Jury. *American University Law Review*, 40, 727.
- Cecil, J. S., & Willging, T. (1993). *Court-Appointed Experts: Defining the Role of Experts Appointed Under Federal Rule of Evidence 706*.
- Cecil, J. S., & Willging, T. E. (1994). Accepting Daubert's Invitation: Defining a Role for Court-Appointed Experts. *Emory Law Journal*, 43, 995.
- Centers for Disease Control and Prevention. (1999). Ten Great Public Health Achievements, 1900-1999: Impact of Vaccines Universally Recommended for Children. *Morbidity and Mortality Weekly Report*, 48, 243.
- Centers for Disease Control and Prevention (CDC). (1999). Impact of Vaccines Universally Recommended for Children--United States, 1990-1998. *MMWR. Morbidity and Mortality Weekly Report*, 48(12), 243-248.
- Chao, B., Farrell, I. P., Durso, C., & Robertson, C. T. (2017). *Why Courts Fail to Protect Privacy: Race, Age, Bias, and Technology* (SSRN Scholarly Paper No. ID 2924744). Rochester, NY: Social Science Research Network. Retrieved from <https://papers.ssrn.com/abstract=2924744>.
- Cheng, E. K., & Yoon, A. H. (2005). Does Frye or Daubert Matter? A Study of Scientific Admissibility Standards. *Virginia Law Review*, 91(2), 471.
- Chong, K. H. (1998). What It Means to be Christian: The Role of Religion in the Construction of Ethnic Identity and Boundary Among Second-Generation Korean Americans. *Sociology of Religion*, 59(3), 259.
- Christensen-Szalanski, J. J. J., & William, C. F. (1991). The Hindsight Bias: A Meta-Analysis. *Organizational Behavior & Human Decision Processes*, 48, 147.
- Christiano, T. (2008). *The Constitution of Equality: Democratic Authority and Its Limits*. Oxford University Press.
- Cohen, G. L. (2007). Bridging the Partisan Divide: Self-Affirmation Reduces Ideological Closed-Mindedness and Inflexibility in Negotiation. *J. Personality & Social Psychology*, 93, 415.
- Cohen, G. L., Aronson, J., & Steele, C. M. (2000). When Beliefs Yield to Evidence: Reducing Biased Evaluation by Affirming the Self. *Personality and Social Psychology Bulletin*, 26(9), 1151-1164.
- Cohen, N. B. (2002). The Gatekeeping Role in Civil Litigation and the Abdication of Legal Values in Favor of Scientific Values Symposium. *Seton Hall Law Review*, 33, 943.
- Cole, S. A. (2009). Don't Shoot the Messenger by One of the Messengers: A Response to Merlino et al. *Tulsa Law Review*, 45, 111.
- Cole, S. A., & Edmond, G. (2015). Science without Precedent: The Impact of the National Research Council Report on the Admissibility and Use of Forensic Science Evidence in the United States. *British Journal of American Legal Studies*, 4, 585.
- Colgrove, J. K. (2006). *State of Immunity: The Politics of Vaccination in Twentieth-Century America*. Berkeley: New York: University of California Press.
- Collins, H. (2014). *Are We All Scientific Experts Now*. Cambridge, UK; Malden, MA: Polity.
- Collins, H. (2017). *Gravity's Kiss: The Detection of Gravitational Waves*. Cambridge, Massachusetts: MIT Press.

- Collins, H., & Evans, R. (2002). The Third Wave of Science Studies: Studies of Expertise and Experience. *Soc. Stud. Sci.*, 32(2), 235.
- Collins, H., & Evans, R. (2007). *Rethinking Expertise*. Chicago: University Of Chicago Press.
- Congressional Research Service. (2011). *Mandatory Vaccinations: Precedent and Current Laws*. Congressional Research Service.
- Cooper, J., Bennett, E. A., & Sukel, H. L. (1996). Complex Scientific Testimony: How Do Jurors Make Decisions? *Law & Human Behavior*, 20(4), 379.
- Cooper, J., & Neuhaus, I. M. (2000). The “Hired Gun” Effect: Assessing The Effect of Pay, Frequency of Testifying, and Credentials on the Perception of Expert Testimony. *Law & Human Behavior*, 24(2), 149.
- Cooperstein, R. (2008). Vaccination Is Both Beyond and Consistent with Chiropractic Philosophy! *Journal of the American Chiropractic Association*, 45, 27.
- Corwin, E. S. (1950). The Passing of Dual Federalism. *Virginia Law Review*, 36(1), 1–24.
- Cover, R. M. (1986). Violence and the Word. *Yale Law Journal*, 95(8), 1601–1629.
- Cush, R. K., & Delahunty, J. G. (2006). The Influence of Limiting Instructions on Processing and Judgements of Emotionally Evocative Evidence. *Psychiatry, Psychology and Law*, 13, 110.
- Cutler, B. L., Penrod, S. D., & Dexter, H. R. (1989). The Eyewitness, the Expert Psychologist, and the Jury. *Law and Human Behavior*, 13(3), 311–332.
- Dahir, V. B., Richardson, J. T., Ginsburg, G. P., Gatowski, S. I., Dobbin, S. A., & Merlino, M. L. (2005). Judicial Application of Daubert to Psychological Syndrome and Profile Evidence: A Research Note. *Psychology, Public Policy & Law*, 11(1), 62.
- Dales, L., Hammer, S. J., & Smith, N. J. (2001). Time Trends in Autism and in MMR Immunization Coverage in California. *Journal of the American Medical Association*, 285(9), 1183–1185.
- Daniels, N. (1979). Wide Reflective Equilibrium and Theory Acceptance in Ethics. *The Journal of Philosophy*, 76(5), 256–282.
- Davies, P., Chapman, S., & Leask, J. (2002). Antivaccination Activists on the World Wide Web. *Archives of Disease in Childhood*, 87(1), 22.
- Davis, K. C. (1969). Hearsay in Nonjury Cases Comment. *Harvard Law Review*, 83, 1362–1368.
- Dawkins, R. (1989). *The Selfish Gene*. New York: Oxford University Press.
- Devlin, P. (1982). Equity, Due Process and the Seventh Amendment: A Commentary on the Zenith Case. *Michigan Law Review*, 81, 1571.
- Diamantis, M. E. (2016). Corporate Criminal Minds. *Notre Dame Law Review*, 91, 2049.
- Dillon, J. R. (2007). Doubting Demaree: The Application of Ex Post Facto Principles to the United States Sentencing Guidelines after United States v. Booker. *West Virginia Law Review*, 110, 1033.
- Dixon, L., & Gill, B. (2001). *Changes in the Standards for Admitting Expert Evidence in Federal Civil Cases Since The Daubert Decision*.
- Dobbin, S. A., Gatowski, S. I., Eyre, R. J., Dahir, V. B., Merlino, M. L., & Richardson, J. T. (2007). Federal and State Trial Judges on the Proffer and Presentation of Expert Evidence. *The Justice System Journal*, 28(1), 1.
- Domitrovich, S., Merlino, M. L., & Richardson, J. T. (2010). State Trial Judge Use Of Court Appointed Experts: Survey Results And Comparisons. *Jurimetrics*, 50, 371.
- Dover, T. E. (1979). An Evaluation of Immunization Regulations in Light of Religious Objections and the Developing Right of Privacy. *University of Dayton Law Review*, 4(2),

