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ARTICLES

An Economic Approach to the Law of Evidence

Richard A. Posner*

In this article, Judge Richard A. Posner presents the first comprehensive economic analysis of the law of evidence. The article is presented in three parts. First, Judge Posner proposes and describes two possible economic models, both a search and a cost-minimization approach, to describe how evidence is obtained, presented, and evaluated. In both, he incorporates Bayes' theorem to examine rational decisionmaking. Second, he examines the evidence-gathering process, comparing and contrasting, in economic terms, the "inquisitorial" and "adversarial" systems of justice. The inquisitorial system, at first glance, appears to be more economically efficient. This, though, may be illusory, a result of the adversarial system's greater public visibility and widespread acceptance of plea bargaining. Finally, the article addresses burden of proof issues, plus specific provisions of the Federal Rules of Evidence: harmless error, limiting instructions, relevance, character evidence, hearsay, expert witnesses, and various privileges and exclusionary rules. He concludes that American evidence law, rather than simply sacrificing efficiency in order to protect noneconomic values, is actually quite efficient and possibly superior to its Continental, inquisitorial counterparts; but a number of reforms are suggested.

The law of evidence is the body of rules that determines what, and how, information may be provided to a legal tribunal that must resolve a factual dispute. The importance of the accurate resolution of such disputes to an economically efficient system of law has been discussed at length,¹ but the

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1. See, e.g., Louis Kaplow, *Accuracy in Adjudication*, in 1 THE NEW PALGRAVE DICTIONARY OF ECONOMICS AND THE LAW 1 (Peter Newman ed., 1998); Louis Kaplow, *The Value of Accuracy in Adjudication: An Economic Analysis*, 23 J. LEGAL STUD. 307 (1994); Richard A. Posner, *An*

economic literature dealing with the rules themselves is scanty in relation to the scope and importance of evidence law.² This article is the first comprehensive (though it is neither exhaustive nor definitive) economic analysis of that law. It is in three parts. The first part proposes and elaborates an economic model (actually two models, a search model and a cost-minimization model) of evidence. The second part examines the basic structure and structural rules of the evidence-gathering process; it includes an economic comparison between the "inquisitorial" and "adversarial" systems of justice and an analysis of issues relating to burden of proof. The third part is an economic appraisal of salient provisions of the Federal Rules of Evidence, the most influential American codification of such rules; it also takes up some issues of evidentiary privilege and exclusion that the rules do not deal with explicitly.

Like many other economic studies of the legal system, mine concludes that the institutional and doctrinal structure of the American law of evidence has a subtle, though intuitive, implicit, and incomplete economic logic. This conclusion will startle. Most evidence professors, and even a few judges,³ would, if asked, say that *of course* the American system of finding facts at trial is inefficient, ludicrously so, and redeemed if at all by the noneconomic values that the system protects. But that assessment is founded on incomplete analysis and on misleading anecdotage that is itself an artifact of a

Economic Approach to Legal Procedure and Judicial Administration, 2 J. LEGAL STUD. 399 (1973).

2. I shall be citing much of the economic literature in this article. For other contributions, see generally RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* 599-605, 621, 647, 749-52 (5th ed. 1998); Stephen McG. Bundy & Einer Richard Elhauge, *Do Lawyers Improve the Adversary System? A General Theory of Litigation Advice and Its Regulation*, 79 CAL. L. REV. 313 (1991); Bruce L. Hay & Kathryn E. Spier, *Burdens of Proof in Civil Litigation: An Economic Perspective*, 26 J. LEGAL STUD. 413 (1997); Jeffrey S. Parker, *Daubert's Debut: The Supreme Court, the Economics of Scientific Evidence, and the Adversarial System*, 4 SUP. CT. ECON. REV. 1 (1995); Frederick Schauer & Richard Zeckhauser, *On the Degree of Confidence for Adverse Decisions*, 25 J. LEGAL STUD. 27 (1996); Symposium, *The Economics of Evidentiary Law*, 19 CARDOZO L. REV. 1531 (1998); Peter T. Wendel, *A Law and Economics Analysis of the Right to Face-to-Face Confrontation Post-Maryland v. Craig: Distinguishing the Forest from the Trees*, 22 HOFSTRA L. REV. 405 (1993); MICHAEL BLOCK, JEFFREY S. PARKER, OLGA VYBORNA & LIBOR DUSEK, *FACT-FINDING EFFICIENCY IN LEGAL PROCEDURE: AN EXPERIMENTAL COMPARISON OF ADVERSARIAL VERSUS INQUISITORIAL REGIMES* (Univ. of Ariz., College of Bus. & Pub. Admin., Dep't of Econ., Discussion Paper 98-1, June 1998); ANDREW F. DAUGHETY & JENNIFER F. REINGANUM, *ON THE ECONOMICS OF TRIALS: ADVERSARIAL PROCESS, EVIDENCE AND EQUILIBRIUM BIAS* (Vanderbilt Univ., Dep't of Econ. & Bus. Admin., Working Paper No. 98-W02, Apr. 1998); Chris William Sanchirico, *Games, Information and Evidence Production, with Application to Legal History and 'Decoupling'* (Oct. 1998) (unpublished manuscript, on file with the University of Southern California Law School); and for a useful bibliography, see Jeffrey S. Parker & Bruce H. Kobayashi, *Evidence*, in *BIBLIOGRAPHY OF LAW AND ECONOMICS* (forthcoming 1999). A larger literature deals with issues in the economics of pretrial discovery and procedure generally that somewhat overlap the issues discussed in this article. See POSNER, *supra*, at 599-644.

3. For a classic statement, see Marvin E. Frankel, *The Search for Truth: An Umpireal View*, 123 U. PA. L. REV. 1031 (1975).

worthwhile feature of the American system—the high degree of public scrutiny that it invites and enables.⁴ Neither cheap nor highly accurate, our adversarial system is radically imperfect from the Utopian standpoint so often, though mistakenly, used to evaluate social institutions. Yet even from a perspective concerned only with economic efficiency in the sense of wealth maximization or cost minimization, it may not be inferior to the feasible alternatives, including the Continental inquisitorial system much touted in some quarters of the American legal academy.

I both emphasize the close connection between rules of evidence and the use of the jury and make repeated reference to Bayes' theorem. So let me make clear at the outset that I do *not* propose that juries or, for that matter, judges be instructed in the elements of Bayesian theory or mathematical probability more generally—or any other theory of probability or evidence. Such efforts at formalizing the tacit, intuitive inferential procedures now employed to resolve factual disputes in trials would cause endless confusion. Not only do few members of the general population have even a rudimentary education in mathematical probability theory or in the theory of rational choice that underlies both mathematical probability theory and economic theory; but legal education itself (alas) “produces no improvement in the ability to apply the statistical and methodological rules of the probabilistic sciences to either scientific studies or everyday-life events.”⁵ The value of Bayes' theorem in the law of evidence is heuristic. The most influential model of rational decisionmaking under conditions of ineradicable uncertainty (conditions which require that decision be based on subjective probabilities), it can be of great help, as we shall see, in evaluating the rationality of rules of evidence.

Although economic theory provides the framework of analysis in this article, I draw heavily on an empirical literature on trials and evidence that is largely psychological in orientation, as well as on Bayes' theorem, other aspects of decision theory, and statistical inference. The approach is therefore eclectic rather than narrowly economic, although it slights epistemological and other philosophical perspectives on the trial process, which seem to me to have only a very limited utility. The article's explanatory findings and reformist suggestions are summarized in the Conclusion—a glance at which will show that, despite the still-widespread belief that economic analysis of law has an inherent tendency toward politically conservative reforms, this is clearly not true with regard to the law of evidence.

4. See Marc Galanter, *An Oil Strike in Hell: Contemporary Legends about the Civil Justice System*, 40 ARIZ. L. REV. 717 (1998).

5. Darrin R. Lehman, Richard O. Lempert & Richard E. Nisbett, *The Effects of Graduate Training on Reasoning: Formal Discipline and Thinking About Everyday-Life Events*, 43 AM. PSYCHOLOGIST 431, 440 (1988).

I. THE ECONOMIC APPROACH TO EVIDENCE

A. *How to Proceed*

There are many possible ways of coming to grips with the economic issues that the law of evidence presents. The simplest would be to take up the various rules piecemeal and examine their economizing properties. Another way would be to deduce the optimal system of dispute resolution from economic theory and compare it with the actual systems in use in this and other countries. A third would be to begin with the epistemological and psychological literatures dealing with rational inquiry.⁶ A fourth would be to build from what is now an extensive empirical literature on the actual operation of the various methods (especially the jury, the focus of this literature) for determining facts at trial.⁷ A fifth would be to see how the private sector resolves disputes and to use its methods as a model, since private dispute resolvers have stronger incentives than public ones to maximize the net benefits of the dispute-resolution process. A sixth approach would be to examine all the possible goals of the law of evidence and try to establish the weight that economic goals should be given.

None of these approaches can be disregarded in a responsible economic analysis of evidence, and I shall touch on all of them at some point in this article. It seems best to begin, however, at an abstract level (the second approach sketched above), by asking: If we were writing on a clean slate and trying to design a system for the resolution of factual disputes in litigation that would be economically efficient in the broadest sense, how would we frame our inquiry? I propose two ways, which are equivalent.

6. A good recent treatise on rational decisionmaking is DAVID A. SCHUM, *THE EVIDENTIAL FOUNDATIONS OF PROBABILISTIC REASONING* (1994) (approaching evidence from "the fields of law, philosophy and logic, probability, semiotics, artificial intelligence, psychology, and history"). For specific reference to the pros and cons of a Bayesian approach to the law of evidence, see *PROBABILITY AND INFERENCE IN THE LAW OF EVIDENCE: THE USES AND LIMITS OF BAYESIANISM* (Peter Tillers & Eric D. Green eds., 1988). For helpful discussions of the cognitive quirks that impede rational decisionmaking, see RICHARD NISBETT & LEE ROSS, *HUMAN INFERENCE: STRATEGIES AND SHORTCOMINGS OF SOCIAL JUDGMENT* (1980); DETLOF VON WINTERFELDT & WARD EDWARDS, *DECISION ANALYSIS AND BEHAVIORAL RESEARCH* 530-59 (1986); and Albert J. Moore, *Trial by Schema: Cognitive Filters in the Courtroom*, 37 *UCLA L. REV.* 273 (1989). I discuss some of the epistemological issues involved in the use of the legal process to make factual determinations in my book, *The Problems of Jurisprudence*, but I no longer agree with everything I said there, particularly with my criticisms of the jury system. See RICHARD A. POSNER, *THE PROBLEMS OF JURISPRUDENCE* 203-19 (1990).

7. For excellent illustrations of this literature, see Richard Lempert, *Civil Juries and Complex Cases: Taking Stock after Twelve Years*, in *VERDICT: ASSESSING THE CIVIL JURY SYSTEM* 181 (Robert E. Litan ed., 1993); Michael J. Saks, *What Do Jury Experiments Tell Us About How Juries (Should) Make Decisions?*, 6 *SO. CAL. INTERDISC. L.J.* 1 (1997).

