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To Have and Have Not: Assessing the Value of Social Science to the Law as Science and Policy

David L. Faigman

UC Hastings College of the Law, faigmand@uchastings.edu

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TO HAVE AND HAVE NOT: ASSESSING THE VALUE OF SOCIAL SCIENCE TO THE LAW AS SCIENCE AND POLICY

*David L. Faigman**

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* Assistant Professor of Law, University of California, Hastings College of the Law.

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INTRODUCTION

Indispensable to the art of lawmaking are the arts and sciences of understanding human behavior. In trying to understand human behavior, the law is joined by a host of disciplines which bring widely varying

methods to the subject. Some disciplines, those traditionally classified as the humanities (e.g., philosophy, history, and literature), employ methods commonly relied upon by legal analysts, such as logical reasoning,¹ historical analysis,² literary interpretation,³ and common sense. Other disciplines, however, those traditionally classified as the social sciences (e.g., psychology, psychiatry, economics, political science, and sociology),⁴ claim special knowledge of human behavior beyond what standard legal analysis can provide.⁵ Through the application of the methods of science, the social

¹ See, e.g., Weinrib, *Legal Formalism: On the Immanent Rationality of Law*, 97 YALE L.J. 949 (1988).

² See, e.g., Powell, *Rules for Originalists*, 73 VA. L. REV. 659 (1987); Kelly, *Clio and the Court: An Illicit Love Affair*, 1965 SUP. CT. REV. 119.

³ See generally Levinson, *Law as Literature*, 60 TEX. L. REV. 373 (1982); but see Posner, *Law and Literature: A Relation Reargued*, 72 VA. L. REV. 1351 (1986) (arguing that the study of literature, or literary interpretation, has little to contribute to legal interpretation of statutes and constitutions); but see Fish, *Don't Know Much About the Middle Ages: Posner on Law and Literature*, 97 YALE L.J. 777 (1988).

⁴ Numerous disciplines concerned with human behavior claim a scientific basis to one extent or another. I use the term social science to refer to any discipline or part of any discipline which explicitly or implicitly rests an explanation of human behavior on a scientific basis. Thus, the focus of this paper is on specific assertions claiming a scientific basis rather than disciplines in a general sense. Nonetheless, certain disciplines on the whole claim a scientific basis, and the law regularly consults a number of these, including psychology, psychiatry, economics, political science, and sociology. This list does not preclude the possibility that assertions made by non-social science disciplines have or claim to have a scientific basis. A literature professor, for example, would be making an essentially scientific claim if she were to state that most literature professors regard James Joyce's *Ulysses* as the greatest novel written in the twentieth century. This statement is empirically testable. Finally, many of the arguments and recommendations herein apply equally to the natural sciences, including physics, chemistry, and biomedical science. For reasons that will become clearer to the reader later, the natural sciences are less susceptible to the problems, and generally already conform to the recommendations, set forth below.

In addition, the analysis below likens some ostensibly social science statements to statements found in literature or what might be derived from common sense. Although the focus of this Article is on the social sciences, the theoretical framework posited is applicable and potentially of great relevance to the present debate surrounding the proper role of literary interpretation in the law. See *supra* note 3.

⁵ The nature of the social sciences has been the subject of Supreme Court speculation on more than one occasion. For example, in speaking on the importance of academic freedom, Justice Frankfurter observed:

Progress in the natural sciences is not remotely confined to findings made in the laboratory. Insights into the mysteries of nature are born of hypothesis and speculation. The more so is this true in the pursuit of understanding in the groping endeavors of what are called the social sciences, the concern of which is man and society. The problems that are the respective preoccupations of anthropology, economics, law, psychology, sociology, and related areas of scholarship are merely departmentalized dealing, by way of manageable division of analysis, with interpenetrating aspects of holistic perplexities. For society's good — if understanding be an essential need of society — inquiries into these problems, specu-

sciences claim an "objective" understanding of human behavior. What relevance social science research has to legal decisionmaking depends upon the validity of this claim.

The role of social science in the law has been, at best, an uncomfortable one since it was first cast in *Muller v. Oregon*.⁶ One commentator observed, for example, that "these meeting grounds are rather like the parlor in the Victorian home in which the girl and her suitor can get together — but not get together too much."⁷ Indeed, this metaphor serves well, for social science as suitor has been alternately embraced and rejected by the law; so far the law cannot seem to decide whether to submit to the overtures of social science.⁸ The seeming indecision, however, reflects the polarized views of social science that have developed in the law.⁹ Critics of social science question whether the distinction between the humanities and the social sciences is real, with many doubting the reliability of current social science research¹⁰ and some questioning whether social inquiry can

lations about them, stimulation in others of reflection upon them, must be left as unfettered as possible.

Sweezy v. New Hampshire, 354 U.S. 234, 261-62 (1957) (Frankfurter, J., concurring in result), quoted in *Board of Regents v. Roth*, 408 U.S. 564, 581-82 (1972) (Douglas, J., dissenting).

⁶ 208 U.S. 412 (1908). In *Muller*, Louis Brandeis filed his famous "Brandeis Brief" supplying the Court with a multitude of studies purportedly demonstrating "the inherent difference between the two sexes." *Id.* at 423. In apparent reliance on these studies, the *Muller* Court upheld an Oregon statute prohibiting women from working in factories for more than ten hours per day. See generally Doro, *The Brandeis Brief*, 11 VAND. L. REV. 783 (1958).

⁷ Riesman, *Some Observations on Law and Psychology*, 19 U. CHI. L. REV. 30, 32 (1951).

⁸ Of course, not all social scientists are willing suitors. Many social scientists reject an applied emphasis, believing, as many lawyers do, that the usefulness of social science research remains quite limited. See, e.g., McCloskey & Egeth, *Eyewitness Identification: What Can a Psychologist Tell a Jury?* 38 AM. PSYCHOLOGIST 550 (1983) (After reviewing the experimental literature on eyewitness identification, the authors conclude that it does not support the view that jurors need help in this area or that psychologists can provide any help that might be needed.); but see Loftus, *Silence is Not Golden*, 38 AM. PSYCHOLOGIST 564 (1983).

⁹ See D. SHUMAN, *PSYCHIATRIC AND PSYCHOLOGICAL EVIDENCE* vi (1986) ("[M]uch of . . . the literature has argued that psychiatric and psychological evidence is unreliable and ought to be excluded from judicial proceedings or, in the alternative, that this evidence is extremely valuable and ought to be received by courts."); see also Bersoff, *Psychologists and the Judicial System*, 10 LAW & HUM. BEHAV. 151 (1986) (tracing the rise and fall, and current ambivalence, of legal interest in social science data).

¹⁰ See Fineman & Opie, *The Uses of Social Science Data in Legal Policymaking: Custody Determinations at Divorce*, 1987 WIS. L. REV. 107, 131; Greeley, *Debunking the Role of Social Scientists in Court*, 7 HUM. RTS., Spring 1978, at 34, 50; O'Brien, *The Seduction of the Judiciary: Social Science and the Courts*, 64 JUDICATURE 8, 10-11 (1980).

ever be scientific.¹¹ Those urging greater reliance on social science assert the special expertise of social scientists, and argue further that even in those areas where the social sciences are less well developed, the law is better off relying on social science opinion than guesswork.¹² But both supporters and critics of social science have failed to articulate adequately the terms of the debate: its critics have yet to explain specifically the failings of social science as science; and its supporters have yet to defend convincingly their belief that social science that is less than scientific is better than guesswork. The role of social science in the legal process remains confused, therefore, due to the lack of a standard by which to measure its relevance.

The primary purpose of this Article is to propose a framework in which both scientific and nonscientific social inquiry can be assessed and utilized by legal decisionmakers. In articulating this framework, I address the presently confused role of the social sciences in the law and urge the adoption of a principled standard by which the legal relevance of social science research can be judged. This standard, although surprisingly in need of defense, is simple in principle, and simply stated: The legal relevance of social science findings should depend on their scientific strength, that is, on the ability of social scientists to answer validly¹³ the questions

¹¹ See Fineman & Opie, *supra* note 10, at 127-30; Trubek & Esser, "Critical Empiricism" in *American Legal Studies: Paradox, Program, or Pandora's Box?* 14 LAW & SOC. INQUIRY 3, 10-13 (1989); Woolhandler, *Rethinking the Judicial Reception of Legislative Facts*, 41 VAND. L. REV. 111, 119 (1988); Fahr, *Why Lawyers are Dissatisfied With the Social Sciences*, 1 WASHBURN L.J. 161, 167-68 (1961). For an overview of criticisms of the use of social science research in the law, and responses to these criticisms, see Driessen, *The Wedding of Social Science and the Courts: Is the Marriage Working?* 64 SOC. SCI. Q. 476 (1983).

¹² See Bonnie & Slobogin, *The Role of Mental Health Professionals in the Criminal Process: The Case for Informed Speculation*, 66 VA. L. REV. 427, 461-66 (1980); G. MELTON, J. PETRILA, N. POYTHRESS & C. SLOBOGIN, *PSYCHOLOGICAL EVALUATIONS FOR THE COURTS* (1987) [hereinafter *PSYCHOLOGICAL EVALUATIONS*]. The primary interlocutor to Professors Bonnie, Slobogin, and other commentators in the debate on the legal relevance of less-than-scientific social inquiry has been Professor Stephen J. Morse. Professor Morse argues persuasively that many of the "expert" opinions of psychologists and psychiatrists in the area of mental health law are invalid and, even if valid, are often irrelevant. See Morse, *Crazy Behavior, Morals and Science: An Analysis of Mental Health Law*, 51 S. CAL. L. REV. 527 (1978) [hereinafter Morse, *Crazy Behavior*]; Morse, *Failed Explanations, and Criminal Responsibility: Experts and the Unconscious*, 68 VA. L. REV. 971 (1982) [hereinafter Morse, *Failed Explanations*]. In this Article, I align myself with many of Professor Morse's views regarding psychological testimony on "crazy" behavior, and hope to add to the discussion by expanding the debate to all purportedly scientific social inquiry.

¹³ For discussion of the term validity, see *infra* note 16 and notes 54-57 and accompanying text.

posed to them.¹⁴ In arguing for the adoption of a scientific standard, I address both poles of the present debate. On the one hand, I respond to critics of social science by arguing that social science findings can reach, and in some areas have already reached, a level of objectivity in accordance with scientific criteria. On the other hand, I respond to some advocates of the social sciences in the law by arguing that the legal relevance of social science findings depends on the extent to which they have met this level of objectivity.

In comparing social science to natural science, critics invariably complain that the former has not achieved the level of sophistication or the level of objectivity of the latter.¹⁵ Yet these critics fail to go beyond such superficial pronouncements to explore what differences actually exist between the social and natural sciences. On close examination, fewer differences exist than one might suppose. In fact, the methodologies employed by many social scientists are fairly similar to those employed by natural scientists; the results derived from these methods are similarly measurable in terms of validity and reliability.¹⁶ This is not to suggest, however, that

¹⁴ The present proposal linking legal relevance to scientific merit has been forwarded in various forms by other commentators. See Black, *A Unified Theory of Scientific Evidence*, 56 *FORDHAM L. REV.* 595 (1988); Moenssens, *Admissibility of Scientific Evidence — An Alternative to the Frye Rule*, 25 *WM. & MARY L. REV.* 545, 567-74 (1984) (proposing a process by which scientific evidence would be evaluated on the basis of its "reliability for a specific purpose"). This Article differs from those sources in that it articulates a conceptual framework in which the legal relevance of *both* valid and not-yet-validated social science statements can be understood.

¹⁵ See, e.g., Dworkin, *Social Sciences and Constitutional Rights — The Consequences of Uncertainty*, 6 *J. L. & EDUC.* 3, 5 (1977) ("While in physics it is now thought to be an unsound judgment that rests merely on correlation between observable events unsupported by some notion of the mechanics that translate the cause to the effect, social science usually is only able to provide correlations without the mechanics."); see also *infra* notes 124-25 and accompanying text.

¹⁶ Defining the scientific terms of validity and reliability with regard to evaluating scientific evidence has been the subject of some dispute. See Black, *supra* note 14, at 611-12 n.80. Unfortunately, this injects unnecessary confusion into the debate. In this Article, I adopt the standard scientific definitions of validity and reliability, which are also the definitions used by most legal commentators. "Validity" refers to the ability of a scientific test to measure what it purports to measure; "reliability" refers to the ability of a scientific test to obtain consistent results. Giannelli, *The Admissibility of Novel Scientific Evidence: Frye v. United States, A Half-Century Later*, 80 *COLUM. L. REV.* 1197, 1201 n.20 (1980). For example, a valid thermometer accurately measures air temperature and, if reliable, does so consistently. A valid test will always be reliable, but a reliable test will not always be valid. A thermometer always ten degrees too high will be consistently inaccurate — reliable, but invalid.

Black has rejected the standard scientific definitions of reliability and validity in favor of Webster's dictionary's definitions of these terms. He explains his use of reliability and validity as follows:

all social science is comparable to all natural science. For example, in physics, the paradigmatic "hard" science, many questions have been answered to a degree not yet matched, and perhaps unmatchable, by the social sciences; and physics, as a mature science, is at least 200 years older than most of its social science counterparts.¹⁷ At the same time, social scientists have provided more certain answers in some areas than physicists can hope to achieve in the more intractable areas of their discipline.¹⁸

Although few advocates of the social sciences would take exception to comparing them to the natural sciences, most would consider a purely scientific standard insufficiently narrow to judge the legal relevance of so-

[R]eliability means that a successful outcome, or a correct answer, is sufficiently probable for a given situation. A baseball player who gets a hit forty percent of the time is an extremely reliable batter, but a lie detection device that correctly indicates falsehood ninety percent of the time may not be reliable enough for use at trial. In contrast to reliability, validity means that which results from sound and cogent reasoning. An invalid conclusion cannot be reliable, yet valid reasoning does not necessarily lead to reliable conclusions. Reliability is the ultimate legal concern, but when it hinges on controversial and contested reasoning, the validity of that reasoning must be addressed.

Black, *supra* note 14, at 599-600 (footnotes omitted). Black's distinction provides a useful insight in that it distinguishes questions of scientific validity from the legal issue of admissibility. This is an important distinction, and one with which I agree. See *supra* note 207. However, Black accomplishes this feat by combining scientists' definitions of validity and reliability into his one term of validity, a result which is likely to lead to confusion between lawyers and scientists.

¹⁷ Modern science emerged from its philosophical ancestry sometime in the seventeenth century with the work of Kepler, Galileo, and Newton. E. BORING, A HISTORY OF EXPERIMENTAL PSYCHOLOGY 10 (2d ed. 1957); see generally T. FERRIS, COMING OF AGE IN THE MILKY WAY (1988). In contrast, psychology did not shed its philosophical identity until the middle of the nineteenth century. E. BORING, *supra*, at 157. As discussed below, many psychologists continue to adhere to the philosophic, rather than the scientific, method.

¹⁸ Many areas of scientific social inquiry have produced important results which have withstood the test of time (as well as the more important test of empirical replication). For example, significant amounts of research have explored the effects of positive and negative reinforcement and punishment on learning and behavior, both in animals and humans. While explanations for large segments of human behavior in this area remain elusive, largely due to the inherent limitations of the subject matter, many fundamental relationships are relatively well understood. For good overviews of the work of B.F. Skinner, the preeminent researcher in this area, see B.F. SKINNER: CONSENSUS AND CONTROVERSY (S. Modgil & C. Modgil eds. 1987); THE OPERANT BEHAVIORISM OF B.F. SKINNER: COMMENTS AND CONSEQUENCES (A. Catania & S. Harnad eds. 1988). But physics too, long viewed as a science of great exactitude, suffers from the inherent limitations of its subject matter. See, e.g., S. HAWKING, A BRIEF HISTORY OF TIME: FROM THE BIG BANG TO BLACK HOLES 74-75 (1988) (Professor Hawking discusses the physical impossibility of building a particle accelerator large enough to test grand unified theories of the universe directly). See also *infra* notes 148-50 and accompanying text (noting that the exactitude of much of physics breaks down in the real world of predicting complex events).

cial science. Instead, when social science research falls short of the scientific ideal, or even is not scientific at all, they argue that this research still can *assist* legal decisionmaking.¹⁹ But such an argument proves too much, for surely some social science findings are so unreliable as to provide no assistance whatsoever. The task remains, therefore, to identify which findings will assist legal decisionmaking and to explain why that is so. The usual response, and in fact the law's apparent course, has been to trust certain professional fields to decide which findings can be of assistance. This practice results in the presumptive admissibility of the testimony of any accredited expert whose testimony is otherwise relevant. But this standard is really no standard at all.²⁰

This Article is divided into four Parts. Part I considers why the legal significance of social science research should depend on its scientific merit. Part I argues that social scientists' contribution to the legal process lies in their ability to describe "objective" reality, or to answer what the law refers to as "questions of fact." Because her findings have been subjected to systematic tests, the social scientist claims an understanding of human behavior superior to the understanding of laypersons. Part I also outlines the scientific method for testing theories of human behavior.

Part II responds to the popular criticisms that, first, social inquiry can never be scientific because the values and biases of the researchers invariably affect their findings, and, second, that the complexity and probabilistic nature of the subject matter defies scientific study. Part II examines the manner in which social scientists seek to identify objective facts in order to determine whether legal decisionmakers can rely on social science findings being relatively unencumbered by the researchers' values. Although social scientists invariably bring their biases and world views to their research, this shortcoming is shared by natural scientists, and indeed cannot be avoided in any area of human inquiry. Nonetheless, the scientific method provides guidelines by which suspected infirmities can be identified so that third parties can evaluate the verity of purportedly objective findings. In considering the legal relevance of scientific social inquiry, Part II examines in particular the criticism that because of the complexity and probabilistic nature of human behavior, the law would be put on an indefinite

¹⁹ See *infra* notes 222-26 and accompanying text.

²⁰ See *infra* notes 302-04 and accompanying text.

footing if it were to rely too heavily on the social sciences. With or without the assistance of social scientists, however, the fact remains that legal decisionmakers must somehow estimate the nature of human behavior. While the subject of human behavior is complex, and the social sciences are imprecise in their understanding of that subject, valid research findings can provide valuable assistance to legal decisionmakers, and will place the law on no less firm ground than that on which it now rests.

Much ostensibly scientific social inquiry, however, does not deserve to be called scientific. Part III considers the structure and legal relevance of nonscientific social inquiry, or what I refer to as *suppositional science*: social science findings advanced without pretense of having survived scientific test and social science findings advanced as having undergone scientific test but which have not actually been tested adequately. Although adherence to scientific principles provides the benchmark for evaluating social science findings, the legal system can still benefit in some ways from suppositional science. I argue in this Part that suppositional science can contribute to legal policy formation, but that it is of little assistance, and may result in considerable prejudice when presented to the trier of fact through expert testimony. When valid social science research is unavailable, suppositional scientific views can provide helpful insights to judges (as policy makers) as well as legislators who must make predictions about human behavior, and who typically listen to the subjective views of all interested parties regarding the factual issues underlying such policy questions. In addition, suppositional science often represents legitimate values or policy considerations which lawmakers,²¹ exercising their independent judgment, may find relevant to the development of legal rules. Suppositional science should not be presented to jurors through expert testimony, however, because such experts can provide little or no assistance to fact-finders who have their own (and possibly equally valid) suppositions concerning the factual questions they must resolve. In this regard, the expert's policy views are irrelevant, and potentially of great prejudice, to the fact-finder's limited task.

Finally, Part IV examines the mechanics of integrating social science research into the trial process. This Part questions the capacity of lawyers

²¹ Throughout this Article, I use the term "lawmaker" to refer to legislators generally and to judges in their policymaking role.

to distinguish the suppositional from the scientific in social science findings. Although not trained in the exotica of empirical science, judges are certainly capable of developing a rudimentary understanding of scientific methods. Yet, when the responsibility for evaluating social science research must be allocated between judge and jury, judges do not appear obviously superior to laypersons. Nonetheless, the possibility that jurors will be overwhelmed by the aura of scientific certainty, combined with the more troubling infusion of policy views associated with expert testimony based on suppositional science, necessitates the adoption of a threshold admissibility standard based on the validity of the proffered research. Still, leaving validity assessments to the discretion of judges potentially raises the concern that social science's political agenda will simply be removed to another level rather than removed from the process entirely. Properly understood and properly used, valid social science research alone interposes no particular ideological agenda on the law.

I. THE SCIENCE OF SOCIAL INQUIRY²²

Although the search for knowledge assumes many forms, the scientific enterprise pursues a peculiar sort of knowledge: "objective" knowledge. Objective is used here not in the sense of identifying an "actual or absolute reality," but instead to identify a "verifiable reality."²³ To be sure, an

²² Parts I and II develop a particular epistemological view on the philosophy of science generally associated with "scientific realism." However, probably no single scientific realist would accept all of the propositions I set out; nor, indeed, I might add, am I likely to accept them all in time. The present foray into the philosophy of science remains tentative and is not intended to be a complete (or final) synthesis. Such an endeavor would demand more than the present thesis requires. Nonetheless, certain insights gleaned from the philosophy of science provide needed assistance to the way we conceive of the role of social science in legal decisionmaking. The present thesis draws heavily on the ideas of Sir Karl Popper, who supplies significant assistance in this regard. Surprisingly, the perspective of the scientific realist has been underrepresented in legal debates that otherwise involve its philosophy of science counterparts. See Fuller, *Playing Without a Full Deck: Scientific Realism and the Cognitive Limits of Legal Theory*, 97 YALE L.J. 549 (1988). One purpose of the present endeavor is to help remedy this situation.

²³ Cries of "positivism" often follow any suggestion that social science can be a working partner of the legal system — usually with the same intonation that "witchcraft" was uttered in Salem, Massachusetts in the seventeenth century. To the extent "positivist" connotes someone who believes that science can discover the one true reality, I, like everyone else these days, am no positivist. But I also do not accept the typically posited alternative that social science is merely pragmatic. See Trubek, *Where the Action Is: Critical Legal Studies and Empiricism*, 36 STAN. L. REV. 575, 586 (1984). Rather, as discussed *infra* at notes 114-21 and accompanying text, social science can identify some general, albeit relative, truths about human behavior.

infinite number of “logically possible worlds” may exist; however, as Sir Karl Popper stated, “the system called ‘empirical science’ is intended to represent only one world: the ‘real world’ or the ‘world of our experience.’”²⁴ The relevance of social science to the legal process arises out of its acquisition of knowledge of the “real world.” The problem for the law lies in distinguishing social science with a legitimate claim to objective knowledge from social science without a legitimate claim to such knowledge. According to Professor Popper, “the *objectivity* of scientific statements lies in the fact that they can be *inter-subjectively tested*.”²⁵ The particular benefit of testable statements is that they are falsifiable.²⁶ A subjective view of reality, or hypothesis, attains objectivity through systematic test or, stated another way, attempts to falsify it. Falsifiability or testability represents the line of demarcation between science and pseudoscience, and the strength of particular scientific statements depends on the extent to which they have been tested appropriately.

A. *Objective Knowledge and Subjective Knowledge*

The subject matter of scientific exploration is the shared experience typically referred to as the “real world” or what arises in the legal process as “questions of fact.”²⁷ Virtually every legal judgment is composed of both factual premises and normative principles, though the latter may depend on still more factual premises. For instance, most views of the wisdom and justice of capital punishment depend in part on the normative question of retribution, and in part on the factual question of general deterrence.²⁸ A proponent of capital punishment might argue that murderers deserve to pay for their crimes with their lives, buttressed perhaps by the

²⁴ K. POPPER, *THE LOGIC OF SCIENTIFIC DISCOVERY* 39 (1959) (footnote omitted) [hereinafter K. POPPER (1959)].

²⁵ *Id.* at 44 (emphasis in original). According to Popper, “inter-subjective *testing* is merely a very important aspect of the more general idea of inter-subjective *criticism*, or in other words, of the idea of mutual rational control by critical discussion.” *Id.* at 44 n.1 (emphasis in original).

²⁶ See generally T. COOK & D. CAMPBELL, *QUASI-EXPERIMENTATION: DESIGN & ANALYSIS ISSUES FOR FIELD SETTINGS* 20-25 (1979) [hereinafter COOK & CAMPBELL].

²⁷ In legal parlance, “questions of fact” are further delineated into legislative facts and adjudicative facts, a distinction of great importance to my discussion in Parts III and IV *infra*. For the purposes of Parts I and II this distinction need not be made.

²⁸ See *Gregg v. Georgia*, 428 U.S. 153, 183-87 (1976); *id.* at 233 (Marshall, J., dissenting) (“The two purposes that sustain the death penalty as nonexcessive in the Court’s view are general deterrence and retribution.”).

argument that capital punishment is a general deterrent.²⁹ An opponent of capital punishment would question the principle of retribution, and probably challenge the deterrent effect of the death penalty.³⁰ Although science cannot contribute to the normative debate,³¹ the factual questions in issue are the stuff of science.

The subjective belief (or disbelief) in the retributive value of capital punishment does not implicate a fact question that is susceptible to test. Subjective beliefs may be examined in the sense that their prevalence can be assessed, but subjective views themselves lie outside the domain of science. Further, a particular view concerning the principle of retribution within the debate on capital punishment could never itself be deemed scientific. No matter how strongly one believes in the maxim "an eye for an eye," for example, this belief is not scientific. This holds true for subjective beliefs about the deterrent effect of capital punishment as well. No matter how strongly one believes capital punishment deters crime, that subjective belief or supposition is not scientific.³² The objectiveness of a proposition depends on the extent to which it can be demonstrated to be true or false. However, since the "truth" of a proposition can never be fully demonstrated, the criterion for objectiveness is the extent to which a proposition can be falsified.³³

1. *Falsifiability*

Professor Popper devoted much of his philosophical efforts to articulating a criterion by which scientific statements could be distinguished from

²⁹ *Id.* at 183-87; see also *Furman v. Georgia*, 408 U.S. 238, 308 (1972) (Stewart, J., concurring).

³⁰ See *Gregg*, 428 U.S. at 238 (Marshall, J., dissenting).

³¹ In many cases, the normative choice might still depend on factual assertions. The Supreme Court has repeatedly based its retributive argument, at least in part, on a factual basis. Concerned with the possibility that without capital punishment the public might turn to self-help, the Court observed:

The instinct for retribution is part of the nature of man, and channeling that instinct in the administration of criminal justice serves an important purpose in promoting the stability of a society governed by law. When people begin to believe that organized society is unwilling or unable to impose upon criminal offenders the punishment they 'deserve,' then there are sown the seeds of anarchy — of self-help, vigilante justice, and lynch law.

Gregg v. Georgia, 428 U.S. at 183 (quoting *Furman v. Georgia*, 408 U.S. 238, 308 (1972) (Stewart, J., concurring)).

³² K. POPPER (1959), *supra* note 24, at 46.