- 401.
- Dreyfuss, R. C. (1989). The Federal Circuit: A Case Study in Specialized Courts. *New York University Law Review*, 64, 1.
- Dryden, J. (1865). *The Poetical Works of John Dryden*. London: Bell and Daldy.
- Dunning, D. (2011). The Dunning Kruger Effect: On Being Ignorant of One's Own Ignorance. In *Advances in Experimental Social Psychology* (James M. Olson and Mark P. Zanna, p. 247).
- Dworkin, R. (2003). Rawls and the Law. *Fordham Law Review*, 72, 1387–1406.
- Edmond, G., & Vuille, J. (2014). Comparing The Use Of Forensic Science Evidence In Australia, Switzerland, And The United States: Transcending The Adversarial-Nonadversarial Dichotomy. *Jurimetrics*, 54, 221.
- Edwards, H. T. (2003). The Effects of Collegiality on Judicial Decision Making. *University of Pennsylvania Law Review*, 151(5), 1639.
- Edwards, H. T., & Livermore, M. A. (2009). Pitfalls of Empirical Studies That Attempt to Understand the Factors Affecting Appellate Decisionmaking. *Duke Law Journal*, 58(8), 1895.
- Eisenberg, T. (1994). Differing Perceptions of Attorney Fees in Bankruptcy Cases. *Washington University Law Quarterly*, 72, 979.
- Englich, B., & Mussweiler, T. (2001). Sentencing Under Uncertainty: Anchoring Effects in the Courtroom. *Journal of Applied Social Psychology*, 31, 1535.
- Epley, N., & Dunning, D. (2000). Feeling “Holier than Thou”: Are Self-Serving Assessments Produced by Errors in Self- or Social Prediction? *Journal of Personality & Social Psychology*, 79(6), 861.
- Epstein, S. (1994). The Construction of Lay Expertise: AIDS Activism and the Forging of Credibility in the Reform of Clinical Trials. *Science, Technology & Human Values*, 20(4), 408.
- Ericsson, A., & Pool, R. (2016). *Peak: Secrets from the New Science of Expertise*. New York: Eamon Dolan/Mariner Books.
- Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The Role of Deliberate Practice in the Acquisition of Expert Performance. *Psychology Review*, 100(3), 363.
- Etienne, M. (2010). Sentencing Women: Reassessing the Claims of Disparity. *Journal of Gender, Race & Justice*, 14, 73.
- Faigman, D. L. (2005). *Modern Scientific Evidence: The Law and Science of Expert Testimony*. Eagan, MN: Thomson/West.
- Faigman, D. L. (2008). Anecdotal Forensics, Phrenology, and Other Abject Lessons from the History of Science. *Hastings Law Journal*, 59, 979.
- Faigman, D. L., & Baglioni, Jr., A. J. (1988). Bayes' Theorem in the Trial Process: Instructing Jurors on the Value of Statistical Evidence. *Law & Human Behavior*, 12(1), 1.
- Faigman, D. L., & Imwinkelried, E. J. (2012). Wading into the Daubert Tide: Sargon Enterprises, Inc. v. University of Southern California. *Hastings Law Journal*, 64, 1665–1696.
- Faigman, D. L., & Lesikar, C. (2014). Organized Common Sense: Some Lessons from Judge Jack Weinstein's Uncommonly Sensible Approach to Expert Evidence. *DePaul Law Review*, 64, 421.
- Faigman, D. L., & Monahan, J. (2005). Psychological Evidence at the Dawn of the Law's Scientific Age. *Annual Review of Psychology*, 56(1), 631.

- Faigman, D. L., Slobogin, C., & Monahan, J. (2016). Gatekeeping Science: Using the Structure of Scientific Research to Distinguish between Admissibility and Weight in Expert Testimony. *Northwestern University Law Review*, 110, 859.
- Federal Judicial Center. (1989). *Court-Appointed Experts: Defining the Role of Experts Appointed Under Federal Rule of Evidence 706*.
- Fehrenbacher, D. E. (1978). *The Dred Scott Case: Its Significance in American Law and Politics*. Oxford University Press.
- Fenner, G. M. (2000). The Forced Use of Inadmissible Hearsay Evidence in Bankruptcy Court Development. *American Bankruptcy Institute Law Review*, 8, 453–478.
- Feyerabend, P. (2010). *Against Method* (4th ed.). London ; New York: Verso.
- Fienberg, S. E. (Ed.). (1989). *The Evolving Role of Statistical Assessments as Evidence in the Courts*. New York, NY: Springer New York.
- Fisher, J. (2015). *Silicone On Trial: Breast Implants and the Politics of Risk*. Sager Group, The.
- Fisher, M. A. (2001). Going for the Blue Ribbon: The Legality of Expert Juries in Patent Litigation. *Columbia Science & Technology Law Review*, 2, 1.
- Flores, D. M., Richardson, J. T., & Merlino, M. L. (2009). Examining The Effects of the Daubert Trilogy on Expert Evidence Practices in Federal Civil Court: An Empirical Analysis. *South Illinois University Law Journal*, 34, 533.
- Foucault, M. (2016). *Abnormal: Lectures at the College de France, 1974-1975*. London: Verso.
- Fowler, W. (1942a). Principal Provisions of Smallpox Vaccination Laws and Regulations in the United States. *Public Health Reports*, 56, 325.
- Fowler, W. (1942b). State Diphtheria Immunization Requirements. *Public Health Reports*, 57, 325.
- Freed, G. L., Clark, S. J., Butchart, A. T., Singer, D. C., & Davis, M. M. (2010). Parental Vaccine Safety Concerns in 2009. *Pediatrics*, 2009-1962.
- Freedman, D., Pisani, R., & Purves, R. (2007). *Statistics* (4th ed.). New York: W. W. Norton & Company.
- Froeb, L. M., & Kobayashi, B. H. (1996). Naive, Biased, yet Bayesian: Can Juries Interpret Selectively Produced Evidence. *Journal of Law, Economics and Organization*, 12, 257.
- Fulginiti, V. A. (1982). Informed Consent in Immunization Practice. In V. A. Fulginiti (Ed.), *Immunization in Clinical Practice: A Useful Guideline to Vaccines, Sera, and Immune Globulins in Clinical Practice*. Philadelphia: Lippincott.
- Furgeson, J. R., Babcock, L., & Shane, P. M. (2008). Do a Law's Policy Implications Affect Beliefs About Its Constitutionality? An Experimental Test. *Law & Human Behavior*, 32(3), 219.
- Gatowski, S. I., Dobbin, S. A., Richardson, J. T., Ginsburg, G. P., Merlino, M. L., & Dahir, V. (2001). Asking the Gatekeepers: A National Survey of Judges on Judging Expert Evidence in a Post-Daubert World. *Law & Human Behavior*, 25(5), 433.
- Gelb, D. K. (2014). The Court as Gatekeeper: Preventing Unreliable Pretrial eDiscovery from Jeopardizing a Reliable Fact-Finding Process The Philip D. Reed Lecture Series: Advisory Committee on Evidence Rules. *Fordham Law Review*, 83, 1287–1298.
- Gertner, N. (2006). What Yogi Berra Teaches About Post-Booker Sentencing. *Yale L.J. Pocket Part*, 115, 137.
- Giannelli, P. C. (1980). The Admissibility of Novel Scientific Evidence: Frye v. United States, a Half-Century Later. *Columbia Law Review*, 80, 1197–1250.
- Giannelli, P. C. (1993). Daubert: Interpreting the Federal Rules of Evidence Scientific Evidence