B. *The Search Model*

The first way is to model factfinding as a problem in search, analogous to searching for a consumer durable,⁸ with the correct answer to the question of (say) “Did X shoot Y?” corresponding to the utility-maximizing choice between two brands of dishwasher.⁹ It is only an analogy. Not only are the incentives of the participants not the same in the two search processes, but external effects are also more likely in the case of the evidence search. I shall try to account for the differences later.

The search process, which in the litigation setting is the process of obtaining, sifting, marshaling, presenting, and (for the trier of fact) weighing evidence, confers benefits and incurs costs.¹⁰ Benefits are a positive function of the probability (p) that if the evidence is considered by the trier of fact the case will be decided correctly, and of the stakes (S) in the case. To keep things simple, I shall assume that the benefits are simply the product of the two terms, hence pS , where p is a positive function of the amount of evidence (x), so that the full expression for the benefits of the search is $p(x)S$. With enough evidence, p might equal 1, meaning that a trial would be certain to produce the correct outcome. The costs of the trial (c) are also a positive function of the amount of evidence (x).

Some of these assumptions will have to be relaxed later, but for now, the net benefits ($B(x)$) of what I am calling the “evidence search” in a case are given by

$$B(x) = p(x)S - c(x) \quad (1)$$

and thus the optimum amount of search—the amount that maximizes net benefits—satisfies

$$p_x S = c_x \quad (2)$$

where the subscripts denote derivatives. In words, the search should be carried to the point at which marginal cost and marginal benefit are equated. The amount of evidence at the optimum point will be greater the higher the

8. See, e.g., Sridhar Moorthy, Brian T. Ratchford & Debabrata Talukdar, *Consumer Information Search Revisited: Theory and Empirical Analysis*, 23 J. CONSUMER RES. 263 (1997); Asher Wolinsky, *Competition in a Market for Informed Experts' Services*, 24 RAND J. ECON. 380 (1993).

9. A dichotomous choice is assumed in both the legal and consumer examples for the sake of simplicity. Nothing of analytical relevance turns on the assumption.

10. Social and private benefits and costs must be distinguished, but that is for later.

stakes in the case, the lower the cost of obtaining evidence, and the greater the effect of evidence in increasing the likelihood of an accurate outcome.

For this optimum to exist, it is enough if $p(x)$ is increasing at a decreasing rate ($p_{xx} < 0$) and that c_x is nondecreasing ($c_{xx} \geq 0$).¹¹ These conditions are plausible. Begin with the benefits side: As more and more evidence is obtained, the effect of additional evidence on the outcome of the case will tend to decrease, especially if the searcher begins the search with the most probative evidence, and that will be the rational procedure unless that evidence is particularly costly to obtain. But this is a rather crude description of a complex process, and let me complicate it a bit, using a search model developed by Martin Weitzman.¹² Suppose there are n possible sources of evidence; the sources are independent of each other (that is, discovering valuable evidence in one does not help you find valuable evidence in any other); and each source has a known probability (p) of containing valuable evidence, a known value (V) of that evidence should it turn out to be contained in the source, and a cost (c) of exploring the source to discover whether it does contain the evidence. Then for each source there will be an expected net gain from searching of $pV - c$. If we are searching among the sources for the best one (for example, the best expert witness for our case, or the best character witness, or, in general, one witness or document where there are alternative possibilities), rather than seeking to accumulate evidence, it can be shown that we should continue the search until we find a source that yields evidence having a V (call it V^*) that exceeds $(pV - c)/p$ for all the unsearched sources. Since $(pV - c)/p$ is, equivalently, $V - c/p$, and $V > c/p$ for all $c > 0$, this means stopping at the first success if each success has the same evidentiary value. In the event of failure, we should next explore the source having the highest p (assuming constant V and c), lowest c , or highest V .

If the searcher cannot determine in advance which evidence is most likely to be fruitful, his search procedure will resemble random sampling,

11. The second condition implies that there are no economies of scale in searching for evidence. A simple version of Equation (1) that satisfies both conditions is

$$B(x) = (x/(x + 1))S - cx$$

where p takes the specific value of $x/(x + 1)$, and $c(x)$ takes the specific value of cx (constant costs). The optimum amount of evidence (x^*) is then

$$x^* = (S/c)^{1/2} - 1$$

and is greater the higher the ratio of the stakes in the case to the unit cost of the evidence. Notice that it increases at a diminishing rate as that ratio rises.

The condition that c_x be nondecreasing is not strictly necessary. It is enough if it decreases less rapidly than the benefits of the search decrease, so that $p_{xx}S < c_{xx}$.

12. See Martin L. Weitzman, *Optimal Search for the Best Alternative*, 47 *ECONOMETRICA* 641, 646-48 (1979).

and as the size of a sample grows, the value of additional sampling in conducting to a more accurate result rises at a falling rate. (Roughly speaking, accuracy increases by the square root of the sample size.) So, under either this or the previous model (or other plausible models of the search for evidence), there will be declining marginal utility of search. Indeed, as we shall see, beyond some point the marginal utility of additional searching for evidence may turn negative. But there will be little tendency for the cost of additional searching to fall as the search widens, and it may well begin to rise, as the initial leads run out. I say "little," not "no," for two reasons. First, a heavy initial investment in evidence gathering may generate leads that, for a time, enable the searcher to obtain additional evidence at low cost. Second, when aggregated over all cases, the cost of searching for evidence may actually fall with increases in the amount of evidence obtained, though only up to a point. More accurate factfinding increases deterrence of wrongful conduct, which in turn reduces the number of cases and hence the aggregate costs of the legal process.

To see how accuracy in factfinding relates to deterrence, notice that the expected cost of punishment (EC) is actually the difference between the expected cost of punishment if one commits a crime ($EC_g = p_g S$, where p_g is the probability of punishment if the accused is guilty and S is the sentence) and the expected cost of punishment if one does not commit a crime ($EC_i = p_i S$ where p_i is the probability of punishment if the accused is innocent and S is as before). Hence $EC = p_g S - p_i S$; equivalently, $EC = (p_g - p_i)S$, making it transparent that if punishment is imposed randomly, so that the probability of punishment is the same regardless of guilt (that is, if $p_g = p_i$), the expected punishment cost for committing the crime will be zero. The more accurate the process of determining guilt is, the less random punishment will be, and so the greater will be the law's deterrent effect.¹³ To put this point differently, greater accuracy in the determination of guilt increases the returns to being innocent.

The point is not limited to criminal law. It applies to all areas of law in which deterrence of unlawful behavior is an important objective. It shows what a good investment expenditures on evidence can be. Granted, there is a danger of exaggeration if one fails to distinguish between punishment that is truly random and punishment that merely has a random component. Suppose that a person with a criminal record is quite likely to be convicted of any subsequent crime with which he is charged even if he did not commit that crime. This will reduce the effect of the criminal law in deterring him from committing subsequent crimes. At the same time, it will increase deterrence against his committing the first crime, and it will also cause people with a criminal record to steer clear of activities in which they might be arrested and

13. See Posner, *supra* note 1, at 412.

falsely charged. So inaccuracy can increase as well as reduce deterrence.¹⁴ But probably (though this can only be a guess) the latter effect will predominate in most cases, even that of convicting second and other subsequent offenders of crimes they have not committed. If the law enforcement authorities concentrate their limited resources on such offenders because they are easier to convict regardless of guilt, the expected punishment of first offenders will decline because the authorities will devote fewer resources to prosecuting them.

Deterrence plays a starring role in the economic analysis of evidence because it links the concern with accuracy that is so central to the evidentiary process with the economist's conception of law as a system for creating incentives for efficient conduct. Since the accurate determination of facts at trial is important to the efficacy of law in imparting efficient incentives, accuracy in adjudication is an economic as well as moral and political value.

C. *The Cost-Minimization Model*

An alternative way of modeling the search for evidence, one that derives from familiar economic models of procedure and of negligence,¹⁵ is as a process of cost minimization. Let p now be the probability of an erroneous rather than of a correct outcome, and pS the cost of the error (the probability of error weighted by the stakes). Suppose that $p = .1$, implying that, on average, one of ten cases will be decided incorrectly. If the average stakes in these cases are \$100,000, then the expected cost of error is \$10,000. The specific assumption (that pS equals the social costs of error) is arbitrary. But it is a reasonable guess that the social cost of an erroneous outcome will generally rise with the dollar equivalent of the stakes in the case. I will both defend and qualify this assumption shortly.

The social goal of the evidentiary process is to minimize the sum of the cost of error and the cost of error avoidance, that is, to minimize

$$C(x) = p(x)S + c(x). \quad (3)$$

Formally this is done by differentiating $C(x)$ with respect to x and setting the result equal to zero, yielding

14. For other examples of how inaccuracy in adjudication can actually enhance social welfare, see Michael L. Davis, *The Value of Truth and Optimal Standards of Proof in Legal Disputes*, 10 J.L. ECON. & ORG. 343 (1994).

15. See WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF TORT LAW* 58-60 (1987) (negligence); Posner, *supra* note 1, at 401 (procedure).

$$-p_x S = c_x. \quad (4)$$

That is, the search for evidence should be carried to the point at which the last bit of evidence obtained yields a reduction in error costs equal to the cost of obtaining the evidence. For this optimum to exist, it is enough if increases in x have a diminishing effect in reducing pS and if, as before, c_x is nondecreasing.

D. *Some Additional Observations About the Models*

“Costs” may seem too narrow a concept to serve as a criterion for choosing among alternative rules of evidence. However, this objection may rest on too narrow a concept of “costs.” The costs of evidence search, in a proper economic analysis, are not limited to time and other direct costs. They include indirect costs resulting from the incentive effects of the search process. Consider Federal Rule of Evidence 407, which forbids the use of evidence that after the accident giving rise to the plaintiff’s suit, the defendant repaired the condition that caused the accident. The primary concern is that the admissibility of such evidence would, by discouraging repairs, increase the risk of future accidents. Law professors like to emphasize the indirect costs of rules of evidence, but by arguing that the law of evidence has multiple goals rather than just the goal of accuracy in factfinding.¹⁶ The economist will agree that accuracy (p in Equations (1) through (4)) is not the only goal. Indeed, it is better described not as a goal at all but rather as one of the factors that determines the net benefits of a search for evidence. The other goals discussed in the evidence literature, such as providing catharsis to quarreling parties, resolving disputes in a manner acceptable to the community, safeguarding interests in personal liberty, and protecting other values (as in the subsequent-repair example) are likewise best regarded not as distinct goals but rather as factors influencing one term or another in the basic equations. Not only can noneconomic concerns thus be accommodated within a framework of economic analysis, but the basic insight of that analysis as applied to evidence law—that the law is engaged in making tradeoffs between the accuracy and cost of trials—is also a familiar and even orthodox theme in noneconomic writing about evidence law.¹⁷ The economic approach serves more to refine and extend than to challenge the intuitions of the legal professional.

16. See, e.g., Michael L. Seigel, *A Pragmatic Critique of Modern Evidence Scholarship*, 88 NW. U. L. REV. 995 (1994) (stressing indirect costs and citing Laurence Tribe and Charles Nesson).

17. See, e.g., Jon O. Newman, *Rethinking Fairness: Perspectives on the Litigation Process*, 94 YALE L.J. 1643, 1647-50 (1985).