³³ See *infra* text accompanying notes 34-43.

nonscientific statements, especially pseudo-scientific, prescientific, and metaphysical statements.³⁴ In an effort to identify how scientific statements differ from nonscientific statements, what he called the “problem of demarcation,”³⁵ Professor Popper articulated the criterion of falsifiability. Primarily, the criterion of falsifiability provides that “[a] statement or theory is . . . falsifiable if and only if there exists at least one potential falsifier — at least one possible basic statement that conflicts with it logically.”³⁶ The hallmark of scientific statements is that they are vulnerable to refutation. In short, “the criterion of the scientific status of a theory is its falsifiability, or refutability, or testability.”³⁷

The annals of social science are replete with examples of purportedly scientific, yet nonfalsifiable, theories. Such theories display a profound resiliency to seemingly contradictory data, repeatedly demonstrating their capacity to encompass all observed phenomena. For instance, the proposition that “punishments imposed by the criminal law reflect society’s ‘conscious and unconscious urges’ ”³⁸ is immune to falsification. No example of criminal punishment could be forwarded that could not be fit into the posited theory. Indeed, even the observation of the use of more humane criminal penalties would not necessarily falsify the theory, either because the new penalties could still be construed as expressing those urges³⁹ or by the explanation that the desires had been repressed only to be manifested in another form.⁴⁰ The apparent strength of pseudo-scientific theories — their explanatory power — is actually their greatest weakness.⁴¹

³⁴ See K. POPPER, *UNENDED QUEST: AN INTELLECTUAL AUTOBIOGRAPHY* (1976); see also K. POPPER, *REALISM AND THE AIM OF SCIENCE* xix [From the POSTSCRIPT TO *THE LOGIC OF SCIENTIFIC DISCOVERY*] (W. Bartley, III ed. 1983) [hereinafter K. POPPER (1983)]; see generally K. POPPER, *CONJECTURE AND REFUTATIONS: THE GROWTH OF SCIENTIFIC KNOWLEDGE* 33-59 (1963) (In a clear and succinct fashion, Popper explains the development and import of his philosophy.) [hereinafter K. POPPER (1963)]. For a sample of criticisms of Professor Popper’s use of the criterion of falsifiability, see Lakatos, *Falsification and the Methodology of Scientific Research Programmes*, in *CRITICISM AND THE GROWTH OF KNOWLEDGE* 91 (I. Lakatos & A. Musgrave eds. 1970); P. DUHEM, *THE AIM AND STRUCTURE OF PHYSICAL THEORY* (P. Wiener trans. 1954).

³⁵ K. POPPER (1963), *supra* note 34, at 39.

³⁶ K. POPPER (1983), *supra* note 34, at xx.

³⁷ K. POPPER (1963), *supra* note 34, at 37.

³⁸ This psychoanalytic proposition is advanced in C. SCHOENFELD, *PSYCHOANALYSIS AND THE LAW* 19 (1973).

³⁹ *Id.* at 20.

⁴⁰ *Id.* at 20-21.

⁴¹ K. POPPER (1963), *supra* note 34, at 34-35. By explaining everything, pseudo-scientific theories explain nothing. Popper provides two “very different examples” of human behavior fully explain-

In contrast, the fact that scientific theories are vulnerable to falsification imparts a strength stemming from having taken the risk of refutation. One example of a falsifiable statement would be the view that criminal penalties operate to deter criminal conduct. As a logical matter, this statement is potentially falsifiable by a variety of observations inconsistent with the stated relationship. Empirical research might corroborate the hypothesis by finding evidence supporting it; or research might cast doubt on the hypothesis if the evidence contradicted it; or, more likely, research might compel modification of the hypothesis to account for the complexity of the findings.

Importantly, the concept of falsifiability is separate from the question of when a scientific theory can be corroborated or falsified by observations.⁴² The *status* of a statement as scientific depends on its amenability to test; the *merit* of a scientific statement depends on the degree to which it has survived attempts at falsification.⁴³ In the end, the legal relevance of social science research depends on both its status and merit as science.

2. Theory Testing

Less a means for discovering truth than an instrument for identifying falsehood, science systematically tests common sense in order to identify the most plausible explanations of reality.⁴⁴ Through the formulation of

able by both Alfred Adler's and Sigmund Freud's theories:

that of a man who pushes a child into the water with the intention of drowning it; and that of a man who sacrifices his life in an attempt to save the child. . . . According to Freud the first man suffered from repression (say, of some component of his Oedipus complex), while the second man had achieved sublimation. According to Adler the first man suffered from feelings of inferiority (producing perhaps the need to prove to himself that he dared to commit some crime), and so did the second man (whose need was to prove to himself that he dared to rescue the child).

Id. at 35.

⁴² K. POPPER (1983), *supra* note 34, at xx ("[Falsifiability] has to do only with the logical structure of statements and classes of statements. And it has *nothing* to do with the question whether or not certain possible experimental results would be accepted as falsifications.") (emphasis in original).

⁴³ The distinction between the status of a statement as scientific and its merit as a scientific statement is an important one in this Article. I regard statements that fail to have either the status of a scientific statement or any merit as a scientific statement as suppositional science. Hence, the criterion of falsifiability relates to only one facet of suppositional science; the other facet of suppositional science depends on the actual attempts to falsify the scientific statement.

⁴⁴ See K. POPPER, OBJECTIVE KNOWLEDGE 191 (1979) ("[I]t is the aim of science to find satisfactory explanations, of whatever strikes us as being in need of explanation.") (emphasis omitted)

theories and hypotheses⁴⁵ scientists, just as laypersons, attempt to explain their observations of the world about them. Yet, when first formulated, no one theory can be considered more correct than any other. A theory's value can be measured only by its success at describing or predicting events whose observation corroborates it; or, stated otherwise, a theory's value depends on its success at having withstood attempts to falsify it.⁴⁶ Since observations consistent with a theory may be accounted for by an alternative theory with greater explanatory power, one can never prove a theory true.⁴⁷ On the other hand, theories can be falsified when observations depart significantly from expectation.⁴⁸ A theory's value, therefore, is only as good as the tests conducted under its influence. No matter how compelling or coherent a scientific theory appears, its efficacy always depends on empirical test.⁴⁹

[hereinafter K. POPPER (1979)]; E. NAGEL, *THE STRUCTURE OF SCIENCE: PROBLEMS IN THE LOGIC OF SCIENTIFIC EXPLANATION* 4 (1961) ("It is the desire for explanations which are at once systematic and controllable by factual evidence that generates science; and it is the organization and classification of knowledge on the basis of explanatory principles that is the distinctive goal of the sciences.").

⁴⁵ Throughout this Article, I use the concepts of theories and hypotheses interchangeably. Scientific theories and hypotheses describe expected relationships regarding the world of our experience that are amenable to test, and thus subject to corroboration or falsification. However, hypotheses typically speak to relationships between specific variables, whereas theories are more comprehensive, usually involving a number of interrelated hypotheses.

⁴⁶ K. POPPER (1959), *supra* note 24, at 33; K. POPPER (1979), *supra* note 44, at 193.

⁴⁷ K. POPPER (1959), *supra* note 24, at 40. Both theory and hypothesis may be corroborated by experience, and neither can be proven true. For example, the hypothesis that "all swans are white" may be corroborated by the experience of observing 100 swans, all of which are white. But no matter how many swans are observed, it is still possible to find a non-white swan. Upon finding a black swan, a researcher will have to modify her hypothesis, perhaps positing that "99.9% of swans are white," a hypothesis similarly susceptible to falsification, but immune to certain proof. *See id.* at 101 n.1; Quine & Ullian, *Hypothesis*, in *INTRODUCTORY READINGS IN THE PHILOSOPHY OF SCIENCE* 196, 197 (E. Klemke, R. Hollinger & A. Kline eds. 1980).

⁴⁸ K. POPPER (1959), *supra* note 24, at 86; *see also* Lakatos, *supra* note 34, at 91-199.

⁴⁹ The uncertain value of untested theories can be illustrated by the fact that although Nobel prizes in physics often go to theoretical physicists, they are not awarded until the theory has been corroborated by empirical investigation. For example, Albert Einstein won the Nobel Prize in physics in 1921 for his 1906 theory of general relativity only after his prediction that starlight would be deflected as it passed by the sun was confirmed following a solar eclipse in 1919. Similarly, Paul Dirac and Erwin Schrodinger shared the physics prize in 1933 following David Anderson's discovery of positrons in 1932 which corroborated their theory, independently derived in 1926, that introduced wave equations into quantum mechanics. (David Anderson won the Nobel prize in 1936 for his experimental work.) *See* *ENCYCLOPEDIA BRITANNICA MICROPEDIA* Vols. 1-29 (Fifteenth ed. 1987); *ENCYCLOPEDIA AMERICANA*, Vols. 1-30 (U.S. Constitution Bicentennial Commemorative ed.) (International ed. 1987).

It should be noted that as a logical matter not all statements counted as scientific will have been

The testing of theories forms the battlefield of the scientific enterprise, and it is in the trenches that science maintains its principal advantages over common sense. Science mandates clear articulation of the variables under consideration so that any disagreement over method or analysis can be readily identified.⁵⁰ Moreover, science subjects theories and hypotheses to systematic and constant tests,⁵¹ in order to uncover the outer limits of their strengths or explanatory powers.⁵² These advantages are important, since social scientists' claims of expertise depend on their ability to produce explanations better than what common sense provides. To be sure, social scientists can contribute to the quest for knowledge in ways not deemed scientific, and perhaps in ways superior to common sense. Social scientists, like philosophers, for example, have insights on the human con-

subjected to empirical test. Popper explains the logical problem as follows:

Systems of theories are tested by deducing from them statements of a lesser level of universality. The statements in their turn, since they are to be inter-subjectively testable, must be testable in like manner — and so *ad infinitum*.

It might be thought that this view leads to an infinite regress, and that it is therefore untenable. . . . However, this is not so. The deductive method of testing cannot establish or justify the statements which are being tested; nor is it intended to do so. Thus there is no danger of an infinite regress. . . . [T]he fact that the tests cannot go on for ever does not clash with my demand that every scientific statement must be testable. For I do not demand that every scientific statement must have in *fact been tested* before it is accepted. I only demand that every such statement must be capable of being tested; or in other words, I refuse to accept the view that there are statements in science which we have, resignedly, to accept as true merely because it does not seem possible, for logical reasons, to test them.

K. POPPER (1959), *supra* note 24, at 47-48 (emphasis in original). This logical paradox affects the analysis *infra* only tangentially. Social science findings of interest to the law are at a sufficient level of universality that they ought to have been tested.

⁵⁰ E. NAGEL, *supra* note 44, at 7-8. The clear articulation of variables in the sciences involves reduction of descriptive terms to "operational definitions" for the purpose of testing. Herbert Feigl nicely explained the problem as follows:

To put it briefly, if crudely, operational analysis is to enable us to decide whether a given term in the way it is used, has a 'cash value,' i.e., factual reference. If it does have factual reference, operational analysis is to show us precisely *what* that factual reference is, in terms, ultimately, of the data of direct observation.

Feigl, *Operationism and Scientific Method*, 52 PSYCHOLOGICAL REV. 250, 252-53 (1945) (emphasis in original). Temperature, for example, which cannot be directly observed, might be operationally defined as "the linear expansion of a mercury column in a glass tube of even width." *Id.* at 254. Similarly, intelligence or competence might be operationally defined as success on certain standardized tests. See Stevens, *The Operational Basis of Psychology*, 47 AM. J. PSYCHOLOGY 323 (1935). The importance of operational definitions for the law is discussed *infra* at notes 95-96 and accompanying text.

⁵¹ E. NAGEL, *supra* note 44, at 12.

⁵² *Id.* at 5-6.

dition that cannot be discounted.⁵³ The claim to scientific understanding, however, sets the social scientist apart from other thoughtful observers. A scientific claim is a claim to having identified an aspect of reality — that is, the world made up of our shared experience. It is a claim to knowledge susceptible to independent verification. The merit of individual scientific claims can be evaluated only by considering their adherence to the precepts of the academy of science. The next section provides a broad overview of those precepts.

B. An Outline of The Methods of Science

The methods of science cannot be described very simply or in the form of a checklist of factors lawyers can use to evaluate the worth of empirical research by noting what is absent. As a consequence, this section provides only a broad outline of concepts and practices integral to the scientific method. In the Parts that follow, this outline will be completed in some detail. This Article does not assume the existence of, and does not try to create, lawyer-scientists. Nonetheless, lawmakers need to distinguish completely unsound research from fundamentally sound research, and they should have the competence to do so.

Any discussion of the scientific method must begin with the concept of *validity*. Validity refers to the accuracy of scientific propositions.⁵⁴ Validity typically is separated into two types, internal and external. As its name indicates, internal validity refers to the association between the specific variables studied, and more particularly, to threats that might undermine the connection identified.⁵⁵ Thus, internal validity raises the question

⁵³ See *infra* notes 224-56 and accompanying text.

⁵⁴ COOK & CAMPBELL, *supra* note 26, at 37.

⁵⁵ Cook and Campbell identify the following seven factors as substantial threats to internal validity:

[History] is a threat when an observed effect might be due to an event which takes place between the pretest and the posttest, when this event is not the treatment of research interest. . . .

[Maturation] is a threat when an observed effect might be due to the respondent's growing older, wiser, stronger, more experienced, and the like between pretest and posttest and when this maturation is not the treatment of research interest.

[Testing] is a threat when an effect might be due to the number of times particular responses are measured. In particular, familiarity with a test can sometimes enhance performance because items and error responses are more likely to be remembered at later testing sessions.

[Instrumentation] is a threat when an effect might be due to a change in the measuring

"whether there is a causal relationship from one variable to another *in the form in which the variables were manipulated or measured.*"⁵⁶ In contrast, external validity concerns the *generalizability* of the findings. External validity depends on the generalizability of the variable or effect studied to 1) the concept of interest ("construct validity"), 2) different variables measuring the same concept, and 3) different persons, settings, and times.⁵⁷ Internal validity is a prerequisite to external validity, since any threat to the relationship identified between the variables studied will cast doubt on the generalizability of that finding.

One powerful method of studying hypotheses, and the one typically considered most "scientific,"⁵⁸ is experimentation. A scientist's ability to rule out competing hypotheses increases greatly with the opportunity to manipulate variables. Suppose a researcher believes there is an association between the size of the jury and the amount of damages it will award, with smaller juries tending to award more extreme (both higher and lower) amounts than larger juries.⁵⁹ One way of investigating this ques-

instrument between pretest and posttest and not to the treatment's differential impact at each time interval.

[Statistical regression] is a threat when an effect might be due to respondents' being classified into experimental groups at, say, the pretest on the basis of pretest scores. When this happens and measures are unreliable, high pretest scores will score relatively lower at the posttest and low pretest scorers will score higher. It would be wrong to attribute such differential "change" to a treatment because it might be due to statistical regression. . . .

[Selection] is a threat when an effect may be due to the difference between the kinds of people in one experimental group as opposed to another. . . .

[Mortality] is a threat when an effect may be due to the different kinds of persons who dropped out of a particular treatment group during the course of an experiment. This results in a selection artifact, since the experimental groups are then composed of different kinds of persons at the posttest.

Id. at 51-53.

⁵⁶ *Id.* at 38 (emphasis added).

⁵⁷ *Id.* at 39. The terms internal validity and external validity embody the four questions researchers ask:

(1) Is there a relationship between the two variables? (2) Given that there is a relationship, is it plausibly causal from one operational variable to the other or would the same relationship have been obtained in the absence of any treatment of any kind? (3) Given that the relationship is plausibly causal and is reasonably known to be from one variable to another, what are the particular cause and effect constructs involved in the relationship? and (4) Given that there is probably a causal relationship from construct A to construct B, how generalizable is this relationship across persons, settings, and times?

Id.

⁵⁸ See, e.g., Dworkin, *supra* note 15, at 5.

⁵⁹ In an effort to explain the apparent growing unpredictability of civil jury awards, Professor

tion would be to assign subjects randomly into one of two groups, with one group containing mock juries of twelve persons each, and the other group containing mock juries of six persons each.⁶⁰ These panels could then be presented with an identical videotaped trial and, following deliberations, their monetary awards could be compared. If all factors are held constant except for jury size, any differences beyond what should be expected by chance can be attributed to the tested factor of jury size.

Compare this experiment with the alternative, for example, of a field study in which a researcher compares State *A*, which employs twelve person juries, and State *B*, which employs six person juries. A finding that State *A*'s jury awards are significantly lower than State *B*'s jury awards could be a function of jury size or other factors not the focus of study, such as the types of cases coming to trial in each state differences in litigation strategies among each states' lawyers, and different traditions or customs in the respective communities. Although the statistical design employed can sometimes rule out rival hypotheses, an experiment provides the greatest control by allowing the scientist to study the effect of certain identified variables while other variables are held constant (for example, even if they are present, the variables effectively cancel out because they influence all experimental groups equally). Moreover, future experiments can examine other variables of interest, and either investigate their effects alone or their possible interaction with jury size.

In social inquiry, however, the experiment has disadvantages that a field study, such as comparisons between States *A* and *B*, might alleviate.

Michael Saks forwards the hypothesis that an increasing reliance on smaller juries in state courts might be contributing to the observed phenomenon. He explains as follows:

Smaller sized juries, like any smaller samples, produce less stable and more variable results than larger samples. While defendants and insurers may attribute this growth in unpredictability to mysterious changes in the minds of jurors, it may be due simply to a change in their numbers.

Saks, *If There Be A Crisis, How Shall We Know It?* 46 MD. L. REV. 63, 76 (1986). In an accompanying footnote, Professor Saks explains the statistical basis for the hypothesis:

[W]hen the size of the jury is reduced by one-half (from 12 to 6), all other things being equal, the variability in its awards will increase by the square root of 2, or 1.41. That is, the variability in awards will increase by 41%.

Id. at n.51. See also Saks, *Blaming the Jury* (Book Review), 75 GEO. L.J. 693, 709-10 (1986). It should be noted that research has not yet been conducted testing this hypothesis; the text, however, outlines how such a program could be designed.

⁶⁰ On the various strategies social scientists use to study juries, see generally V. HANS & N. VIDMAR, *JUDGING THE JURY* (1986).

In particular, the generalizability of the finding that jury size affects jury awards in the laboratory is limited by the contrived nature of the methods employed. Mock jury studies do not have the complexity or import of the real jury trial.⁶¹ In addition, a valid and legally significant hypothesis should always be observed outside the laboratory. Therefore, field studies contribute importantly to the corroboration of hypotheses by demonstrating their cogency outside the laboratory.

Even alone, studies involving no experimental manipulation can corroborate hypotheses and eliminate rival hypotheses. In social inquiry, experimentation is not always a practicable alternative. Correlational studies, for example, provide significant data on the relationship, and possible causal connection, between factors of interest to the law.⁶² Moreover, in addition to the example of comparing two states employing different jury sizes, other nonexperimental studies could be devised that would further test the hypothesis. For example, a scientist might take advantage of a "natural experiment"⁶³ by reviewing the records of State C, which just recently instituted six person juries after having used twelve person panels. If State C's records indicate a change in award amounts corresponding to the change in jury size policy, the stated hypothesis will have received further support. Failure to find such an effect will not alone falsify the hypothesis, but it will weaken it somewhat. Many other ways could be envisioned to examine the hypothesis of interest.

The scientific method is neither static nor easily encapsulated. Every body of research exploring the accuracy of a theory must be judged on its merits according to scientific criteria. No one method can be assumed to be more scientific than another. Experimental techniques provide information not available otherwise, just as nonexperimental research studies provide information on factors not amenable to experiment. Particle physics and astrophysics are both "scientific," even though the former primarily employs experimental methods while the latter relies principally on correlational studies. The appropriateness of the method depends on the nature

⁶¹ See Konecni & Ebbesen, *External Validity of Research in Legal Psychology*, 3 LAW AND HUM. BEHAV. 39 (1979); see also Proshansky, *Environmental Psychology and the Real World*, 31 AM. PSYCHOLOGIST 303, 305-10 (1976) (Discussing the need for social science to step out of the laboratory into the real world, and, moreover, to include the environment as a variable to be studied.).

⁶² See generally COOK & CAMPBELL, *supra* note 26, at 295-339.

⁶³ See *id.* at 296.

of the question being addressed.

C. Conclusion

What all science has in common is the systematic test of posited explanations about reality.⁶⁴ The natural sciences hold a special status in society due to their enormous success in testing phenomena with seemingly extraordinary precision and, to a large extent, free of subjective bias. Also, natural science appears marked by a high degree of consensus among its participants regarding the methods utilized as well as the findings obtained. In contrast, the short history of scientific social inquiry is marred by examples of extraordinary imprecision and the large role researchers' biases seem to play in their findings. Also, social scientists never seem to agree on anything. Although many of the shortcomings of social science as compared to natural science are real, they are also too often overstated. At bottom, social science research shares many of the attributes of research in natural science: it shares the positive attribute of objective understanding derived through controlled systematic inquiry, and it shares the limitation that all sciences suffer, given the great complexity of their respective subjects. The next Part examines the strengths and weaknesses of scientific inquiry, and what value an imprecise and changeable social science has to legal decisionmaking.

⁶⁴ Inevitably, the question is raised as to when a hypothesis or explanation is scientific enough to be relied upon by legal decisionmakers. While this question is integral to much of the discussion below, it is ultimately not one amenable to simple answer. Popper poses and answers the same question — as posed to scientists — as follows:

The question "What kind of explanation may be satisfactory?" thus leads to the reply: an explanation in terms of testable and falsifiable universal laws and initial conditions. And an explanation of this kind will be the more satisfactory the more highly testable these laws are and the better they have been tested. (This applies also to the initial conditions.)

K. POPPER (1979), *supra* note 44, at 193.

II. ON ACHIEVING AN OBJECTIVE SOCIAL SCIENCE

Implicit or explicit in virtually all discussions of the significance of social science findings to legal decisionmaking lies the question of whether social inquiry can be scientific. Although this question has received significant attention from social scientists⁶⁵ and philosophers of science,⁶⁶ it has troubled legal commentators surprisingly little.⁶⁷ This Part is divided into two sections. First, I consider the argument that social inquiry cannot be objective in the way the natural sciences are, because social researchers' values inevitably interfere with the inquiry. Next, I consider the relevance of valid social science research to legal decisionmaking and, in particular, respond to the argument that relying on social science findings will subject the law to constant change as findings change.

A. *Checking the Effects of Researchers' Values*

Perhaps the most often repeated criticism of social science is that it is inherently value-laden.⁶⁸ Part of this belief comes from the fact that as human beings social scientists study themselves. Social scientists bring too much baggage of their own to the laboratory, the argument goes, to be able to study other people's behavior objectively. Without question, social

⁶⁵ See Krawiec, *Is Psychology a Science?*, 3 ACADEMIC PSYCHOLOGY BULL. 21 (1981); Vallance, *Social Science and Social Policy: Amoral Methodology in a Matrix of Values*, 27 AM. PSYCHOLOGIST 107 (1972); Levine, *Scientific Method and the Adversary Model: Some Preliminary Thoughts*, 29 AM. PSYCHOLOGIST 661 (1974); Youtz, *Some Comments on "Scientific Method and the Adversary Model,"* 29 AM. PSYCHOLOGIST 714 (1974).

⁶⁶ See generally E. NAGEL, *supra* note 44, at 447-85; Cohen, *Reason in Social Science*, in READINGS IN THE PHILOSOPHY OF SCIENCE (H. Feigl & M. Brodbeck eds. 1953).

⁶⁷ A recent exception, perhaps, is Fineman & Opie, *supra* note 10, at 124-31, in which they briefly survey what they term the "modern criticisms of social science." *Id.* at 127. Although they explain that their critique is not meant to be exhaustive, it unfortunately fails to confront the more subtle questions presented. For example, the argument is made that "[i]nherent in the elevation of positivism to the position where it is viewed as providing answers is a belief that values have not interfered with the framing of the questions or the presentation of the answers, and that facts are discoverable, knowable, and dispositive." *Id.* However, most social scientists, indeed all scientists, know the disruptive role values play in their research. The challenge is understanding what effect scientists' values have on their data, and controlling it. As I discuss *infra* at notes 68-166 and accompanying text, the potential prejudicial effect of values on social science findings dictates a cautionary approach to such findings, not blind rejection of them.

⁶⁸ See, e.g., Fineman & Opie, *supra* note 10, at 127; O'Brien, *supra* note 10, at 12; see also Jones, *Legal Inquiry and the Methods of Science*, in LAW AND THE SOCIAL ROLE OF SCIENCE 120, 128-29 (H. Jones ed. 1966).

scientists' values affect the kinds of research done and, at least indirectly, the findings of that research. This is true of the natural sciences as well. The topics selected for study, the variables identified as worthy of measurement, and, to some extent, the interpretation of findings, depend on the values or interests of the scientist and the times in which she lives. The primary advantage of the scientific method is not that it eliminates a researcher's bias, only that it reveals the bias that does exist.

Essentially four possible sources of bias in social inquiry can be identified: 1) the selection of problems, 2) the determination of the contents of conclusions, 3) the identification of fact, and 4) the assessment of evidence.⁶⁹

1. *The Selection of Problems*

Social scientists have been criticized repeatedly, and with good reason, for spending a disproportionate amount of time on law-related issues about which the law cares relatively little. For example, researchers' efforts to study juries is out of all proportion either to the number of trials or to the number of trials involving juries.⁷⁰ Similarly, a Martian reading the social science and law literature might come away believing eyewitness misidentification was the most important empirical issue, and one of the only issues, facing the legal system.⁷¹

Not surprisingly, social scientists tend to select problems on the basis of their interests, their understanding of the law, and the amenability of the problems to scientific study. Thus, the proliferation of studies on eyewitness identification is understandable, in that it flows naturally from a long history of research on human perception. Also, a nonlawyer can easily understand the danger of eyewitness misidentification and its importance

⁶⁹ These sources of bias were originally posited — and refuted — by Professor Ernest Nagel. E. NAGEL, *supra* note 44, at 485. This Part owes a significant debt to Professor Nagel for his earlier analysis of many of the general issues related to the law discussed here.

⁷⁰ One commentator notes that though researchers' preoccupation with juries is not very realistic it may be "conceptually justifiable." See Loh, *Psycholegal Research: Past and Present*, 79 MICH. L. REV. 659, 678 (1981) ("Although only a minority of cases go to trial and fewer yet are heard by a jury, the ideal of using lay members to find facts, to interpose the conscience of the community, and to legitimate official action is part of the foundation of our system of justice.").

⁷¹ See Saks, *The Law Does Not Live By Eyewitness Testimony Alone*, 10 LAW & HUM. BEHAV. 279 (1986); Konecni & Ebbesen, *Courtroom Testimony by Psychologists on Eyewitness Identification Issues*, 10 LAW & HUM. BEHAV. 117 (1986).

to the law.⁷² Moreover, this type of research is relatively easy to do, especially since college sophomores can be used as subjects. Thus, unlike the study of a complex legal issue such as property distribution under intestate succession laws,⁷³ eyewitness perception requires little legal sophistication and is relatively easy to research.

Criticism of problem selection in the social sciences should be directed more at the possible lack of relevance of the research and less at the inherent value bias of the researchers. Scientists select problems on the basis of what seems important, and to this extent all science is culture-bound.⁷⁴ In the present context, however, what is important is decided by the law. For example, following the Supreme Court's call for empirical research on jury size in *Williams v. Florida*,⁷⁵ the law and social science literature abounded with such research.⁷⁶ These findings were later used (though how well remains a matter of dispute)⁷⁷ in the Court's determination that

⁷² See Loftus, *Reconstructing Memory: The Incredible Eyewitness*, 15 JURIMETRICS J. 188, 190 (1975) ("Since eyewitness testimony carries so much weight, it is important to find out why distortion occurs in a witness' memory.").

⁷³ See J. MONAHAN & L. WALKER, SOCIAL SCIENCE IN LAW: CASES AND MATERIALS 275-84 (1985) [hereinafter J. MONAHAN & L. WALKER (1985)].