- after the Death of Frye. *Cardozo Law Review*, 15, 1999.
- Gilbert, M. (1987). Modelling Collective Belief. *Synthese*, 73(1), 185.
- Gilbert, M. (1989). *On Social Facts*. New York: Routledge.
- Giner-Sorolla, R., & Chaiken, S. (1997). Selective Use of Heuristic and Systematic Processing Under Defense Motivation. *Personality and Social Psychology Bulletin*, 23(1), 84–97.
- Glanz, J. M., Newcomer, S. R., Narwaney, K. J., Hambidge, S. J., Daley, M. F., Wagner, N. M., ... Weintraub, E. S. (2013). A Population-Based Cohort Study of Undervaccination in 8 Managed Care Organizations Across the United States. *JAMA Pediatrics*, 167(3), 274.
- Gobet, F. (2016). *Understanding Expertise: A Multi-Disciplinary Approach*. London ; New York, NY: Palgrave Macmillan.
- Godlee, F., Smith, J., & Marcovitch, H. (2011). Wakefield's Article Linking MMR Vaccine and Autism was Fraudulent. *British Medical Journal*, 342(jan05 1), c7452–c7452.
- Golan, T. (2004). *Laws of Men and Laws of Nature: The History of Scientific Expert Testimony in England and America*. Cambridge, Mass.; London: Harvard University Press.
- Goldman, A. (2012). A Guide to Social Epistemology. In A. Goldman (Ed.), *Reliabilism and Contemporary Epistemology*. New York: Oxford University Press.
- Goldman, A. I. (1999). *Knowledge in a Social World*. Oxford: Oxford University Press.
- Goldman, A. I. (2001). Experts: Which Ones Should You Trust? *Philosophy and Phenomenological Research*, 63(1), 85.
- Goldman, A. I. (2004). Group Knowledge Versus Group Rationality: Two Approaches to Social Epistemology. *Episteme*, 1(1), 11.
- Goldsmith, L. M., & Dillon, J. R. (2015). The Hallowed Hope: The School Prayer Cases and Social Change. *St. Louis U. L.J.*, 59, 409.
- Gostin, L. O. (2008). *Public Health Law: Power, Duty, Restraint* (2d ed.). Berkeley : New York.
- Gottesman, M. H. (1998). From Barefoot to Daubert to Joiner: Triple Play or Double Error? *Arizona Law Review*, 40, 753.
- Gould, S. J. (2002). *Rocks of Ages: Science and Religion in the Fullness of Life*. Cambridge: Ballantine Books.
- Graber, M. A. (2006). *Dred Scott and the Problem of Constitutional Evil*. Cambridge University Press.
- Greening, L., & Chandler, C. C. (1997). Why It Can't Happen to Me: The Base Rate Matters, But Overestimating Skill Leads to Underestimating Risk. *Journal of Applied Social Psychology*, 27(9), 760.
- Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring Individual Differences in Implicit Cognition: The Implicit Association Test. *Personality & Social Psychology*, 74(6), 1464.
- Greenwald, A., & Krieger, L. H. (2006). Implicit Bias: Scientific Foundations. *California Law Review*, 94(945).
- Groscup, J. L., Penrod, S. D., Studebaker, C. A., Huss, M. T., & O'Neil, K. M. (2002). The Effects of Daubert on the Admissibility of Expert Testimony in State and Federal Criminal Cases. *Psychology, Public Policy & Law*, 8(4), 339.
- Gross, S. R. (1991). Expert Evidence. *Wisconsin Law Review*, 1991, 1113.
- Gust, D. A., Strine, T. W., Maurice, E., Smith, P., Yusuf, H., Wilkinson, M., ... Schwartz, B. (2004). Underimmunization Among Children: Effects of Vaccine Safety Concerns on Immunization Status. *Pediatrics*, 114(1), e16–e22.
- Guthrie, C., Rachlinski, J. J., & Wistrich, A. J. (2001). Inside the Judicial Mind. *Cornell Law*

- Review*, 86, 777.
- Guthrie, C., Rachlinski, J. J., & Wistrich, A. J. (2002). Judging by Heuristic - Cognitive Illusions in Judicial Decision Making. *Judicature*, 86, 44–50.
- Guthrie, C., Rachlinski, J. J., & Wistrich, A. J. (2007). Blinking on the Bench: How Judges Decide Cases. *Cornell Law Review*, 93, 1.
- Guthrie, C., Rachlinski, J. J., & Wistrich, A. J. (2008). The Hidden Judiciary: An Empirical Examination of Executive Branch Justice Special Symposium Issue Measuring Judges and Justice. *Duke Law Journal*, 58, 1477–1530.
- Haack, S. (2001). An Epistemologist in the Bramble-Bush: At the Supreme Court with Mr. Joiner. *Journal of Health Politics, Policy and Law*, 26(2), 217–248.
- Hahn, U., & Oaksford, M. (2007). The Rationality of Informal Argumentation: A Bayesian Approach to Reasoning Fallacies. *Psychology Review*, 114(3), 704.
- Hall, M. E. K. (2011). *The Nature of Supreme Court Power*. New York: Cambridge University Press.
- Hambrick, D. Z., Oswald, F. L., Altmann, E. M., Meinz, E. J., Gobet, F., & Campitelli, G. (2014). Deliberate Practice: Is That All It Takes to Become an Expert? *Intelligence*, 45,
- Hand, L. (1901). Historical and Practical Considerations Regarding Expert Testimony. *Harvard Law Review*, 15, 40.
- Hans, V. P. (2007). Judges, Juries, and Scientific Evidence. *Journal of Law and Policy*, 16, 19–46.
- Hanson, J. D., & Kysar, D. A. (1999). Taking Behavioralism Seriously: The Problem of Market Manipulation. *New York University Law Review*, 74, 630.
- Hardwig, J. (1985). Epistemic Dependence. *Philosophy*, 82, 335.
- Hartz, L. (1955). *The Liberal Tradition in America; an Interpretation of American Political Thought Since the Revolution*. Harcourt, Brace.
- Hastorf, A. H., & Cantril, H. (1954). They Saw a Game: A Case Study. *The Journal of Abnormal and Social Psychology*, 49(1), 129.
- Hawkins, S. A., & Hastie, R. (1990). Hindsight: Biased Judgments of Past Events After the Outcomes are Known. *Psychological Bulletin*, 107, 311.
- Hempel, C. G. (1965). *Aspects Of Scientific Explanation, and Other Essays in The Philosophy Of Science*. New York: Free Press.
- Hertz-Picciotto, I., & Delwiche, L. (2009). The Rise in Autism and the Role of Age at Diagnosis. *Epidemiology*, 20, 84.
- Heuer, L., & Penrod, S. (1994). Trial Complexity: A Field Investigation of Its Meaning and Its Effects. *Law and Human Behavior*, 18(1), 29.
- Hodge, J. G. J., & Gostin, L. O. (2001). School Vaccination Requirements: Historical, Social, and Legal Perspectives. *Kentucky Law Journal*, 90, 831.
- Holland, M. (2012). Compulsory Vaccination, the Constitution, and the Hepatitis B Mandate for Infants and Young Children. *Yale Journal of Health Policy, Law, and Ethics*, 12, 39.
- Holmes, O. W. (1881). *The Common Law*. New York: Dover Publications.
- Hooper, L. L., Cecil, J. S., & Willging, T. E. (2001). Assessing Causation in Breast Implant Litigation: The Role of Science Panels Causation in Law and Science. *Law & Contemporary Problems*, 64, 139.
- Hopkins, D. R. (1983). *Princes and Peasants: Smallpox in History*. Chicago: University of Chicago Press.
- Horowitz, I. A., Victor, E., Bordens, K. S., & Boureois, M. J. (2001). The Effects of Complexity

- on Jurors' Verdicts and Construction of Evidence. *Journal of Applied Psychology*, 86(4), 641.
- Horton, R. (1995). Myths in Medicine. Jenner Did Not Discover Vaccination. *British Medical Journal*, 310(6971), 62.
- Hosch, H. M. (1980). A Comparison of Three Studies of the Influence of Expert Testimony on Jurors. *Law & Human Behavior*, 4(4), 297.
- Huber, P. W. (1993). *Galileo's Revenge: Junk Science in the Courtroom*. New York: Basic Books.
- Hume, D. (2000). *A Treatise of Human Nature*. (D. F. Norton & M. J. Norton, Eds.). Oxford; New York: Oxford University Press.
- Hume, D. (2008). *An Enquiry Concerning Human Understanding*. (P. Millican, Ed.). Oxford; New York.
- Hutchins, E. (1995). *Cognition in the Wild*. Cambridge, Mass: MIT Press.
- Intergovernmental Panel on Climate Change. (2007). *Climate Change 2007: Synthesis Report*. Retrieved from http://www.ipcc.ch/publications_and_data/ar4/syr/en/main.html.
- Jacobson, R. M., Targonski, P. V., & Poland, G. A. (2007). A Taxonomy of Reasoning Flaws in the Anti-Vaccine Movement. *Vaccine*, 25(16), 3146.
- Jasanoff, S. (1993). What Judges Should Know About the Sociology of Science. *Judicature*, 77, 77.
- Jasanoff, S. (1997). *Science at the Bar: Law, Science, and Technology in America*. Cambridge, Mass.: Harvard University Press.
- Jefferson, T. (1801). *Notes on the State of Virginia* (8th ed.). Boston, Walpole, N.H: David Carlisle.
- Jenner, E. (1798). *An Inquiry into the Causes and Effects of the Variolae Vaccinae*. London: Dawsons.
- Jervis, R. (2006). Understanding Beliefs. *Pol. Psychol.*, 27(5), 641.
- Jurs, A., & DeVito, S. (2012). The Stricter Standard: An Empirical Assessment of Daubert's Effect on Civil Defendants. *Catholic University Law Review*, 62, 675.
- Jurs, A. W. (2012). Questions from the Bench and Independent Experts: A Study of the Practices of State Court Judges. *University of Pittsburgh Law Review*, 74, 47.
- Kahan, D. M. (2007). The Cognitively Illiberal State. *Stanford Law Review*, 60, 115.
- Kahan, D. M. (2013). Ideology, Motivated Reasoning, and Cognitive Reflection. *Judgment & Decision Making*, 8, 407.
- Kahan, D. M., Braman, D., Gastil, J., Slovic, P., & Mertz, C. K. (2007). Culture and Identity-Protective Cognition: Explaining the White-Male Effect in Risk Perception. *J. Empirical Legal Stud.*, 4(3), 465.
- Kahan, D. M., Braman, D., Slovic, P., Gastil, J., & Cohen, G. L. (2007). *The Second National Risk and Culture Study: Making Sense of - and Making Progress In - The American Culture War of Fact* (SSRN Scholarly Paper No. ID 1017189). Rochester, NY: Social Science Research Network. Retrieved from <http://papers.ssrn.com/abstract=1017189>.
- Kahan, D. M., Hoffman, D. A., & Braman, D. (2008). Whose Eyes are You Going to Believe - Scott v. Harris and the Perils of Cognitive Illiberalism. *Harvard Law Review*, 122, 837.
- Kahan, D. M., Hoffman, D. A., Braman, D., & Evans, D. (2012). They Saw a Protest: Cognitive Illiberalism and the Speech-Conduct Distinction. *Stanford Law Review*, 64, 851.
- Kahan, D. M., Jenkins-Smith, H., & Braman, D. (2011). Cultural Cognition of Scientific Consensus. *J. Risk Res.*, 14(2), 147.