It can be a little more precise about how additional evidence nudges a factual inquiry toward an accurate conclusion. In the most intuitive version of Bayes' theorem, the posterior odds (the odds after a new piece of evidence, x , is considered) that some hypothesis (say that X shot Y) is correct are obtained by multiplying the prior odds by the ratio of (1) the probability that the evidence would have been observed if the hypothesis were true to (2) the probability that the evidence would be observed if the hypothesis were not true, as in

$$\Omega(H|x) = L \times \Omega(H) \quad (5)$$

where Ω is odds,¹⁸ H is hypothesis, and L (the likelihood ratio) is $p(x|H)/p(x|\bar{H})$. Suppose that the new piece of evidence is testimony by bystander Z that he saw X shoot Y . Suppose further that the prior odds ($\Omega(H)$) are 1 to 2 that X shot Y , while the probability that Z would testify that he saw X shoot Y if X did shoot Y is .8, and the probability that he would testify that he saw X shoot Y if X did not shoot Y is .1, so that the likelihood ratio is 8. The posterior odds that X shot Y will therefore be 4 to 1.

Several qualifications to the economic analysis thus far presented should be noted. One is that the stakes in a case are an imperfect measure of the social benefits of additional evidence gathering. Imagine a dispute over liability under a statute that was repealed after the dispute arose but that still, not having been repealed retroactively, governs the dispute. If a lot of money is involved, the optimum *private* investment in evidence gathering may be very large because victory will confer (or conserve) substantial economic rents; and yet the social benefits from a correct decision might be nil. Or might not be: The expectation that any dispute arising under the statute would be resolved by accurate methods, come what may, might have induced efficient behavior when the statute was in force.

The broader point is that parties may underinvest in the search for evidence in some cases because accuracy in adjudication confers benefits on nonparties by increasing the deterrent efficacy of the law, while overinvesting in others for rent-seeking reasons. But it is a reasonable conjecture that in general, if not in every case, the larger the stakes (they need not, of course, be pecuniary) the more important it is from a social as well as private standpoint that the case be decided correctly. If inaccuracy reduces deterrence and

18. $\Omega(H|x) = p(H|x)/p(\bar{H}|x)$, and $\Omega(H) = p(H)/p(\bar{H})$. The tilde (\sim) means "not." If, in the example in the text, the probability, given X shot Y , that Z would testify that he saw the shooting is .4, and the probability that, given X did not shoot Y , Z would nevertheless testify that he saw him do it is .1, then the odds that X shot Y are 4 to 1 (or, equivalently, 4). If (before Z 's testimony) the probability that X shot Y was .1 and the probability that he did not was .2, the odds that X shot Y (the prior odds) would be 1 to 2 (or .5).

hence compliance with law, it will impose greater social costs the bigger the case. It is more important to deter billion-dollar oil spills resulting from negligence than million-dollar oil spills resulting from negligence.

A second qualification is that altering posterior odds may not have much or even any social value even if the likelihood ratio of the new evidence is high, as in our shooting example, where it was 8. The value of the evidence will depend on the prior odds and on the decision rule. Suppose that the prior odds (as a consequence of the previously presented evidence) that X shot Y are not 1 to 2 but 1 to 10 and that for X to be held liable for the shooting the trier of fact must consider the odds that he did it to be at least 1.01 to 1 (the preponderance standard). Then the new evidence, since it would not lift the posterior odds above the threshold (multiplying the prior odds by a likelihood ratio of 8 yields posterior odds of only 1 to 1.25), would have no value. This would also be the case if, with the prior odds unchanged at 1 to 2, the trier of fact must reckon the odds to be at least 9 to 1 (one possible interpretation of the proof beyond a reasonable doubt standard) in order to find against X ; for the posterior odds are only 4 to 1.

A final qualification is that investments in evidence may yield benefits that go beyond altering the outcome of particular cases. Take the simple case in which the outcome depends solely on the ratio of the investments of each side. A , say, will beat B if A spends twice as much as B ; otherwise B will win. Then a proportional reduction in each side's expenditures will not alter the outcome. But it may well reduce the amount of information generated for the consideration of the tribunal, and by doing so may increase the variance of the actual as distinct from the expected outcome and also increase the likelihood of an appeal by reducing confidence in the accuracy of the outcome.

II. THE STRUCTURE OF THE FACTUAL INQUIRY

A. *Inquisitorial versus Adversarial Systems, with Special Reference to the American Jury*

1. *The "pure" systems compared.*

The benefits and costs of searching for evidence, and so the optimal kind and amount of such search, vary with the type of searcher. Begin with the case in which the only searcher is a professional judge. That is a caricature of the inquisitorial system that prevails in Continental Europe, Japan, and most other non-English-speaking countries, for although lawyers play a smaller role in developing evidence in an inquisitorial system than they do in an adversarial one, it is not trivial (it also varies from country to country). But I wish to make the contrast between the systems as stark as possible, and

so I shall treat tendencies as if they were their extremes.¹⁹ Therefore I shall not only ignore the role of the lawyer as an evidence searcher in the inquisitorial system, but also treat trial by jury as the sole form of trial in the adversarial system.

It might seem that our searcher-judge would be an extremely efficient searcher, because of selection, training, and experience.²⁰ But maybe not. Since it is difficult to evaluate legal factfinding and thus to criticize a judge for having made erroneous findings or praise him for good ones, the judge's incentive to exert himself to do a good job will be limited. In addition, if he is highly paid, the cost of search may be substantial. The amount of search conducted, moreover, will depend on the number of judges and auxiliary judicial personnel, and that number may be determined without much regard to the socially optimal amount of search. In addition, the public may lack confidence in the judge's search and in the conclusions he draws from it because the process of judicial inquiry in an inquisitorial system, like grand jury proceedings in the United States, is carried on mainly behind closed doors. And there is a danger that the judge will render the "popular" result in a case, irrespective of justice.

In the adversarial process exemplified by the modern American civil jury trial, the evidence search is conducted separately by the lawyers for the opposing sides and presented to a nonexpert, ad hoc, multiheaded tribunal for decision. Because trial lawyers are compensated directly or indirectly on the basis of success at trial, their incentive to develop evidence favorable to their client and to find the flaws in the opponent's evidence is very great and, if it is a big money case, their resources for obtaining and contesting evidence will be ample. If the size of the stakes in a case is at least a rough proxy for the social costs of an inaccurate decision, there will be at least a rough alignment between the amount of search that is actually conducted and the amount that is socially optimal.

The amount of search is driven not by the stakes alone, however, but also by the likely effect of the marginal bit of evidence on the outcome. Recall

19. The very simplest example of factual inquiry would be that of a parent investigating a dispute between two of his or her children. Bentham seems to have considered this the appropriate model for the system of legal evidence, though not a model to be followed slavishly. See 1 JEREMY BENTHAM, RATIONALE OF JUDICIAL EVIDENCE 6-8 (J.S. Mill ed., London, Hunt & Clarke 1827). See generally Laird C. Kirkpatrick, *Scholarly and Institutional Challenges to the Law of Evidence: From Bentham to the ADR Movement*, 25 LOY. L.A. L. REV. 837 (1992). For descriptions of the differences between adversarial and inquisitorial handling of evidence problems, see MIRJAN R. DAMAŠKA, EVIDENCE LAW ADRIFT (1997); DAVID LUBAN, LAWYERS AND JUSTICE: AN ETHICAL STUDY 93-103 (1988); John H. Langbein, *The German Advantage in Civil Procedure*, 52 U. CHI. L. REV. 823 (1985).

20. It is commonly remarked, as though the point were obvious, that the inquisitorial approach is more efficient than the adversarial approach. See, e.g., Craig M. Bradley, *The Convergence of the Continental and the Common Law Model of Criminal Procedure*, 7 CRIM. L.F. 471 (1996). This article challenges that assumption.

from Equation (2) that the marginal benefit of a piece of evidence is given by $p_x S$, where p_x is the effect of the evidence on the probability that the trial will reach the right result (whether from a social or, as here, where we are considering the incentives of lawyers rather than judges, a private standpoint). This implies that, other things being equal, more evidence will be obtained the closer the case is.²¹ The closer the case, the more of an effect on the outcome additional evidence is likely to have and so the more likely such evidence is to be furnished to the trier of fact. If the case is one sided, additional evidence, even though highly probative considered by itself, may have no effect on the outcome.

The incentive to present more evidence the closer the case is (other things being equal) has a *tendency* to promote efficiency, but no stronger statement is possible. It is easy to imagine cases in which the additional evidence induced by the closeness of the case has no social product. Suppose that party *A* can increase the probability of a favorable outcome by one percent by adducing one more bit of evidence at cost *X*. And suppose that his opponent, *B*, can nullify that one percent shift in *A*'s favor by adding another bit of evidence, evidence favorable to *B*, also at cost *X*. If each party puts in his additional evidence, a cost of $2 \times X$ will be incurred without any change in the expected outcome. The example, however, is somewhat unrealistic. If *A* can anticipate *B*'s response, *A* has no incentive to put in the additional evidence. *A* and *B* will jointly benefit from agreeing to keep the evidence out.²²

The competitive character of the search process and the presentation of the results to a body of amateur judges (the jurors) that does not itself participate in the gathering of the evidence makes it difficult to situate the adversarial system on a continuum with the inquisitorial. The model for the latter is a police investigation, but for the former it is the debate. The debater's tools are the tools of rhetoric, the set of techniques for inducing belief in matters involving irremediable uncertainty that often is due to the audience's lack of sophistication. As emphasized by theorists of rhetoric beginning with Aristotle, an important dimension of effective rhetoric (called the "ethical appeal") is making the speaker, as well as the speech, credible. The economics of consumer search sketched in Part I again provides a helpful parallel.²³ Some consumer goods are what are called in economics "credence goods." A good is a credence good if the consumer cannot readily determine its quality by inspection or even use, so that he has to take its quality "on faith." The importance of credibility in a rhetorical system of justice and the

21. See Avery Katz, *Judicial Decisionmaking and Litigation Expenditure*, 8 INT'L REV. L. & ECON. 127 (1988).

22. A stipulation (agreement) of the parties to limit evidence will normally be enforced. If lawyers were perfect agents of their clients, such stipulations would be even more common than they are, but they are common.

23. For a fuller discussion, see RICHARD A. POSNER, *OVERCOMING LAW* 498-530 (1995).

incentives of lawyers to enhance the credibility of their witnesses without regard for the truth explain the emphasis that adversary systems place on cross-examination and rebuttal and the corresponding suspicion of hearsay evidence, which, defined functionally, is simply testimony that is not subject to cross-examination.²⁴

The significance of cross-examination is often misunderstood, and its social value consequently underappreciated, because of failure to consider the deterrent effect of the right of cross-examination. Because cross-examination *can* destroy a witness's credibility, it rarely does so in practice and so is mistakenly denigrated. The witness whose credibility would be destroyed by cross-examination will not be called at all or will try to pull the sting of the cross-examiner by acknowledging on direct examination the facts that a cross-examiner could be expected to harp on.