⁷⁴ E. NAGEL, *supra* note 44, at 486.

⁷⁵ 399 U.S. 78 (1970).

⁷⁶ See, e.g., Davis, Bray & Holt, *The Empirical Study of Decision Processes in Juries: A Critical Review*, in LAW, JUSTICE AND THE INDIVIDUAL IN SOCIETY: PSYCHOLOGICAL AND LEGAL ISSUES 326 (J. Tapp & F. Levine eds. 1977); Penrod & Hastie, *Models of Jury Decision-Making: A Critical Review*, 86 PSYCHOLOGY BULL. 462 (1979).

Another example of social scientists' responsiveness to judicial requests for research involves the effect in capital cases of disqualifying jurors who have moral or religious scruples which would prevent them from ever voting for the death penalty. In *Witherspoon v. Illinois*, 391 U.S. 510, 521-23 (1968), the Court held that excluding jurors in capital cases who would refuse to impose the death penalty did not violate a defendant's sixth or fourteenth amendment rights. However, the Court specifically noted that insufficient data existed to "conclude, either on the basis of the record now before us or as a matter of judicial notice, that the exclusion of jurors opposed to capital punishment results in an unrepresentative jury on the issue of guilt or substantially increases the risk of conviction." *Id.* at 517-18. Following *Witherspoon*, psychologists devoted much attention to the question presented, with most researchers reporting a relationship between "death-qualified" juries and increased conviction rates. See generally *Special Issue: Death Qualification*, 8 LAW & HUM. BEHAV. 1 (C. Haney ed. 1984). Despite this attention, the Court recently affirmed *Witherspoon*, finding the research conducted in the interim unhelpful. *Lockhart v. McCree*, 476 U.S. 162, 166-68 (1986); see generally Bersoff, *Social Science Data and the Supreme Court: Lockhart as a Case in Point*, 42 AM. PSYCHOLOGIST 52 (1987) (suggesting a contrary conclusion to the *Lockhart* ruling in light of the great volume of social science research).

⁷⁷ See Kaye, *And Then There Were Twelve: Statistical Reasoning, The Supreme Court, and The Size of the Jury*, 68 CALIF. L. REV. 1004 (1980).

a jury comprised of less than six members deprives a person of the right to a trial by jury.⁷⁸

Although it is true that studying a phenomenon gives it status,⁷⁹ lawmakers remain the ultimate arbiters of a phenomenon's status. In most cases, researchers take their cue from the agenda set by lawmakers. Even when social scientists are ahead of the law in identifying and studying factors of possible importance, lawmakers must independently assess the legal relevance of the factors identified.⁸⁰ Certainly, policymakers should never defer to psychologists' ordering of phenomenon, just as they must guard against singling out for reliance certain factors simply because these factors have been the subject of scientific testing. As long as lawmakers are deciding the areas of importance, they have no ground to criticize the researchers' fidelity.

2. *The Determination of the Contents of Conclusions*

A more difficult problem inheres in the presumed tendency of social scientists to graft their values onto their conclusions. In this section, I assume that factual judgments can be separated from value judgments, so that managing value-charged social scientific conclusions is merely a practical matter. The validity of this assumption is considered in the following discussion. Therefore, the difficulty becomes discerning which conclusions are compelled by the scientific findings, and which are the product of a researcher's social ideals.⁸¹

It may be assumed that in many cases what initially attracts researchers to legal problems is the hope to reform legal rules they view as "substantively" wrong. In researching the factual context of a legal rule with which social scientists disagree, they may unwittingly (or wittingly) interpret their data as more supportive of a particular normative position than

⁷⁸ *Ballew v. Georgia*, 435 U.S. 223, 243-45 (1978).

⁷⁹ See Fineman & Opie, *supra* note 10, at 125 n.50.

⁸⁰ The Supreme Court, for example, has not been shy about ignoring the presence of empirical research when the research contradicts an empirical assumption the Court wishes to make, *see supra* note 76 (discussing *Witherspoon* and its progeny), or did not support a decision reached on other grounds, *see infra* text accompanying notes 325-32 (discussing *McCleskey v. Kemp*, 481 U.S. 279 (1981)); *see generally* Shaman, *Constitutional Fact: The Perception of Reality By The Supreme Court*, 35 U. FLA. L. REV. 236 (1983).

⁸¹ E. NAGEL, *supra* note 44, at 488-89; *see also* Passmore, *Can the Social Sciences Be Value-Free?*, in READINGS IN THE PHILOSOPHY OF SCIENCE 674 (H. Feigl & M. Brodbeck eds. 1953).

the data actually compels. Although natural scientists share this source of difficulty, they do so to a lesser degree because a natural scientist's inquiry tends to be less value-laden. Unfortunately, "prevent[ing] our likes, aversions, hopes, and fears from coloring our conclusions" may not be entirely feasible.⁸² At the same time, researchers' prejudices are not fatal to scientific social inquiry.

In the short-term, lawyers and social scientists share the burden of identifying and eliminating bias from research findings. For their part, researchers must be more forthcoming, possibly by stating explicitly their substantive biases entirely separately from their scientific findings.⁸³ Of course, such a practice will never be totally effective, because many value preferences are not fully known to the scientist, or their effect on the analysis is not fully understood.⁸⁴ Nonetheless, a greater recognition of the problem will likely mitigate its effect. Additionally, social scientists should display more modesty when evaluating the significance of their findings. Sometimes researchers exude the confidence in their conclusions that their one study has settled the matter for the law.⁸⁵ Rarely, if ever, is one study so conclusive that a legal rule can rest solely upon it.⁸⁶

Lawyers also must take responsibility for identifying bias where it occurs in empirical research. This means that lawyers must understand more than the conclusion; they must also consider how the findings were obtained.⁸⁷ For this purpose, the most important section for lawyers to read and understand in a scientific paper is the methods section. There, the researcher explains the design of the study, describes the sample population, defines — concretely — the question addressed, and describes the

⁸² E. NAGEL, *supra* note 44, at 488.

⁸³ *Id.* at 489; see also G. RUSSELL, *THE CHANGING ROLE OF FATHERS?* 206 (1983) ("It is impossible to achieve complete objectivity [in research], and therefore it should perhaps be mandatory that people state their biases so that others may better interpret and understand their work.").

⁸⁴ E. NAGEL, *supra* note 44, at 489.

⁸⁵ See Levine, Book Review, 34 *HASTINGS L.J.* 1325, 1338-39 (1983) (suggesting that the authors of an empirical study of court decisions involving educational policy asserted too much for their findings in light of certain methodological flaws in the study).

⁸⁶ See Mahoney, *Experimental Methods and Outcome Evaluation*, 46 *J. CONSULTING & CLINICAL PSYCHOLOGY* 660, 660 (1978) ("The perfect experiment has yet to be designed and is, in some sense, inconceivable.") (citation omitted).

⁸⁷ See D. HOROWITZ, *THE COURTS AND SOCIAL POLICY* 279 (1977) (The author discusses several cases in which he found that the Supreme Court relied on summaries of studies "to the detriment of accuracy and completeness.").

measures used to evaluate the question. The worth, or worthlessness, of a study can almost always be discerned from the methods section. And only if one understands how the study was conducted can one evaluate the soundness of the researcher's conclusions.

The ability of readers of the scientific literature to identify errors due to extraneous factors should not be overstated, because some errant variables will not be observable in the methods, or any other, section. A multitude of unanticipated factors could influence the findings of a particular study or series of studies. But in the long-term, the ordinary checks inherent in the scientific enterprise can be relied upon to expose the biases, unconscious or conscious, of the researchers.⁸⁸ Professor Nagel explained the dynamics of this system as follows:

[M]odern science encourages the invention, the mutual exchange, and the free but responsible criticisms of ideas; it welcomes competition in the quest for knowledge between independent investigators, even when their intellectual orientations are different; and it progressively diminishes the effects of bias by retaining only those proposed conclusions of its inquiries that survive critical examination by an indefinitely large community of students, whatever be their value preferences or doctrinal commitments.⁸⁹

The conclusion that value biases influence the lessons researchers draw from their data is less surprising than the suggestion that lawmakers can be so easily misled by that bias. The methods and conclusions of social science research are like the premises and conclusions of legal argumentation: the validity of the premises must be determined in order to assess the soundness of the conclusions that the premises purportedly compel. Just as no good lawyer would accept a legal conclusion without examining the validity of the premises, no good lawmaker should accept research findings without examining how they were obtained.

3. *The Identification of Fact*

A more fundamental criticism of scientific social inquiry concerns the assumption made in the previous section that fact and value are distin-

⁸⁸ See Jones, *supra* note 68, at 127-29.

⁸⁹ E. NAGEL, *supra* note 44, at 489-90; see generally D. HULL, *SCIENCE AS A PROCESS: AN EVOLUTIONARY ACCOUNT OF THE SOCIAL AND CONCEPTUAL DEVELOPMENT OF SCIENCE* (1988).

guishable in social inquiry. Critics argue that in studying purposive human behavior, value judgments invariably become intertwined with the descriptions of that behavior.⁹⁰ Specifically, in the ordinary course of describing and categorizing events, social scientists cannot help but make evaluative judgments. The alternative of describing discrete factual events would be cumbersome, simplistic, and probably misleading. An arguable instance of this criticism is the psychological study of children's competence. An unavoidable consequence of studying competence, it might be argued, is the inevitable value judgment required by that categorization. This criticism, however, misconstrues the evaluative role of social scientific inquiry.

Without denying that many researchers blur factual judgments and value judgments in the course of scientific inquiry, in principle these judgments can be kept distinct. Professor Nagel noted that confusion often arises from the failure to distinguish between "characterizing value judgments" and "appraising value judgments." He provided the following example of a characterizing value judgment from biology:

Animals with blood streams sometimes exhibit the condition known as "anemia." An anemic animal has a reduced number of red blood corpuscles, so that, among other things, it is less able to maintain a constant internal temperature than are members of its species with a "normal" supply of such blood cells. However, although the meaning of the term "anemia" can be made quite clear, it is not in fact defined with complete precision. . . . [T]o decide whether a given animal is anemic, an investigator must judge whether the available evidence *warrants* the conclusion that the specimen is anemic. . . . When the investigator reaches a conclusion, he can therefore be said to be making a "value judgment," in the sense that he has in mind some standardized type of physiological condition designated as "anemia" and he *assesses* what he knows about his specimen with the measure provided by this assumed standard.⁹¹

⁹⁰ See Fineman & Opie, *supra* note 10, at 130 ("The data can never be totally separated from the political, personal, and professional opinions of the person manipulating them."); Whitford, *Critical Empiricism*, 14 LAW & SOC. INQUIRY 61, 62 (1989) (asserting "the impossibility of fully separating description from evaluation"); see also Markey, *Jurisprudence or "Juriscience"?*, 25 WM. & MARY L. REV. 525, 529 (1984).

⁹¹ E. NAGEL, *supra* note 44, at 492-93 (emphasis in original).

In addition to the assessment that the animal is anemic, a biologist might assert that this condition is undesirable because of the animal's inability to maintain itself. Professor Nagel referred to such expressions of approval or disapproval as " 'appraising value judgments.' " ⁹² To be sure, at times the terminology of social inquiry make fact/value distinctions difficult, with characterizing value judgments often implying appraising value judgments. But this point only counsels caution; it does not contravene the capacity of social scientists to make the distinction.

By distinguishing characterizing value judgments from appraising value judgments, the factual nature of social scientific inquiry into children's competence, for instance, can be understood. For example, psychologists interested in children's competence have gleaned certain characteristics from case law associated with various areas of legal competence. ⁹³ In studying this question, researchers typically compare children of different ages to adults (who are presumed competent by the law) on these factors. ⁹⁴ Subsequent characterizations of certain children as competent is analogous to the biologist's characterizations concerning anemia in animals. Based on the identified characterizing criteria, the researcher classifies the subject group either within or outside the category of competence.

But this practice raises a concern over the character of the tests used to assess the relevant legal question: in examining the factual question having legal relevance, how has the social scientist "operationally defined" ⁹⁵ the issue thought to be of interest? How can we be sure that the "competence" the courts speak about is the same "competence" the social scientists measured in their research? The short answer to this question is that we cannot be sure; but a court *can* compare what the social scientist did test with its own conception of competence. For example, in evaluating juveniles' "competency" to waive their *Miranda* rights, Professor Grisso identified primarily three components of competency reflected in the legal literature: 1) comprehension of rights, 2) beliefs about legal context, and

⁹² *Id.* at 493.

⁹³ See, e.g., T. GRISSO, JUVENILES' WAIVER OF RIGHTS: LEGAL AND PSYCHOLOGICAL COMPETENCE 41-58 (1981).

⁹⁴ See, e.g., *id.* at 95-97; Weithorn & Campbell, *The Competency of Children and Adolescents to Make Informed Treatment Decisions*, 53 CHILD DEV. 1589, 1591 (1982).

⁹⁵ As discussed more fully *supra* at note 50, operational definitions are "the link[s] between the empirical (or descriptive) terms of our scientific language and the data of experience." Feigl, *supra* note 50, at 253.

3) problem solving style.⁹⁶ Since Professor Grisso's tests of competency are based on courts' explanations of the concept, courts might be expected to find his results to be of some assistance to their original inquiry. The important point is that such a comparison can be made. Whether the psychological measure of competence adequately meets the legal conception of competence, therefore, remains challengeable separately in the same way that the factors characterizing anemia may be challenged. But in no respect does the characterizing value judgment that children of a certain age are "competent" entail a corresponding appraising value judgment.

In fact, psychological studies which find children as young as fifteen comparable to adults in their competency to make important decisions may be cited to support widely divergent legal conclusions. Whereas this research may support children's participation in decisions of commitment to mental hospitals⁹⁷ and autonomous abortion decisions,⁹⁸ it may also support juveniles' waivers of *Miranda* rights⁹⁹ and perhaps even juvenile capital punishment statutes.¹⁰⁰ Although the cognitive ability of children is a scientific question, the legal consequences that befall competent and incompetent children remain policy choices. Psychology might be able to identify some of the consequences of choosing one course over another, but it can never offer a scientific judgment on what effects are *better* avoided. Therefore, a court may continue to hold that fifteen-year-old children

⁹⁶ T. GRISSO, *supra* note 93, at 41-58; *see also* Weithorn & Campbell, *supra* note 94, at 1594-95 (The researchers evaluated competency on four scales: 1) evidence of choice, 2) reasonable outcome, 3) rational reasons, and 4) understanding.).

⁹⁷ *See* Weithorn & Campbell, *supra* note 94, at 1596.

⁹⁸ *See* G. MELTON & A. PLINER, *Adolescent Abortion: A Psychological Analysis*, in *ADOLESCENT ABORTION: PSYCHOLOGICAL AND LEGAL ISSUES* 5 (G. Melton ed. 1986).

⁹⁹ *See* T. GRISSO, *supra* note 93, at 194 (Professor Grisso's research potentially supports a "conservative" result on the basis of his finding that juveniles between the ages of 15 and 16 with I.Q. scores above 80 "demonstrate[] a level of understanding and perception similar to that of 17-21-year-old adults for whom the competence to waive rights is presumed in law.").

¹⁰⁰ *See, e.g.*, Hoffmann, *On the Perils of Line-Drawing: Juveniles and the Death Penalty*, 40 HASTINGS L.J. 229 (1989). Professor Hoffmann argues that the failure to apply the death penalty to juveniles on the basis of age alone creates "comparative injustice" if the same punishment would be applied to an adult under similar circumstances. According to Professor Hoffmann, age operates as only a rough approximation of such possible mitigating factors as "immaturity, poor judgment, lack of responsibility, and inability to evaluate carefully the possible consequences of one's conduct." *Id.* at 275. Taken together, these factors may be said to represent a sort of "competence to commit capital offenses." Presumably, if empirical research demonstrated that 15 and 16 year-olds were "competent" along the lines Professor Hoffmann suggests, it would tend to support capital punishment statutes for offenders this age. *Id.* at 275-80.

should not be consulted when committed to mental hospitals, even though they generally may be as competent to make important decisions as adults. This result might be justified because of a concern for family autonomy¹⁰¹ or recognition of competing parental rights.¹⁰² When confronted by conflicting value choices, courts must exercise their best judgment in light of all of the information available; where relevant, social science research can help clarify the available choices.

4. *The Assessment of Evidence*

In addition to accusations that a researcher's values affect her conclusions, critics claim that bias may enter into the very assessment of data.¹⁰³ Three variants of this claim will be considered: first, that a researcher's social position and educational training influence the kinds of evidence deemed important; second, that the statistical decision rules employed by researchers mask important value choices;¹⁰⁴ and third, that historically, a researcher's relative "social perspective" impedes attempts to identify "universal" principles.¹⁰⁵

Whether a researcher's social status affects the kinds of evidence she deems relevant to social inquiry is an empirical question.¹⁰⁶ Some support may be expected for the view that a researcher's socioeconomic, religious, and political views play some part in the assessment of data. But, as the previous discussion indicates, manifestations of such bias are recognizable by careful review of the measures applied in the research. Once prejudice is identified, a study's findings may be discounted, or dismissed accordingly.

A somewhat more technical objection to the problem of assessing evidence concerns the statistical rules that researchers use to decide if any effect has occurred. When comparing sample populations in order to determine whether some variable has had an effect, two types of error are

¹⁰¹ See *Parham v. J.R.*, 442 U.S. 584, 598-604 (1979).

¹⁰² See *Planned Parenthood v. Danforth*, 428 U.S. 52, 73 (1976).

¹⁰³ E. NAGEL, *supra* note 44, at 495.

¹⁰⁴ See generally Rudner, *The Scientist Qua Scientist Makes Value Judgments*, in *INTRODUCTORY READINGS IN THE PHILOSOPHY OF SCIENCE* 231 (E. Klemke, R. Hollinger & A. Kline eds. 1980).

¹⁰⁵ E. NAGEL, *supra* note 44, at 495.

¹⁰⁶ *Id.* at 495-96.

possible. A researcher might conclude that the factor of interest did have an effect when it did not (type I error); or she might conclude that the factor of interest had no effect when it did (type II error).¹⁰⁷ Social scientists are well acquainted with the sources of these errors and have devised various strategies to avoid them. The present criticism, however, is directed not at the possibility of error, but instead at the values employed when deciding to avoid one error at the expense of possibly committing the other.

An example will assist the discussion. Suppose a researcher is interested in whether a diversionary program, which provides job training to criminal offenders as an alternative to prison, lowers recidivism rates. Hypothesizing that the program will lower recidivism rates, she subsequently conducts a study comparing program participants to a control group of individuals who received prison sentences. Upon comparison, the researcher finds different recidivism rates between the two groups, but must decide whether they are "significant" enough to conclude that the diversionary program made the difference; after all, some differences should be expected as a matter of chance. In assessing her data, the researcher must be cognizant of the possibility of committing one of the two types of error mentioned above. If she makes a type I error, she will erroneously conclude that the program had an effect when it did not, and thus potentially contribute to a decision to release more prisoners to such programs. Alternatively, she might make a type II error, erroneously concluding that the program did not have an effect when it did, and thus potentially contribute to a decision not to release prisoners to such programs. Unfortunately, even when using statistical methods, she cannot eliminate or fully minimize the chance of making both types of error at the same time, and therefore must decide which error is more important to avoid. It appears, therefore, that researchers cannot avoid importing their values into the assessment of data.¹⁰⁸

Although the above example illustrates a valid source of concern, the magnitude of the problem is not as great as it might first appear. Within the social sciences, certain conventions have arisen that minimize an experimenter's independent judgment regarding drawing conclusions from

¹⁰⁷ See generally COOK & CAMPBELL, *supra* note 26, at 42-43.

¹⁰⁸ See Rudner, *supra* note 104, at 232-33.

data. In particular, the much discussed convention of a .05 probability of confidence restricts researchers to the relatively conservative risk of a five percent chance of finding type I errors.¹⁰⁹ On some occasions, researchers might wish to lessen the risk of making a type I error by adopting a more conservative level of confidence, say one out of one hundred (.01). Similarly, less concern with making a type I error may lead a researcher to adopt a less conservative level of confidence, possibly ten out of one hundred (.10).¹¹⁰ Without question, scientists' value preferences could affect the setting of confidence levels in a way that makes drawing a particular conclusion more or less difficult. Ideally, these judgments should be the responsibility of lawmakers;¹¹¹ in any case, the standard selected should always be made explicit so that readers understand the decision rule the scientist applied in stating her conclusion. Departures from .05, and indeed even the decision to use a confidence level of .05, should be scruti-

¹⁰⁹ See D. BARNES, *STATISTICS AS PROOF: FUNDAMENTALS OF QUANTITATIVE EVIDENCE* 237-38 (1983); D. HINKLE, W. WIERSMA & S. JURS, *APPLIED STATISTICS FOR THE BEHAVIORAL SCIENCES* 159 (1979).

¹¹⁰ One standard statistics textbook suggests that researchers should find an effect when the "p" level is less than .01 (i.e., probability of making a type I error is less than one percent) but not when it is greater than .10. When the p level is in between, the significance is borderline, and any conclusions should be viewed accordingly. D. KLEINBAUM & L. KUPPER, *APPLIED REGRESSION ANALYSIS AND OTHER MULTIVARIABLE METHODS* 29 (2d ed. 1988).

Consider the example of a researcher studying the toxicity of a drug on experimental animals. The researcher must decide between two hypotheses: 1) the drug is toxic, and 2) the drug is not toxic. If only a few animals experience serious side effects after receiving the drug, she must consider the consequences of making either a type I error or a type II error. Her assessment necessarily will be guided by her view of the values at stake. E. NAGEL, *supra* note 44, at 496-97. To take a contemporary example, if she is studying a possible AIDS treatment, her greater concern may be committing a type II error. Depending on the nature of the side effects, the consequences of erroneously concluding that the drug has no effect are great in light of the effect of the AIDS virus left untreated. This judgment may lead her to adopt a relatively liberal level of confidence of ten percent. On the other hand, she may be studying an anti-wrinkle drug such as Retin-A, thus being particularly concerned with making a type I error. In this case, the researcher must balance distribution of a toxic drug against lower profits for drug companies and an older looking population. These concerns may lead her to adopt a very conservative level of confidence, possibly as high as one out of a thousand.

¹¹¹ Judging what is the acceptable risk of making an error is not uncommon to the law. For instance, in exploring the presumption of innocence, a basic premise of our criminal justice system, Professor Scott Sundby observes as follows:

How far we extend the presumption of innocence is an issue of balancing society's interest in controlling crime and society's interest in not convicting innocent individuals. Consider, for example, how the presumption of innocence is often colloquially expressed: it is better to let ten guilty go free than to convict one innocent person.

Sundby, *The Reasonable Doubt Rule and the Meaning of Innocence*, 40 HASTINGS L.J. 457, 459-60 (1989).

nized independently by anyone relying on a researcher's findings.¹¹² Once again, the important lesson is that a review of a researcher's methodological discretion illuminates biases potentially affecting the reported findings.¹¹³

The third and most "radical" claim that values influence the assessment of data maintains that a "necessary *logical* connection" exists between the researcher's social perspective and the method and understanding of what is studied, rendering lessons from one time or place of no relevance to another time or place.¹¹⁴ Knowledge of societal or cultural facts, according to this view, is context specific. Therefore, the factual validity of a social finding can only be understood by knowing the society from which it emerged.¹¹⁵ As Professor Nagel explained the criticism, "there is no analysis of social phenomena which is not the expression of some special social standpoint, or which does not reflect the interests and values dominant in some sector of the human scene at a certain stage of its history."¹¹⁶

Although the claim typically excludes the natural sciences from its critical gaze,¹¹⁷ natural scientists also must state conclusions in a manner dependent on context. For instance, simply measuring the velocity of a stone dropped from a fixed point requires specification of the system of measurement used as well as a statement of the experimental conditions under which the measurement is taken. The situational dependence of this example is complicated further by adding the perspective of the observer. Albert Einstein provided the paradigmatic illustration of this complication:

I stand at the window of a railway carriage which is travelling uniformly, and drop a stone on the embankment, without throwing it. Then, disregarding the influence of the air resistance, I see the stone

¹¹² See *Watson v. Fort Worth Bank*, 108 S. Ct. 2777, 2789 n.3 (1988) (advocating a case-by-case analysis of mathematical disparities as a reflection of the belief that the usefulness of statistics "depends on all of the surrounding facts and circumstances") (quoting *Teamsters v. United States*, 431 U.S. 324, 340 (1977)).

¹¹³ Whatever problems exist in regard to statistical decision rules should not be overstated. Only rarely will the assessments made in the typical investigation be particularly controversial or involve the special commitment of the researcher. E. NAGEL, *supra* note 44, at 497.

¹¹⁴ *Id.* at 498.

¹¹⁵ See K. MANNHEIM, *IDEOLOGY AND UTOPIA: AN INTRODUCTION TO THE SOCIOLOGY OF KNOWLEDGE* 271 (1959).

¹¹⁶ E. NAGEL, *supra* note 44, at 498.

¹¹⁷ *Id.* at 499.

descend in a straight line. A pedestrian who observes the misdeed from the footpath notices that the stone falls to earth in a parabolic curve. I now ask: Do the "positions" traversed by the stone lie "in reality" on a straight line or on a parabola?¹¹⁸

Absolute objectivity, it would seem, is unattainable even in natural science.¹¹⁹ Yet, substantial objectivity, or what Professor Nagel refers to as "relational objectivity," is achieved when natural scientists identify invariant connections between factors, that is, formulations which are valid irrespective of some particular perspective.¹²⁰ As a matter of logic, natural science can, and often does, identify relations which are demonstrable within the specifications established by experiment and which transcend particular value orientations or social perspectives.

The social sciences also operate in relationally specific contexts. To the extent that objectivity in the natural sciences depends on identifying and then transcending specific relational contexts, the social sciences, in principle, can do the same. Even though two sets of experimental results may be the product of separate social perspectives or value orientations, additional research may seek out "common denominators" from which results may be formulated, irrespective of the researcher's initial perspectives.¹²¹ The complaint that the new synthesis suffers from a similar perspective-myopia can be admitted, though it is hardly the fatal flaw social science's critics suppose; the claim for social science, as well as natural science, is relative objectivity, not absolute objectivity.

A researcher's values and social perspective inevitably intrude into the identification of problems, the analysis of data, and the conclusions drawn from the inquiry into social facts. Adhering to the scientific method in such studies perhaps provides only a limited, and not entirely satisfying, check on the interference of researchers' biases. But, however imperfect the process might be, the benefits of a *scientific* social inquiry are worth the effort. The next section addresses the question of the relevance of this work to the law.

¹¹⁸ A. EINSTEIN, *RELATIVITY: THE SPECIAL AND THE GENERAL THEORY* 9 (Holt ed. 1920).

¹¹⁹ See generally T. KUHN, *THE STRUCTURE OF SCIENTIFIC REVOLUTIONS* (2d ed. 1970).

¹²⁰ E. NAGEL, *supra* note 44, at 501.