- Kahan, D. M., Peters, E., Dawson, E. C., & Slovic, P. (2017). Motivated Numeracy and Enlightened Self-Government. *Behavioural Public Policy*, 1(1), 54–86.
- Kahan, D. M., Peters, E., Wittlin, M., Slovic, P., Ouellette, L. L., Braman, D., & Mandel, G. (2012). The Polarizing Impact of Science Literacy and Numeracy on Perceived Climate Change Risks. *Nature Climate Change*, 2(10), 732.
- Kahneman, D. (2011). *Thinking, Fast and Slow*. New York.
- Kahneman, D., Slovic, P., & Tversky, A. (1982). *Judgment Under Uncertainty: Heuristics and Biases*. Cambridge University Press.
- Kahneman, D., & Tversky, A. (1972). Subjective Probability: A Judgment of Representativeness. *Cognitive Psych.*, 3(3), 430.
- Kahneman, D., & Tversky, A. (1973). On the Psychology of Prediction. *Psych. Rev.*, 80, 237.
- Kang, J., Bennett, M., Carbado, D., & Casey, P. (2011). Implicit Bias in the Courtroom. *UCLA Law Review*, 59, 1124.
- Kang, J., & Lane, K. (2010). Seeing Through Colorblindness: Implicit Bias and the Law. *UCLA Law Review*, 59, 1124.
- Kantrowitz, A. (1967). Proposal for an Institution for Scientific Judgment. *Science*, 156, 763.
- Kantrowitz, A. (1977). The Science Court Experiment: Criticisms and Responses. *Bulletin of Atomic Scientists*, 33, 44.
- Kapsa, M. M., & Meyer, C. B. (1999). Scientific Experts: Making Their Testimony More Reliable. *California Western Law Review*, 35, 313.
- Kaptchuk, T. J. (2001). The Double-Blind, Randomized, Placebo-Controlled Trial: Gold Standard or Golden Calf? *Clinical Epidemiology*, 54(6), 541.
- Kata, A. (2010). A Postmodern Pandora's Box: Anti-Vaccination Misinformation On The Internet. *Vaccine*, 28, 1709.
- Kaufman, M. (1967). The American Anti-Vaccinationists and Their Arguments. *Bulletin of the History of Medicine*, 41(5), 463.
- Kaye, D. H., Hans, V. P., Dann, B. M., Farley, E., & Albertson, S. (2007). Statistics in the Jury Box: How Jurors Respond to Mitochondrial DNA Match Probabilities. *Journal of Empirical Legal Studies*, 4(4), 797.
- Keelan, J., Pavri-Garcia, V., Tomlinson, G., & Wilson, K. (2007). YouTube as a Source of Information on Immunization: A Content Analysis. *JAMA*, 298(21), 2482–2484.
- Keeton, R. (1988). Legislative Facts and Similar Things: Deciding Disputed Premise Facts. 73 *Minnesota Law Review*, 73, 1.
- Keltner, D. (2016, October 1). Avoiding the Behaviors That Turn Nice Employees into Mean Bosses. Retrieved April 11, 2018, from <https://hbr.org/2016/10/dont-let-power-corrupt-you>
- Keltner, D., Gruenfeld, D. H., & Anderson, C. (2003). Power, Approach, and Inhibition. *Psychology Review*, 110(2), 265.
- Kennedy, A., LaVail, K., Nowak, G., Basket, M., & Landry, S. (2011). Confidence About Vaccines In The United States: Understanding Parents' Perceptions. *Health Affairs*, 30(6), 1151–1159.
- Kesan, J. P., & Ball, G. G. (2010). Judicial Experience and the Efficiency and Accuracy of Patent Adjudication: An Empirical Analysis of the Case for a Specialized Patent Trial Court. *Harvard Journal of Law & Technology*, 24, 393.
- Kip Viscusi, W. (1999). How Do Judges Think About Risk? *American Law & Economics Review*, 1(1), 26.

- Klarman, M. J. (2006). *From Jim Crow to Civil Rights: The Supreme Court and the Struggle for Racial Equality*. New York; Oxford: Oxford University Press.
- Klein, M. S. (1990). Expert Testimony in Pharmaceutical Product Liability Actions. *Food, Drug, Cosmetic Law Journal*, 45, 393–442.
- Koehler, J. J. (1993). The Influence of Prior Beliefs on Scientific Judgments of Evidence Quality. *Organizational Behavior & Human Decision Making Processes*, 56(1), 28.
- Koehler, J. J., Chia, A., & Lindsey, S. (1995). The Random Match Probability in DNA Evidence: Irrelevant And Prejudicial? *Jurimetrics*, 35(2), 201.
- Korobkin, R., & Guthrie, C. (1997). Psychology, Economics, and Settlement: A New Look at the Role of the Lawyer. *Texas Law Review*, 76, 77.
- Korsgaard, C. M. (2012). *Kant: Groundwork of the Metaphysics of Morals*. (M. Gregor & J. Timmermann, Eds.) (2nd ed.). Cambridge: Cambridge University Press.
- Kovera, M. B., Gresham, A. W., Borgida, E., Gray, E., & Regan, P. C. (1997). Does Expert Psychological Testimony Inform or Influence Juror Decision Making? A Social Cognitive Analysis. *Journal of Applied Psychology*, 82(1), 178.
- Kovera, M. B., & McAuliff, B. D. (2000). The Effects of Peer Review and Evidence Quality on Judge Evaluations of Psychological Science: Are Judges Effective Gatekeepers? *Journal of Applied Psychology*, 85(4), 574.
- Kovera, M. B., McAuliff, B. D., & Hebert, K. S. (1999). Reasoning about Scientific Evidence: Effects of Juror Gender and Evidence Quality on Juror Decisions in a Hostile Work Environment Case. *Journal of Applied Psychology*, 84(3), 362.
- Krafka, C., Dunn, M. A., Treadway Johnson, M., Cecil, J. S., & Miletich, D. (2002). Judge and Attorney Experiences, Practices, and Concerns Regarding Expert Testimony in Federal Civil Trials. *Psychology, Public Policy & Law*, 8, 309.
- Kramer, L. D. (2000). Putting the Politics Back into the Political Safeguards of Federalism. *Columbia Law Review*, 100(1), 215–293.
- Kraus, J. S. (1999). Political Liberalism and Truth. *Legal Theory*, 5(1), 45–73.
- Krauss, D. A., & Sales, B. D. (2001). The Effects of Clinical and Scientific Expert Testimony on Juror Decision Making in Capital Sentencing. *Psychology, Public Policy & Law*, 7(2), 267.
- Kruger, J., & Dunning, D. (1999). Unskilled and Unaware of It: How Difficulties in Recognizing One's Own Incompetence Lead to Inflated Self-Assessments. *Personality & Social Psychology*, 77(6), 1121.
- Kuhn, T. (1962). *The Structure of Scientific Revolutions*.
- Kunda, Z. (1990). The Case for Motivated Reasoning. *Psych. Bull.*, 108, 480.
- Kunin, C. C., Ebbesen, E. B., & Konecni, V. J. (1992). An Archival Study of Decision-Making in Child Custody Disputes. *Clinical Psychology*, 48, 564.
- Ladd, M. (1952). Expert Testimony. *Vanderbilt Law Review*, 5, 414.
- Landes, W. M., & Posner, R. A. (2009). Rational Judicial Behavior: A Statistical Study. *J. Leg. Analysis*, 1(2), 775.
- Landsman, S., & Rakos, R. F. (1994). A Preliminary Inquiry into the Effect of Potentially Biasing Information on Judges and Jurors in Civil Litigation. *Behavioral Science & Law*, 12, 113.
- Lane, M. (2014). When the Experts Are Uncertain: Scientific Knowledge and the Ethics of Democratic Judgment. *Episteme*, 11(01), 97.
- Largent, E. A., & Snodgrass, R. T. (2012). Blind Peer Review by Academic Journals. In