The adversary system makes it difficult for litigants to signal the strength of their case. Just as poker players must bluff occasionally to avoid revealing the strength of their hand and thus losing the strategic advantage of secrecy, so a lawyer who has a weak case must pretend to have a strong one in order to avoid tipping his hand. One might expect, however, that some lawyers would specialize in strong cases, so that the fact that the lawyer had been retained would signal that the case was strong and thus induce a favorable settlement. This would be a cheap and reliable method of signaling. But I do not think it is widespread.

The adversary system may seem less efficient than the inquisitorial merely because it involves two searchers (or teams of searchers)—the counsel for the opposing sides—rather than one (the judge). There is duplication and hence there are added costs. And because the searchers are not disinterested, the system needs procedures for preventing concealment and distortion of evidence. When permitted to do so, as they are in the American legal system, lawyers assist (some would say they coach) their witnesses to make the witness's story credible; lawyers understand the importance to effective rhetoric of the ethical appeal. Such assistance is not altogether a bad thing. It can remind the witness of true facts that he may have forgotten, help him to articulate his recollections in an intelligible form, and show him how to testify in compliance with the rules of evidence.

Because the private benefits of searching for evidence may exceed or fall short of the social benefits, privatizing the search (as in the adversarial system) may result in too much or too little evidence from a social standpoint, as we have seen, whereas in principle (a tremendous qualification, however) the inquisitorial judge can continue his search for evidence until he reaches the point at which marginal cost and marginal benefit intersect and he can stop

24. The witness can be cross-examined, but not the out-of-court declarant whose "testimony" the witness is repeating.

right there. The judge in the adversary system can, however, limit the amount of search, too. He can do this not only by curtailing pretrial discovery, setting an early trial date, and limiting the length of the trial (all measures that judges in our system are authorized to employ), but also by excluding evidence at trial under the authority of Rule 403 of the Federal Rules of Evidence. (It is true that by the time a Rule 403 motion is made, the evidence will be gathered. But parties are unlikely to gather evidence if they expect the judge to exclude it at trial.) The relevance and hearsay rules also conduce to this end. The function of the rules of evidence in limiting the external costs generated by an adversary system is one reason why such rules are less important in an inquisitorial system.²⁵

The law cannot force the parties to search more than the case is worth to them merely because the additional search would confer a social benefit. But it can force them to collect somewhat more evidence than they might if left to their own devices, as we shall see when we consider the rules governing the burden of production.

Because the jury is an ad hoc tribunal, a significant amount of time is consumed at the outset of trial in the selection of the members of the tribunal. And because it is inexperienced, a professional judge is needed to guide it, and the pace of the trial is slowed down by the need to educate the jurors in the rudiments of their job. In the federal courts, civil jury trials are on average more than twice as long as civil bench (that is, judge) trials.²⁶ So there is no saving of judge time by employing a jury; rather the contrary, though with some offset because the judge does not have to decide the case or write an opinion. The rules of evidence, it is frequently argued, would be largely unnecessary if there were no jury trials; they are mainly designed to protect laymen from making cognitive errors as a result of inexperience. And so the formulation and application of those rules are another cost of trial by jury.

Trial by jury also magnifies differences in ability between opposing counsel because the judge, for fear of interfering with the jury's decision-making, cannot easily redress the balance by questioning the witnesses himself or suggesting lines of argument, as he could in a bench trial. This is not entirely a bad thing, because trial by jury penalizes bad lawyers more than nonjury trials do and so might produce, in Darwinian fashion, a higher qual-

25. See GORDON TULLOCK, TRIALS ON TRIAL: THE PURE THEORY OF LEGAL PROCEDURE 151-57 (1980); Konstantinos D. Kerameus, *A Civilian Lawyer Looks at Common Law Procedure*, 47 LA. L. REV. 493, 500 (1987); Franklin Strier, *What Can the American Adversary System Learn from an Inquisitorial System of Justice?*, 76 JUDICATURE 109, 109 (1992). An alternative approach would be a regulatory ("Pigouvian") tax on evidence, but there would have to be a subsidy for those cases in which the parties underinvest in evidence from a social standpoint. The implementation of such a tax-subsidy scheme would, unfortunately, require far more information than the government could feasibly obtain.

26. See RICHARD A. POSNER, THE FEDERAL COURTS: CHALLENGE AND REFORM 193 n.1 (1996).

ity of lawyer than bench trials in which the judge seeks to compensate for the inadequacies of the weaker lawyer. Yet "goodness" here includes the unscrupulous mastery of deceitful rhetorical tricks. Finally, and seemingly most tellingly, it may seem obvious that the jurors' inexperience and naiveté will reduce the likelihood of an outcome that corresponds to the true facts of the case. Not only do the jurors have higher information costs than professional judges do, but they also may be more subject to cognitive illusions and emotionalism than a professional judge who has "seen it all before."

But this is only part of the picture. The competitive character of the adversary process gives the searchers (the lawyers) greater incentives to search hard than in a system where the judge is the principal or only searcher.²⁷ Competition always involves duplication of effort yet more often than not yields more than offsetting benefits, and it may do so in a trial. To put this point differently, the adversarial system relies on the market to a much greater extent than the inquisitorial system does, and the market is a more efficient producer of most goods than the government. Professor Langbein, a distinguished defender of the inquisitorial approach, recognizes that the adversarial approach has the advantage that it "aligns responsibility with incentive" and "is an undoubted safeguard against official sloth" but offers a "straightforward" answer to this concern: "The judicial career must be designed in a fashion that creates incentives for diligence and excellence."²⁸ This is easier said than done, and may in fact be quite infeasible in America's political culture.²⁹ Some evidence of this is the widespread dissatisfaction with American administrative agencies, which employ methods and procedures (expert judges, no jurors, relaxed rules of evidence, and more control by the tribunal over evidence gathering) that somewhat resemble those of inquisitorial systems.

We must not rest, however, on a dogmatic preference for market allocation of resources but must consider concretely how competition might conduce to optimal evidence gathering. It might do this not only by inducing greater efforts by each side to find supporting evidence but also by inducing greater efforts to find the flaws in the other side's evidence.³⁰ Greater efforts would not apply across the board; rather, as I have also pointed out, there would be greater efforts the larger the stakes and the closer the case, hence greater in those cases where a more thorough and careful marshaling and evaluation of evidence are likely to confer greater social benefits. In general,

27. See Mathias Dewatripont & Jean Tirole, *Advocates*, 107 J. POL. ECON. 1 (1999).

28. Langbein, *supra* note 19, at 848.

29. See John C. Reitz, *Why We Probably Cannot Adopt the German Advantage in Civil Procedure*, 75 IOWA L. REV. 987 (1990).

30. The latter point is emphasized in GIULIANA PALUMBO, OPTIMAL "EXCESSIVE" LITIGATION IN ADVERSARIAL SYSTEMS (ECARE, Université Libre de Bruxelles, Working Paper No. 98-01, June 1998).

moreover, the party having the objectively stronger case will be able to obtain evidence favorable to it at lower cost than the opposing party can obtain evidence favorable to itself.³¹ So the competitive system of gathering evidence will tend to favor the party who would win in an error-free world.³²

The adversarial system also facilitates the drawing of reliable inferences from evidentiary lacunae.³³ If one party ought to be able to obtain favorable evidence to itself at low cost, then its failure to present such evidence allows the trier of fact to infer that the party is concealing unfavorable evidence and should therefore lose.

Although the average juror may be less bright and will certainly be less experienced in adjudication, than the average judge, “two heads are better than one”—and six, eight, or twelve inexperienced heads may be better than the one experienced head when they pool their recollections and deliberate to an outcome. The judge does not merely preside, moreover; he can take the case away from the jury by granting a new trial or, if the evidence is completely one-sided, a directed verdict or judgment notwithstanding the verdict, if the jury seems to him to have screwed up. The twelve heads are really thirteen. And depending on the type of case, the jurors may be more like the witnesses and parties, in terms of social background, occupation, education, life experience, race, mores, and outlook, than the judge is. That may make it easier for them to understand, and to determine the credibility of, the witnesses than it is for the judge to do so. This is most likely to be true in personal injury tort cases and in criminal cases, but together these two categories account for most jury trials.³⁴

31. Ideally, the cost of producing favorable evidence should be infinite to the party who deserves to lose. If it were, the fact that parties have incentives to lie under a regime of competitive evidence gathering would not lead to erroneous results. See Chris William Sanchirico, *Enforcement by Hearing: An Integrated Model of Evidence Production* (Dec. 1997) (unpublished manuscript, on file with Columbia University Dep’t of Econ. and Columbia Law School).

32. See Luke M. Froeb & Bruce H. Kobayashi, *Naive, Biased, yet Bayesian: Can Juries Interpret Selectively Produced Evidence?*, 12 J.L. ECON. & ORG. 257, 266 (1996); see also Paul Milgrom & John Roberts, *Relying on the Information of Interested Parties*, 17 RAND J. ECON. 18, 25 (1986).

33. See Hyun Song Shin, *Adversarial and Inquisitorial Procedures in Arbitration*, 29 RAND J. ECON. 378, 404 (1998) (in an adversarial system, “the absence of a conclusive submission by either the plaintiff or defendant can be treated as a signal in itself”).

34. In the most recent year for which statistics are available (1996 for state cases, 1997 for federal), 74% of all jury trials in the United States were either personal injury tort cases or criminal cases. For the data on which this statistic is based, see EXAMINING THE WORK OF STATE COURTS, 1996: A NATIONAL PERSPECTIVE FROM THE COURT STATISTICS PROJECT 25, 28 (Brian J. Ostrom & Neal B. Kauder eds., 1997); JUDICIAL BUSINESS OF THE UNITED STATES COURTS: 1997, at 152-54 tbl.C-4, 359-61 tbl.T-1 (visited Apr. 30, 1999) <http://www.uscourts.gov/judicial_business/contents.html>. The state figure on which this estimate is based is only an approximation, however, as there is no comprehensive “personal injury” category. I therefore approximated it as the sum of “auto [torts]” and “medical malpractice.”

If judges as well as jurors are prone to make cognitive errors or be overcome by emotion, trial by jury may actually proceed more rationally than trial by judge, since in a bench trial there is no gatekeeper protecting the trier of fact from confusing or excessively prejudicial evidence. The point is less that we need rules of evidence because we have juries than that we have no mechanism for enforcing rules of evidence against judges. There would have to be a screening judge to keep inadmissible evidence from the trial judge. The latter would be humiliated by being deemed unable to keep inadmissible evidence of which he was aware from influencing his decision. But probably he *would* be unable to keep from being influenced by such evidence. Indeed, it is not even certain that judges are less prone to cognitive illusions than jurors. The literature on these illusions provides some basis for thinking that market settings tend to dispel or at least reduce them,³⁵ but none for thinking that government processes have similar effects.³⁶ We shall see, however, that there is at least a small amount of evidence that judges are less prone to cognitive illusions than juries.

Gatekeeping is one way of combating cognitive illusions; another is the adversary process itself. If, for example, the lawyer for one party uses "framing" to influence a witness's testimony, the other lawyer can reframe the question on cross-examination to offset the effect of his opponent's framing. This is another respect in which the adversarial system (with jury) may be better at dealing with cognitive illusions than the inquisitorial system.