¹²¹ *Id.*

B. The Effect of a Changing Social Science on the Evolution of the Law

Many critics fear that the substantial use of findings in social science will place the law on an indefinite footing, rendering it subject to the vagaries of the latest scientific discovery.¹²² Empirical findings, the argument goes, will always be bound to the specific conditions under which the study was conducted, continually being modified or revised by later studies, and a compliant law will be rendered indefinite as a result.¹²³ This contention must be addressed on two levels. First, on a practical level, it must be admitted that the social sciences have yet to offer theories that predict human behavior with certainty; nor are social scientists able to include in their explanatory models all variables that could influence behavior. But these limitations should make the social sciences modest, not irrelevant. Moreover, it remains possible, at least theoretically, that social scientists may one day articulate and test general theories or laws of human behavior in much the same way as the natural sciences do now. Yet, even if successful in doing so, the legal utility of such models remains in doubt.

1. The Indeterminacy of Social Science

One consequence of the law's reliance on scientists for knowledge of social facts is that the law might fluctuate with every new data set¹²⁴ or, alternatively, change too slowly while waiting for new data to be collected.¹²⁵ By far the favorite catalyst for the dire predictions surrounding claims of social scientific indeterminacy is footnote eleven of *Brown v. Board of Education*.¹²⁶ In footnote eleven, the Court cited a series of studies conducted by Dr. Kenneth Clark and others that purportedly demonstrated the low self-image of blacks attending segregated schools

¹²² See Greeley, *supra* note 10, at 34.

¹²³ See O'Brien, *supra* note 10, at 20.

¹²⁴ See, e.g., Cahn, *Jurisprudence*, 30 N.Y.U. L. REV. 150, 167 (1955) ("[S]ince the behavioral sciences are so very young, imprecise, and changeful, their findings have an uncertain expectancy of life. Today's sanguine asseveration may be cancelled by tomorrow's new revelation — or new technical fad."); O'Brien, *Of Judicial Myths, Motivations and Justifications: A Postscript on Social Science and the Law*, 64 JUDICATURE 285, 289 (1981) (arguing that constitutional standards should not rest on the most recent public opinion survey).

¹²⁵ See, e.g., Berger, *Desegregation, Law, and Social Science*, 23 COMMENTARY 471, 476 (1957) ("[W]e may reach a point where we shall be entitled to equality under law *only* when we can show that inequality has been or would be harmful.") (emphasis in original).

¹²⁶ 347 U.S. 483, 494 (1954).

compared to blacks attending integrated schools.¹²⁷ In apparent reliance on this research, the Court concluded that "separate but equal" was not equal after all. The *Brown* footnote has spurred vociferous commentary, some of it critical of the studies cited,¹²⁸ but most of it critical of the Court's purported reliance on social science findings, whatever the validity of the studies.

The latter criticism, that the Court should not have considered even valid social science data, is curious. One commentator argued, for instance, that the "interpretation that isolation of minorities is inherently unequal and discriminatory has more quality if backed by reason, history and experience."¹²⁹ And indeed, "[w]e would pose a greater danger to our 200 year experience in constitutional interpretation relying on social science data rather than on the bedrock of a coherent constitutional principle."¹³⁰ But much of the rationale for the original "separate but equal" doctrine rested upon the "social science data" of the nineteenth century,¹³¹ so it is at least natural to refute that rationale with the social science data of the present day.¹³² In any event, regardless of whether it is articulated, interpreting the equal protection clause to mean that separate facilities are "unequal and discriminatory" rests upon the judgment that unacceptable consequences follow social isolation of one group. The form of these alleged consequences is an empirical question,¹³³ however obvious the an-

¹²⁷ See generally M. CHESLER, J. SANDERS & D. KALMUSS, *SOCIAL SCIENCE IN COURT: MOBILIZING EXPERTS IN THE SCHOOL DESEGREGATION CASES 18-22* (1988) [hereinafter *SOCIAL SCIENCE IN COURT*].

¹²⁸ See, e.g., Cahn, *supra* note 124, at 161-65.

¹²⁹ Doyle, *Can Social Science Data Be Used in Judicial Decisionmaking?* 6 J. L. & EDUC. 13, 18 (1977).

¹³⁰ *Id.*; see also Greeley, *supra* note 10, at 49.

¹³¹ See P. ROSEN, *THE SUPREME COURT AND SOCIAL SCIENCE* 29-30 (1972); Hovenkamp, *Social Science and Segregation Before Brown*, 1985 DUKE L.J. 624, 627 ("[T]he law of race relations [at the time of *Plessy v. Ferguson*] was a product of the period's social science, just as the law of race relations developed by the Warren Court during the *Brown* era was a product of the social science of that period.").

¹³² Hovenkamp, *supra* note 131, at 627-28. See generally *SOCIAL SCIENCE IN COURT*, *supra* note 127 (reviewing the history of the *Brown* litigation and the factors that went into the decision to employ social scientists as part of the litigation strategy).

¹³³ Professor Dworkin argues otherwise, drawing on the distinction between causal relationships and interpretative judgments, a distinction roughly identical to the one between characterizing value judgments and appraising value judgments made *supra* at note 93 and accompanying text. Beginning with a premise from another scholar, Dworkin argues as follows:

"We don't need evidence for the proposition that segregation is an insult to the Black

swer might seem in the late twentieth century.¹³⁴ Valid data on this issue should not be eschewed for proving the obvious. Rather, valid data should provide confirmation of an obvious social condition, thereby spurring reform otherwise slow in coming.

Still, the concern arises that explicit reliance on social science research might lead to the undercutting of some legal rules if subsequent studies contradict the earlier studies first used to establish the rule.¹³⁵ For example, if studies now found that blacks in segregated schools have higher self-esteem than blacks in integrated schools, then this finding might cast doubt on the continuing validity of the rule announced in *Brown*. But this argument attributes more influence to the data than it surely had in the *Brown* decision. At best, footnote eleven supplied just one piece to a complicated puzzle of constitutional jurisprudence.¹³⁶ This argument also assumes that constitutional interpretation does not change when backed by "reason, history and experience." Two hundred years of experience prove the error of this view.¹³⁷ Finally, if the studies cited in *Brown* were

community — we *know* it; we know it the way we know that a cold causes snuffles." It is not that we don't *need* to know it nor that there isn't something there to know. There is a fact of the matter, namely that segregation is an insult, but we need no evidence for that fact — we just know it. It's an interpretative fact.

Dworkin, *supra* note 15, at 5 (quoting and analyzing Professor Cahn's argument in Cahn, *Jurisprudence*, 30 N.Y.U. L. REV. 150, 157-68 (1955)). Although the insulting effect of segregation is indeed "interpretative" or an "appraising value judgment," the manifestation of the insult remains an empirical question. To be sure, the insulting effect of segregation may not be measurable or has yet to be measured very well. Furthermore, failure or success at measuring such an effect should not influence the legal rule. See *infra* notes 318-19 and accompanying text.

¹³⁴ Cf. Karst, *The Supreme Court 1976 Term — Foreword: Equal Citizenship Under the Fourteenth Amendment*, 91 HARV. L. REV. 1 (1977).

¹³⁵ Note, *Social Science Statistics in the Courtroom: The Debate Resurfaces in McCleskey v. Kemp*, 62 NOTRE DAME L. REV. 688, 707 (1987).

¹³⁶ Professor Bork noted that "[i]t has long been obvious that [*Brown*] does not rest upon the grounds advanced in Chief Justice Warren's opinion, the specially harmful effects of enforced school segregation upon black children. That much . . . is made plain by the per curiam decisions that followed outlawing segregated public beaches, public golf courses and the like." Bork, *Neutral Principles and Some First Amendment Problems*, 47 IND. L.J. 1, 13 (1971).

¹³⁷ In criticizing the "strict intentionalist" school of constitutional interpretation, Professor Paul Brest explained the problem of achieving a stable constitutional understanding on a historical basis as follows:

[A] settled constitutional understanding is in perpetual jeopardy of being overturned by new light on the adopters' intent — shed by the discovery of historical documents, re-examinations of known documents, and reinterpretations of political and social history. Moreover, constitutional interpretation is not a scientific process but a subjective undertaking which vests the historian with enormous discretion in ordering and analyzing her data.

valid,¹³⁸ subsequent valid studies that appear to conflict always should be explainable by a new hypothesis or theory that can give reasons for the results of both studies.¹³⁹ Such explanations may or may not be relevant to the formation or application of the pertinent legal rule. Nevertheless, while subsequent research may contradict the findings of earlier studies, there is no reason to believe it will consequently throw the law into turmoil.

It still may be argued that the very variables social scientists study will change over time, thus necessitating either a continual replication of studies or possibly the attachment of an expiration date to each study.¹⁴⁰ But this objection takes a near-sighted view of the goal, if not always the reality, of social science. Consider, for example, the deterrent effect of the exclusionary rule on police misconduct.¹⁴¹ A finding in 1989 that the rule deters police misconduct could appear to be "out of date" in a relatively short amount of time as circumstances change. Police training could be-

Novel interpretations are due as much to changes in the interpreter's perspective as to anything extrinsic. And we have witnessed enough dramatic revisions of social and political history to be sure that the past is not about to stand still.

Brest, *The Misconceived Quest for the Original Understanding*, 60 B.U.L. REV. 204, 231 (1980). See also C. MILLER, *THE SUPREME COURT AND THE USES OF HISTORY* 155-61 (1969); Wofford, *The Blinding Light: The Uses of History in Constitutional Interpretation*, 31 U. CHI. L. REV. 502, 509-11, 528-33 (1964).

¹³⁸ To be sure, the empirical value of the social science studies cited in *Brown* has been justifiably questioned. Whatever value these studies have exists as suppositional science. See *infra* notes 159-268 and accompanying text. Consider the following colloquy:

Justice Frankfurter: [W]e are here in a domain which I do not yet regard as science in the sense of mathematical certainty. This is all opinion evidence.

Mr. Greenberg: That is true, Your Honor.

Justice Frankfurter: I do not mean that I disrespect it. I simply know its character. It can be a very different thing from, as I say, things that are weighed and are measured and are fungible. We are dealing here with very subtle things, very subtle testimony.

Oral Argument, *Gebhart v. Belton*, 347 U.S. 483 (1954) (No. 10), *quoted in* ARGUMENT: THE ORAL ARGUMENT BEFORE THE SUPREME COURT IN *BROWN V. BOARD OF EDUCATION OF TOPEKA*, 1952-1955, 172-73 (L. Friedman ed. 1969).

¹³⁹ See generally Epps, *The Impact of School Desegregation on the Self-Evaluation and Achievement Orientation of Minority Children*, LAW & CONTEMP. PROBS., Summer 1978, at 57 (reviewing the methods and findings of studies on the self-concept of black schoolchildren after *Brown*).

¹⁴⁰ See Dworkin, *supra* note 15, at 6 ("Correlations of social phenomena are fragile in the sense that the data, the behaviour which forms the correlation, can change very quickly.").

¹⁴¹ See *infra* notes 320-24 and accompanying text (discussing the factual assumptions the Court made regarding the deterrent effect of the exclusionary rule in *United States v. Leon*, 468 U.S. 897 (1984)).

come more enlightened, the availability and effectiveness of civil suits under section 1983 for police misconduct could increase, and hundreds of other factors could combine to make the exclusionary rule's deterrent function obsolete. Yet these very variables, variables that are likely to fluctuate, are the subjects of scientific study. Ideally, social science will progress to a point where its theories will take into account the fluctuations of different variables and be able to predict outcomes on some well-corroborated theoretical basis. For the time being, the extent to which researchers fail to study likely intervening variables reduces the legal relevance of their conclusions.

No matter how advanced social science should become, or how successfully it identifies the general laws of human behavior, substantial uncertainty will always remain a feature of the scientific enterprise.¹⁴² The creation of grand theories with broad predictive power has proved to be difficult even in physics, where control of variables generally is less difficult than in the social sciences and the variables of interest have been studied for a longer time. The practicality of grand theories in the social sciences is called into question upon the sober reflection of the difficulty of the task. In the following section, I consider the question of the possibility of grand theories of human behavior and, more importantly, whether such theories would prove to have much practical impact on the law anyway.

2. *On Grand Theories of Human Behavior*

For the most part, social science has failed to articulate and corroborate general laws of human behavior from which individual behavior can be reliably predicted.¹⁴³ Social researchers typically follow the relatively simplistic course of testing specific hypotheses by measuring only a few variables while holding other variables of potential significance constant. This practice results in a fairly good understanding of the particular variables under the specific circumstances studied, but limits rather severely the ability to generalize the results to other contexts. A variable not considered in a study but present in the application of the results could completely undermine expectations. The lack of fundamental explanatory models, it

¹⁴² See Sperlich, *Postrealism: Should Ignorance be Elevated to a Principle of Adjudication*, 64 JUDICATURE 93, 95 n.15 (1980) ("[S]cientific knowledge must be uncertain because the world that it reflects is uncertain, and that knowledge instability is a virtue rather than a vice.").

¹⁴³ But see *infra* note 146.

would seem, restricts the range of application of social science. Despite the social sciences' current failure to develop grand theories in the manner of the natural sciences, it remains theoretically possible for them to do so in the future.

For some time, the natural sciences have posited grand theories to explain wide ranges of phenomenon. Indeed, today physicists strive to enunciate the grandest theory of them all — the “grand theory of the universe” — a theory that would bring together the theories of general relativity and quantum mechanics.¹⁴⁴ The beauty of grand theories is that they can singularly explain seemingly very different events. For example, “a lightning storm, the motions of a mariner's compass, the appearance of a rainbow, and the formation of an optical image in the range finder of a camera . . . can all be understood in terms of modern electromagnetic theory.”¹⁴⁵ In contrast, social scientists usually study only individual variables with little success so far in identifying and testing theoretical predictions in the way physics has.¹⁴⁶ At least theoretically, this need not be the case. Professor Nagel explains the point as follows:

[T]he fact that social processes vary with their institutional settings, and that the specific uniformities found to hold in one culture are not pervasive in all societies, does not preclude the possibility that these specific uniformities are specializations of relational structures

¹⁴⁴ See generally S. HAWKING, *supra* note 18, at 11-12.

¹⁴⁵ E. NAGEL, *supra* note 44, at 462.

¹⁴⁶ Of course, grand theories of human behavior or human nature probably have existed from the time human beings first became social. Indeed, such theories can even be found in the Old Testament: “And God saw that the wickedness of man *was* great in the earth, and that every imagination of the thought of his heart *was* only evil continually.” *Genesis* 6:5 (King James) (emphasis added). Grand theories of human behavior continue to surround us, including, for example, in psychology those of Sigmund Freud, Carl Jung, and Alfred Adler, and in economics those of Milton Friedman and John Kenneth Galbraith. Most of these grand theories should be deemed suppositional science because they are untestable as posited or have not yet been subjected to significant empirical scrutiny. See Grunbaum, *The Foundations of Psychoanalysis* in *MIND AND MEDICINE: PROBLEMS OF EXPLANATION AND EVALUATION IN PSYCHIATRY AND THE BIOMEDICAL SCIENCES* 143 (L. Landan ed. 1983) (concluding that Freud's theory is scientific in part (i.e., to the extent it is “falsifiable”) but is as yet unvalidated); Nagel, *Methodological Issues in Psychoanalytic Theory*, in *PSYCHOANALYSIS, SCIENTIFIC METHOD, AND PHILOSOPHY* 38-56 (S. Hook ed. 1959) (same). But many grand theories of human behavior with various levels of complexity have received significant corroboration, and these theories form the foundation for much of the empirical research being conducted today. For example, Professor B.F. Skinner's theories on learning have been subjected to extensive empirical study and continue to exert a strong influence on scientific thinking. See generally B.F. SKINNER: *CONSENSUS AND CONTROVERSY*, *supra* note 18.

invariant for all cultures. For the recognized differences in the ways different societies are organized and in the modes of behavior occurring in them may be the consequences, not of incommensurably dissimilar patterns of social relations in those societies, but simply of differences in the specific values of some set of variables that constitute the elementary components in a structure of connections common to all the societies.¹⁴⁷

The more difficult barrier to overcome may be that grand theories usually provide very little certainty in predicting in the real world what will or did happen in a particular case. Since the law is primarily a practical discipline, this shortcoming poses a significant obstacle. Uncertainty may be manifested in science in two ways. First, most general laws make predictions based on highly abstract assumptions that rarely hold true in practice. And second, uncertainty itself is integral to many modern scientific theories.

The first aspect of uncertainty can be illustrated by the fact that, under Newtonian principles, physicists can predict with great accuracy the speed at which a leaf will fall in a vacuum. However, they will have much less success predicting the speed and trajectory of a leaf falling in a stiff wind.¹⁴⁸ Knowledge of wind speed and direction might increase accuracy, but too many unknown factors combine to have confidence in any prediction in this example.¹⁴⁹ Similarly, even though our understanding of the orbits of the planets in our solar system is quite sophisticated, calculating the minute variations in those orbits still remains beyond the grasp of present day scientists and their computers.¹⁵⁰

¹⁴⁷ E. NAGEL, *supra* note 44, at 462.

¹⁴⁸ *Id.* at 461.

¹⁴⁹ *Id.*

¹⁵⁰ T. FERRIS, *COMING OF AGE IN THE MILKY WAY* 120-21 (1988). Indeed, Isaac Newton's description of the difficulty posed in calculating the interactions of the planets sounds familiar to the problems posed in studying human behavior. If you substitute the word person for planet in the following excerpt from Newton's *Principia* the similarities become manifest:

The orbit of any one planet depends on the combined motion of all the planets, not to mention the action of all these on each other. But to consider simultaneously all these causes of motion and to define these motions by exact laws allowing of convenient calculation exceeds, unless I am mistaken, the force of the entire human intellect.

Id. at 121 (quoting I. NEWTON, *PRINCIPIA* 13 (Cajori-Motte trans.)). See also J. GLEICK, *CHAOS: MAKING A NEW SCIENCE* 7 (1987) ("Predictability is one thing in a cloud chamber where two particles collide at the end of a race around an accelerator. It is something else altogether in the simplest

Meteorology, a science based on highly corroborated physical laws, demonstrates daily the perils of predicting complex events. But meteorology is also an example of the value of even uncertain predictions. Like most meteorological phenomena, human behavior might be reducible to determinable laws identifiable in a vacuum, but would become less precise in the complex real world given the simpleness of our present tools of measurement and calculation.¹⁵¹ Even a moment's reflection on the myriad of factors that influence human behavior in the real world makes clear the difficulty of the task. Indeed, to the extent that future environments (or past environments that are not completely known) affect behavior, as surely they do, some measure of uncertainty will always be associated with social scientific knowledge. For instance, research supports experts who testify that cross-racial identifications are generally less accurate than same-race identifications,¹⁵² but research will never support an expert opinion on the accuracy of a particular eyewitness identification.¹⁵³ While a little knowledge can sometimes be a dangerous thing, it is rarely more dangerous than no knowledge at all.

Uncertainty may enter into scientific understanding of human behavior in an even more basic way. While social scientists, like all scientists, approach problems with the assumption of a fundamentally deterministic world, findings in the natural sciences cast doubt on this basic assumption. The great revolution in twentieth century physics has come from the recognition that the very nature of some events is probabilistic.¹⁵⁴ It was a denial of this insight that led to Einstein's famous statement, "God does not play dice [with the universe]."¹⁵⁵ Despite Einstein's disbelief, the

tub of roiling fluid, or in the earth's weather, or in the human brain.").

¹⁵¹ For example, economists who assume that people are "rational" decisionmakers have articulated highly sophisticated models that purport to make predictions of great exactitude. In the real world, of course, people are not rational decisionmakers, and the economists' models suffer accordingly.

¹⁵² See generally Johnson, *Cross-Racial Identification Errors in Criminal Cases*, 69 CORNELL L. REV. 934 (1984).

¹⁵³ Nearly a century ago, Professor John Wigmore pointed out the fact that psychologists could never identify precisely the accuracy of a particular eyewitness identification, though he believed his observation to be more fatal to psychology than it is. Wigmore, *Professor Muensterberg and the Psychology of Testimony: Being a Report of the Case of Cokestone v. Muensterberg*, 3 U. ILL. L. REV. 399, 423 (1909).

¹⁵⁴ S. HAWKING, *supra* note 18, at 56. See generally R. CREASE & C. MANN, *THE SECOND CREATION: MAKERS OF THE REVOLUTION IN 20TH-CENTURY PHYSICS* 83 (1986).

¹⁵⁵ S. HAWKING, *supra* note 18, at 56.

principle of uncertainty forms one of the cornerstones of modern physics. In explaining the complex theory of quantum electrodynamics, Professor Richard Feynman provides a fascinating example of uncertainty in modern physics by describing an experiment to measure the partial reflection of light by a glass surface.¹⁵⁶ The experimenter focuses a light source onto a block of glass and sets up two light receptors, known as photomultipliers. One photomultiplier measures the number of photons reflected off the glass surface (receptor *A*), and the other, imbedded in the glass, measures the number of photons transmitted by the front surface of the glass (receptor *B*). The experimenter observes that “for every 100 photons that go down toward the glass, an average of 4 arrive at *A* and 96 arrive at *B*. So partial reflection in this case means that 4% of the photons are reflected by the front surface of the glass, while the other 96% are transmitted.”¹⁵⁷

As Professor Feynman explains, the challenge is to explain this result in terms of a theory: “how does the photon ‘make up its mind’ whether it should go to *A* or *B*?”¹⁵⁸ Physicists have advanced various theories to explain the phenomenon of partial reflection, including “holes” in the glass, or proper “aiming” of the photons, but none agree with the experiment. Professor Feynman discusses the implications of living with this uncertainty:

Try as we might to invent a reasonable theory that can explain how a photon “makes up its mind” whether to go through glass or bounce back, it is impossible to predict which way a given photon will go. Philosophers have said that if the same circumstances don’t always produce the same results, predictions are impossible and science will collapse. Here is a circumstance — identical photons are always coming down in the same direction to the same piece of glass — that produces different results. We cannot predict whether a given photon will arrive at *A* or *B*. All we can predict is that out of 100 photons that come down, an average of 4 will be reflected by the front surface. Does this mean that physics, a science of great exactitude, has been reduced to calculate only the *probability* of an event, and not predicting exactly what will happen? Yes. That’s a retreat, but that’s the way it is. Nature permits us to calculate only

¹⁵⁶ R. FEYNMAN, QED: THE STRANGE THEORY OF LIGHT AND MATTER 17-19 (1985).

¹⁵⁷ *Id.* at 17.

¹⁵⁸ *Id.* at 18.

probabilities. Yet science has not collapsed.¹⁵⁹

The uncertainty associated with an individual photon's behavior is not unlike the uncertainty associated with an individual person's behavior.¹⁶⁰ To some philosophers, the uncertainty of an individual person's actions is a function of the actor's free will, though to say the same about a photon would provoke significant response. For the scientist qua scientist, uncertainty can remain part of the equation without necessarily being susceptible to the scientist's explanatory theories. The scientist explains what she can, and accepts as uncertain what remains, whether interpreted as free will, randomness, or otherwise.¹⁶¹ For the law, however, the explanation adopted to account for the uncertainty that lies beyond the scientist's equation matters a great deal. Indeed, the very foundation of the adult criminal justice system rests on the supposition that individuals ordinarily act with "free will."¹⁶² The law's concern over nonscientific considerations is to be applauded, but it must also be guarded. Although scientists inevitably have ideas about what cannot be scientifically explained, their suppositions are not necessarily superior to a layperson's.

The uncertainty endemic in the natural sciences, whether resulting from the complexity of the phenomenon being studied or the probabilistic nature of the phenomenon itself, relates to the common complaint about social science that even when it validly describes group behavior, it cannot predict the behavior of a given individual.¹⁶³ Although obviously photons

¹⁵⁹ *Id.* at 19 (emphasis in original). Perhaps the classic example of uncertainty in modern physics is the Heisenberg uncertainty principle. According to this principle, it is impossible to know both the location and velocity of a subatomic particle at the same time. *See id.* at 55-56.

¹⁶⁰ Cf. Stephenson, *Quantum Theory and Q-Methodology: Fictionalistic and Probabilistic Theories Conjoined*, 33 *PSYCHOLOGICAL REC.* 213, 215-17 (1983) (discussing the parallels between quantum theory and factor theories in psychology).

¹⁶¹ *See* J. GLEICK, *supra* note 150, at 251 (discussing the relationship between determinism and free will in relation to modern physics).

¹⁶² *See* L. WEINREB, *NATURAL LAW AND JUSTICE* (1987).

¹⁶³ Tribe, *Trial by Mathematics: Precision and Ritual in the Legal Process*, 84 *HARV. L. REV.* 1329, 1374 (1971) ("[F]or the jury to announce that it is prepared to convict the defendant in the face of an acknowledged and numerically measurable doubt as to his guilt is to tell the accused that those who judge him find it preferable to accept the resulting risk of his unjust conviction than to reduce that risk by demanding any further or more convincing proof of his guilt."); *but see* Saks & Kidd, *Human Information Processing and Adjudication: Trial by Heuristics*, 15 *LAW & SOC'Y REV.* 123, 125 (1980-81) ("[W]hile certain errors and harm may be inherent even in the proper use of probabilistic tools, even more harm may be inherent in not using them.").

and people differ, the question of how a photon or a person "makes up its/her mind" may be equally tangential to ask for both photons and people as a matter of scientific inquiry. The complexity of the human animal alone may be so great that the analogous question to what determines whether a photon bounces off or is transmitted by a glass surface may never really be answered. Add to this the possibility of uncertainty as basic to nature's process and the task multiplies a thousand-fold. Notwithstanding the uncertainty which is endemic to the scientific enterprise, scientific social inquiry can still offer significant assistance to the legal decisionmaker. Joseph Ford, a physicist, responded to Einstein's proclamation that God does not play dice with the universe by asserting that God does indeed play dice, "[b]ut they're loaded dice. And the main objective of physics now is to find out by what rules were they loaded and how can we use them for our own ends."¹⁶⁴ Social science shares this objective.

The indeterminacy of scientific social inquiry should hardly undermine its asserted competence given the fundamentally indeterminate nature of the legal process.¹⁶⁵ The judgments made by triers of fact depend on witnesses who do not remember all they have seen or who fail to say all that they know, on documents that are missing or incomplete, and finally on the always pressing exigencies of limited time. Moreover, identifying applicable law is complicated first by the indeterminacy of the facts, which is compounded by the difficulty of interpreting what the legislature said or meant to say, and second, by what other courts have said or meant to say about the matter given the determined factual situation. Social science data cannot provide certainty to this process; perhaps the contribution of social science is limited to only lessening slightly the amount

¹⁶⁴ J. GLEICK, *supra* note 150, at 314 (quoting Joseph Ford).

¹⁶⁵ A recent Note advances an argument similar in many respects to the one presented in this section. Note, *The Scientific Model in Law*, 75 GEO. L.J. 1967 (1987). As a general matter, I agree with the Note's two main theses: 1) "that judicial decisionmaking can be studied scientifically" and 2) "that judicial decisionmaking benefits from the use of scientific techniques and principles." *Id.* at 2001. However, the Note tends to be somewhat vague on what limitations, if any, might apply to the analogy drawn between the scientific model and the law. For example, the author observes that general theories of law and general theories in the natural sciences are indeterminate. *Id.* at 1985-87. While true, this observation hardly proves that the law is amenable, in all respects, to scientific study. Only if it can be demonstrated that the methods of science can be applied to the law is this thesis supported.

of uncertainty that goes into the equation.¹⁶⁶

C. Conclusion

By its very nature, social science possesses as much potential for objective investigation as its more heralded first cousin, natural science. To be sure, social scientists' biases, just as natural scientists' biases, can become intertwined with the questions asked, how the questions are framed, and even to some measure, the answers provided. But the traditional checks the scientific method places on researchers constrains the role the particular scientist's values play in shaping her findings. Using due diligence, lawmakers should be able to discern most bias present in social research. That bias, which is difficult to detect, will be exposed over time with the general development of scientific knowledge. In addition, lawmakers cannot afford to forget, nor do they usually forget, that it is they who establish the relevance of the questions asked as well as the answers provided. So long as lawmakers remain diligent, social research can offer much valuable — and value neutral — information to legal decisionmakers.