- Christopher T. Robertson & A. S. Kesselheim (Eds.), *Blinding as a Solution to Bias* (pp. 75–93). Amsterdam; Boston: Elsevier, Academic Press.
- Lash, K. T. (1998). Power and the Subject of Religion. *Ohio State Law Journal*, 59, 1069.
- Latour, B. (2004). Why Has Critique Run out of Steam? From Matters of Fact to Matters of Concern. *Critical Inquiry*, 30, 225.
- Latour, B. (2005). *Reassembling the Social: An Introduction to Actor-Network Theory*. New York: Oxford University Press.
- Lawrence, D. (2012). Anti-Vaccination Attitudes within the Chiropractic Profession: Implications for Public Health Ethics. *Topics in Integrative Health Care*, 3(4), 1.
- Laycock, D. (1995). Continuity and Change in the Threat to Religious Liberty: The Reformation Era and the Late Twentieth Century. *Minnesota Law Review*, 80, 1047.
- Leary, M. R., Diebels, K. J., Davisson, E. K., Jongman-Serenio, K. P., Isherwood, J. C., Raimi, K. T., Hoyle, R. H. (2017). Cognitive and Interpersonal Features of Intellectual Humility. *Personality and Social Psychology Bulletin*, 43(6), 793.
- Leavitt, J. W. (2003). Public Resistance or Cooperation? A Tale of Smallpox in Two Cities. *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science*, 1, 185.
- Lee, A. C. C., & Kemper, K. (2000). Homeopathy and Naturopathy: Practice Characteristics and Pediatric Care. *Archives of Pediatrics & Adolescent Medicine*, 154(1), 75.
- Lee, P. (2010). Patent Law and the Two Cultures. *The Yale Law Journal*, 120(1), 2.
- Lee, T. V. (1988). Court-Appointed Experts And Judicial Reluctance: A Proposal To Amend Rule 706 Of The Federal Rules Of Evidence. *Yale Law & Policy Review*, 6, 480.
- LeFever, L. E. (2005). Religious Exemptions from School Immunization: A Sincere Belief or a Legal Loophole Comment. *Penn State Law Review*, 110, 1047–1068.
- Lehman, D. R., Lempert, R. O., & Nisbett, R. E. (1988). The Effects of Graduate Training on Reasoning: Formal Discipline and Thinking About Everyday-life Events. *American Psychologist*, 43(6), 431.
- Lemley, M. A. (2013). Why Do Juries Decide If Patents Are Valid. *Virginia Law Review*, 99, 1673.
- Lepore, J. (2014). *The Secret History of Wonder Woman*. New York: Alfred A. Knopf.
- Lepore, J. (2015). On Evidence: Proving Frye As A Matter of Law, Science, and History. *Yale Law Journal*, 124, 1092.
- Levett, L. M., & Kovera, M. B. (2008). The Effectiveness of Opposing Expert Witnesses for Educating Jurors about Unreliable Expert Evidence. *Law & Human Behavior*, 32(4), 363.
- Levett, L. M., & Kovera, M. B. (2009). Psychological Mediators of the Effects of Opposing Expert Testimony on Juror Decisions. *Psychology, Public Policy & Law*, 15(2), 124.
- Levin, A. L., & Cohen, H. K. (1971). The Exclusionary Rules in Nonjury Criminal Cases. *University of Pennsylvania Law Review*, 119(6), 905–932.
- Levinson, J. D., Young, D. M., & Rudman, L. A. (2012). Implicit Racial Bias: A Social Science Overview. In J. D. Levinson & R. J. Smith (Eds.), *Implicit Racial Bias Across the Law* (pp. 9–24). New York, NY: Cambridge University Press.
- Lewins, F. W. (1978). Australia: Religion and Ethnic Identity. In H. Mol (Ed.), *Identity and Religion: International, Cross-Cultural Approaches* (p. 19).
- Lewis, T., & Kahn, R. (2005). The Reptoid Hypothesis: Utopian and Dystopian Representational Motifs in David Icke’s Alien Conspiracy Theory. *Utopian Studies*, 16(1), 45–74.
- Lieberman, J. D., & Arndt, J. (2000). Understanding the Limits of Limiting Instructions: Social Psychological Explanations for the Failures of Instructions to Disregard Pretrial Publicity

- and Other Inadmissible Evidence. *Psychology, Public Policy & Law*, 6(3), 677.
- Liu, J., Li, J., Feng, L., Li, L., Tian, J., & Lee, K. (2014). Seeing Jesus in Toast: Neural and Behavioral Correlates of Face Pareidolia. *Cortex*, 53, 60.
- Lodge, M., & Taber, C. S. (2013). *The Rationalizing Voter*. Cambridge ; New York: Cambridge University Press.
- Loeser, Note, C. E. (2014). From Paper Terrorists to Cop Killers: The Sovereign Citizen Threat. *N.C. L. Rev.*, 93, 1106.
- Lord, C. G., Ross, L., & Lepper, M. R. (1979). Biased Assimilation and Attitude Polarization: The Effects of Prior Theories on Subsequently Considered Evidence. *Personality & Social Psychology*, 37(11), 2098.
- MacCoun, R. J. (1998). Biases in the Interpretation and Use of Research Results. *Ann. Rev. Psychol.*, 49(1), 259.
- Mackie, J. L. (1977). *Ethics: Inventing Right and Wrong*. New York: Penguin.
- Majumder, M. S., Cohn EL, Mekaru SR, Huston JE, & Brownstein JS. (2015). Substandard Vaccination Compliance and the 2015 Measles Outbreak. *JAMA Pediatrics*, 169(5), 494.
- Mark, J. T., Marion, B. B., & Hoffman, D. D. (2010). Natural Selection and Veridical Perceptions. *J. Theoretical Bio.*, 266(4), 504.
- Mathiesen, K. (2006). The Epistemic Features of Group Belief. *Episteme*, 2(3), 161.
- McCarthy, J. (2008). *Mother Warriors: A Nation of Parents Healing Autism Against All Odds*. New York: Dutton.
- McCarthy, J., & Kartzinell, J. (2010). *Healing and Preventing Autism: A Complete Guide*. New York: Plume, Penguin.
- McCormack, N. (2009). Peer Review and Legal Publishing: What Law Librarians Need to Know about Open, Single-Blind, and Double-Blind Reviewing. *Law Library Journal*, 101, 59–70.
- Mercer, L., Creighton, S., Holden, J. J. A., & Lewis, M. E. S. (2006). Parental Perspectives on the Causes of an Autism Spectrum Disorder in their Children. *Journal of Genetic Counseling*, 15(1), 41–50.
- Mercier, H., & Sperber, D. (2011). Why Do Humans Reason? Arguments for an Argumentative Theory. *Behavioral & Brain Sci.*, 34(02), 57.
- Merton, R. K. (1973). *The Sociology of Science: Theoretical and Empirical Investigations*. (N. W. Storer, Ed.). Chicago: University of Chicago Press.
- Miller, J. F. (2004). Should Juries Hear Complex Patent Cases? *Duke Law & Technology Review*, 2004, 4.
- Minzner, M. (2007). Detecting Lies Using Demeanor, Bias, and Context. *Cardozo Law Review*, 29, 2557–2582.
- Miron, J. A. (1998). The Constitutionality Of A Complexity Exception To The Seventh Amendment. *Chicago-Kent Law Review*, 73, 865.
- Mnookin, J. L. (2007a). Expert Evidence and the Confrontation Clause after Crawford v. Washington. *Journal of Law and Policy*, 15, 791.
- Mnookin, J. L. (2007b). Idealizing Science and Demonizing Experts: An Intellectual History of Expert Evidence. *Villanova Law Review*, 52, 763.
- Mnookin, J. L. (2008). Expert Evidence, Partisanship, and Epistemic Competence. *Brooklyn Law Review*, 73, 1009.
- Mnookin, J. L. (2009). The Courts, the NAS, and the Future of Forensic Science. *Brooklyn Law Review*, 75, 1209.