Jurors have, moreover, a certain freshness that many judges lack. The judge may be case-hardened and therefore less likely to attend to the particulars of a new case. Bayes' theorem shows that the judge's case-hardened attitude may be quite rational. The higher one's prior odds, the less search a Bayesian will do, other things being equal. Suppose a judge, by virtue of having presided in many similar cases, reckons at the outset of a new case that the odds that the defendant is guilty are 100 to 1. He will have little incentive to pay close attention to the evidence presented at trial, because evidence of the defendant's guilt will not alter his original judgment, while evidence of the defendant's innocence, unless extremely powerful, will not push the posterior odds into the range in which the judge would acquit the defendant. For example, if in the case in which the judge's prior odds are 100 to 1 in favor of guilt the evidence creates a likelihood ratio of 8 to 1 that the defendant is not guilty, the judge's posterior odds on guilt will still be 12.5 to 1.

35. See, e.g., Colin Camerer, *Individual Decision Making*, in THE HANDBOOK OF EXPERIMENTAL ECONOMICS 587, 674-75 (John H. Kagel & Alvin E. Roth eds., 1995); Vernon L. Smith, *Rational Choice: The Contrast Between Economics and Psychology*, 99 J. POL. ECON. 877, 884-88 (1991).

36. See Christine Jolls, Cass R. Sunstein & Richard Thaler, *A Behavioral Approach to Law and Economics*, 50 STAN. L. REV. 1471, 1543-45 (1998).

All this is perfectly rational. But when the pattern becomes understood, litigants will no longer have an incentive to produce much evidence. (To see this, think of the extreme case where the judge has made up his mind irrevocably about the correct outcome of the case before any evidence is presented.) Eventually the accuracy of the litigation process will be severely compromised, as the judge's prior odds, formed on the basis of trials in which the parties did put in a lot of evidence, become less and less accurate. The problem will be aggravated if, as many cognitive psychologists believe, people succumb to "confirmation bias," meaning that they tend to interpret evidence in the way most consistent with their prior beliefs. The fact that the life-tenured judge on a fixed salary pays no penalty for succumbing to this bias undermines his resistance to it. The dangers stemming from strong prior odds are less acute in trial by jury.

A related point is that judges, by virtue of their experience, may take shortcuts to decision, while jurors, being new to the process, may think more carefully about the evidence. The judge's snap decision may be as good as the jurors' more deliberate one—but it may not be better.

With its adversary character, and the need to present the evidence all at once (a jury cannot be kept together indefinitely, whereas a judge can try a case in stages over an indefinite period of time and delay issuing his decision until long after the trial has ended),³⁷ the American jury trial is much more easily monitored by the public than an inquisitorial process modeled on a police investigation. This is important in a culture that distrusts officials—and so is the delegation of a large part of the judicial function to nonofficials, the jurors and the lawyers (though when representing the government in court they usually are government employees). With so much of the judicial function privatized, the number of professional judges required to staff the courts is much smaller than in inquisitorial judiciaries,³⁸ and this pattern caters to public mistrust of officialdom. Another way of understanding the pattern is that a decision to have a small number of judges drives up the cost of search by them, so that the search function devolves on others, the lawyers and jurors, who might be considered excessively high-cost searchers (relative to benefits) if judges were plentiful and judge search therefore cheap.

American popular mistrust of judges has a further significance. It has resulted in most American judges being elected rather than appointed and in

37. See DAMAŠKA, *supra* note 19, at 60 (emphasizing the compression of the adversarial compared to the inquisitorial trial and attributing it to the jury). In the United States as in Europe, judge trials tend to last longer from beginning to end (although the amount of actual trial time is less) because, not having to keep a jury together, the judge can interrupt the trial to attend to other business.

38. For example, the ratio of lawyers to judges is 54.59 to 1 in the United States compared to 6.07 to 1 in France, 6.86 to 1 in Germany, and 2.86 to 1 in Switzerland. See RICHARD A. POSNER, *LAW AND LEGAL THEORY IN ENGLAND AND AMERICA* 28 tbl.1.1 (1996).

keeping judicial salaries well below the opportunity costs of the ablest lawyers. The consequence is a vicious cycle (vicious if you do not like juries). Because America mistrusts judges, American judges really are less trustworthy than judges in a culture of greater respect for officials. This in turn narrows the competence gap between judges and jurors, and so reduces the error costs of jury trials relative to bench trials. The gap is further narrowed because, when judges are elected, repeat litigants, such as insurance companies, and specialized trial lawyers, such as the tort plaintiffs' bar, have strong incentives to channel campaign contributions to judges who favor their interests. The incentives are blunted, and the bad effect on justice reduced, if decisional responsibility is shared with jurors. A jury system also reduces the incentive to bribe judges.³⁹ And it counteracts the political bias inherent in an elected judiciary. The judge who sits without a jury cannot blame the outcome of a trial (which might be the acquittal of a political ally) on others; he can diffuse responsibility if he sits with a jury. Jurors, unlike judges, do not have career incentives to render verdicts that are popular with whoever controls judicial careers.

Doubts about the competence of jurors are influenced by the assumption that jurors constitute a random sample of the lay population, but the assumption is false. In the federal system, the names of potential jurors are usually taken from voter registration lists, so that people whose sense of civic responsibility is insufficient to motivate them to register to vote are in practice disqualified from serving on a jury. The people whose names are chosen in this way are sent summonses to jury duty, but the most irresponsible of these people simply ignore them and there is rarely any follow-up. Then when the cooperators are questioned by the judge as part of the process of jury selection, the potential jurors who do not want to serve make up excuses and are usually let off. Challenges for cause eliminate the jurors who are likely to be partial to one side or another, and peremptory challenges enable the lawyers to act on inarticulate hunches to eliminate some of those who remain. The prospects who make it through this gauntlet are not a random sample of the inhabitants of the federal judicial district, but generally are above average in competence, civic-mindedness, neutrality, and sense of responsibility (except that peremptory challenges are sometimes used to exclude the ablest prospective jurors—the ones most likely to see through the case presented by the lawyer making the challenge). Contrary to legend, retired people are underrepresented rather than overrepresented on juries.⁴⁰ So, however, are the busiest people, and some of them would make first-class jurors.

Even assuming that jurors are on balance as competent to resolve factual disputes as (American) judges, we might worry that they have no incentive to

39. See Dewatripont & Tirole, *supra* note 27, at 30.

40. See RICHARD A. POSNER, *AGING AND OLD AGE* 152 (1995).

exert themselves. They are less likely than judges to be criticized publicly for reaching the “wrong” result (though this, as we saw, can be both good and bad). They have no career stakes in doing their job as jurors well, and their financial incentive to conduct a careful sifting of the evidence is nil. Yet almost all judges who sit with juries are struck by their conscientiousness, whether or not the judge agrees with the jury’s verdict. Part of the explanation is the screening for conscientiousness that I have mentioned. More important is what might be called the theatrics of trial by jury. American judicial systems strive, apparently with some success, to create an atmosphere in which the jurors, caught up in the drama of decisionmaking, do their best to render a sound verdict. This is no more (or less) surprising from the standpoint of rational choice than the fact that an audience can be frightened by a scary movie even though everyone knows that it is make-believe.

Well-publicized instances of crazy jury trials—interminable, uncivil, lawless, resulting in outlandish verdicts and other egregious miscarriages of justice, or all these things at once—have convinced some observers that the American system is grossly inefficient.⁴¹ But there are pitfalls in relying on anecdote to shape public policy in a nation as vast and as blanketed by the media as the United States. The very fact that the American jury trial facilitates public evaluation—that the mistakes of the system are harder to bury—guarantees that the system will look less efficient than one that operates behind a veil.

2. *Mixed systems and feasible reforms.*

For the sake of clarity I have been contrasting polar systems of gathering and evaluating evidence in litigation—an inquisitorial system without any participation by lawyers in the evidentiary process and an adversarial system of jury trials. Actual systems are mixed—lawyers do play an evidentiary role in the Continental legal systems, and only a small fraction of American cases are decided by juries—and their best features could be combined. The jury could in principle be abolished without jettisoning the adversary system, as has essentially been done in civil cases in England, though I shall note that England’s system is less adversary than the American sense. More cases could be channeled into arbitration, which mostly uses lay judges but ones who, unlike jurors, have expertise. A number of suggested and some already implemented reforms of the adversary system and corresponding reforms of

41. For arguments supporting this position from an economic standpoint, see TULLOCK, *supra* note 25, at 87-105 and Gordon Tullock, *Defending the Napoleonic Code over the Common Law*, in RESEARCH IN LAW AND POLICY STUDIES 3 (Stuart S. Nagel ed., 1988).

the inquisitorial system offer promise of enhancing efficiency.⁴² Here are some designed to make trial by jury more accurate:⁴³

1. Restoring the size of the civil jury to the traditional twelve (from six to eight, its size in the federal system at present), in order to
 - a. obtain greater diversity of experience, which is important because determining probabilities with regard to the sorts of uncertainty involved in a trial draws heavily on the adjudicator's common sense, which is shaped in turn by people's experiences,
 - b. exploit the Condorcet jury theorem on the superiority of collective to individual judgment,⁴⁴ and
 - c. reduce variance in outcomes by drawing on a larger, though still small, sample of the community.⁴⁵
2. Imposing educational qualifications on jurors in highly complex litigation.
3. Encouraging jurors to take a more active role in the search process by permitting them to
 - a. take notes,
 - b. ask questions of the lawyers, witnesses, and judge,

42. See, e.g., PALUMBO, *supra* note 30, at 2, 19-20. On the growing convergence between the Continental (inquisitorial) and Anglo-American (adversarial) systems, see, for example, CRIMINAL JUSTICE IN EUROPE: A COMPARATIVE STUDY (Phil Fennell, Christopher Harding, Nico Jörg & Bert Swart eds., 1995); John D. Jackson, *Playing the Culture Card in Resisting Cross-Jurisdictional Transplants: A Comment on "Legal Processes and National Culture,"* 5 CARDOZO J. INT'L & COMP. L. 51 (1997); Kerameus, *supra* note 25.

43. Many of these are discussed in Saks, *supra* note 7 and Lempert, *supra* note 7, at 220-31, and are summarized in SECTION OF LITIGATION, AMERICAN BAR ASSOCIATION, CIVIL TRIAL PRACTICE STANDARDS pt. 1 (1998). See also Michael Honig, *Jury Trial Innovations*, N.Y. L.J., Nov. 9, 1998, at 3.

44. See, e.g., Bernard Grofman & Guillermo Owen, *Condorcet Models, Avenues for Future Research*, in INFORMATION POOLING AND GROUP DECISION MAKING 93, 94 (Bernard Grofman & Guillermo Owen eds., 1986). The theorem requires that each juror make an independent judgment, that each have a probability greater than .5 that his judgment is correct, and—critically—that the jury arrives at its outcome by majority vote. Suppose that each member of a 12-person jury has a .6 probability of being correct. Then the jury will reach the incorrect result only if 7 members are wrong, and the probability of this is .4⁷, which is only 15 percent. Under a rule of unanimity, the probability of error would be .4. But, because juries deliberate, an articulate majority can often win over dissenters and obtain a unanimous verdict.