The uncertainties that will continue to attach to even the best social research should only qualify its value, as this uncertainty in no way undermines its value. When compared to natural science, social science shares the uncertainty that attends predictions of complex phenomena as well as the uncertainty potentially inherent in the phenomena itself. An inability to explain completely human behavior hardly undermines the value of social science to the legal process. Scientific social inquiry, even in a primitive state, has much to offer the legal process. In fact, we should welcome the modesty of scientific social inquiry and beware the alternative: that of the confident social inquirer who purports to explain everything. It is the latter social inquirer, the suppositional scientist, that is the focus of the attention of the next Part.

¹⁶⁶ See M. SAKS & R. VAN DUIZEND, *THE USE OF SCIENTIFIC EVIDENCE IN LITIGATION* 4-6 (1983). Professor Woolhandler recently argued against any "regularized reception" of social science research on legislative fact questions by courts. She asserted that "[t]he reformists' claims that regularized reception of legislative facts will lead to better substantive decisions ultimately fails because of the reformists' own inability to tell us what is a good decision." Woolhandler, *supra* note 11, at 123-24. But this is the strength of social science. Nobody expects social science to answer the normative questions presented to courts. The "reformists" claim is only that courts will make better normative judgments if they are supplied with accurate factual information.

III. THE STRUCTURE OF SUPPOSITIONAL SCIENCE

Not all segments of the social science community claim membership in the scientific community, and many segments that do should not.¹⁶⁷ In this Part, I consider the nature and legal relevance of ostensibly scientific social inquiry that wholly fails to meet the standards of science, or what I refer to as suppositional science. Suppositional science refers to two types of "findings" advanced by social researchers: first, those that on their face are untestable or have not been tested in any fashion whatsoever; and second, those that assume the veneer of science (i.e., are forwarded as fully tested propositions) but have yet to be tested adequately.¹⁶⁸ Untested statements are relatively easy to recognize, though ironically, they have occupied a surprisingly far-reaching role in the law. The second variety of suppositional science, the scientific statement without adequate empirical support, requires greater attentiveness to identify, and thereby poses a greater danger of misuse. The primary thesis of this Part is that social science statements should be founded on the same basis as all scientific theories, that is, on their having withstood attempts at falsification.¹⁶⁹ There is no reason to assume that a social science theory not subjected to sufficient empirical test is more accurate than ad hoc theorizing of laypersons.¹⁷⁰ Laypersons, as much as social scientists, theorize about the deter-

¹⁶⁷ The extent to which different social scientists claim scientific status for their work varies greatly, and not necessarily with the validity of the claim. For example, while most observers would not consider psychoanalysis to be scientific, many psychoanalysts would disagree. Compare E. BORING, *supra* note 17, at 713 ("We can say, without any lack of appreciation for what has been accomplished, that psychoanalysis has been prescientific.") with C. BRENNER, AN ELEMENTARY TEXTBOOK OF PSYCHOANALYSIS 1 (1973) ("Psychoanalysis is a scientific discipline which was begun by Sigmund Freud.").

¹⁶⁸ A significant portion of this Part is devoted to the discussion of the methodologies and findings of psychiatry and clinical psychology. Although these disciplines sometimes represent the most egregious examples of suppositional science, they by no means fill the field. At the same time, some psychiatric and clinical psychological findings are based on sound empirical investigation. The sweep of this Part is intended to be broad, and covers any form of social science that proffers opinions that are untestable or as yet not adequately tested. My intent is not to indict disciplines, only methodologies. For general discussions of the failings of psychiatry and clinical psychology in the area of mental health, mainly on scientific grounds, see Morse, *Crazy Behavior*, *supra* note 12; Ennis & Litwack, *Psychiatry and the Presumption of Expertise: Flipping Coins in the Courtroom*, 62 CALIF. L. REV. 693 (1974); but see Bonnie & Slobogin, *supra* note 12.

¹⁶⁹ See *supra* note 4 and accompanying text.

¹⁷⁰ Psychological research on the claimed reasoning abilities of psychologists and psychiatrists casts doubt on assertions that psychological expert reasoning is superior to that of laypersons. See Faust, *Declarations Versus Investigations: The Case for the Special Reasoning Abilities and Capabilities of the Expert Witness in Psychology/Psychiatry*, 13 J. PSYCHIATRY & L. 33, 52 (1985).

minants of human behavior. In order to claim a special role in the legal process, social scientists must demonstrate the greater validity of their theories.

A. *The Methods of Suppositional Science*

In light of the many methods researchers employ to test hypotheses empirically, all with differing degrees of efficacy, this section does not endeavor to make fine distinctions between reasonable research alternatives. Instead, this section surveys examples of methodological failure. The first part of this section addresses the obvious proposition that empirical statements not based on any scientific test have limited value to the law. Of particular concern in the first part is the practice among some social scientists of asserting empirical statements in vague and indefinite ways that insulate them from scientific test. This practice results in classifications and definitions that tend to be vacuous, allowing consumers of this social science product to liberally distend ostensible boundaries, limited only by their individual discretion. The second part of this section concerns inadequately tested social scientific statements, or, more particularly, statements based on claimed scientific examinations that actually amount to no test at all. In general, these suppositions rely on studies infected with poorly conceptualized measures, lack of comparison groups, rampant bias, and an overall lack of rigor.

1. *The Problem of Untestable Hypotheses*

The problem of untestable hypotheses is perhaps best exemplified by the vagaries of clinical diagnoses of mental impairment.¹⁷¹ A particularly acute form of this problem involves the commitment of juveniles to mental hospitals, since they can be "voluntarily" committed on the basis of paren-

("Common claims for the special reasoning powers or capabilities of the expert witness in psychology are refuted consistently by the judgment literature."). See generally Brehmer, *In One Word: Not From Experience*, 45 ACTA PSYCHOLOGICA 223 (1980).

¹⁷¹ The problem of clinical diagnosis is in some ways a subset of deeper problems with many of the prevalent theories in psychology, and, in particular, the theories of Freud, Jung, Adler, and others upon which many experts rely. See Morse, *Failed Explanations*, *supra* note 12, in which Professor Morse provides an excellent critique of the use of psychoanalytic and psychodynamic theories in mental health law along many of the same lines presented here. As noted *supra* note 12, the present thesis is more sweeping than Professor Morse's and seeks to provide a broad indictment of nonscientific social inquiry.

tal consent and the recommendation of one physician.¹⁷² In an exhaustive review of current practices in the mental hospitalization of juveniles, Lois A. Weithorn attributed skyrocketing admission rates in part to the wide latitude given admitting physicians by the diagnostic criteria they use.¹⁷³ For example, the National Association of Private Psychiatric Hospitals (NAPPH) provides a set of guidelines which cite "sexual promiscuity" as an example of "self-defeating" and/or "self-destructive" behavior mandating "immediate acute-care hospitalization [as] the only reasonable intervention."¹⁷⁴ Yet these guidelines do not define the type of sexual activity constituting "promiscuity."¹⁷⁵ As a result, this "standard allows anyone using the guidelines to apply personal moral standards in making admission decisions."¹⁷⁶

Use of vague or undefined criteria for classification prevents empirical corroboration altogether, since the observations which would corroborate or falsify the classification are never explicitly stated.¹⁷⁷ Hence, the NAPPH hypothesis that immediate acute-care hospitalization comprises the only reasonable intervention — or a reasonable one at all — for sexually promiscuous children cannot be tested unless the terms are operationally defined.¹⁷⁸ Specifically, what behaviors would characterize a child as sexually promiscuous, and what measures would demonstrate the "reasonableness" (effectiveness?) of the intervention? The hypothesis can be tested only by making explicit the behaviors and observations upon which

¹⁷² In *Parham v. J.R.*, 442 U.S. 584 (1979), the Court held that it was not unconstitutional for a parent to commit his or her child (under the age of eighteen) to a state institution on the basis of the recommendation of one physician. See generally *CHILDREN'S COMPETENCE TO CONSENT* (G. Melton, G. Koocher & M. Saks eds. 1983).

¹⁷³ Note, *Mental Hospitalization of Troublesome Youth: An Analysis of Skyrocketing Admission Rates*, 40 STAN. L. REV. 773, 783-92 (1988).

¹⁷⁴ *Id.* at 786 (quoting NAT'L ASS'N OF PRIVATE PSYCHIATRIC HOSPITALS, GUIDELINES FOR PSYCHIATRIC HOSPITAL PROGRAMS: CHILDREN AND ADOLESCENTS (1984)).

¹⁷⁵ *Id.*

¹⁷⁶ *Id.* See generally Morse, *Crazy Behavior*, *supra* note 12, at 602-03.

¹⁷⁷ One commentator suggests the following reforms for the use of diagnostic classifications:

(1) Diagnostic categories that are empirically unverified and unreliably used should be excluded. (2) Those remaining should be sharpened and their defining characteristics should be brought more in line with results of multivariate statistical studies. (3) The operational criteria . . . should be based on empirical research.

Quay, *A Critical Analysis of DSM-III as a Taxonomy of Psychopathology in Childhood and Adolescence*, in *CONTEMPORARY DIRECTIONS IN PSYCHOPATHOLOGY* 151, 164 (T. Millon & G. Klerman eds. 1986).

¹⁷⁸ See *supra* notes 50, 95.

it is based. Moreover, only after the test is made explicit can others determine the importance of the tested behaviors, and whether the test of them actually corroborates the hypothesis.¹⁷⁹

The vagueness of many clinical classifications reflects a deeper methodological error underlying many tests of empirical propositions. Many social scientists continue to rely (sometimes exclusively) on the case method to corroborate theories of human behavior. In its usual form, the case method involves observation of a small number of individuals over an extended period of time. From such observations, some researchers purport to construct general laws or theories applicable to the population at large.¹⁸⁰ But conclusions based on case studies invariably suffer from either the bias of the researcher or the unrepresentativeness of the sample, or both.

A researcher's bias, although perhaps benign, may manifest itself through selective attention to the expected behavior,¹⁸¹ thus operating as a self-fulfilling confirmation of the hypothesis. Much suppositional science conforms to common experience and in this way appeals to our intellects and may not be fully devoid of value. Yet, theories and opinions spun from such suppositions are like proverbs that have a measure of wisdom, but upon close examination contain little substantive content. For in-

¹⁷⁹ See generally Eysenck, *A Critique of Contemporary Classification and Diagnosis*, in *CONTEMPORARY DIRECTIONS IN PSYCHOPATHOLOGY*, *supra* note 177, at 73, 91-92; McReynolds, *Diagnosis and Clinical Assessment: Current Status and Major Issues*, 40 *ANN. REV. OF PSYCHOLOGY* 83 (1988).

¹⁸⁰ It should be noted that researchers employing the case method vary widely in the amount of complexity and control they account for. The most extreme example is what Cook and Campbell call the "one-group posttest-only design." This design "involves making observations only on persons who have undergone a treatment, and then only after they have received it." *COOK & CAMPBELL*, *supra* note 26, at 96. By itself, this design is "totally uninformative." *Id.* On occasion, case studies may prove more helpful. Cook and Campbell provide the following example:

[I]n education a case study might reveal that a new mathematics curriculum stresses algebra over geometry and arithmetic and that, after completing the curriculum, a particular group of children scores well above national norms in algebra but not in geometry and arithmetic. To the extent the researcher can rule out alternative possibilities (e.g., the difference is due to chance, or existed before the new curriculum began), it is provisionally warranted to infer causation.

Id. at 97. Even in this example, however, the conclusion can be considered only tentative at best, since other — predisposing — variables cannot be ruled out completely.

¹⁸¹ The practice of researchers paying selective attention to expected observations, or what is commonly termed "experimenter expectancies," is discussed more fully *infra* at notes 209-10 and accompanying text.

stance, whether "absence makes the heart grow fonder" or "out of sight [means] out of mind" is the kind of debate that could support many courtroom battles. Common experience or observation, when selectively targeted, can lend support to just about any interpretation desired.

Selective use of limited samples of individuals also creates the significant danger that the behavior studied will not be representative of the general population. Sigmund Freud, for example, devised his elaborate theories of the human psyche almost exclusively from studying small numbers of self-selected individuals.¹⁸² Obvious difficulties arise in applying to the general population a theory based, for example, on the finding that certain members of the clinical population studied suffer from dysfunction associated with sex and aggression. Even if the observation is accurate — whatever its parameters might be — its generalizability is suspect. Although in some cases a less than representative sample will not completely skew a researcher's observations, the case method embodies an extreme violation of the basic tenet to obtain a representative sample.¹⁸³

The use of unjustifiably expansive categorizations is not limited to clinical diagnoses; it extends to purportedly research-based classifications as well. One notable example is the work of researchers interested in the "battered woman syndrome,"¹⁸⁴ a theory which has been urged in numerous criminal trials to support battered women's claims that they killed in self-defense, although under the circumstances imminent danger was not apparent. Lenore Walker, the leading proponent of this theory, defines a battered woman as any woman "18 years of age or over, who is or has been in an intimate relationship with a man who repeatedly subjects or subjected her to forceful physical and/or psychological abuse."¹⁸⁵ The in-

¹⁸² C. BRENNER, *supra* note 167, at 1; *see generally* Morse, *Failed Explanations*, *supra* note 12.

¹⁸³ Although the case method represents a less than scientific way to test hypotheses, it often provides stimulus for hypothesis development and thus scientific advancement. *See* J. SIMON, *BASIC RESEARCH METHODS IN SOCIAL SCIENCES: THE ART OF EMPIRICAL INVESTIGATION* 44 (2d ed. 1978) ("Descriptive research in the form of case studies is usually the jumping-off point for the study of new areas in the social sciences.").

¹⁸⁴ *See* L. WALKER, *THE BATTERED WOMAN SYNDROME* (1984) [hereinafter L. WALKER (1984)]; L. WALKER, *THE BATTERED WOMAN* (1979) [hereinafter L. WALKER (1979)]. The battered woman syndrome theory is also discussed *infra* at notes 250-56 and accompanying text, which discusses the relevance of suppositional science to lawmaking, and *infra* at notes 315-19 and accompanying text, which discusses the ideological bias social science might engender in the hands of lawmakers.

¹⁸⁵ L. WALKER (1984), *supra* note 184, at 203.

clusiveness of this definition becomes apparent upon examination of its terms. For example, "repeatedly" means merely more than once, and "abuse" includes, in addition to physical assaults, "extreme verbal harassment and expressing comments of a derogatory nature with negative value judgments."¹⁸⁶ This expansive definition could be, and has been, used to include virtually any woman accused of killing her husband or lover.¹⁸⁷ However, sound empirical research in this area should be expected to expose the overinclusiveness of the definition. Unfortunately, the research in this area has not been sound.¹⁸⁸

Yet, battered woman syndrome researchers claim to have conducted some "tests" of the hypotheses underlying their definition of battered women, and in fact have published numerous books and articles reporting that research.¹⁸⁹ As considered in the next section, however, just because research is made to look like science does not make it science.¹⁹⁰

2. *The Problem of Improperly Tested Hypotheses*

More troubling than empirical propositions subjected to no scientific test are hypotheses which have been examined, but in a way that provides no verification whatsoever. Some researchers advance seemingly sophisticated research that, even the most superficial inspection would reveal, have fatal flaws in scientific method. In many cases, the research design contains flaws so severe that the test appears to be constructed to confirm the researcher's hypotheses, rather than to test them in any meaningful way.¹⁹¹ The practice of clothing research in the trappings of science is

¹⁸⁶ *Id.*

¹⁸⁷ See, e.g., *State v. Martin*, 666 S.W.2d 895 (Mo. Ct. App. 1984) ("Battered woman" defendant who had hired a hit-man for \$10,000 to kill her husband proffered expert testimony (by Lenore Walker) on syndrome.).

¹⁸⁸ See Note, *The Battered Woman Syndrome and Self-Defense: A Legal and Empirical Dis-sent*, 72 VA. L. REV. 619 (1986) (authored by David Faigman).

¹⁸⁹ See, e.g., L. WALKER (1984), *supra* note 184; Walker, Thyfault & Browne, *Beyond the Juror's Ken: Battered Women*, 7 VT. L. REV. 1 (1982).

¹⁹⁰ The problem of inadequately tested empirical statements (or "suppositional science") can be likened to Professor Feynman's description of "cargo cult science." According to Professor Feynman, after World War II certain Pacific Islanders wanted the cargo planes to keep returning. These Islanders made runways, stationed a man with wooden headphones and bamboo for antennas, lighted some fires and waited for the planes to land. Cargo cult scientists act in the same way. "They follow all the apparent precepts and forms of scientific investigation, but they're missing something essential because the planes don't land." N.Y. Times, Feb. 17, 1988, at D27, col. 1.

¹⁹¹ See, e.g., *Buhrle v. State*, 627 P.2d 1374, 1377 (Wyo. 1981) (criticizing the scientific method

particularly troubling due to the legal system's traditional naivete regarding social science research. As this section demonstrates, like the Emperor's new clothes in Hans Christian Andersen's famous tale, the "scientific findings" of suppositional science are spun from cloth not there at all.¹⁹² In this section, I review five categories of error to which suppositional scientists regularly succumb: a) small or unrepresentative samples and laboratory research, b) absence of comparison groups, c) failure to test statistical significance, d) experimenter expectancies and hypothesis guessing, and e) legally irrelevant outcome measures.¹⁹³ In order to illustrate these errors in operation, this section generally examines the research concerning the effects of pornography on those who view it.¹⁹⁴ I have selected the present example in part because of its importance to the law, but primarily because of the wide disparity in the quality of the

Lenore Walker used to test the battered woman syndrome for "mak[ing] certain conclusions and stat[ing] certain theories, [and] then engag[ing] in research to attempt to substantiate those theories and conclusions").

¹⁹² H.C. ANDERSEN, *THE EMPEROR'S NEW CLOTHES* (E. Blegvad trans. 1959). The expert witness relying on suppositional science resembles too well the Emperor in Andersen's tale. Consider the story's conclusion:

And so the Emperor walked in the procession under the lovely canopy, while all the crowds in the street and all the people at their windows said, "Heavens! How marvelous the Emperor's new clothes look! Such a beautiful train on those robes! How exquisitely it fits!" No one wanted it thought that he could not see anything, as that would make him somebody who was either very stupid or badly fitted for his position. None of the Emperor's clothes had ever before been such a success.

"But he has nothing on!" said a little child.

"Good heavens, listen to the voice of innocence!" said the father, and the child's remark was whispered from one to another.

"He has nothing on! That's what a little child is saying: 'He has nothing on!'"

"He has nothing on!" shouted everybody in the end. And the Emperor cringed inside himself, for it seemed to him that they were right; but he thought like this: "I shall have to go through with the procession."

And then he held himself even more proudly erect, and the chamberlains walked on behind him carrying the train that was not there at all.

Id. at 30-32.

¹⁹³ It bears repeating that the common errors identified in this section are not intended to operate as a checklist for determining when social science findings have been adequately tested. Sometimes research suffering from one very grave error will be invalidated by that error; at other times, research suffering from several minor errors could be deemed valid. Judges must become sophisticated enough to make these difficult judgments. See *infra* notes 278-307 and accompanying text.

¹⁹⁴ For more comprehensive reviews of the research on the effects of pornography, see E. DONNERSTEIN, D. LINZ & S. PENROD, *THE QUESTION OF PORNOGRAPHY: RESEARCH FINDINGS AND POLICY IMPLICATIONS* (1987); *PORNOGRAPHY AND SEXUAL AGGRESSION* (N. Malamuth & E. Donnerstein eds. 1984).

research in this area as well as the frequent failure of lawmakers to adequately evaluate the research results.¹⁹⁵

a. Small or Unrepresentative Samples and Laboratory Research

In a way similar to the problems underlying the case method,¹⁹⁶ studying small or unrepresentative samples results in an inability to apply the conclusions generally to other populations. By definition, small samples are unrepresentative because the statistical likelihood of having the diversity or complexity of the larger population represented in the sample decreases as the size of the sample decreases. A poll reporting Americans' views on the "serious literary, artistic, or scientific value"¹⁹⁷ of *Playboy* magazine obviously would be worthless if the results were based on ten responses. What number would be sufficient is a matter of statistical theory not pertinent to the present discussion. In many studies, however, researchers rely on sample sizes which are plainly too small to represent the population of interest.¹⁹⁸

Similarly, many social science studies examine samples that bear little resemblance to the population of interest, and often in highly artificial contexts. The exemplar of this practice is psychologists' deep fascination with studying the undergraduate college student in the laboratory. Laboratory research using undergraduates has been integral to much of the research on the effects of pornography, and this research has in turn played an integral role in policymaking.¹⁹⁹ Due to the accessibility of the undergraduate population, its significant role in research is understandable;²⁰⁰ and the results of this research undoubtedly further the scientific

¹⁹⁵ Many of the examples of legal misapplication of the research on pornography are drawn from the ATTORNEY GENERAL'S COMMISSION ON PORNOGRAPHY: FINAL REPORT (1986) [hereinafter ATTORNEY GENERAL'S REPORT]. For an extensive overview of the Commissioners' use of the research, see Linz, Penrod & Donnerstein, *The Attorney General's Commission on Pornography: The Gaps Between "Findings" and Facts*, 1987 AM. B. FOUND. RES. J. 713.

¹⁹⁶ See *supra* note 180 and accompanying text.

¹⁹⁷ *Miller v. California*, 413 U.S. 15, 24, *reh'g denied*, 414 U.S. 881 (1973).

¹⁹⁸ In addition, the use of small sample sizes could potentially lead to a failure to find differences that do exist.

¹⁹⁹ See Linz, Penrod & Donnerstein, *supra* note 195, at 722-23 (discussing researchers' reliance on laboratory experiments, and the Attorney General's Commission's undue reliance on this form of research); see also ATTORNEY GENERAL'S REPORT, *supra* note 195, at 156.

²⁰⁰ College sophomores have played a particularly significant role in research on juries, a venue in which, in reality, they play a very small part. See generally Gerbasi, Zuckerman & Reis, *Justice Needs a New Blindfold: A Review of Mock Jury Research*, 84 PSYCHOLOGY BULL. 323, 342-43

enterprise somewhat.²⁰¹ The legal relevance of an empirical study is proportionately related to the sample population's representativeness of the population to which the study applies, and its congruence with the factual circumstances of interest to the law. Research programs relying solely, or principally, on laboratory research, using sample populations bearing little or no resemblance to the population of interest to the law, possess little legal relevance.²⁰²

b. Absence of a Comparison Group

When researchers study the effect some variable has on behavior, being certain of the identity of the specific variable having the effect on the outcome measure is one of the challenges presented. Comparison groups, or control groups, give researchers more confidence that the variable believed to be influencing behavior is in fact doing so.²⁰³ In a nutshell, the ideal comparison group would provide a researcher with a group of subjects that would be identical to the group in which the particular variable is operating, except for the presence of that variable. Hence, any differences on the outcome measure between the experimental group, beyond chance variation, could be attributed to the variable of interest.

Consider, for example, a researcher interested in the effect violent pornography has on males, hypothesizing that such movies decrease their empathy for female victims of violent crime. If the researcher attempted to test this hypothesis by showing a violent-pornographic film to a group of subjects, and subsequently obtained lower than average responses on a test of empathy,²⁰⁴ her data would be of little use in specifying the cause of

(1977) (The researchers review the many factors affecting jurors' verdicts, and conclude that the methodological sampling problems inherent in the studies limit the generalizability of the findings.).

²⁰¹ The realities of scientific research are somewhat less straightforward than the textual discussion might suggest. In fact, scientific knowledge tends to advance in fits and starts. Sound theory testing in the social sciences invariably involves some amount of laboratory testing which, as the text indicates, may not be generalizable to the legal setting without further field tests. However, both laboratory tests and field tests have limitations, the former involving external validity (generalizability) and the latter involving internal validity. See *supra* notes 55-57 and accompanying text. Yet together, laboratory and field research can provide valuable — and valid — information. See Monahan & Loftus, *The Psychology of Law*, 33 ANN. REV. PSYCHOLOGY 441, 456-58 (1982).

²⁰² See Brannigan & Goldenberg, *Social Science Versus Jurisprudence in Wagner: The Study of Pornography, Harm, and The Law of Obscenity in Canada*, 2 SOCIAL EPISTEMOLOGY 107, 108-09 (1988).

²⁰³ See COOK & CAMPBELL, *supra* note 26, at 7-9.

²⁰⁴ Researchers in this area regularly use "attitude scales" to measure changes in men's attitudes

the results. There would be no context in which the data could be understood. In order to better understand the effect of violent-pornographic films, the researcher must compare the audience that viewed this genre of film with groups having viewed other film types, such as a film containing violence only, a pornographic film containing no violence, and a film neither pornographic nor violent.²⁰⁵ Without comparing these groups' responses on the empathy scale, there is no way to know whether the initial test's findings resulted from the combination of violence against women and pornography, violence against women alone, pornography alone, or merely sitting in a darkened movie theatre for a prolonged period with an all male audience.²⁰⁶

c. Failure to Test Statistical Significance

Whether stated explicitly or remaining implicit, most social science studies involve some comparison or contrast of one kind or another. Classifications of abnormal behavior take shape only in relation to normal behavior. The significance of such comparisons, or more particularly, the significance of the differences observed after making these comparisons, depends on more than just the finding of a measurable difference. Because observed differences between groups could be a function of chance fluctuations, the statistical question remains whether observed differences vary enough to be fairly attributed to the variable being tested.

Returning to the example of the researcher interested in the effect of violent-pornographic films on the levels of empathy that males have for female victims, assume the researcher compared only the following two groups on her empathy scale: the violent-pornographic film group (the XXX-film group) and the group which viewed a film containing no vio-

toward women following a screening of pornographic materials. See, e.g., Malamuth & Check, *The Effects of Mass Media Exposure on Acceptance of Violence Against Women*, 89 J. RES. PERSONALITY 436 (1981).

²⁰⁵ Many early studies on the effects of pornography confounded sexual explicitness and violence. See, e.g., Donnerstein & Berkowitz, *Victim Reactions in Aggressive Erotic Films as a Factor in Violence Against Women*, 41 J. PERSONALITY & SOC. PSYCHOLOGY 710 (1981). Later studies have clarified the relationship between the various factors significantly. See *infra* note 206.