- Mnookin, J. L., Cole, S. A., Dror, I. E., & Fisher, B. A. J. (2010). The Need for a Research Culture in the Forensic Sciences. *UCLA Law Review* 58, 725.
- Mnookin, R. H., & Kornhauser, L. (1979). Bargaining in the Shadow of the Law: The Case of Divorce. *Yale Law Journal*, 88, 950.
- Mnookin, S. (2011). *The Panic Virus: A True Story of Medicine, Science, and Fear*. New York: Simon & Schuster.
- Monahan, J., & Walker, L. (1986). Social Authority: Obtaining, Evaluating, and Establishing Social Science in Law. *Pennsylvania. Law Review*, 134(3), 477.
- Moore, K. A. (2000). Judges, Juries, and Patent Cases: An Empirical Peek inside the Black Box. *Michigan Law Review*, 99(2), 365.
- Moore, K. A. (2001). Are District Court Judges Equipped to Resolve Patent Cases. *Harvard Journal of Law & Technology*, 15, 1.
- Moore, K. A. (2005). Markman Eight Years Later: Is Claim Construction More Predictable. *Lewis & Clark Law Review*, 9, 231.
- Murch, S. H., Anthony, A., Casson, D. H., Malik, M., Berelowitz, M., Dhillon, A. P., Walker-Smith, J. A. (2004). Retraction of an Interpretation. *The Lancet*, 9411(363), 750.
- Myers, R. D., Reinstein, R. S., & Griller, G. M. (1999). Complex Scientific Evidence and the Jury. *Judicature*, 83, 150.
- Na‘īm, ‘Abd Allāh Aḥmad. (1990). *Toward an Islamic Reformation: Civil Liberties, Human Rights, and International Law*. Syracuse, N.Y.: Syracuse University Press.
- Nickerson, R. S. (1998). Confirmation Bias: A Ubiquitous Phenomenon in Many Guises. *Rev. of Gen. Psychol.*, 2(2), 220.
- Nielsen, K. (1988). In Defense of Wide Reflective Equilibrium. In D. Odegard (Ed.), *Ethics and Justification*. Edmonton: Academic Printing.
- Nyhan, B., & Reifler, J. (2015). Does Correcting Myths about the Flu Vaccine Work? An Experimental Evaluation of the Effects of Corrective Information. *Vaccine*, 33(3), 459–464.
- O’Connor, S. (1995). The Supreme Court’s Philosophy of Science: Will the Real Karl Popper Please Stand Up? *Jurimetrics*, 35(3), 263–276.
- Offit, P. A. (2010). *Autism’s False Prophets: Bad Science, Risky Medicine, and the Search for a Cure*. New York: Columbia University Press.
- Omer, S. B., Pan WY, Halsey NA, & et al. (2006). Nonmedical Exemptions to School Immunization Requirements: Secular Trends and Association of State Policies with Pertussis Incidence. *Journal of the American Medical Association*, 296(14), 1757.
- Omer, S. B., Richards, J. L., Ward, M., & Bednarczyk, R. A. (2012). Vaccination Policies and Rates of Exemption from Immunization, 2005–2011. *New England Journal of Medicine*, 367(12), 1170.
- O’Neill, W. R. (2006). Modernity and Its Religious Discontents: Catholic Social Teaching and Public Reason. *Notre Dame Journal of Law, Ethics & Public Policy*, 20, 295.
- Oswald, F. L., Mitchell, G., Blanton, H., Jaccard, J., & Tetlock, P. E. (2013). Predicting Ethnic and Racial Discrimination: A Meta-Analysis of IAT Criterion Studies. *Personality & Social Psychology*, 105(2), 171.
- Ovid, 43 B. C.-17 A. D. or 18 A. D. (1958). *The Metamorphoses*. New York: Viking Press.
- Owen, D., & Davidson, J. (2009). Hubris Syndrome: An Acquired Personality Disorder? *Brain*, 132(5), 1396.
- Paradise, J.-E. (1998). The Disparity between Men and Women in Custody Disputes: Is Joint

- Custody the Answer to Everyone's Problems. *St. John's Law Review*, 72, 517.
- Parrini, P., Salmon, W. C., & Salmon, M. H. (Eds.). (2003). *Logical Empiricism: Historical & Contemporary Perspectives*. Pittsburgh: University of Pittsburgh Press.
- Pettit, P. (2010). Groups with Minds of Their Own. In *Social Epistemology: Essential Readings* (Alvin I. Goldman, p. 242).
- Phadke, V. K., Bednarczyk, R. A., Salmon, D. A., & Omer, S. B. (2016). Association Between Vaccine Refusal and Vaccine-Preventable Diseases in the United States: A Review of Measles and Pertussis. *Journal of the American Medical Association*, 315(11), 1149.
- Pirsch, P. A. (2012). Blind Trusts as a Model for Campaign Finance Reform. *William & Mary Policy Review*, 4, 212.
- Plous, S. (1993). *The Psychology of Judgment and Decision Making*. New York.
- Popper, K. (1959). *The Logic of Scientific Discovery*.
- Posner, R. A. (1999). The Law and Economics of the Economic Expert Witness. *Journal of Economic Perspectives*, 13(2), 91.
- Posner, R. A. (2008). *How Judges Think*. Cambridge, MA: Harvard University Press.
- Possolo, M. (2013). Morals Legislation after Lawrence: Can States Criminalize the Sale of Sexual Devices Note. *Stanford Law Review*, 65, 565–598.
- Pound, R. (1910). Law in Books and Law in Action. *American Law Review*, 44, 36.
- Pound, R. (1956). The Causes of Popular Dissatisfaction with the Administration of Justice. *Baylor Law Review*, 8, 1–25.
- Quinton, A. (1975). Social Objects. *Proceedings of the Aristotelian Society*, 76, 1.
- Rachlinski, J. J., Guthrie, C., & Wistrich, A. J. (2011). Probable Cause, Probability, and Hindsight Judgment by the Numbers: Converting Qualitative to Quantitative Judgments in Law. *Journal of Empirical Legal Studies*, 8, 72.
- Rachlinski, J. J., Johnson, S. L., Wistrich, A. J., & Guthrie, C. (2008). Does Unconscious Racial Bias Affect Trial Judges. *Notre Dame Law Review*, 84, 1195.
- Rachlinski, J. J., Wistrich, A. J., & Guthrie, C. (2012). Altering Attention in Adjudication. *UCLA Law Review*, 60, 1586.
- Rachlinski, J. J., Wistrich, A. J., & Guthrie, C. (2015). Can Judges Make Reliable Numeric Judgments: Distorted Damages and Skewed Sentences. *Indiana Law Journal*, 90, 695.
- Rachlinski, J., & Wistrich, A. (2017). Judging the Judiciary by the Numbers: Empirical Research on Judges. *Annual Review of Law and Social Science*, 13.
- Rai, A. K. (2002). Specialized Trial Courts: Concentrating Expertise on Fact. *Berkeley Technology Law Journal*, 17(2), 877.
- Rawls, J. (1993). *Political Liberalism*. New York: Columbia University Press.
- Rawls, J. (1999). *A Theory of Justice* (rev'd). Cambridge, Mass: Belknap Press of Harvard University Press.
- Rawls, J. (2001a). *Justice as Fairness: A Restatement*. (E. Kelly, Ed.). Cambridge, Mass.
- Rawls, J. (2001b). The Idea of Public Reason Revisited. In S. Freeman (Ed.), *John Rawls: Collected Papers* (p. 573).
- Raz, J. (2008). The Claims of Reflective Equilibrium. *Inquiry*, 25, 307.
- Redding, R. E., & Reppucci, N. D. (1999). Effects of Lawyers' Socio-Political Attitudes on Their Judgments of Social Science in Legal Decision Making. *Law & Human Behavior*, 23(1), 31.
- Reiber, M. A., & Weinberg, J. D. (2009). The Complexity of Complexity: An Empirical Study of Juror Competence in Civil Cases. *University of Cincinnati Law Review*, 78, 929.