45. For evidence that larger juries increase accuracy and reduce variance, see Saks, *supra* note 7, at 14-15, 42-43, and Michael J. Saks & Mollie Weighner Marti, *A Meta-Analysis of the Effects of Jury Size*, 21 L. & HUM. BEHAV. 451 (1997). Some cases are so huge that a single jury, even of 12, is too small to assure accuracy commensurate with the stakes. This is a problem in mass tort class action, when claims with aggregate stakes of literally billions of dollars may be combined for trial before a single jury. The solution is to have a sample of the cases tried before separate juries. See *In re Rhone-Poulenc Rorer Inc.*, 51 F.3d 1293, 1304 (7th Cir. 1995); Michael J. Saks & Peter David Blanck, *Justice Improved: The Unrecognized Benefits of Aggregation and Sampling in the Trial of Mass Torts*, 44 STAN. L. REV. 815, 841-51 (1992).

- c. read daily transcript, and, more doubtfully,
 - d. call witnesses.
4. Instructing jurors on the law before and during as well as at the close of trial.
 5. Explaining to jurors the basic rules of evidence so that they do not draw inappropriate negative inferences from the withholding of evidence from them. Jurors' ignorance of the rules of evidence can lead them to entertain ungrounded suspicions of the honesty of lawyers and witnesses and to draw erroneous "missing evidence" inferences.⁴⁶
 6. Avoiding legal jargon in instructions—a problem so pervasive that some empirical studies have found "that instructed jurors have no better grasp of the law than uninstructed jurors!"⁴⁷
 7. Changing the rules of evidence so as to combat some of the cognitive quirks that beset decisionmakers.
 8. Shortening trials as much as possible so that jurors do not experience information overload.

Accuracy is only one of two factors to be considered in an economic analysis of evidence; cost is the other. But most of the suggested reforms are virtually costless and some, like compressing the trial, might actually reduce costs. The most costly reform would be to increase the size of the jury. The larger the jury, the higher the opportunity costs of taking jurors from their ordinary pursuits, both because more jurors would be needed and because trials would be longer, since jury selection would take longer and jury deliberations would be more protracted. There would also be more hung juries, and hence more retrials. But the added costs might well be offset by more accurate factfinding, which a larger jury would promote. This should produce better deterrence, resulting, as noted earlier, in less wrongful conduct and fewer trials—so the net increase in trial costs might be small or even negative. Also, the settlement rate would be higher the more predictable the outcome of the trial, and this, too, counteracts the effect of a larger jury on aggregate trial costs.

I do not want to go overboard in praise of the large jury. Arbitration, which as a privately created and financed method of adjudication provides a valuable though not infallible benchmark for evaluating the efficiency of

46. For analysis and examples, see Bruce A. Green, "The Whole Truth?": *How Rules of Evidence Make Lawyers Deceitful*, 25 LOY. L.A. L. REV. 699 (1992).

47. Saks, *supra* note 7, at 35; see also Reid Hastie, David Schkade & John Payne, *A Study of Juror and Jury Judgments in Civil Cases: Deciding Liability for Punitive Damages*, 22 LAW. & HUM. BEHAV. 287, 304 (1998). It may, however, fall into the category of problems that are hopeless but not serious. The instructions are determined before the lawyers' closing arguments to the jury, and the lawyers are not permitted to argue to the jury legal positions inconsistent with the instructions. In effect, then, the lawyers instruct the jury, but they do so *consistently* with the law as laid down by the judge.

public systems of adjudication, rarely involves more than three arbitrators, and usually there is only one. This suggests that the costs of a larger panel would exceed the benefits that I have just stressed. But implications for the efficiency of the large jury are blurred by the fact that cases selected for arbitration differ systematically from those adjudicated in courts. Almost all are contract cases in which the parties agreed in the contract itself to arbitrate disputes arising out of it, and perhaps in most of them the parties did not anticipate disputes likely to involve stakes large enough to warrant more than a brief and informal process of resolution. Although many multimillion dollar contracts provide for arbitration and rarely, if ever, provide for arbitration by a panel of more than three arbitrators, most contract cases, even when the stakes are huge, turn on the language of the contract. Messy factual disputes of the sort that a large panel of factfinders might be better able to resolve are avoided. The benefits of additional arbitrators may therefore be slight even in large cases.

Another variable in the design of trial by jury is the voting rule. Unanimity is the traditional rule, but some states have relaxed it. It is difficult to say whether this is a good idea, apart from the effect on the number of cases resulting in hung juries, which may however be slight if the unanimity requirement gives way to a lesser supermajority requirement (for example, conviction or acquittal by a 10 to 2 vote).⁴⁸ On the one hand, deliberation is likely to be more perfunctory if unanimity is not required. On the other hand, unprincipled compromises, which may be necessary to secure unanimity, are also less likely.

3. *A summary comparison.*

Because Americans mistrust officials more than people in most other countries that are otherwise similar to the United States, an effective inquisitorial system would cost more here than in the countries in which it is used;⁴⁹ this may be one reason we have not adopted it. Beyond that, the empirical evidence needed to make a responsible comparative evaluation of the two types of system is largely nonexistent. In particular, there is little evidence to support the often vociferous criticisms of the jury system.⁵⁰ Opponents of the jury and proponents of the inquisitorial system can, however, point to two types of evidence. First, experimental evidence (limited, how-

48. See Alvin K. Klevorick & Michael Rothschild, *A Model of the Jury Decision Process*, 8 J. LEGAL STUD. 141, 155 (1979); Edward P. Schwartz & Warren F. Schwartz, *Decisionmaking by Juries Under Unanimity and Supermajority Voting Rules*, 80 GEO. L.J. 775, 787 (1992).

49. The English legal system may seem a counterexample, since it is an adversary system yet the English population is famously (if diminishingly) respectful of officials. The appearance is misleading; functionally, the English legal system is closer to the legal systems of the Continent than to the U.S. system. See POSNER, *supra* note 38, at 20-36.

50. See Lempert, *supra* note 7, at 182, 233-34.

ever, to a single study) indicates that judges are less subject to hindsight bias than jurors.⁵¹ Second, the conviction rate is lower in bench trials than in jury trials. This is significant because in most states the decision in a criminal case as to whether to be tried by a judge or by a jury is entirely the defendant's. If juries are less accurate guilt determiners than judges, innocent defendants will choose to be tried by judges rather than run the risk of jury mistake, while guilty defendants will choose to be tried by juries, hoping for a mistake. The acquittal rate should therefore be higher in bench trials—and it is.⁵²

Kevin Clermont and Theodore Eisenberg present some parallel evidence for civil cases: In products liability and medical malpractice cases, bench trials strongly favor plaintiffs and jury trials strongly favor defendants.⁵³ The plaintiff's choice of a bench trial, if he has a strong case, is explicable on the same ground as the criminal defendant's choice of bench trial if *he* has a strong case. The puzzle is why the civil defendant does not elect jury trial if he has a weak case and thus needs a mistake by the trier of fact in order to prevail. The authors think that defendants' lawyers have accepted popular misconceptions that juries are inveterately pro-plaintiff. An alternative possibility is related to the assumed greater accuracy of judges. To say that juries are less accurate than judges is to say that there is greater variance around the mean (the correct result, presumably) in jury than in judge decisions. If a defendant has a very weak case, this greater variance may hurt him. Suppose that the range of possible damages awards by a judge is \$10,000 to \$100,000 (for a mean of \$55,000) but for a jury in the same case is \$0 to \$110,000 (same mean). If the defendant has no chance of persuading the jury to award zero damages, he has more to lose from being tried by a jury than by a judge. It is so because in a civil case the jury determines the size of the sanction, but in a criminal case the judge does. As a result, jury inaccuracy is likely to work to the disadvantage of the guilty defendant in the civil case and to his advantage (as noted in the preceding paragraph) in the criminal case.

I should note that what I am calling "jury inaccuracy" need not reflect a difference in competence. It could reflect simply a difference in variance resulting from the fact that there are many more jurors than there are judges, and juries are more diverse because they lack the uniformity of outlook and experience that judges tend to have by virtue of common training and voca-

51. See W. Kip Viscusi, *How Do Judges Think about Risk?*, 1 AM. L. & ECON. REV. (forthcoming 1999) (manuscript at 17-20, 26, on file with author).

52. See Gerald D. Gay, Martin F. Grace, Jayant R. Kale & Thomas H. Noe, *Noisy Juries and the Choice of Trial Mode in a Sequential Signalling Game: Theory and Evidence*, 20 RAND J. ECON. 196, 211 (1989).

53. See Kevin M. Clermont & Theodore Eisenberg, *Trial by Jury or Judge: Transcending Empiricism*, 77 CORNELL L. REV. 1124, 1162-66 (1992).

tion. A defendant who has a weak case will tend to prefer a jury trial when the jury is asked to make a binary decision (such as guilty or innocent, liable or not liable), because in such a case variance can only work to his benefit by reducing the expected punishment.⁵⁴

Jurors doubtless are somewhat more lawless than judges, because they do not internalize the values of law-following to the same extent as most judges; this is the reason that we have rules that forbid revealing to the jury that the defendant in a tort case has liability insurance. This point is somewhat to one side of the question of factfinding competence; more studies are needed before it can be concluded with any confidence that the American jury is a less accurate factfinder than the American, or even the European, judge. If it is less accurate, however, it is probably less efficient, at least in civil cases. The direct cost of jury trials plainly exceeds that of bench trials. Only if a great deal of value is assigned to John Stuart Mill's "education in citizenship" rationale, or to some other political value of jury trial, are the added costs likely to be offset by greater benefits—except in criminal cases. Distrust of officials is too great in America for people to be willing to entrust their liberty solely to professional judges.

B. *Burden of Proof*

1. *Burden of production.*

Burden of proof has two aspects, of which the first is important only in an adversary system where the tribunal does not participate in the search for evidence. This aspect is the burden (duty) of submitting evidence to the tribunal, as distinct from the burden of persuading the tribunal that one ought to win the case. The two burdens are intertwined; for one thing, the burden of persuasion generally determines who has the burden of production. In the ordinary civil case, the plaintiff's burden is to show that his position is more likely than not correct. In other words, if at the end of the trial the jury either thinks the defendant should win or does not know which side should win—the evidence seems in equipoise—the plaintiff loses. This makes a plaintiff who puts in no evidence very likely to lose. It makes sense, as a way of economizing on the time of the tribunal (as well as reducing nuisance litigation), to require the plaintiff, as a precondition to getting to trial, to submit evidence that if believed would be likely to carry the day with the jury, before the defendant is required to submit any evidence.⁵⁵ This assumes that the cost to the plaintiff of obtaining this evidence is not disproportionately

54. Suppose all judges are average, and the average judge will convict this defendant. The average jury will also convict him, but one in ten juries will acquit him. Then he is better off choosing a jury trial.

55. See generally Bruce L. Hay, *Allocating the Burden of Proof*, 72 *IND. L.J.* 651 (1997).

greater than the cost to the defendant of obtaining contrary evidence (if there is any). But if, as a result of modern pretrial procedures for discovering evidence in the possession of the opposing party, the costs of searching for evidence are symmetrical, the burden of production should indeed be on the party that bears the burden of persuasion—that, is the plaintiff in the case of the main claim but the defendant in the case of affirmative defenses, such as consent, statute of limitations, laches, accord and satisfaction, incapacity, preemption, and *res judicata*.