²⁰⁶ Recent research which has carefully examined the various categories of concern and is discussed in the text, indicates that "both violent pornography and less sexually explicit depictions of violence against women may produce important changes in attitudes and behaviors." Linz, Penrod & Donnerstein, *supra* note 195, at 721 (emphasis in original); see also Linz, Penrod & Donnerstein, *The Effects of Multiple Exposures to Filmed Violence Against Women*, 34 J. COMM. 130 (1984).

lence or pornography (the G-film group). Suppose the researcher compared the "difference scores" of these groups — that is, their individual scores on the empathy scale before seeing the respective film subtracted from their individual scores after seeing the film — and found that while the XXX-film group decreased fifteen points on average, the G-film group decreased only five points on average. If the researcher only reported these data, readers could not assess the soundness of any conclusions she might draw from the observed differences. Due to the size of the sample studied, or great variability in the responses on the outcome measure, such observed differences may be a result of chance fluctuations. The theoretical basis of statistical significance and the process by which it is calculated are topics beyond the scope of this Article. It is sufficient to say that in most social science research, failure to calculate any measure of statistical significance is a substantial violation of a basic tenet of empirical inquiry.²⁰⁷

d. Experimenter Expectancies and Hypothesis Guessing

A significant, though easily remedied, problem in vast amounts of social inquiry involves the collection of data by researchers aware of the hypothesis being tested and positioned to affect the cast of the data collected. This problem is especially acute in some clinical interview settings in which the interviewers are trained to look for certain behaviors and then instructed to note on some scale the existence and intensity of the behaviors in question. Such procedures potentially result in data reflecting what the experimenter expects to hear, rather than what the subjects actually said. This danger "can be decreased by employing experimenters who have no expectations or have false expectations, or by analyzing the data separately for [experimenters who] have different kinds or levels of expectancy."²⁰⁸

²⁰⁷ It is important to note, however, that statistical formulae cannot prescribe the legal significance of the observed differences. Even if the observed differences between the XXX-film group and the G-film group are significant enough not to be, in all likelihood, a function of chance error, the legal significance remains to be evaluated. This determination will depend on the policymaker's view of the significance of the outcome measure — in this example, the empathy scale — to the legal matter in issue. The decrease in empathy, though statistically significant, may not be so great that it should override the legal principles at stake. In addition, the court or legislature might find the empathy scale only a poor estimator of the answer to the question whether violent-pornographic films lead to increased violence. See J. MONAHAN & L. WALKER (1985), *supra* note 73, at 79-80.

²⁰⁸ COOK & CAMPBELL, *supra* note 26, at 67.

Human subjects' proneness to "hypothesis guessing" poses a related source of difficulty for social inquiry.²⁰⁹ Given the level of sophistication of their subjects, social scientists must constantly guard against subjects figuring out the hypothesis, and then giving the researchers what they want to hear.²¹⁰ Experimenters can avoid this difficulty by disguising their hypotheses. In assessing the value of subjects' responses, lawmakers would be well advised to consider the form of the questions asked. Just as in direct examination of witnesses, leading questions have no place in empirical inquiry.

e. Legally Suspect Outcome Measures

In a significant amount of psychological research, the measures selected to test hypotheses of legal concern do not reflect the legal concern accurately, and, in some cases, the legal concern is effectively untestable. The most troubling problems arise when outcome measures do not seem to relate either directly or at all to the legal question at issue, yet researchers or lawmakers draw such connections. For example, Linz, Penrod, and Donnerstein recently pointed out the error in the conclusion of the Attorney General's Commission on Pornography that research supports the as-

²⁰⁹ *Id.* at 66-67.

²¹⁰ In the early 1970s a group of Stanford researchers conducted a now famous study examining what effect playing the role of "guard" or "prisoner" would have on subjects in a simulated prison setting. Haney, Banks & Zimbardo, *Interpersonal Dynamics in a Simulated Prison*, 1 INT'L J. CRIMINOLOGY & PENOLOGY 69 (1973). Subjects were randomly assigned to one of the two groups. The researchers found that the "guards" assumed their roles with a vengeance, becoming very aggressive and oppressive. The "prisoners" also reacted severely, with five suffering extreme emotional depression and others suffering various degrees of depression, passivity, and helplessness. The authors concluded that they "observed empirical relationships in the simulated prison environment which were strikingly isomorphic to the internal relations of real prisons, corroborating many of the documented reports of what occurs behind prison walls." *Id.* at 89. This study, however, has been criticized for having observed not the dynamics of what occurs behind prison walls, but instead what the subjects thought was expected of them. Banuazizi & Movahedi, *Interpersonal Dynamics in a Simulated Prison: A Methodological Analysis*, 30 AM. PSYCHOLOGIST 152, 156 (1975). Banuazizi and Movahedi explain as follows:

(a) The subjects entered the experiment carrying strong social stereotypes of how guards and prisoners act and relate to one another in a real prison; (b) in the experimental context itself, there were numerous cues pointing to the experimental hypothesis, the experimenters' expectations, and possibly, the experimenters' ideological commitment; and thus (c) complying with the actual or perceived demands in the experimental situation, and acting on the basis of their own role-related expectancies, the subjects produced data highly in accord with the experimental hypothesis.

Id.

sertion that exposure to degrading pornography is causally related to sexually violent behavior.²¹¹ The Attorney General's Report based this conclusion on one study which indicated that "exposure to degrading pornography results in callous attitudes about rape"²¹² and another study which indicated a "relationship between certain rape-related attitudes and self-reported acts of sexual aggression."²¹³ Linz, Penrod, and Donnerstein explain that the Commission's conclusion that exposure to degrading pornography is directly related to acts of sexual aggression cannot be validly deduced from two separate studies; the relationship would have to be observed in a single study.²¹⁴ The authors note the ethical impossibility of conducting such an experiment and suggest alternative means by which the question can be studied.²¹⁵

Less troubling, but still noteworthy problems arise in many cases due to differences in sensitivity between the legally relevant outcome measure and alternative measures selected by social scientists. For example, lawmakers may want to know whether the number of guilty verdicts is affected by removing jurors from the guilt phase of capital cases because they would refuse to vote to impose the death penalty upon finding the defendant guilty. Psychologists, however, sometimes avoid dichotomous variables like "guilty/not guilty,"²¹⁶ preferring to substitute variables more sensitive to effects, such as multi-valued scales.²¹⁷ While psychological research should not be faulted for its adaptation of psychological methods to legal questions, the lessons drawn from such research nonetheless must be tempered by the recognition that sometimes psychologists ask their subjects questions that are different from those which the lawyers had previously asked the psychologists.

²¹¹ Linz, Penrod & Donnerstein, *supra* note 195, at 724.

²¹² *Id.* (citing Zillman & Bryant, *Pornography, Sexual Callousness, and the Trivialization of Rape*, 32 J. COMM. 10 (1982)).

²¹³ *Id.* (citing Malamuth, *Predictors of Naturalistic Sexual Aggression*, 50 J. PERSONALITY & SOC. PSYCHOLOGY 953 (1986)).

²¹⁴ *Id.* at 725. The authors also call into question the relationship between "degrading but non-violent sexual material" and "calloused attitudes about rape." *Id.*

²¹⁵ *Id.*

²¹⁶ See Konecni & Ebbesen, *A Critique of Theory and Method in Social-Psychological Approaches to Legal Issues*, in *THE TRIAL PROCESS* 481 (B. Sales ed. 1981).

²¹⁷ Brannigan & Goldenberg, *supra* note 202, at 109-10, for example, criticize experiments by Malamuth and Donnerstein which generalize subjects' willingness to administer shocks in a bogus learning exercise following exposure to pornography to tendencies to assault or rape.

Although the flaws identified in this section will be detectable in some measure in most social science research, the principal object here has been to call attention to that research suffering from numerous, and particularly severe, methodological errors. Unquestionably, basically sound research that commits one or more of these errors should be discounted according to the type and severity of the errors. Of special concern should be that large body of research which blithely ignores virtually all precepts of science, yet makes a claim to special knowledge through the science label.²¹⁸ Only by adequate testing of their hypotheses can social scientists demonstrate that their understanding of the "world of experience" is better than anyone else's.

In fact, given the untestable or as yet untested nature of suppositional scientific statements, it is impossible to know if these pronouncements have any greater validity than any other informed speculation on the nature of human behavior. To all appearance, an expert who bases an opinion on the writings of Sigmund Freud is as likely to be "correct" as one who relies on an interpretation of literary works,²¹⁹ such as the novels of Feodor Dostoevsky²²⁰ or the plays of William Shakespeare;²²¹ but only

²¹⁸ See, e.g., Note, *supra* note 188, at 636-40 (detailing the methodological flaws in the research on the battered woman syndrome); Note, *Checking the Allure of Increased Conviction Rates: The Admissibility of Expert Testimony on Rape Trauma Syndrome in Criminal Proceedings*, 70 VA. L. REV. 1657, 1691-99 (1984) (detailing the methodological flaws in the research on the rape trauma syndrome).

²¹⁹ See Morse, *Failed Explanations*, *supra* note 12, at 990-91 (1982) (considering Freudian psychology to be "literary-interpretative").

²²⁰ The Dostoevskian psychologist would have a rich literature from which to draw his opinions. For example Dostoevsky's masterpieces *Crime and Punishment* and *The Brothers Karamazov* provide robust examples and analyses of human psychology which could support much expert testimony. Joseph Frank's extraordinary multivolume biography of Dostoevsky is an excellent example of a detailed examination of the psychological analyses integral to much of Dostoevsky's fiction. See, e.g., J. FRANK, *DOSTOEVSKY: THE SEEDS OF REVOLT* 205-08 (1976) (discussing the deeply psychological nature of Dostoevsky's early work in *The Double*).

Frank's biography of Dostoevsky is important in two further respects to the present thesis. First, Frank illustrates the close connection in style and substance between Dostoevsky and Freud, a closeness that belies treating one as art and the other as science. See *id.* at 379-80. Second, Frank presents numerous examples where Freud's frequent analyses of Dostoevsky's psychic condition manifest a reckless disregard for the facts of Dostoevsky's life. See, e.g., *id.* at 383-90 (discussing and criticizing Freud's diagnosis of Dostoevsky on the basis of facts that Freud should have known were almost certainly incorrect). Frank's discussion of Freud's "science" makes the highly fictionalized nature of suppositional science clear.

²²¹ Although few experts avowedly rely upon Shakespeare for their expert opinions, many find support for their suppositions in Shakespeare's plays, while others claim an understanding of Shake-

the former one is likely to make it to the witness stand. Still, Freudian psychology, as well as Dostoevskian psychology, cannot be considered valueless to legal decisionmaking. How much value suppositional science has, and in what capacity, are topics examined in the following section.

B. The Relevance of Suppositional Science

Although the ostensibly specialized knowledge upon which suppositional scientists base their expert opinions may have merit as the product of thoughtful professionals, the fact that their knowledge has not been subjected to some sort of objective test renders it suspect as a source for legal decisionmaking. Indeed, in the trial context, this invulnerability to objective scrutiny makes the much discussed battle of the experts inevitable. Yet the Federal Rules of Evidence insist only that "specialized knowledge . . . assist the trier of fact" — a seemingly not very stringent standard. Surely, as has been argued, suppositional scientists have sufficient expertise through experience (i.e., nonscientific observation of clinical populations) and education at least to *assist* the trier of fact to understand the evidence.²²² And outside the trial context, in the realm of legal policy formation, supporters of social science argue that legal reliance on suppositional science at the very least improves upon intuition and speculation.²²³ While suppositional science can contribute helpful insights to legal policy, its use in trials to "assist" fact-finders is problematic.

The value of suppositional science can be compared to other nonscientific disciplines the law regularly consults to gain insights into and understanding of human behavior, such as history, literature, and philosophy.

speare by psychoanalyzing his writings. See, e.g., N. HOLLAND, *PSYCHOANALYSIS AND SHAKESPEARE* (1964). Dostoevsky has also been the subject of psychoanalysis. See Freud, *Dostoevsky and Parricide*, in *GUILT: MAN AND SOCIETY* (R. Smith ed. 1971) (discussed in N. HOLLAND, *supra*, at 11-13).

²²² One group of commentators argues along these lines, stating that psychological "opinions based on a coherent, if unproven, scientific theory may offer the factfinder some assistance in constructing the range of plausible explanations for particular behavior." *PSYCHOLOGICAL EVALUATIONS*, *supra* note 12, at 443 n.79. But if these theories have not been demonstrated to be accurate, I am at a loss to understand what "assistance" the fact-finder receives or how the law should determine when "expert" opinions based on such theories are of assistance. "Coherence" alone does not appear to be a particularly satisfying standard by which to measure purportedly scientific opinion. *But see* Bonnie & Slobogin, *supra* note 12, at 461-95 (contending that courts should allow mental health professionals to offer opinions as expert witnesses even though their opinions are not supported by empirical research).

²²³ See Bonnie & Slobogin, *supra* note 12, at 492-93.

These disciplines, classified as the "humanities," often inform broad legal questions and assist in the formation of legal policy. Since social science's field of study comprises questions of fact, its relevance at the level of policy formation relates to what Kenneth Culp Davis has called "legislative facts."²²⁴ Legislative facts are those facts which transcend the particular dispute, having relevance to legal reasoning and the fashioning of legal rules.²²⁵ Contrasted with legislative facts are "adjudicative facts." Adjudicative facts are those facts particular to the dispute.²²⁶

Recently, John Monahan and Laurens Walker refined Professor Davis' dichotomy in a way especially well-suited to the present discussion.²²⁷ Professors Monahan and Walker identified three levels of convergence between social science and law: social authority,²²⁸ social or adjudicative facts²²⁹ and social frameworks.²³⁰ Social authority refers to social science research relevant to the determination of legislative facts and thus the formulation of legal rules.²³¹ According to their proposal, social authority is

²²⁴ Davis, *An Approach to Problems of Evidence in the Administrative Process*, 55 HARV. L. REV. 364, 402-03 (1942).

²²⁵ See FED. R. EVID. 201(a), advisory committee's note ("Legislative facts . . . are those which have relevance to legal reasoning and the lawmaking process, whether in the formulation of a legal principle or ruling by a judge or court or in the enactment of a legislative body.").

²²⁶ See *id.*; see also Davis, *supra* note 224, at 402.

²²⁷ Of course, to accept my argument the reader does not have to accept the Monahan-Walker model. The analysis below could easily be fitted into the traditional legislative-adjudicative fact dichotomy. At the same time, I should add that in the more likely event that the reader rejects my argument, the Monahan-Walker model should receive none of the blame.

²²⁸ Monahan & Walker, *Social Authority: Obtaining, Evaluating and Establishing Social Science in Law*, 134 U. PA. L. REV. 477 (1986) [hereinafter Monahan & Walker (1986)].

²²⁹ Walker & Monahan, *Social Facts: Scientific Methodology as Legal Precedent*, 76 CALIF. L. REV. 877 (1988) [hereinafter Walker & Monahan (1988)]. I use Davis' term "adjudicative fact" rather than Monahan and Walker's "social fact," because it conveys the main idea better. "Social fact" suggests a fact of general import rather than one peculiar to the dispute. For an explanation of Walker and Monahan's selection of the term "social fact" see *id.* at 881-82 n.26.

²³⁰ Walker & Monahan, *Social Frameworks: A New Use of Social Science in Law*, 73 VA. L. REV. 559 (1987) [hereinafter Walker & Monahan (1987)].

²³¹ To illustrate the relevance of social authority to legislative facts, Monahan and Walker forward the example of *United States v. Leon*, 468 U.S. 897 (1984), in which the Court reviewed social science research when considering the soundness of a good-faith exception to the exclusionary rule. Walker & Monahan (1987), *supra* note 230, at 562. In weighing the costs and benefits of the exclusionary rule, the Court cited several studies which had considered the effect of the rule on the disposition of felony arrests. *Leon*, 468 U.S. at 907 n.6. As Monahan and Walker explain, the relevance of this social authority rests upon its contribution to legal reasoning: "None of these studies involved the immediate parties to the *Leon* case. Rather, the research was used exclusively and explicitly for the purpose of considering whether to alter an existing rule of law." Walker & Monahan (1987), *supra*

analogous to legal authority and should be consulted similarly.²³² Hence, judges would consider social science "precedent" (i.e., past research) as presented through briefs,²³³ through arguments,²³⁴ and sua sponte.²³⁵ The information found to be relevant would then be incorporated into the judge's conclusions of law. Alternatively, in the Monahan-Walker model, social science research might be relevant to adjudicative facts, in which case, after being deemed admissible, it would be presented to the trier of fact through expert testimony.²³⁶ Finally, social science research might have relevance as a combination of social authority and adjudicative fact. Professors Monahan and Walker label this theory social frameworks. In social frameworks, some issue in the particular dispute is claimed to be an instance of a social scientific finding or theory of general import.²³⁷ According to the model, the judge would consider and instruct the jury on the verity of the general claim, but the jury would also hear expert testimony on how the theory applies in the case before it.²³⁸

1. *The Relevance of Suppositional Science as Social Authority*

Suppositional science can potentially play as broad a role in informing legal policy as any other nonscientific discipline. A judge's study of his-

note 230, at 562.

²³² Monahan & Walker (1986), *supra* note 228, at 490-91; see also Korn, *Law, Fact, and Science in the Courts*, 66 COLUM. L. REV. 1080, 1101-02 (1966) (suggesting that scientific knowledge more closely resembles law than fact).

²³³ Monahan & Walker (1986), *supra* note 228, at 496-97.

²³⁴ *Id.*

²³⁵ *Id.* at 497-98.

²³⁶ Walker & Monahan (1988), *supra* note 229, at 887. See, e.g., *Zippo Mfg. Co. v. Rogers Imports*, 216 F. Supp. 670, 690-91 (S.D.N.Y. 1963) (consumer survey measuring degree of public confusion between the plaintiff's and the defendant's cigarette lighters).

²³⁷ Walker & Monahan (1987), *supra* note 230, at 563-67. Monahan and Walker discuss several examples of the use of social science research as social frameworks. In particular, they review eyewitness identification, assessments of dangerousness, battered woman syndrome, and sexual victimization. In each of these examples, general scientific findings are sought to be applied in individual cases to assist the trier of fact to determine some fact in issue. See *infra* notes 250-60 and accompanying text for discussion of the use of battered woman syndrome as a social framework.

²³⁸ *Id.* at 588-96. This Article adopts Monahan and Walker's tripartite analysis rather than Davis' dichotomy primarily because the former explains more fully the role social science research plays in the courts. Yet, at the level of legislative fact, social science research also has potential relevance to the lawmaking task of the legislative branch of government. My discussion below of judges' use of social science to decide legislative fact questions applies similarly to legislators deciding such questions. Thus, implicit in the present argument is the assumption that judges sometimes must make law in ways similar to legislators, and that this role interacts with their use of social science research.

tory, for example, enables her to better understand what the framers of the fourteenth amendment intended by the words "due process." Like suppositional science, historical explanations cannot be tested, and thus have a tendency to multiply in proportion to the number of scholars studying the question.²³⁹ But invulnerability to falsification does not interfere with judges' reviewing the relevant historical record. Some theories fit the historical data better and consequently have more persuasive force. Still, because the several coherent theories remaining cannot be tested against one another, judges exercise considerable political judgment when deciding which ones to incorporate into their opinions. In addition, the theories themselves inevitably are imbued with the subjective and normative value judgments of the theorists. The same state of affairs exists with suppositional science.

One of the most extreme modern examples of suppositional science, which has had a significant impact on legal policy, is Professors Joseph Goldstein, Anna Freud, and Albert J. Solnit's book *Beyond the Best Interests of the Child*.²⁴⁰ These noted authors²⁴¹ applied psychoanalytic theory to the legal issue of selecting child placements following such circumstances as abuse, neglect, adoption and divorce. The empirical conclusions the authors draw have been roundly criticized.²⁴² I would add my voice to

²³⁹ One example of the uncertainties of historical research comes from the desegregation litigation of *Brown v. Board of Education*, in which an intermediate court asked both sides for further argument on the intention of the framers of the fourteenth amendment regarding public school segregation. *Brown v. Board of Educ.*, 345 U.S. 972 (1953) (Miscellaneous Orders). A mass of historical scholarship was directed at this question by both sides. In the volumes of materials filed on this question, the historians could not achieve consensus on the matter. The Court later dismissed these materials, stating, "At best, they are inconclusive." *Brown v. Board of Educ.*, 347 U.S. 483, 489 (1954). Ironically, the Court turned instead to suppositional psychological research to support its holding. See *supra* notes 126-34 and accompanying text.

²⁴⁰ J. GOLDSTEIN, A. FREUD & A. SOLNIT, *BEYOND THE BEST INTERESTS OF THE CHILD* (1973) [hereinafter *BEYOND THE BEST INTERESTS OF THE CHILD*]. See Davis, "There is a Book Out . . .": *An Analysis of Judicial Absorption of Legislative Facts*, 100 HARV. L. REV. 1539, 1544 (1987) [hereinafter Davis, *Judicial Absorption*] (discussing the impact of *BEYOND THE BEST INTERESTS OF THE CHILD* on the law).

²⁴¹ Professor Goldstein is affiliated with the Yale Law School, Dr. Solnit with the Yale Child Study Center, and Dr. Freud with the Hampstead Child-Therapy Clinic, London. J. GOLDSTEIN, *supra* note 240, at ix.

²⁴² See, e.g., Katkin, Bullington & Levine, *Above and Beyond the Best Interests of the Child: An Inquiry into the Relationship Between Social Science and Social Action*, 8 LAW AND SOC'Y REV. 669 (1974) ("[T]he book's greatest utility may be as an example of the wrong way to employ social science to solve problems of social policy.").

this group. The authors' conclusions are not based on systematic research, and appear to be representative solely of their personal or professional opinions on the subject.²⁴³ Nonetheless, these authors' views cannot be categorically rejected as being irrelevant to legislative fact-finding.

Psychological research concerning the effects of alternative placements on children remains unsettled in many of the areas in which Goldstein, Freud, and Solnit commented.²⁴⁴ Because of this lack of resolution, their work, and many of the suppositions of others in this area, remain relevant to the debate. When a scientific hypothesis has not yet been subjected to empirical test, or attempts to do so have failed to firmly corroborate or falsify the theory, lawmakers should give the hypothesis due consideration when establishing legal rules. Under such conditions, unsubstantiated theories can provide helpful insights, and are at least as valid as the lawmaker's best guess. In addition, as discussed more fully in the following section, suppositional scientific findings often reflect legitimate policy views that should be taken into consideration by lawmakers.

While the values implicit in the recommendations proffered by Goldstein, Freud, and Solnit do not appear ideologically based, their recommendations do reflect a strong distrust of judgments made by the legal system in the area of child placement, as well as a concomitant faith in the psychiatric profession's ability to do a better job in this area.²⁴⁵ To the extent their recommendations reflect personal values, or possibly the val-

²⁴³ To provide just one example of the unscientific nature of this work, the authors make the following empirical statement:

Adoption agencies advise that children be informed of their adoptive status. Such knowledge has a different impact at different ages. The young child tends to ignore it, even if informed repeatedly, and to develop his attachments as a wanted child to his psychological parents Adolescents frequently institute a search for the lost and unknown parents, as a step preliminary to achieving independence from any parental authority and reaching maturity.

BEYOND THE BEST INTERESTS OF THE CHILD, *supra* note 240, at 23. The only support cited for the "empirical fact" about adolescent behavior is a footnote citing an *Ann Landers* advice column. *Id.* at n.9. (Not surprisingly, the letter is signed "Confused in Chicago.") The authors provide no support for their observation of young children's behavior.

²⁴⁴ See generally PSYCHOLOGY AND CHILD CUSTODY DETERMINATIONS (L. Weithorn ed. 1987).

²⁴⁵ See Davis, *Law, Science, and History: Reflections Upon In the Best Interests of the Child*, 86 MICH. L. REV. 1096, 1096-97 (1988) [hereinafter Davis *Law, Science, and History*]; see generally Weisberg, *The "Discovery" of Sexual Abuse: Experts' Role in Legal Policy Formulation*, 18 U.C. DAVIS L. REV. 1 (1984).

ues of the psychiatric profession, legal policymakers should extend respect to those value judgments. Whatever weight these values are accorded results not from the fact that certain professionals hold them, but instead from an independent legal judgment of the force of these values.²⁴⁶

The danger remains that lawmakers will mistake these authoritative suppositions as scientific authority,²⁴⁷ or will fail to properly discount scientific suppositions when scientific findings are available. The danger of judicial confusion is certainly a cause for concern, and so far the judiciary has not often demonstrated itself to be a knowledgeable consumer of the social science product.²⁴⁸ Moreover, the relevance of suppositional science is not substantial; its usefulness is limited to providing insights to lawmakers and to representing policy views that would be better proffered without pretense of being scientific. Nevertheless, as discussed in Part IV, lawmakers should be capable of determining what value social science possesses.²⁴⁹ At the level of legislative fact, any possible prejudicial effect of suppositional science should be remedied through the education of lawmakers. The possible prejudicial effect of suppositional science at the level of adjudicative fact, however, presents a very different problem — one that the next two sections will consider. The next section treats the thorny issue of the usefulness of suppositional science at the uncertain border between legislative fact and adjudicative fact, that is, at the level of social framework.

²⁴⁶ For a good discussion of the role scientists' values play in policy formation and why legislators sometimes inquire into scientists' value choices, see Hammond & Adelman, *Science Values and Human Judgment*, in JUDGMENT AND DECISION MAKING 128-30 (H. Arkes & K. Hammond eds. 1986).

²⁴⁷ In her survey of judicial use of Goldstein, Freud, and Solnit's book, Professor Peggy Davis found an "incautious" and uncritical judiciary. Davis, *Judicial Absorption*, *supra* note 240, at 1593. Davis *Law, Science, and History*, *supra* note 245, is "incautious" herself in repeatedly referring to Goldstein, Freud, and Solnit's work as scientific. She states, for example, that these authors "have enriched the store of scientific knowledge upon which lawmakers may draw in advancing the public good and promoting the interests of children." *Id.* at 1119. See also Weisberg, *supra* note 245, at 1.

²⁴⁸ See Davis, *Judicial Absorption*, *supra* note 240; see also Suggs, *The Use of Psychological Research by the Judiciary: Do Courts Adequately Assess the Validity of Research?*, 3 LAW & HUM. BEHAV. 135 (1979).

²⁴⁹ See *infra* notes 276-332 and accompanying text.

2. *The Relevance of Suppositional Science as Social Framework*

Suppositional science applies to social frameworks at the legislative fact level of fixing the scope of the legal rule in the same way that it is relevant to legislative facts as social authority. While suppositional science retains some relevance to the fact-finding conducted by jurors at the adjudicative fact level of social frameworks, its potential for misuse, confusion, and waste of time makes it too prejudicial to admit through expert testimony. One example of a social framework, and also an example of suppositional science, is the theory of the battered woman syndrome.²⁵⁰ At the legislative fact level of social frameworks, the theory's purported relevance comes from the claim that after prolonged abuse, women experience a "constant state of fear" as a result of the cyclical nature of the violence.²⁵¹ In addition, the repeated abuse puts battered women in a psychological state known as learned helplessness.²⁵² These two theories purport to explain why some battered women kill in the absence of imminent harm (i.e., because of the constant state of fear, harm is reasonably perceived as always "imminent"), and fail to leave the violent relationship (i.e., they are unable to leave due to learned helplessness). For the social framework to apply in a particular case, the defense must produce an expert to testify that the defendant suffers from the battered woman syndrome. In this way, the battered woman syndrome theory pertains to both legislative facts and adjudicative facts in that it addresses facts that transcend the particular litigation and facts special to the litigation.

²⁵⁰ See L. WALKER (1984), *supra* note 184; L. WALKER (1979), *supra* note 184. For general discussions of this topic, see Schneider, *Equal Rights to Trial for Women: Sex Bias in the Law of Self-Defense*, 15 HARV. C.R.-C.L. L. REV. 623 (1980); Note, *The Battered Wife's Dilemma: To Kill or To Be Killed*, 32 HASTINGS L.J. 895 (1981); Kitports, *Defending Battered Women's Self-Defense Claims*, 67 OREGON L. REV. 393 (1988).