- Reich, J. A. (2014). Neoliberal Mothering and Vaccine Refusal: Imagined Gated Communities and the Privilege of Choice. *Gender and Society*, 20, 1.
- Rich, G. (1980). *A Brief History of the United States Court of Customs and Patent Appeals*. Washington, D.C. :
- Robertson, Christopher T., & Kesselheim, A. S. (2016). *Blinding as a Solution to Bias : Strengthening Biomedical Science, Forensic Science, and Law*. Amsterdam; Boston: Elsevier, Academic Press.
- Robertson, Christopher T., & Yokum, D. V. (2012). The Effect of Blinded Experts on Juror Verdicts. *Journal of Empirical Legal Studies*, 9, 765–794.
- Robertson, Christopher Tarver. (2010). Blind Expertise. *New York University Law Review*, 85, 174.
- Rorty, R. (1988). The Priority of Democracy to Philosophy. In M. D. Peterson & R. C. Vaughan (Eds.), *The Virginia Statute for Religious Freedom: Its Evolution and Consequences in American History*. New York: Cambridge University Press.
- Rosenberg, G. N. (2008). *The Hollow Hope: Can Courts Bring about Social Change?* (2d ed.). Chicago: University of Chicago Press.
- Rosenkranz, N. Q. (2006). Condorcet and the Constitution: A Response to the Law of Other States. *Stanford Law Review*, 59, 1281–1308.
- Roth, A. (2010). Safety in Numbers - Deciding When DNA Alone is Enough to Convict. *New York University Law Review*, 85, 1130.
- Rousseau, J.-J. (1968). *The Social Contract*. (M. Cranston, Trans.). Harmondsworth, Eng: Penguin.
- Rubinfeld, D. L. (1985). Econometrics in the Courtroom. *Columbia Law Review*, 85, 1048.
- Russell, M. L., Injeyan, H. S., Verhoef, M. J., & Eliasziw, M. (2004). Beliefs and Behaviours: Understanding Chiropractors and Immunization. *Vaccine*, 23(3), 372.
- Rutledge, P. (1985). *The Role of Religion in Ethnic Self-Identity: A Vietnamese Community*. Lanham: University Press of America.
- Sagan, C. (1997). *The Demon-Haunted World: Science as a Candle in the Dark*. New York: Ballantine Books.
- Saks, M. J. (2009). Judging Admissibility. *Journal of Corporation Law*, 35, 135.
- Saks, M. J., & Faigman, D. L. (2008). Failed Forensics: How Forensic Science Lost Its Way and How It Might Yet Find It. *Annual Review of Law & Social Science*, 4(1), 149.
- Saks, M. J., & Kidd, R. F. (1980). Human Information Processing and Adjudication: Trial by Heuristics. *L. & Soc. Rev.*, 15(1), 123.
- Saks, M. J., & Spellman, B. A. (2016). *The Psychological Foundations of Evidence Law*. New York ; London: NYU Press.
- Salganicoff, A., Ranji, U. R., & Wyn, R. (2005). *Women and Health Care: A National Profile*.
- Sanders, J. (1998). *Bendectin on Trial: A Study of Mass Tort Litigation*. Ann Arbor: University of Michigan Press.
- Schauer, F. (2006). On the Supposed Jury-Dependence of Evidence Law. *University of Pennsylvania Law Review*, 155(1), 165.
- Schepsle, K. A. (1992). Congress Is a “They,” Not an “It”: Legislative Intent as an Oxymoron. *International Review of Law & Economics*, 12, 239.
- Schklar, J., & Diamond, S. S. (1999). Juror Reactions to DNA Evidence: Errors and Expectancies. *Law & Human Behavior*, 23(2), 159.
- Schmitt, F. F. (1994). The Justification of Group Beliefs. In *Socializing Epistemology: The*

- Social Dimensions of Knowledge* (Frederick F. Schmitt, p. 270).
- Schulz, K. F., & Grimes, D. A. (2002). Blinding in Randomised Trials: Hiding Who Got What. *Lancet*, 359(9307), 696.
- Schwartz, D. L. (2008). Practice Makes Perfect? An Empirical Study of Claim Construction Reversal Rates in Patent Cases. *Michigan Law Review*, 107(2), 223.
- Segal, J. A., & Spaeth, H. J. (2002). *The Supreme Court and the Attitudinal Model Revisited*. Cambridge, UK; New York: Cambridge University Press.
- Selinger, E., & Crease, R. P. (Eds.). (2006). *The Philosophy of Expertise*. Columbia University Press.
- Severyn, K. M. (1995). Jacobson v. Massachusetts: Impact on Informed Consent and Vaccine Policy. *Journal of Pharmacy & Law*, 5, 249.
- Sevier, J. (2013). Redesigning the Science Court. *Maryland Law Review*, 73, 770.
- Shapiro, M. (1994). Judges As Liars. *Harvard Journal of Law & Public Policy*, 17, 155.
- Shapiro, M. H. (2012). Updating Constitutional Doctrine: An Extended Response to the Critique of Compulsory Vaccination. *Yale Journal of Health Policy, Law, and Ethics*, 12, 87.
- Shermer, M. (2009). Agenticity. *Scientific American*, 300, 36.
- Silver, N. (2015). *The Signal and the Noise: Why So Many Predictions Fail—But Some Don't*. New York: Penguin Press.
- Sinclair, U. (1994). *I, Candidate for Governor. and How I Got Licked*. New York: University of California Press.
- Smith, B. C., Penrod, S. D., Otto, A. L., & Park, R. C. (1996). Jurors' Use of Probabilistic Evidence. *Law & Human Behavior*, 20(1), 49.
- Smith, P. J., Chu, S. Y., & Barker, L. E. (2004). Children Who Have Received No Vaccines: Who Are They and Where Do They Live? *Pediatrics*, 114(1), 187.
- Solum, L. B. (1993). Situating Political Liberalism. *Chicago-Kent Law Review*, 69, 549–588.
- Solum, L. B. (2006). Public Legal Reason. *Virginia Law Review*, 92, 1449.
- Sood, A. M. (2013). Motivated Cognition in Legal Judgments—An Analytic Review. *Annual Review of Law & Social Science*, 9(1), 307.
- Spohn, C. (2013). The Effects of the Offender's Race, Ethnicity, and Sex on Federal Sentencing Outcomes in the Guidelines Era. *Law & Contemporary Problems*, 76(1), 75.
- Starr, S. (2012). Estimating Gender Disparities in Federal Criminal Cases. *American Law & Economics Review*, 17, 127.
- Stebay, N., Hosch, H. M., Culhane, S. E., & McWethy, A. (2006). The Impact on Juror Verdicts of Judicial Instruction to Disregard Inadmissible Evidence: A Meta-Analysis. *Law & Human Behavior*, 30(4), 469.
- Stiernberg, C. (2013). Science, Patent Law, and Epistemic Legitimacy: An Empirical Study of Technically Trained Federal Circuit Judges. *Harvard Journal of Law & Technology*, 27, 279.
- Stoknes, P. E. (2014). Rethinking Climate Communications and the “Psychological Climate Paradox.” *Energy Research & Social Science*, 1, 161–170.
- Sundström, A. (2008). Self-Assessment of Driving Skill – A Review from a Measurement Perspective. *Transportation Research Part F: Traffic Psychology and Behaviour*, 11(1), 1.
- Sunstein, C. R., Schkade, D., Ellman, L. M., & Sawicki, A. (2007). *Are Judges Political?: An Empirical Analysis of the Federal Judiciary*. Brookings Institution Press.
- Tai, S. (2009). Uncertainty about Uncertainty: The Impact of Judicial Decisions on Assessing