In the case of defenses, moreover, it would be inefficient to require the plaintiff to anticipate and produce evidence contravening the indefinite number of defenses that a defendant might plead in a given case. Such a requirement would also force the plaintiff to do the defendant's legal research for him. The plaintiff would have to identify and counter defenses of which the defendant might not have been aware as well as some which the defendant might have good tactical or evidentiary reasons not to plead or that he might not plead simply because he had one clearly dispositive defense. For example, if the statute of limitations is a plausible defense in only five percent of cases, making the plaintiff plead and prove that his suit was timely would impose costs with no corresponding benefits in ninety-five percent of cases. This discussion suggests that the nineteenth-century rule that the plaintiff in a negligence case had to prove his lack of contributory negligence as well as the defendant's negligence would have been sound from an economic standpoint only if either (1) contributory negligence was a likely defense in the vast majority of such cases, or (2) because pretrial discovery was very limited, it would have been much more costly for the defendant than for the plaintiff to determine whether the plaintiff had been negligent.

The economic rationale of rules governing the burden of production is further illustrated by the *McDonnell Douglas* rule.⁵⁶ Applied mainly in employment discrimination cases, the rule permits the plaintiff, say in a case of racial discrimination in hiring, to establish his *prima facie* case (and thus withstand a motion for summary judgment by the defendant) with evidence merely that he was qualified for the job but was passed over in favor of someone of another race. But the rule does more: Satisfying the just-described burden of production creates a presumption of discrimination, meaning that if the defendant puts in no evidence, the plaintiff is entitled to summary judgment. The probability that he lost the job opportunity *because* he was discriminated against might seem not to be very high if the only evidence is as described. But this disregards the evidentiary significance of missing evidence. If the defendant, who after all made the decision to give the job to someone other than the plaintiff, maintains complete silence about

56. See *McDonnell Douglas Corp. v. Green*, 411 U.S. 792, 802 (1973); see also *Furnco Construction Corp. v. Waters*, 438 U.S. 567, 577-78 (1978).

the reason for his action, an inference of discrimination arises. If the reason was otherwise, he should have been able without great difficulty to produce some evidence of that.

If the defendant breaks his silence and gives a noninvidious reason for his action, and the plaintiff is unable to present evidence casting doubt on that reason, then the plaintiff loses, again without a trial. If, however, the plaintiff is able to contest the genuineness of the defendant's reason, the case goes to the jury and the *McDonnell Douglas* rule falls out. A jury that disbelieves the defendant's reason can infer that the plaintiff was indeed discriminated against, but it need not do so;⁵⁷ it may conclude that the defendant is embarrassed by the reason that motivated his action and is concealing it, even though it is not discriminatory.

The *McDonnell Douglas* rule is sometimes thought to be motivated by a desire of "liberal" judges to make it easier for the plaintiff to prevail in a discrimination case. My analysis suggests that the rule is justifiable in neutral terms of minimizing cost, specifically minimizing the cost of trial in cases in which the parties can be induced to "show their hand" before trial.

2. *Burden of persuasion.*

In the typical civil trial, there is no basis for supposing that Type I errors (false positives, such as convicting an innocent person) on average impose higher costs than Type II errors (false negatives, such as an erroneous acquittal). So it is enough to justify a verdict for the plaintiff that the probability that his claim is meritorious exceeds, however slightly, the probability that it is not. But because the cost to an innocent defendant of criminal punishment may well exceed the social benefit of one more conviction of a guilty person (in maintaining deterrence and preventing the person from committing crimes for a period of time, namely while he is imprisoned pursuant to his conviction), Type I errors are more serious than Type II errors in criminal cases and therefore are weighted more heavily in the former by the imposition of a heavy burden of persuasion on the prosecution.⁵⁸

Trading off Type I and Type II errors is a pervasive feature of evidence law. Take disputes over whether a given police lineup is unduly "suggestive." If the other people in the lineup resemble the defendant very closely, the chance of a Type I error (mistakenly identifying the defendant as the criminal) is minimized, because the defendant does not "stand out." But the chance of a Type II error (mistakenly failing to identify the defendant as the

57. For a comprehensive discussion of this issue, see *Fisher v. Vassar College*, 114 F.3d 1332, 1337-38 (2d Cir. 1997) (en banc).

58. See Posner, *supra* note 1, at 408-15.

criminal) is increased, because it is easier to confuse the defendant with the other people in the lineup.

Another but consistent way to explain the difference between the criminal and civil burdens of proof is by reference to the inherent advantages of the prosecution in a criminal case, compared to a private plaintiff, in an adversary system of justice, that is, a system of competitive evidence search. The government has enormous prosecutorial resources.⁵⁹ It can allocate these across cases as it pleases, extracting guilty pleas by threatening to concentrate its resources against any defendant who refuses to plead and using the resources thus conserved to wallop the occasional defendant who does invoke his right to a trial. This is like the situation in which unequal access to capital markets can make predatory pricing a rational strategy.⁶⁰ The analogy is closest and the strategy likely to be most effective when, as is most commonly the case, the defendant cannot afford to hire counsel and is dependent on court-appointed counsel who, other than in capital cases, are kept on a short financial tether. Even the rare defendant who can afford to hire counsel will normally be unable to match the resources that the government can credibly threaten to pour into the case. The burden of proving guilt beyond a reasonable doubt is a partial offset (like the provision of counsel to indigent defendants) to the inequality of the parties' resources for gathering and presenting evidence. In an inquisitorial system, where the search is conducted by a presumably disinterested judge, the need for a heavier burden of proof in a criminal than in a civil system is attenuated.

A complicating factor is that prosecutors may be disinterested, since, unlike private lawyers, their incomes are not tied directly to success in litigation. Economic theory, as well as common sense and observation, suggests, however, that the desire to win, weighted by the stakes in the case (roughly, the sentence if the defendant is convicted), is the most important argument in the prosecutorial utility function. Prosecutors thus have incentives similar to those of private lawyers. Being a prosecutor is rarely a terminal job; it is a stepping stone. Future employers will evaluate a prosecutor by his success in litigation, which will be seen as a function of his win rate weighted by the opposition that he had to overcome in order to win. Opposition will usually be greater the graver the offense charged.

59. In cities with a population of a million or more, the average budget of the local prosecutor's office exceeds \$25 million. See CAROL J. DEFRANCES & GREG W. STEADMAN, PROSECUTORS IN STATE COURTS, 1996, at 1 (U.S. Dep't of Justice, Bureau of Justice Statistics, NCJ 170092, July 1998). Annual appropriations for the offices of the U.S. Attorneys, which prosecute most federal criminal cases, aggregate some \$1 billion. See BUDGET OF THE UNITED STATES GOVERNMENT, FISCAL YEAR 1999, at 594 app. (1998).

60. See, e.g., DOUGLAS G. BAIRD, ROBERT H. GERTNER & RANDAL C. PICKER, GAME THEORY AND THE LAW 183-84 (1994).

Judges, when asked to express proof beyond a reasonable doubt as a probability of guilt, generally pick a number between .75 and .90 (depending on the judge), and jury quantifications are similar.⁶¹ These may seem shockingly low figures, implying that as many as a quarter of the people convicted of crime are innocent. Not so. The higher the crime rate in relation to prosecutorial resources, the more thoroughly prosecutors will screen cases for easy ones to win, and these will tend to be drawn from the tail of the distribution of suspects that contains the suspects who are most likely to be guilty. The heavy burden of persuasion and the other procedural advantages of criminal defendants increase the incentive of prosecutors to go after the most guilty by making it difficult to convict a defendant (notwithstanding the disparity in resources between the prosecuting authorities and all but the wealthiest defendants) unless the case is one sided against him. If because of prosecutorial screening only one percent of the persons prosecuted are innocent, then even, if all are convicted, only one percent of convicted defendants will be innocent. And that is an exaggeration. Not all persons who are prosecuted are convicted, and it is normally much easier for an innocent defendant to create enough doubt in the trier of fact to induce an acquittal.

Tight screening implies that some, perhaps many, guilty people are not prosecuted and that most people who are prosecuted and acquitted are actually guilty. In the previous example, if a ten percent acquittal rate is assumed, then ninety-nine percent of the defendants acquitted would actually have been guilty if the probability of acquittal was random with respect to innocence and ninety percent if all innocent defendants were acquitted.⁶² This implies that when crime rates rise faster than prosecutorial resources, entailing an even finer mesh in the screening of cases to pursue, the procedural advantages of defendants should be reduced by courts or legislatures if society wants to maintain the same balance between the probabilities of convicting the innocent and of acquitting the guilty. This point suggests a possible nonideological basis for the Supreme Court's swing against the rights of criminal defendants in the 1970s and 1980s. Had those rights been preserved intact, the rise in crime rates in that era (which greatly exceeded the increase in the number of prosecutions)⁶³ would have had the paradoxical effect of

61. See THE EVOLVING ROLE OF STATISTICAL ASSESSMENTS AS EVIDENCE IN THE COURTS 201-04 (Stephen E. Fienberg ed., 1989); JOSEPH L. GASTWIRTH, 2 STATISTICAL REASONING IN LAW AND PUBLIC POLICY: TORT LAW, EVIDENCE, AND HEALTH 700-02 (1988).

62. Of 10,000 defendants, 100 (1%) are assumed to be innocent. If 1000 are acquitted (10%) and the probability of acquittal is the same regardless of innocence, then in that group of 1000, 1% are innocent and therefore 99% guilty. If all 1000 innocents are acquitted, then 9000 of the acquitted defendants must be guilty (90%). "[J]uries are not particularly good at evaluating eyewitness testimony. . . . If they return few erroneous convictions it is because they are given few opportunities to judge innocent defendants." Samuel R. Gross, *Loss of Innocence: Eyewitness Identification and Proof of Guilt*, 16 J. LEGAL STUD. 395, 432 (1987).

63. Between 1960 and 1996, the "crime index" compiled by the FBI and reported in the FBI's annual *Uniform Crime Reports* grew more than fivefold. See FEDERAL BUREAU OF INVEST-

making it easier for guilty defendants to avoid punishment. That in turn would have reduced the expected cost of punishment, and so driven crime rates even higher, unless there was an offsetting increase in the severity of punishment for those (fewer) criminals who were caught and convicted.

The assumption in the preceding paragraph of crime rates rising faster than prosecutorial resources suggests an alternative response to rising crime rates to curtailing defendants' procedural rights: increasing prosecutorial budgets. Courts could exert pressure on legislatures to do this by holding the line on procedure and invalidating (as cruel and unusual) steep legislative increases in the severity of criminal punishments. Legislatures would be forced to choose between increasing prosecutorial budgets and higher crime rates that would place additional pressure on the courts to relax procedural safeguards. The courts chose not to play this game of chicken with federal and state legislators.