²⁵¹ For discussions of the "cycle theory," see L. WALKER (1984), *supra* note 184, at 95-104; L. WALKER (1979), *supra* note 184, at 55-70.

²⁵² For a discussion of the application of learned helplessness theory to the context of battered women, see L. WALKER (1984), *supra* note 184, at 86. *But see* Note, *supra* note 188, at 641 ("[F]rom a theoretical perspective one would predict that if battered women suffered from learned helplessness they would not assert control over their environment; certainly, one would not predict such a positive assertion of control as killing the batterer.").

a. At The Legislative Fact Level of Social Frameworks

Although research on the battered woman syndrome is of dubious scientific validity,²⁵³ it nevertheless remains relevant to the social framework applied in self-defense cases. As an initial matter, in the absence of other empirical research to the contrary, the theory's psychological suppositions provide insights which may inform legal policy. For example, the theory's view that familial violence is often cyclical, thus making a battered woman's fear of future abuse more reasonable, generally conforms to common sense and should also inform the legal rule. This insight might support legislative reform of the imminence requirement of the rule of self-defense, or a more liberal judicial construction of the imminence requirement.²⁵⁴

More important is the substantive policy view held by researchers of the battered woman syndrome that the rule of self-defense does not account for the situation of the battered woman who kills. In particular, these advocates argue that the legal requirement that battered women respond to an *imminent* threat using *proportional force* fails to take into account the fact that a woman may be unable to defend herself when the threat becomes imminent.²⁵⁵ According to this view, the rules of self-defense should be modified to take into account the principle that a battered woman's "untimely" response to a deadly threat may still be reasona-

²⁵³ See Note, *supra* note 188, at 622 ("question[ing] the validity of the research on battered woman syndrome and argu[ing] that in self-defense cases courts should not admit expert testimony based on this research").

²⁵⁴ See, e.g., C. EWING, *BATTERED WOMEN WHO KILL: PSYCHOLOGICAL SELF-DEFENSE AS LEGAL JUSTIFICATION* (1987). Under the Monahan-Walker model's conception of social frameworks, valid social science research pertaining to facts of general import would be presented to the trier of fact through the judge's instructions. Under the traditional model, this evidence is presented directly to the trier of fact as relevant to the adjudicative fact in question. FED. R. EVID. 201(a). The present proposal does not necessarily prefer one process over the other. *Valid* social science research should be presented to the trier of fact either through the judge's instructions or expert testimony. The present proposal contemplates that even *invalid* social science pertaining to facts of general import might have legal relevance, but only to the fashioning of legal rules (i.e., exclusively at the legislative fact level).

²⁵⁵ See Schneider, *supra* note 250, at 632 (a battered woman disadvantaged in size learns weapons are necessary after unsuccessful attempts to defend herself unarmed); MacKinnon, *Toward Feminist Jurisprudence*, 34 STAN. L. REV. 703, 732 (1982) ("Women thus perceive the need and do need to resort to deadly force, [and] are more threatened than a similarly situated man, largely because they are less able to care for themselves than they would be if they were trained the way men are trained.").

ble.²⁵⁶ Importantly, however, the researchers' conclusions are legally relevant for the insights and values they offer to policy formation, not for their scientific validity. Simply put, the view of these researchers represents a sound policy argument.

b. At the Adjudicative Fact Level of Social Frameworks

The relevance of scientific suppositions does not extend to the application of a social framework to particular disputes through expert testimony. The Federal Rules of Evidence provide that expert testimony will be allowed only when it "will assist the trier of fact to *understand the evidence* or to determine a *fact in issue*." But when experts testify to non-scientific "findings," they inevitably intermingle their judgment of sound policy with their determination of what the facts are. In purporting to explain to the jury "what is" (i.e., this defendant, who suffers from battered woman syndrome, reasonably believed harm was imminent), these experts actually testify to what they believe the legal rule "ought to be" (i.e., a battered woman who kills in self-defense in the absence of imminent harm may still have acted reasonably).²⁵⁷ Thus, this ostensibly descriptive testimony is a thinly disguised normative judgment.²⁵⁸ As a result, the established policy of legal rules becomes modified, and in some

²⁵⁶ See Note, *supra* note 188, at 643-47; C. EWING, *supra* note 254, at 78-79.

²⁵⁷ Lenore Walker recognizes the difficulty in separating her policy views from her research, and has candidly acknowledged the effect her values might have on her conclusions. In the introduction to *The Battered Woman*, she stated as follows:

I am aware that this book is written from a feminist vision. It is a picture of what happens in a domestic violent act from the perspective of only one of the two parties. The men do not have equal rebuttal time. Rather, I view women as victims in order to understand what the toll of such domestic violence is like for them. Unfortunately, in doing so I tend to place all men in an especially negative light, instead of just those men who do commit such crimes.

L. WALKER (1979), *supra* note 184, at xvii. In the preface to her more recent book, Walker again notes her role as an advocate, but this time suggests that her research findings do not simply reflect her subjective views:

It is foolish for academicians and professionals to stand behind the cloak of objectivity in a field of study as politicized as this. Wife-beating has been with us for as long as we have historical records, but there were few attempts to understand or change it until the feminists politicized it Neutrality or objectivity by anyone in this field, where estimates of incidence rates run higher than half of the population, is unlikely unless special precautions are used, such as those taken by a researcher.

L. WALKER (1984), *supra* note 184, at x.

²⁵⁸ See Davis, *Law, Science, and History*, *supra* note 245, at 1107.

cases nullified, by the expert's testimony.²⁵⁹ While the law grudgingly accepts a jury's power to nullify legal rules,²⁶⁰ it is less clear that experts should have this power.

One area of scientific evidence that implicates the dual level of social frameworks, and which has had a long tradition of expert involvement in policy debate, includes the testimony of mental health experts on issues such as insanity, diminished capacity,²⁶¹ and dangerousness. For example, an expert testifying for the state at a capital sentencing hearing who offers the opinion that the defendant is "dangerous" and "will probably kill again" bases this opinion on the observation that the defendant manifests certain characteristics believed to be associated with future dangerousness.²⁶² The validity of that opinion depends in part on the validity of

²⁵⁹ For another example of suppositional science offered to change the effect of a legal rule, see Note, *Checking the Allure of Increased Conviction Rates: The Admissibility of Expert Testimony on Rape Trauma Syndrome in Criminal Proceedings*, 70 VA. L. REV. 1657, 1659 (1984) ("One response to [the] perceived failure [of rape reform legislation] has been the use of expert psychiatric and psychological testimony on 'rape trauma syndrome' (RTS) in criminal rape proceedings."). Arguably, the use of RTS creates greater concern than the use of the battered woman syndrome, since it is principally used by prosecutors to increase conviction rates rather than defendants to escape the confines of an "unjust" rule. *Id.* at 1694-95; see also *infra* note 260.

²⁶⁰ For an overview of responses to jury nullification, ranging from grudging acceptance to warm embrace, see Schefflin & Van Dyke, *Jury Nullification: The Contours of a Controversy*, 43 LAW & CONTEMP. PROB., Autumn 1980, at 51 (concluding that jurors should be instructed that they have the "power of nullification"); see also Horowitz, *The Effect of Jury Nullification Instruction on Verdicts and Jury Functioning in Criminal Trials*, 9 LAW & HUM. BEHAV. 25 (1985) (empirical examination of the effect on verdicts of an explicit nullification instruction). Not surprisingly, I found no similar reviews of "expert nullification," since the factors arguably supporting a jury's power to nullify (e.g., conscience of the community) do not extend to experts. However, it has been argued in certain cases that even invalid expert testimony should be proffered in lieu of a change in the legal rule. On a personal note, I have heard this argument many times in response to my view that both battered woman syndrome research and the rules of self-defense, which proscribe admission of a defendant's history of abuse to support her claim that she acted reasonably, are flawed. See Faigman, *Discerning Justice When Battered Women Kill* (Book Review), 39 HASTINGS L.J. 207, 226 (1987). Whether experts should be discouraged from testifying when that testimony might nullify an allegedly incorrect law is a difficult question to answer. It seems that the legal process is better served if incorrect laws are modified on the merits rather than through the legerdemain of suppositional science. *Id.* at 221. See Weithorn, *Professional Responsibility in the Dissemination of Psychological Research in Legal Contexts*, in REFORMING THE LAW: IMPACT OF CHILD DEVELOPMENT RESEARCH 252, 262, n.1 (G. Melton ed. 1987).

²⁶¹ For an excellent analysis of how the judgments of mental health experts on questions of insanity and diminished capacity are invariably imbued with the experts' individual value preferences, see Morse, *Crazy Behavior*, *supra* note 12, at 539-600.

²⁶² See J. MONAHAN, *THE CLINICAL PREDICTION OF VIOLENT BEHAVIOR* 21-22 (1981) [hereinafter MONAHAN (1981)].

studies finding a general relationship between the characteristics the defendant purportedly possesses and future dangerousness.²⁶³ When valid data support a finding that a characteristic the defendant possesses is associated with future dangerousness, this data should be presented to the trier of fact.²⁶⁴ However, even when such data exist, experts should not be allowed to give an opinion on the future dangerousness of the *particular* defendant unless other data support the validity of these judgments.²⁶⁵ Presently, most studies cast doubt on the special abilities of mental health experts to identify future dangerousness.²⁶⁶ There is no reason to believe that triers of fact, when provided with relevant studies, cannot assess the particular defendant's dangerousness as well as an expert.²⁶⁷ Indeed, triers

²⁶³ See *id.* at 38-39; see generally Monahan, *Risk Assessment of Violence Among the Mentally Disordered: Generating Useful Knowledge*, 11 INT'L J. L. & PSYCHIATRY 249, 250-51 (1988) [hereinafter Monahan (1988)].

²⁶⁴ Under a traditional model, this evidence would be presented to the trier of fact through expert testimony. Under the Monahan-Walker model, this information would be incorporated into the judge's instructions to the jury. Walker & Monahan (1987), *supra* note 230, at 588-96.

²⁶⁵ See generally Kleinmuntz, *The Scientific Study of Clinical Judgment in Psychology and Medicine*, 4 CLINICAL PSYCHOLOGY REV. 111 (1984) (reviewing studies comparing intuitive clinical predictions of behavior to formal statistical predictions, and finding the latter superior to the former); P. MEEHL, *CLINICAL VERSUS STATISTICAL PREDICTIONS: A THEORETICAL ANALYSIS AND A REVIEW OF THE EVIDENCE* (1954).

Experts having relevant factual information which does not depend on a social scientific test and which could assist the trier of fact in assessing a fact in issue, certainly should be allowed to testify on those matters. For instance, the testimony of a psychologist told by the defendant that sometimes voices in his head direct him to kill, would be relevant to an assessment of dangerousness. But absent a showing of an ability to do so validly, experts should not be permitted to draw conclusions or offer an opinion to the jury. See Morse, *Crazy Behavior*, *supra* note 12, at 601, in which Professor Morse argues that:

[M]ental health experts should be limited to testifying about behavior they observe and in limited cases about relevant reasonably hard scientific data. They should not be allowed to testify about theoretical matters that are in dispute or to state conclusions that are not based on firm scientific evidence.

²⁶⁶ See Monahan (1988), *supra* note 263, at 250 ("The upper bound of accuracy that even the best risk assessment technology could achieve was on the order of .33. That is, of every three disordered persons predicted by psychiatrists or psychologists to be violent, one will be discovered to commit a violent act, and two will not."). See generally H. STEADMAN & J. COCOZZA, *CAREERS OF THE CRIMINALLY INSANE* 151 (1974) (research indicating an error rate of 80%); T. THORNBERRY & J. JACOBY, *THE CRIMINALLY INSANE: A COMMUNITY FOLLOW-UP OF MENTALLY ILL OFFENDERS* 189 (1979); Cocozza & Steadman, *The Failure of Psychiatric Predictions of Dangerousness: Clear and Convincing Evidence*, 29 RUTGERS L. REV. 1084, 1098 (1976) (citing research reporting an error rate of 86%). But see Bonnie & Slobogin, *supra* note 12, at 461, in which Professors Bonnie and Slobogin accept the limitations of clinical predictions of dangerousness, but argue that such predictions nonetheless contain some probative value and should be admitted under certain circumstances.

²⁶⁷ See Morse, *Crazy Behavior*, *supra* note 12, at 620 ("Without hard, methodologically sound

of fact may be better situated than experts to make these determinations because their judgments are not clouded by expert witness fees or strong ideological biases.²⁶⁸

3. *The Relevance of Suppositional Science to Adjudicative Facts*

Social science research might be relevant to many factual questions presented at trial which do not relate directly to general theories of human behavior or to broad policy questions. Such adjudicative facts are squarely within the province of the trier of fact. For example, a valid survey showing consumer confusion over two products might be used in a trademark litigation suit,²⁶⁹ and reliable statistical comparisons of one business' work force to the surrounding population might be used in a discrimination suit.²⁷⁰ As with all evidence, a judge must pass on the admissibility of social science research offered on an adjudicative fact before it goes to the

quantitative data, the guess of an expert is unlikely to be better than the guess of laypersons.”).

²⁶⁸ Perhaps the quintessential example of biased testimony in the area of predicting dangerousness is the expert witness practice of Doctor Grigson, who is also known as “the killer shrink.” See Bloom, *Doctor for the Prosecution*, AM. LAW., Nov. 1979, at 25. Grigson testifies frequently for the prosecution, often in a manner on the fringe of accepted medical practice. See Dix, *The Death Penalty, “Dangerousness,” Psychiatric Testimony, and Professional Ethics*, 5 AM. J. CRIM. L. 151, 172 (1977) (asserting that Grigson operates “at the brink of quackery”). In *Barefoote v. Estelle*, 463 U.S. 880 (1983), for example, without having examined the defendant, Grigson testified that the defendant had a “one hundred percent” chance of being a continuing threat to society. *Id.* at 905 n.11. At Barefoot’s habeas proceeding, another psychiatrist testified that if a doctor on his staff made such an assertion without having examined the patient, “‘we would kick him off the staff of the hospital for his arrogance.’” *Id.*

Professor Johnson, in *The Politics of Predicting Criminal Violence* (Book Review), 86 MICH. L. REV. 1322 (1988), remarks on the political considerations that have become part of the standards of admissibility for expert testimony on dangerousness. She observes that “the standards governing the reliability required of scientific evidence that will be used to justify a person’s further incarceration or execution are astonishingly different from the standards for evidence that will be used to prove racial discrimination in the sentencing process.” *Id.* at 1322.

²⁶⁹ See, e.g., *Zippo Mfg. Co. v. Rogers Imports*, 216 F. Supp. 670, 690-91 (S.D.N.Y. 1963) (consumer survey offered to prove public confusion between the plaintiff’s and the defendant’s cigarette lighters).

²⁷⁰ See, e.g., *EEOC v. United Va. Bank/Seaboard Nat’l*, 615 F.2d 147, 149 (4th Cir. 1980) (In an action for racial discrimination, plaintiff offered “a statistical comparison of black employees at [the Bank] with black people in the total area work force.”); see also *City of Richmond v. J.A. Croson Co.*, 109 S. Ct. 706, 725 (1989) (The Court held that “statistical comparisons of the racial composition of an employer’s workforce to the racial composition of the relevant population may be probative of a pattern of discrimination. But where special qualifications are necessary, the relevant statistical pool for purposes of demonstrating discriminatory exclusion must be the number of minorities qualified to undertake the particular task.”).

jury. The standard of admissibility for this evidence should be the same as the standard applied to social authority and social frameworks: only valid research should be allowed to go to the jury.

The standard I have applied so far has been particularly sensitive to policy views masquerading as empirical fact. This concern persists with adjudicative facts, though the danger is more easily recognized in this area. Even though a researcher examining an adjudicative fact question may suffer from as much or more bias than other researchers, this bias is likely to be manifested clearly in the method of examining the question, rather than submerged in scientific jargon or theory. The question of admissibility thus depends principally on the researcher's application of the correct methodology,²⁷¹ and this is the standard applied in cases today. For example, "case-specific surveys are generally admissible if they are conducted according to the principles accepted by social scientists and statisticians for gathering and analyzing survey data."²⁷² Failure to collect or analyze data in the prescribed manner, as a result of bias, mistake, or otherwise, results in the exclusion of the evidence.²⁷³

C. Conclusion

Suppositional science assumes primarily two forms. It can be recognized easily in the form of untestable or wholly untested assertions of empirical fact. While such assertions are typically backed by numerous case studies, such observations, unaided by controlled investigation, provide little more than common sense can provide. More difficult to identify, though similarly lacking significant value to the legal process, are those empirical statements purportedly subjected to test, but which have actually received no real test at all. Yet, even while failing to merit full scientific status, suppositional science should not be ignored by legal decisionmakers, though, ironically, it has greater value to lawmaking than to fact finding.

I do not draw the line of relevance of suppositional science between juror and lawmaker simply because I am more sanguine about the latter's

²⁷¹ According to the Monahan-Walker model, *supra* note 227 and accompanying text, research methodology should be evaluated in the same way as social authority, but particular applications of methodology must be assessed on a case by case basis, or as adjudicative fact. Walker & Monahan (1988), *supra* note 229, at 887-88.

²⁷² C. MCCORMICK, MCCORMICK ON EVIDENCE § 208, at 642 (3d ed. 1984).

²⁷³ See generally D. BARNES, *supra* note 109.

ability to avoid being overwhelmed by such evidence.²⁷⁴ The policymaking role forms a necessary part of the lawmaker's responsibilities. The measure of relevance in the legislative context is sweeping, bound only by the inherent value of the evidence and inevitable time constraints. The value of suppositional science will be marginal or nonexistent for the very reasons it is deemed suppositional in many, if not most, cases. Nonetheless, lawmakers should have the benefit of a variety of views, both objectively scientific as well as subjectively persistent. The juror's role, in contrast, is limited strictly to that of applying the law to the facts as they are determined to exist. Social science is relevant to the jury's role only to the extent that it assists in making that determination reasonably free of normative or subjective bias.²⁷⁵

Still, several questions remain. It must be considered whether lawmakers can accurately be expected to discriminate between suppositional science and valid social science. Also, whatever a lawmaker's ability might be in regard to science, the division of responsibility between judge and juror for evaluating scientific evidence in the trial context must still be determined; judges are not obviously better than juries at the assigned task. Finally, lingering doubts remain over whether lawmakers will use social science, in all its variety, simply to advance particular political agendas. The final Part addresses these concerns.

IV. EVALUATING AND INTEGRATING SOCIAL SCIENCE INTO LEGAL DECISIONMAKING

The problem of integrating social science research into the legal process is complicated by the fact that not all social science is created equal, thus requiring an assessment of the probative value of particular social science findings. This problem raises the initial question of the legal system's capacity to evaluate and use social science research correctly. If such capacity exists, an important question remains: what should be the proper allocation of functions in the trial context between judge and juror in making those assessments?²⁷⁶ The previous Part sought to establish the premise

²⁷⁴ As discussed *infra* notes 312-14 and accompanying text, I do believe the judge is a better arbiter of the validity of scientific social inquiry than jurors.

²⁷⁵ See also Korn, *supra* note 232, at 1091.

²⁷⁶ Because jurors do not enter into the decisionmaking process at the level of legislative fact or social authority, the primary issue at this level concerns only the lawmaker's ability to correctly evalu-

that it is outside the jury's charge to consider the policy matters implicit in much suppositional science. This Part argues that the possibility of juror misuse of an expert's policy views coupled with possible jury confusion concerning the technology of social science supports a threshold admissibility standard based on a finding that the proffered research is valid. It first considers the basic question of lawmakers' capacities to critically evaluate social science research. Next, this Part examines the proper dynamic between judge, as arbiter of admissibility, and juror, as determiner of the weight admitted evidence receives. Finally, this Part concludes by returning to the familiar concern that social science research inherently contains policy values that lawmakers will use to fulfill particular political agendas.²⁷⁷

A. *Mastering the Methods of Social Science*

An overriding question in this Article, implicit until now, concerns the capacity of the legal system to accurately integrate social science research into legal decisionmaking.²⁷⁸ Many courts have expressed discomfort at having to review the methodological and, in particular, statistical underpinnings of social science research.²⁷⁹ Untrained in such exotica, judges fear treading in areas that can only lead to uncomplimentary commentary in the legal literature.²⁸⁰ However, presenting the problem as concern over the ability of lawyers to comprehend social science minutiae misstates the issue. Even the most difficult concepts used by social scientists are no more difficult than the more esoteric legal concepts lawyers employ regularly. The proper question is whether lawmakers have the inclination or motivation to devote the time necessary to learn the methods of social science. Stated in this way, the question poses a paradox.

Not until lawmakers understand the basic methods of social science are

ate social science research. This question is the subject of the first section of the present Part. The question whether policymakers might still use social science incorrectly, and, in particular, to serve certain ideological ends, is addressed in the last section of this Part.

²⁷⁷ See O'Brien, *supra* note 10, at 20-21.

²⁷⁸ See also Note, *Scientific Evidence and the Question of Judicial Capacity*, 25 WM. & MARY L. REV. 675 (1984).

²⁷⁹ See, e.g., *Craig v. Boren*, 429 U.S. 190, 204 (1976) ("It is unrealistic to expect either members of the judiciary or state officials to be well versed in the rigors of experimental or statistical technique.").

²⁸⁰ See generally *Kaye*, *supra* note 77 (criticizing the Court's use of social science in the jury size cases); *Bersoff*, *supra* note 9 (criticizing the Court's use of social science).

they likely to substantively rely upon research findings. Yet, in order for the investment in learning basic research methods to appear worthwhile, lawmakers must perceive a substantial need for this knowledge. This paradox can only be broken through education; both education of lawmakers on the value and mechanics of social scientific inquiry, as well as education of social scientists on ways to bring this information to the legal system in a coherent manner.

Education of those involved in the legal system on the methods of social science must proceed alongside social scientists' declarations of substantive relevance. The *legal relevance* of social science research simply cannot be divorced from its *scientific credibility*. Hence, with every offer of proof, lawmakers must ask for, and social scientists must provide, a cogent explanation of the methods and analyses that produced the scientific opinion. Social scientists must put their role as scientist ahead of their role as advocate. Since social scientists' value to the legal process lies in their capacity as scientists, it behooves them to act accordingly. The law can facilitate this scientific role by removing the incentives for social scientists to operate as "hired guns," either by adopting a model of admissibility which systematically excludes suppositional scientific evidence, or by employing disinterested experts (possibly court-appointed) who owe allegiance only to the truth-finding role of the process.²⁸¹

Researchers also can do more to increase the legal system's comprehension and proper use of scientific findings. Presently, social scientists, like many professionals, speak to one another using jargon that has the unintentional effect of excluding outsiders.²⁸² When speaking to a legal audience, researchers must tone down the scientific jargon without losing the subtlety and complexity of the research. This has been accomplished in the natural sciences²⁸³ and can be replicated in the social sciences. Finally,

²⁸¹ See, e.g., *People v. Barbara*, 400 Mich. 352, 358, 255 N.W.2d 171, 173 (1977) (The court excluded polygraph examination testimony because "[t]here was no testimony by disinterested and impartial experts" on the scientific acceptability of such tests.).

²⁸² See Hazard, *Limitations on the Uses of Behavioral Science in the Law*, 19 CASE W. RES. 71, 71 (1967) ("A great deal of behavioral science is cult oriented rather than problem oriented and the behavioral scientists are more interested in sharing with each other niceties and displays of technical erudition rather than sharing with the larger community some useful disclosures.").

²⁸³ See, e.g., R. FEYNMAN, *supra* note 156 (explaining the theory of quantum electrodynamics for a lay audience); D. PARK, *INTRODUCTION TO THE QUANTUM THEORY* (2d ed. 1974) (same); M. GARDNER, *THE RELATIVITY EXPLOSION* (1976) (explaining relativity theory for a lay audience).

the present "publish or perish" mentality of the social science departments of most universities results in unnecessary serialization of reports of single studies. Lawmakers have more than they can handle just researching legal sources. A single study is not likely to receive much attention by busy lawmakers if it is spread out over a half-dozen journals. Recognizing the difficulty of educating legal decisionmakers on ways to evaluate the validity of social science, researchers must pursue a curriculum that ensures a proper role for scientific social inquiry in the legal system.²⁸⁴

B. The Role of Judge and Jury in Evaluating Scientific Evidence

The topic of the proper division of responsibility between judge and juror in regard to evaluating scientific evidence has received much attention. The law typically treats scientific evidence differently than ordinary evidence,²⁸⁵ though the reasons for so doing are not always made clear. The primary reason given for the special treatment of scientific evidence is the concern that jurors could be overwhelmed by the aura of certainty that surrounds scientific evidence.²⁸⁶ This reason is typically advanced by commentators who have little trouble piercing the purported pseudoscientific veil.²⁸⁷ Nonetheless, judges and jurors on occasion could conceivably defer to the claimed precision of the scientist either because of a perceived expertise or simply by a desire to place a judgment or finding on the apparent bedrock of scientific opinion. Added to the concern that jurors will be unable to keep scientific evidence in perspective is the possibility of expert nullification. In other words, jurors will be presented with value choices outside their charge to decide. This Part begins with a brief look at the traditional legal tests of the admissibility of scientific evidence and then discusses the need to interpret these tests using a standard of scientific validity in order to avoid expert nullification of legal rules and the potentially overwhelming effect of scientific evidence.

²⁸⁴ See Melton, *Bringing Psychology to the Legal System: Opportunities, Obstacles, and Efficacy*, 42 AM. PSYCHOLOGIST 488 (1987).

²⁸⁵ See C. McCORMICK, *supra* note 272, § 203, at 605.

²⁸⁶ See Strong, *Questions Affecting the Admissibility of Scientific Evidence*, 1970 U. ILL. L.F. 1, 12-13.

²⁸⁷ See, e.g., Fineman & Opie, *supra* note 10.

1. *Standard Tests of Admissibility*

Either of two legal tests will ostensibly control the division of responsibility for evaluating scientific evidence: 1) the *Frye*²⁸⁸ test, or 2) the “relevancy test.”²⁸⁹ Under *Frye*, the judge has the initial responsibility to determine whether the proffered scientific evidence has been “generally accepted” in “the pertinent field.”²⁹⁰ If so, the evidence is admitted and the jury determines what weight it deserves. Under the relevancy test, adopted in the Federal Rules of Evidence, the judge determines whether the proffered scientific evidence “will assist the trier-of-fact to understand the evidence or to determine a fact in issue.”²⁹¹ Once scientific evidence passes muster, the trier-of-fact must determine what weight the evidence merits.

This division of responsibility between judge and jury for assessing scientific evidence is less clear in practice than it is in theory. First, the continuing force of *Frye* is unclear when the Federal Rules apply, with some courts continuing to apply both tests together.²⁹² Moreover, neither test is a paragon of drafting and both lead to confusion in application.²⁹³ At least in theory, however, both tests admit relevant trustworthy scientific evidence and exclude irrelevant untrustworthy science.²⁹⁴ Therefore, supposi-

²⁸⁸ *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923).

²⁸⁹ See generally P. GIANNELLI & E. IMWINKELRIED, *SCIENTIFIC EVIDENCE* § 1-9, at 31-47 (1986).

²⁹⁰ *Frye*, 293 F. at 1014. In *Frye*, the District of Columbia Circuit set forth the classic formulation of the general acceptance test as follows:

Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.