- Scientific Uncertainty. *University of Pennsylvania Journal of Constitutional Law*, 11, 671.
- Tamanaha, B. Z. (2009). *Beyond the Formalist-Realist Divide: The Role of Politics in Judging*. Princeton, N.J.: Princeton University Press.
- Tanford, J. A. (1990). The Law and Psychology of Jury Instructions. *Nebraska Law Review*, 69, 71.
- Tännsjö, T. (1990). *Moral Realism*. Savage, Md.: Rowman & Littlefield.
- Taylor, B., Miller, E., Farrington, C., Petropoulos, M.-C., Favot-Maya, I., Li, J., & Waight, P. A. (1999). Autism and Measles, Mumps, and Rubella Vaccine: No Epidemiological Evidence for a Causal Association. *The Lancet*, 353(9169), 2026–2029.
- Taylor, L. E., Swerdfeger, A. L., & Eslick, G. D. (n.d.). Vaccines are Not Associated with Autism: An Evidence-Based Meta-Analysis of Case-Control and Cohort Studies. *Vaccine*.
- Tetlock, P. E. (2005). *Expert Political Judgment: How Good Is It? How Can We Know?* Princeton, N.J.: Princeton University Press.
- Thaler, R. H. (2015). *Misbehaving: The Making of Behavioral Economics*. New York: W. W. Norton & Company.
- Thaler, R. H., & Sunstein, C. R. (2009). *Nudge: Improving Decisions About Health, Wealth, and Happiness*. New Haven: Yale University Press
- Thompson, W. C. (1989). Are Juries Competent to Evaluate Statistical Evidence? *Law & Contemporary Problems*, 52(4), 9.
- Thompson, W. C., & Schumann, E. L. (1987). Interpretation of Statistical Evidence in Criminal Trials: The Prosecutor's Fallacy and the Defense Attorney's Fallacy. *Law & Human Behavior*, 11(3), 167.
- Timmermans, S., & Haas, S. (2008). Towards a Sociology of Disease. *Sociology of Health & Illness*, 30(5), 659.
- Trouche, E., Johansson, P., Hall, L., & Mercier, H. (2015). The Selective Laziness of Reasoning. *Cognitive Science*, 40, 2122.
- Tversky, A., & Kahneman, D. (1974). Judgment under Uncertainty: Heuristics and Biases. *Science*, 185(4157), 1124.
- Tversky, A., & Kahneman, D. (1981). The Framing of Decisions and the Psychology of Choice. *Science*, 211, 453.
- Tversky, A., & Kahneman, D. (1982). Evidential Impact of Base Rates. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), *Judgment Under Uncertainty: Heuristics and Biases*.
- Tyler, T. R. (1990). *Why People Obey the Law*. New Haven: Yale University Press.
- Uhlmann, V., Martin, C. M., Sheils, O., Pilkington, L., Silva, I., Killalea, A., O'Leary, J. J. (2002). Potential Viral Pathogenic Mechanism for New Variant Inflammatory Bowel Disease. *Molecular Pathology*, 55(2), 84.
- Ullman-Margalit, E., & Morgenbesser, S. (1977). Picking and Choosing. *Social Research*, 44(4), 757.
- U.S. Global Change Research Program. (2014). *Climate Change Impacts in the United States: The Third National Climate Assessment*. U.S. Global Change Research Program.
- van Panhuis, W. G., Grefenstette, J., Jung, S. Y., Chok, N. S., Cross, A., Eng, H., Burke, D. S. (2013). Contagious Diseases in the United States from 1888 to the Present. *New England Journal of Medicine*, 369(22), 2152–2158.
- Vedantam, S. (2010). *The Hidden Brain: How Our Unconscious Minds Elect Presidents, Control*

- Markets, Wage Wars, and Save Our Lives*. New York: Spiegel & Grau.
- Vickers, A. L. (2005). Daubert, Critique and Interpretation: What Empirical Studies Tell Us about the Application of Daubert. *University of San Francisco Law Review*, 40, 109.
- Vidmar, N., & Diamond, S. S. (2001). Juries and Expert Evidence. *Brooklyn Law Review*, 66, 1121.
- Vosoughi, S., Roy, D., & Aral, S. (2018). The Spread of True and False News Online. *Science*, 359(6380), 1146.
- Vrij, A. (2008). *Detecting Lies and Deceit: Pitfalls and Opportunities*. Chichester; Hoboken, NJ: John Wiley.
- Waites, R. C., & Giles, D. A. (2005). Are Jurors Equipped to Decide the Outcome of Complex Cases. *American Journal of Trial Advocacy*, 29, 19.
- Wakefield, A. J., & McCarthy, J. (2011). *Callous Disregard: Autism and Vaccines--The Truth Behind a Tragedy*. New York, NY: Skyhorse Publishing.
- Wakefield, A., Murch, S., Anthony, A., Linnell, J., Casson, D., Malik, M., ... Walker-Smith, J. (1998). Ileal-lymphoid-nodular Hyperplasia, Non-specific Colitis, and Pervasive Developmental Disorder in Children. *The Lancet*, 351(9103), 637–641.
- Waters, N. L., & Hodge, J. P. (2005). *The Effects of the Daubert Trilogy in Delaware Superior Court*.
- Waxse, D. J., & Yoakum-Kriz, B. (2012). Experts on Computer-Assisted Review: Why Federal Rule of Evidence 702 Should Apply to Their Use Emerging Legal Issues in the Digital Age. *Washburn Law Journal*, 52, 207–224.
- Wells, G. L. (1992). Naked Statistical Evidence of Liability: Is Subjective Probability Enough? *Personality & Social Psychology*, 62(5), 739.
- Wigmore, J. H. (1924). To Abolish Partisanship of Expert Witnesses, as Illustrated in the Loeb-Leopold Case. *Journal of the American Institute of Crime & Criminology*, 15(3), 341.
- Wilk, P. A. (1984). Expert Testimony on Rape Trauma Syndrome: Admissibility and Effective Use in Criminal Rape Prosecution. *American University Law Review*, 33, 417.
- Wilson, E. O. (1998). *Consilience: The Unity of Knowledge*. New York: Knopf.
- Wilson, T. D., DePaulo, B. M., Mook, D. G., & Klaaren, K. J. (1993). Scientists' Evaluations of Research: The Biasing Effects of the Importance of the Topic. *Psychological Science*, 4, 322.
- Wilson, T. D., Houston, C. E., Etling, K. M., & Brekke, N. (1996). A New Look at Anchoring Effects: Basic Anchoring and its Antecedents. *Experimental Psychology*, 125(4), 387.
- Wingate, P. H., & Thornton, III, G. C. (2004). Industrial/Organizational Psychology and the Federal Judiciary: Expert Witness Testimony and the Daubert Standards. *Law & Human Behavior*, 28, 97.
- Wissler, R. L., & Saks, M. J. (1985). On the Inefficacy of Limiting Instructions: When Jurors Use Prior Conviction Evidence to Decide on Guilt. *Law & Human Behavior*, 9, 37.
- Wistrich, A. J., Guthrie, C., & Rachlinski, J. J. (2005). Can Judges Ignore Inadmissible Information? The Difficulty of Deliberately Disregarding. *University of Pennsylvania Law Review*, 153(4), 1251.
- Wittlin, M. (2016). Hindsight Evidence. *Columbia Law Review*, 116(5), 1323.
- Wolf, S. (1950). Effects of Suggestion and Conditioning on the Action of Chemical Agents in Human Subjects; The Pharmacology of Placebos. *Clinical Investigation*, 29, 29(1, 1), 100, 100–109.
- Wolfe, R. M., & Sharp, L. K. (2002). Anti-Vaccinationists Past and Present. *British Medical*

- Journal*, 325(7361), 430.
- Wolfe, R. M., Sharp, L. K., & Lipsky, M. S. (2002). Content and Design Attributes of Antivaccination Web Sites. *Journal of the American Medical Association*, 287, 3245.
- Wooldridge, J. M. (2009). *Introductory Econometrics: A Modern Approach*. Mason, Ohio: South-Western Cengage Learning.
- Wynne, B. (1989). Sheepfarming after Chernobyl: A Case Study in Communicating Scientific Information. *Environment: Science and Policy for Sustainable Development*, 31(2), 10.
- Yarnall, M. A. (2009). Dueling Scientific Experts: Is Australia's Hot Tub Method A Viable Solution For The American Judiciary? *Oregon Law Review*, 88, 311.
- Yochim, E. C., & Silva, V. T. (2013). Everyday Expertise, Autism, and "Good" Mothering in the Media Discourse of Jenny McCarthy. *Communication and Critical/Cultural Studies*, 10(4), 406.
- Zipprich, J., Winter, K., Hacker, J., Xia, D., Watt, J., & Harriman, K. (2015). Measles Outbreak – California, December 2014-February 2015. *Morbidity & Mortality Weekly Report*, 64, 153.