Id.

²⁹¹ FED. R. EVID. 702 (“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.”).

²⁹² See, e.g., *United States v. Gillespie*, 852 F.2d 475 (9th Cir. 1988); *United States v. Tranowski*, 659 F.2d 750 (7th Cir. 1981); *United States v. Brown*, 557 F.2d 541, 557 (6th Cir. 1977) .

²⁹³ See Graham, *Relevancy and the Exclusion of Relevant Evidence: Admissibility of Evidence of a Scientific Principle or Technique — Application of the Frye Test*, 19 CRIM. L. BULL. 51 (1983).

²⁹⁴ Whether the *Frye* general acceptance test or the Federal Rules of Evidence relevancy test provide different standards has been the subject of some debate. See generally Imwinkelried, *A New*

tional science should be excluded under both tests.

2. *Assessing the Admissibility of Scientific Evidence*

Traditionally, ostensibly scientific expert testimony has been treated differently than ordinary expert testimony, though the modern trend appears to be to treat the two the same.²⁹⁵ The distinction should be retained because scientific evidence is different from all other forms of evidence. The differences lie both in the methods by which this evidence is gathered, and therefore the very nature of scientific evidence, as well as the complexity of this evidence and the concomitant difficulty for jurors in assessing its probative value.

a. *Checking the Penchant for Expert Nullification*

Scientist-experts base their testimony either on the empirical research and conclusions of researchers unconnected with the particular litigation or upon their own research which may or may not have been conducted with the present litigation in mind. The rationale for accepting the research conclusions of scientists not present in the courtroom, statements that would otherwise be deemed hearsay, comes from the reliability that the legal system attaches to these statements. But to the extent that ostensibly scientific statements reflect personal values rather than scientific observation, the traditional hearsay dangers become implicated and pose substantial prejudice to the opponent of the evidence who cannot cross examine the researcher to uncover bias. Although experts who testify on their own research findings appear free of this criticism, they too are susceptible to a hearsay objection. Ultimately, no mature research program stands by itself. Science is a cumulative enterprise based upon the contributions of many researchers. Moreover, in principle at least, scientists

Era in the Evolution of Scientific Evidence — A Primer on Evaluating the Weight of Scientific Evidence, 23 WM. & MARY L. REV. 261, 266-67 (1981). It has been argued that the issue should not be whether the two tests differ, but what standard should apply to scientific evidence. Professor Saltzburg, for example, explains as follows:

The two approaches are essentially the same, despite the frequency with which they are assumed to differ. The question that is more significant is how much success a scientific claim must have before courts will rely on it. The answer to this question should be the same under *Frye* or a relevance approach.

Saltzburg, *Frye and Alternatives*, 99 F.R.D. 208, 209 (1983).

²⁹⁵ See C. McCORMICK, *supra* note 272, § 203, at 605-07.

come to the courtroom free of the usual personal biases that tarnish other witnesses. Not only is it impossible to impeach for personal bias those scientists not present in the courtroom, and difficult to impeach those that are in the courtroom, there is something unseemly about impeaching scientists on other than scientific grounds.

Yet, the insights of suppositional science can arguably enrich the trial process in a similar fashion to its potential value to policy formation. By its nature, *suppositional* science has the potential to provide two services to the legal system. Sometimes suppositional science might offer insights of some assistance to relevant factual issues, and sometimes such suppositions might contain policy views deserving legal deference.²⁹⁶ The degree of assistance suppositional experts can lend to fact-finding, however, depends on the validity of the opinions they hold, opinions difficult to assess in the absence of empirical tests. And, in the trial context, the value preferences of expert witnesses are irrelevant to the jury's task.

As this Article has sought to demonstrate, the validity of suppositional science is indefinite, because it has not been subjected to adequate testing.²⁹⁷ An expert's suppositions may be accurate, or they may not be, and no way exists for the juror to discern which is the case. Presented with conflicting suppositions, the so-called battle of the experts, jurors have no well-founded basis on which to choose between them. Such battles are likely to be won by the more persuasive witness, rather than the more persuasive facts or opinion.²⁹⁸

Undoubtedly, cases arise in which a suppositional expert's testimony will offer insights or suggest ways of viewing the evidence that can "assist" the fact-finder's task. The difficulty comes from recognizing these cases when they arise. Without knowing the accuracy of their opinions, neither the judge nor the jury can estimate the value of their testimony. To reassert a point made above, a Dostoevskian psychologist could sometimes provide assistance to fact-finders, perhaps as much assistance as a Freudian psychologist, but in a battle between the Dostoevskian and Freudian experts, nothing in their training or methods would necessarily

²⁹⁶ See *supra* notes 244-56 and accompanying text.

²⁹⁷ See *supra* notes 191-221 and accompanying text.

²⁹⁸ See Levine & Salans, *Exceptions to the Clearly Erroneous Test After the Recent Amending of Rule 52(a) for the Review of Fact Based Upon Documentary Evidence*, 10 AM. J. TRIAL ADVOC. 409, 429 n.116 (1987).

enable jurors to say which expert had the more valid opinion or could provide greater assistance.

In addition to the *potential* insights into factual questions that suppositional experts might provide juries, the only remaining potential significance of suppositional science lies in the value preferences it reflects. Perhaps, if the normative basis for nonscientific expert testimony was recognized, its discretionary allowance could be viewed as a function of legal policy formation. Thus, rather than incorporate into legal rules the factual insights and values reflected by suppositional science, suppositional experts could be allowed to testify generally, leaving to juries the task of choosing among competing suppositions. Professor Herbert Hovenkamp, for example, argues that in antitrust litigation juries should be exposed to competing economic theories and be allowed to choose between them the way they choose among conflicting facts.²⁹⁹ Professor Hovenkamp well recognizes the political component of most economic theories,³⁰⁰ but asserts that greater stability will be achieved in the long run by leaving theory-finding to juries.³⁰¹

But assigning the responsibility of theory-finding to juries invests vast power in expert witnesses to define the value choices resolved by the judicial process. Because judges cannot admit all experts claiming scientific expertise, if judges do not assess the validity of proffered opinions themselves, they must defer to the professional guilds to decide what scientific evidence to admit.³⁰² Admissibility of scientific evidence thus becomes a guild issue resolved not by legal principles, nor on the basis of the accuracy of the evidence, but instead by the internal dynamics of professional organizations.³⁰³ Hence, the Dostoevskian psychologist, for example, is

²⁹⁹ Hovenkamp, *Fact, Value and Theory in Antitrust Adjudication*, 1987 DUKE L.J. 897, 905.

³⁰⁰ *Id.* at 903

³⁰¹ *Id.* at 905. Professor Hovenkamp suggests that only when economic theories are "relatively uncontroversial" should they be incorporated into conclusions of law. *Id.* at 906.

³⁰² Professors Bonnie and Slobogin, *supra* note 12, at 457-61, posit a "solution" — modified by a "functional component" — to the problem of determining the admissibility of scientific evidence. Specifically, Professors Bonnie and Slobogin would graft an experiential requirement onto the already existing requirements of formal training and licensing. While the Bonnie-Slobogin proposal perhaps strengthens somewhat the court's role in assessing the relevance of a particular expert's testimony, it still asks the court to assess admissibility on factors not necessarily associated with the accuracy of that testimony. Research indicates that experience does not necessarily increase the accuracy of clinicians' judgments. See *supra* note 170.

³⁰³ See PSYCHOLOGICAL EVALUATIONS, *supra* note 12, at 17, in which the authors observe that

barred from the courthouse not because we doubt the validity of her opinion, at least no more so than the Freudian psychologist, but because she is not represented politically in one of the two APAs.³⁰⁴

Assigning the theory-finding role to the jury also presumes that all parties are equally situated to employ experts in order to have their political perspectives or values aired in the courtroom. In actuality, letting policy matters be resolved through expert testimony rather than through the process of lawmaking means that parties who cannot afford experts lose their right of representation. Although this loss is obvious and particularly problematic in criminal prosecutions when the state employs "suppositional experts" against indigent defendants,³⁰⁵ it potentially exists whenever experts testify about suppositional science.³⁰⁶ Judicial abdication of the policymaking role effectively disenfranchises individual litigants who cannot employ experts to represent them before the jury.

The content of legal rules should be left to the policymaking role of legislators and judges. Jurors are impanelled only to decide disputed matters of fact. Thus, in assisting jurors with their task, experts ought necessarily be limited to opinions relevant to the factual issues presented. Failure to determine admissibility on the basis of the validity of empirical research permits experts to testify to matters not only beyond their expertise, but also outside the jury's charge to decide. Such an approach effec-

the question of which experts testify typically depends on educational credentials; but the question of what credentials are adequate has "evolved more from the internecine conflicts among the mental health guilds and the law's comfort with a medical model than from any systematic attempt to identify which mental health professionals possess sufficient specialized knowledge to assist the trier of fact."

³⁰⁴ Both the American Psychological Association and the American Psychiatric Association use the APA acronym.

³⁰⁵ See, e.g., *Ake v. Oklahoma*, 470 U.S. 68 (1985) (the Court held that in capital cases due process requires states to supply a court-appointed psychiatric expert to indigent defendants who raise an insanity claim); see generally Note, *Expert Services and the Indigent Criminal Defendant: The Constitutional Mandate of Ake v. Oklahoma*, 84 MICH. L. REV. 1326, 1338-45 (1986) (asserting that the rationale of *Ake* supports provision of experts to indigent defendants in a wide variety of contexts).

³⁰⁶ Arguably, litigants who are unable to employ experts to testify to valid social science research are similarly disadvantaged in the adversarial process. But, by its nature, *valid* social science does not pose the inequities that suppositional science poses. By definition, *valid* social science has been corroborated by empirical test, and has support in fact; the mandates of the scientific method operate to filter scientific evidence, even for opponents of that evidence. In some cases, perhaps, valid data will be subject to varying interpretations, thus indicating the need for court-appointed experts to avoid injustice. However, in the vast majority of cases, a basic requirement of validity for scientific evidence will suffice to avoid inequity in its use in the adversarial process.

tively allows experts to nullify legal rules themselves, by confusing jurors, or to call upon the jury to nullify a legal rule on the basis of policy considerations that the rule does not reflect. However sensible an expert's conclusion might appear as a matter of policy, the proper forum for changing legal rules remains in the legislature or before judges, not on a case-by-case basis before juries.

b. Checking the Potential Overwhelming Effect of Social Science

Subsequent to the judge's determination to admit evidence under either the *Frye* test or a relevancy test, the trier of fact decides what weight the evidence should receive. Just as some ordinary evidence appears only marginally relevant so does some scientific evidence. Hence, knowing, for instance, that the assailant drove a blue car similar to the defendant's blue car may be about as relevant as knowing that the assailant and defendant share a common blood type, but one also shared by about 25% of the population.³⁰⁷ The evidence is relevant, but not overwhelmingly so. Similarly, ordinary evidence and scientific evidence can be quite compelling. The direct testimony of an eyewitness who knows the assailant personally might be comparable to finding the defendant's fingerprints on the murder weapon. Scientific evidence thus shares the earmark of all evidence: its weight depends on its relation to the fact in question.

However, scientific evidence adds a measure of complexity seemingly not present in the case of ordinary evidence: its scientific validity. The weight of scientific evidence depends not only on the purported relevance of the researcher's conclusion, but also the validity of the conclusion itself. Of course, to a significant extent, fact-finders must make validity determinations with all evidence. For instance, the fact-finder must consider both the worth of the knowledge that the defendant's car is the same color as the assailant's car, as well as the reliability of the witness testifying to that fact. But reliability determinations involving nonscientific evidence tend to be more intuitive, and certainly less technical, than for scientific evidence. Moreover, all evidence must meet a basic threshold measure of reliability before it is admitted.³⁰⁸ Therefore, the greatest concern is that jurors will

³⁰⁷ For thorough discussions of the value or lack thereof of probabilistic evidence, see Saks & Kidd, *supra* note 163, and Tribe, *supra* note 163.

³⁰⁸ Under the Federal Rules of Evidence, judges defer to fact-finders in some areas more than others. Under circumstances when fact-finders might be expected to misinterpret the reliability of

accept uncritically the validity of scientific evidence and thus incorrectly estimate its true value when considering its relevance.

Possible juror confusion or misuse of social science evidence would be ameliorated by having judges evaluate its admissibility on the basis of validity.³⁰⁹ By admitting only social science research that meets a minimum threshold standard, judges would remove the possibility that scientifically worthless evidence would be used to establish a matter of fact. Still, some validity questions remain for the trier of fact, though they will normally be ones of applicability rather than of basic methodology. A judge reviewing the research method and statistical design of studies on the accuracy of eyewitness identification, for example, might adjudge that, although not flawless, the methods meet minimum scientific standards.³¹⁰ Opposing counsel might still wish to cross examine the expert on the fact that most of these studies involve college sophomores and are conducted under contrived circumstances. These limitations, probably well within the average layperson's ability to appreciate, are likely to affect the weight that the evidence receives; and even a fact-finders' failure to appreciate the limitations of the research will pose relatively little prejudice so long as the admissibility determination was properly conducted by the judge.

Admittedly, the present proposal rests, in part, on the empirical proposition that jurors are less able to critically evaluate the validity of social science research than judges.³¹¹ While this assumption may be debatable,³¹² no reason exists to believe that judges are less competent than jurors in evaluating scientific evidence. Moreover, making the validity of social science evidence a preliminary fact question for the judge does not take away the fact-finder's obligation or opportunity to independently

evidence, such as hearsay, the court assumes a broader role. In other areas, where fact-finders can be expected to be as competent as the court, such as evaluating a witness' veracity, basic reliability determinations are left to them. *See* Giannelli, *supra* note 16, at 1247 n.379.

³⁰⁹ *See also* Black, *Evolving Legal Standards for the Admissibility of Scientific Evidence*, 239 SCIENCE 1508, 1508 (1988).

³¹⁰ *See supra* note 8 regarding the debate between Professor Loftus and Professors McCloskey and Eggeth on the value of, and need for, expert testimony on eyewitness identification.

³¹¹ *See* Walker & Monahan (1987), *supra* note 230, at 592-94.

³¹² *See* Imwinkelried, *The Standard for Admitting Scientific Evidence: A Critique from the Perspective of Juror Psychology*, 28 VILL. L. REV. 554 (1982-83) (concluding that jurors can usually understand scientific evidence); *but see* *United States v. Addison*, 498 F.2d 741, 744 (D.C. Cir. 1974) (scientific evidence may "assume a posture of mystic infallibility in the eyes of a jury of laymen").

weigh the value of admitted scientific evidence.³¹³ Experts should still be subject to searching cross examination following the judge's decision to admit their testimony. As a result, the two-tiered level of review protects against the improper use of social science evidence. Opponents of such evidence are given two bites at the apple.

In summary, admissibility determinations under either the *Frye* test or a relevancy analysis should be based on a preliminary finding that the proffered scientific evidence is sufficiently valid. The twin factors of expert nullification resulting from suppositional scientific testimony, and the potentially overwhelming effect of scientific evidence on jurors create the possibility that unfair prejudice may occur. Threshold admissibility determinations based on scientific validity lessen the potential effect of experts' value preferences on juror decisionmaking and provide some guarantee that the expert conclusions jurors accept are based on corroborated research. Although evaluating scientific evidence according to a scientific standard provides a shield against juror misuse of this evidence, the possibility remains that both suppositional and scientific evidence will be used by lawmakers as a sword to advance *their* particular ideological agendas. The following section examines this concern.

C. *Social Science and the Concern With Judicial Activism*

Properly understood, valid social science constitutes neither a great liberal force supporting change in the law, nor a great conservative force opposing change. In fact, the defect of suppositional science is its deep ideological component, which provides for easy manipulation by proponents of all views. Historically, suppositional science has been forwarded to support both liberal and conservative causes.³¹⁴ The value of the scientific method comes from the roadblocks it erects to deflect subjectivity. Unlike suppositional science, valid social science lays bare the assumptions

³¹³ Professor Imwinkelried, in *Judge Versus Jury: Who Should Decide Questions of Preliminary Facts Conditioning the Admissibility of Scientific Evidence?* 25 WM. & MARY L. REV. 577, 598-606 (1984), argues that the judge should admit scientific evidence only after finding, as a preliminary fact, the evidence to be valid. Professor Imwinkelried notes, however, that the Federal Rules of Evidence do not presently provide judges with this authority, and accordingly calls for amendment of the applicable rule. *Id.* at 616.

³¹⁴ See *supra* notes 126-39 and accompanying text (discussing the role of suppositional science in *Plessy v. Ferguson*, 163 U.S. 537 (1896), and in *Brown v. Board of Educ.*, 349 U.S. 294 (1955)); see generally Hovenkamp, *supra* note 131, at 38.

and methods it uses to test the empirical constructions necessary to legal decisionmaking. Therefore, when research employs methods or analyses infected by the biases of the researchers, criticism is proper. Indeed, without such criticism, social science can be a mask for any proponent who wishes to wear it.

If applying a scientific standard to social research affects the development of the law in any way, it is probably in a conservative direction. This conservativeness is the result of forces in the legal system itself. Research on the battered woman syndrome, an example of suppositional science discussed above,³¹⁵ illustrates this point. Judicial recognition of the flaws of this research does not mandate the conclusion that battered women who kill do not act reasonably and in self-defense, even when they do so under circumstances not obviously manifesting imminent harm. As some commentators argue, many battered women use deadly force against men when not under an immediate threat of harm because they cannot defend themselves during an attack; it would be unreasonable to expect a small woman to ward off or respond to the attack of a larger man once it has begun.³¹⁶ By adopting the theory of the battered woman syndrome, courts have tacitly accepted the logic of this argument, but have effectively confined the principle to a narrow range of cases.³¹⁷ Indeed, this principle would appear to justify a similar response by a small man in a violent relationship with a large woman or a small man in a violent homosexual relationship with a large man.³¹⁸ Courts need not consider an extension

³¹⁵ See *supra* notes 250-56 and accompanying text.

³¹⁶ See *State v. Kelly*, 97 N.J. 178, 220 n.23, 478 A.2d 364, 385 n.23 (1984).

³¹⁷ See Faigman, *supra* note 260, at 223-24.

³¹⁸ To date, no men have asserted a theory of "battered man syndrome" as a defense in a criminal trial. A recent *Boston Globe* article reports the case of Stanley Tvarian in which such a defense was contemplated by Tvarian's attorney Elliot Levine. The *Globe* reports the story as follows:

"She destroyed so much of him, but it wasn't all at once," their daughter, Karen, said in a handwritten statement she had prepared to read in court If Joan Tvarian struck her husband, which their daughter said happened many times, he would "just take it." And if he cried, "she would curse him for not being enough of a man," the daughter wrote.

But Stanley Tvarian had a breaking point. On September 10, 1987, Joan Tvarian went to bed at about 10 p.m. with a migraine headache and Stanley fell asleep on the couch. When she woke up at 2 a.m. and started screaming . . . , Levine said, a struggle ensued. The next thing Stanley Tvarian remembers, he was sitting on the floor next to the couple's bed whimpering. Joan Tvarian had been strangled. Stanley Tvarian was charged with murder and faced a minimum of 25 years in prison if convicted.

Levine, who is also a psychologist, contends this was probably the first "battered husband syndrome" case in the country, but he did not use that as a defense. "I think it would

along these lines because the empirical research does not apply to these cases. Yet, because of its invalidity, the cited research does not apply to battered women cases either. Recognition of this fact would probably turn courts in a conservative direction. Courts naturally would become concerned with the parameters of the principle which recognizes that under certain circumstances, a small individual may use deadly force against someone bigger even when the smaller person faces no imminent danger of serious bodily harm or death. Fear of the slippery slope, rather than exclusion of suppositional science, operates as a conservative force. The wisdom of extending the rule of self-defense to cases in which harm is not imminent is a debate for the most part separate from the availability of sound social science research.

Social science research plays an important role in informing the law on the accuracy of the law's empirical construction of reality. But neither the presence nor the absence of research should affect the fundamental value choices inherent in legal decisionmaking. In addition to its occasional application of social science,³¹⁹ the Supreme Court has sometimes decided cases in which social science research would have been relevant but did not exist. On other occasions, the Court has ignored seemingly relevant research, believing it ultimately inapplicable to the issues presented.

In *United States v. Leon*,³²⁰ the Court confronted the empirical question of whether the creation of a good-faith exception to the exclusionary rule would have a deleterious effect on deterring constitutional violations by the police. The Court found the empirical evidence on the question equivocal.³²¹ The Court then estimated the effect a good-faith exception would have on the rule's ability to deter constitutional violations by the police.³²² Justice Blackmun wrote in his concurring opinion that the Court's holding was only as sound as the assumptions upon which it

be hard for a man ever to win on self-defense based on traditional stereotypes of a man's strength versus a woman's," he said.

[In June, 1988] Tvarian opted to plead guilty to manslaughter, and the judge in the case agreed to a maximum five-year prison term. Tvarian will be eligible for work release in two years.

Boston Globe, Oct. 16, 1988, at 22, col. 1.

³¹⁹ See, e.g., *supra* note 80.

³²⁰ 468 U.S. 897 (1984).

³²¹ *Id.* at 907 n.6.

³²² See *id.* at 918-21.

rested:

[T]he Court has narrowed the scope of the exclusionary rule because of an empirical judgment that the rule has little appreciable effect in cases where officers act in objectively reasonable reliance on search warrants. . . .

What must be stressed, however, is that any empirical judgment about the effect of the exclusionary rule in a particular class of cases necessarily is a provisional one. . . . If it should emerge from experience that, contrary to our expectations, the good faith exception to the exclusionary rule results in a material change in police compliance with the Fourth Amendment, we shall have to reconsider what we have undertaken here. The logic of a decision that rests on untested predictions about police conduct demands no less.³²³

Justice Blackmun's concurrence in *Leon* indicates that the door remains open to social science evidence which would demonstrate errors in the Court's empirical suppositions.³²⁴ In marked contrast to *Leon* stands the recent case of *McCleskey v. Kemp*,³²⁵ in which the Court explicitly assumed the validity of the proffered social science findings,³²⁶ but held that it did not affect the ultimate legal result.³²⁷ In *McCleskey*, petitioners introduced a series of studies finding that a defendant who had killed a white person in Georgia was 4.3 times more likely to receive the death penalty than a similarly situated defendant who had killed a black person.³²⁸ The Court held that even though the death penalty might sometimes be applied in a discriminatory fashion (as indicated by the social science research), it does not violate the equal protection clause absent a

³²³ *Id.* at 927-28 (Blackmun, J., concurring).

³²⁴ A recent empirical study examining the effects of *Leon* on police practices regarding search warrants and on factors relating to search warrant practices at the trial level found the decision to have had only a minimal effect on the factors studied. Uchida, Bynum, Rogan & Murasky, *Acting in Good Faith: The Effects of United States v. Leon on the Police and Courts*, 30 ARIZ. L. REV. 467, 494 (1988). As the authors recognize, their failure to find an effect immediately following the Court's decision might indicate only that the full impact of the decision has yet to be realized. *Id.* at 474.

³²⁵ 481 U.S. 279, *reh'g denied*, 482 U.S. 920 (1987).

³²⁶ *Id.* at 291 n.7.

³²⁷ For a strong argument that the exclusionary rule (of concern in *Leon*) should not rest on an empirical question, see Kamisar, *Does (Did) (Should) the Exclusionary Rule Rest on a "Principled Basis" Rather Than an "Empirical Proposition,"* 16 CREIGHTON L. REV. 565 (1983).

³²⁸ *McCleskey*, 481 U.S. at 288-89 n.6.

and does not violate the eighth amendment's ban on cruel and unusual punishment unless the State's capital punishment system operates in an arbitrary and capricious manner³³⁰ or the punishment was actually applied in a racially biased manner.³³¹ The *McCleskey* decision exemplifies how, through a court's interpretation of the law, social science research can become irrelevant because the factual questions the research answers have become irrelevant.³³²

Social scientific inquiry possesses no particular ideological agenda. Ideally, it serves the neutral function of supplying assistance to decisionmakers operating under conditions of uncertainty. Social science does not make the difficult policy choices easier; its value lies in making the difficult choices clearer. This Article has been replete with examples of ideology masquerading as science, but the masquerade continues only so long as the legal community fails to gain the knowledge necessary to reveal the imposter's identity.

³²⁹ *Id.* at 292.

³³⁰ *Id.* at 306-07.

³³¹ *Id.* at 312-13.

³³² Another, and certainly more noble, example of the Supreme Court ignoring the factual situation in light of transcendent legal principles is *Palmore v. Sidoti*, 466 U.S. 429 (1984). The *Palmore* Court reversed a Florida county court's judgment that had denied Linda Sidoti custody of her child, Melanie, after Linda married a black man, Clarence Palmore. The county court judge awarded custody to Anthony Sidoti, Linda's former husband, because of the social stigma the child would suffer from being raised by an interracial couple. No social science research was considered either by the Florida county court or the United States Supreme Court, but the latter fully appreciated the situation presented: "It would ignore reality to suggest that racial and ethnic prejudices do not exist or that all manifestations of those prejudices have been eliminated. There is a risk that a child living with a stepparent of a different race may be subject to a variety of pressures and stresses not present if the child were living with parents of the same racial or ethnic origin." *Id.* at 433. No research was necessary, because the empirical issue was irrelevant to the Court's judgment:

The question . . . is whether the reality of private biases and the possible injury they might inflict are permissible considerations for removal of an infant child from the custody of its natural mother. We have little difficulty concluding that they are not. The Constitution cannot control such prejudices but neither can it tolerate them. Private biases may be outside the reach of the law, but the law cannot, directly or indirectly, give them effect. *Id.* On the interrelationship between empirical fact and policy judgment, see Tribe, *Seven Deadly Sins of Straining the Constitution Through a Pseudo-Scientific Sieve*, 36 HASTINGS L.J. 155 (1984).

CONCLUSION

The relevance of the social sciences to judicial decisionmaking depends on their capacity to inform legal decisionmakers of factual questions concerning human behavior. Social scientists begin their explanation by positing hypotheses and theories in much the same way as laypersons do. But scientists also set out to test the accuracy of those explanations. It is this subjection to test that fortifies, and distinguishes from mere supposition, the statements of scientists. Scientific statements, having survived attempts to falsify them, achieve a prestige deserving special recognition, a prestige arising out of confidence in their validity. In contrast, the same confidence cannot be extended to observations not subjected to the rigors of testing.

Yet, as the product of thoughtful professionals, social scientists' suppositions, like those of all thoughtful observers, potentially offer insights into factual questions of legal concern and, moreover, may contain value judgments relevant to legal policy formation. Suppositional science poses little danger of misuse when directed to lawmakers who recognize the limited value it has in answering factual questions and exercise independent judgment in incorporating the value judgments inevitably contained within these suppositions. But whatever value suppositional science might have to lawmakers, this value is outweighed by the substantial prejudice that arises when scientific findings are presented to jurors. The value biases inevitably imbedded in suppositional experts' testimony pose substantial risks of nullifying applicable law. Compounding this problem is the concern that jurors often are incapable of critically evaluating the scientific evidence. On balance, these risks support the adoption of an admissibility standard based on the validity of the proffered evidence.

As science, the social sciences can provide the law only modest assistance. Indeed, modesty is a quality that proponents of social science would do well to exercise. At the same time, however, the significance of social science research should not be underestimated, for ultimately it provides a check on the suppositions of its critics as well as its proponents.