Although the burden of persuasion is much lower in a civil case and most plaintiffs do not operate with a resource constraint (thanks to contingent fees), there is no reason to suppose that a higher fraction of civil than criminal cases are decided incorrectly. Burden of persuasion has less to do with the number of errors than with the distribution of errors between sides. More undeserving plaintiffs than undeserving prosecutors win, but fewer undeserving civil defendants than undeserving criminal defendants win. What makes it likely that most cases, civil or criminal, are resolved correctly is simply that it is usually cheaper to obtain persuasive evidence on the side of truth. But a selection effect makes the overall accuracy of the system difficult to observe. The procedural system as a whole is more accurate than the trial component of it, but it is the latter that is visible. One-sided cases are more likely to be settled before trial, usually with little publicity, than are toss-ups,⁶⁴ and so the latter are overrepresented on the trial docket, which is highly visible. This is a reason that a criminal justice system that disfavors plea bargaining (like the German) is bound to appear more accurate than our system.⁶⁵ The more that plea bargaining is discouraged, the more one-sided cases there are in the trial mix.

IGATION, U.S. DEPARTMENT OF JUSTICE, UNIFORM CRIME REPORTS 33 (1960) (reporting a rate of 1037.9 crimes per 100,000 inhabitants); FEDERAL BUREAU OF INVESTIGATION, U.S. DEPARTMENT OF JUSTICE, UNIFORM CRIME REPORTS 5 (1996) (reporting a rate of 5078.9 crimes per 100,000 inhabitants). During the same period federal criminal prosecutions grew by a third (see annual reports of the Director of the Administrative Office of the U.S. Courts). For state criminal prosecutions, there are data only from 1977. Between then and 1994, the number of prosecutions actually declined slightly (as estimated by the Court Statistics Project of the National Center for State Courts), a period during which the crime index was growing by a third. See STATE COURT CASELOAD STATISTICS: ANNUAL REPORT 34 tbl.13 (1977); STATE COURT CASELOAD STATISTICS, 1995, at 137 tbl.7 (1995).

64. See generally George L. Priest & Benjamin Klein, *The Selection of Disputes for Litigation*, 13 J. LEGAL STUD. 1 (1984).

65. Cf. JOHN H. LANGBEIN, *COMPARATIVE CRIMINAL PROCEDURE: GERMANY* 74 (1977).

3. *Statistical evidence.*

a. *The bus case.*⁶⁶

It is now generally recognized, even by the judiciary, that since all evidence is probabilistic—there are no metaphysical certainties—evidence should not be excluded merely because its accuracy can be expressed in explicitly probabilistic terms, as in the case of fingerprint and DNA evidence.⁶⁷ But courts are reluctant to take the next step and hold that, given the modest burden of persuasion in civil cases, the explicit probability that the plaintiff's essential evidence is true need only exceed fifty percent, however slightly. Suppose that the plaintiff is hit by a bus, and it is known that fifty-one percent of the buses on the road where the plaintiff was hit are owned by Bus Company *A* and forty-nine percent by Company *B*. The plaintiff sues *A* and asks for judgment on the basis of this statistic alone; he tenders no other evidence. If the defendant also puts in no evidence, should a jury be allowed to award judgment for the plaintiff? The law's answer is "no"⁶⁸ and has so much intuitive appeal that it has become Exhibit A in the case against using Bayes' theorem, or mathematical probability generally (or perhaps any theory of probability), to guide or interpret legal factfinding. The answer might, moreover, seem to cast a cloud over the admissibility of any explicitly probabilistic evidence. We can think of the civil burden of persuasion as requiring posterior odds of a shade over one in favor of the plaintiff (say 1.048, which is 51 to 49), because a tie goes to the defendant. If the prior odds are assumed to be 1 to 1, on the theory that the jury begins hearing the evidence—in our hypothetical case, the only evidence the jury hears is the evidence concerning the percentage of buses of each company on the route in question—without any notion of who has the better case, then the posterior odds are equal to the likelihood ratio. This is 1.048 in the bus case, and since

66. For the most thorough discussion of this famous chestnut of modern evidence scholarship, see Gary L. Wells, *Naked Statistical Evidence of Liability: Is Subjective Probability Enough?*, 62 J. PERSONALITY & SOC. PSYCH. 739 (1992). And for economic analysis of it on which I draw in part, see Suzanne Scotchmer, *Rules of Evidence and Statistical Reasoning in Court*, in 3 THE NEW PALGRAVE DICTIONARY OF ECONOMICS AND THE LAW 389, 391-93 (Peter Newman ed., 1998).

67. See, e.g., *United States v. Hannigan*, 27 F.3d 890, 893 n.3 (3d Cir. 1994).

68. See Richard W. Wright, *Causation, Responsibility, Risk, Probability, Naked Statistics, and Proof: Pruning the Bramble Bush by Clarifying the Concepts*, 73 IOWA L. REV. 1001, 1050-51 (1988), and cases cited. The hypothetical case in the text is a variant of *Smith v. Rapid Transit, Inc.*, 58 N.E.2d 754 (Mass. 1945), where the court held that it was not enough "that mathematically the chances somewhat favor" the proposition that a bus of the defendant caused the accident. See *id.* at 755 (quoting *Sargent v. Massachusetts Accident Co.*, 29 N.E.2d 825, 827 (Mass. 1940)). *Kaminsky v. Hertz Corp.*, 288 N.W.2d 426 (Mich. App. 1979), is sometimes cited as being contrary to *Smith*, but this is not an accurate reading. Quite apart from the fact that the corresponding percentages were 90% and 10%, there was also nonstatistical evidence pointing to the defendant's ownership of the truck that had caused the accident. My discussion of the bus hypothetical draws in part on my opinion in *Howard v. Wal-Mart Stores, Inc.*, 160 F.3d 358 (7th Cir. 1998).

it exceeds one, the plaintiff should win—a conclusion almost no legal professional accepts.

The problem that causes this disbelief, however, is not with mathematical probability but with the tacit assumption that the statistic concerning the ownership of the buses is the only evidence that the plaintiff can obtain.⁶⁹ It is the implausibility of this assumption that powers the intuition that the plaintiff should lose. If the statistic is the plaintiff's only evidence, the inference to be drawn is not that there is a fifty-one percent probability that it was a bus owned by *A* that hit the plaintiff but that the plaintiff either investigated and discovered that it was actually a bus owned by *B* (and let us say that *B* is judgment-proof and so not worth suing), or that he has simply not bothered to conduct an investigation. If the first alternative is true, he should of course lose; and since it may be true, the probability that the plaintiff was hit by a bus owned by *A* is significantly less than fifty-one percent, and the plaintiff has failed to carry his burden of production.

Even if the second alternative is true (the plaintiff simply did not bother to investigate), he should lose. A court should not expend any of its scarce resources of time and effort on a case until the plaintiff has conducted a sufficient search to indicate that an expenditure of public resources is reasonably likely to yield a significant social benefit. This is implicit in the decision discussed earlier to place the burden of producing evidence on the plaintiff rather than on the defendant. Suppose it would cost the court system \$10,000 to try even a barebones case. This expenditure would be worthless from the standpoint of deterring accidents should it turn out that the bus was owned by *B*. It makes sense for the court to require some advance investigation by the plaintiff in order to increase the probability that a commitment of judicial resources would be worthwhile. And likewise if there is an external benefit to "getting right" which bus company is responsible for the plaintiff's injury, the law can increase the probability of getting it right by compelling the plaintiff to do a more thorough investigation than it might be in his strictly private interest to do.

If, however, the ratio of buses owned by *A* to those owned by *B* on the route in question is much higher than 51 to 49, then the case against allowing "naked" statistical evidence to carry the plaintiff's burden of production is weakened. Even in the 51 to 49 case, if there is other evidence against *A*, there is an argument for admitting the statistical evidence because the additional evidence, even if weak, will (rightly, under Bayes' theorem) affect the factfinder's posterior odds.⁷⁰ But as we shall see when we discuss Rule 403

69. Another problem, which I shall ignore (though it is relevant in showing the artificiality of the example), is that the plaintiff must prove more than the ownership of the bus to obtain a judgment—notably, he must prove that the accident was due to the bus company's negligence.

70. See Steven C. Salop, *Evaluating Uncertain Evidence with Sir Thomas Bayes: A Note for Teachers*, J. ECON. PERSP., Summer 1987, at 155, 156-57.

of the Federal Rules of Evidence, the probative value of the evidence may be too slight in relation to its cost to be worth admitting.

Suppose both parties do conduct a thorough investigation yet are unable to come up with any additional evidence bearing on the ownership of the bus. There is no longer a basis for suspicion that the plaintiff really believes that a bus owned by Company *B* hit him, or for punishing him for not having investigated more. The case may seem no different from any other one tried under the preponderance of the evidence standard in which the balance of probabilities tilts only slightly in favor of the plaintiff. But there is a difference. Suppose the legal system can identify an entire class of cases in which the balance of probabilities tilts as slightly in favor of the plaintiff as it does in the bus case. If there are 1000 such cases, then allowing them to be tried can be expected to yield 510 correct decisions (that is, 510 decisions in which the defendant was in fact the injurer) and 490 incorrect ones, while not allowing them to be tried can be expected to yield 490 correct decisions and 510 erroneous ones. The social benefits of the twenty additional correct decisions that allowing the 1000 cases to be tried would produce—benefits in more perfect deterrence of negligent accidents—would probably fall short of the social cost of 1000 trials.

There is still another objection to allowing the bus case to go to the jury. If *B*, though responsible in fact for almost half the accidents, is never held liable and *A* is always held liable, *A* will have a big incentive to be careful and *B* little or no incentive to be careful. As a result, over time, more than half the accidents will be caused by *B*, increasing the error rate resulting from allowing juries to base decisions on the ratio of the companies' buses on the route in question. Eventually, *A*, having higher liability costs, will probably withdraw from the route; the rule on burden of proof will have created a monopoly!

b. *Statistical significance.*

Suspicion of purely statistical evidence is merited in the hypothetical bus case. It is also but less justifiably reflected in suggestions that the result of a statistical investigation should be given no weight in a trial unless the result is statistically significant at the five percent level,⁷¹ meaning that the prob-

71. This is a common interpretation of *Hazelwood School District v. United States*, 433 U.S. 299, 311 n.17 (1977), and *Castaneda v. Partida*, 430 U.S. 482, 496 n.17 (1977), as noted without endorsement in THOMAS R. IRELAND, STEPHEN M. HORNER, JAMES D. ROGERS, PATRICK A. GAUGHAN, ROBERT R. TROUT & MICHAEL J. PIETTE, EXPERT ECONOMIC TESTIMONY: REFERENCE GUIDES FOR JUDGES AND ATTORNEYS 237 (1998). See also *Alpo Petfoods, Inc. v. Ralston Purina Co.*, 913 F.2d 958, 962 n.4 (D.C. Cir. 1990); *Ottaviani v. State Univ. of New York*, 875 F.2d 365, 372 (2d Cir. 1989); *Ford v. Seabold*, 841 F.2d 677, 684 n.5 (6th Cir. 1988). But the interpretation is incorrect, as noted in Orley Ashenfelter & Ronald Oaxaca, *The Economics of Discrimination: Economists Enter the Courtroom*, 77 AM. ECON. REV. 321, 323 (1987). For criticism of using

ability that the investigation would have yielded this result even if the hypothesis that it was trying to test was false is no greater than five percent. The five percent test is a convention employed in academic research, though not one to which the research community adheres rigidly. Social scientists often report results that are significant only at the ten percent level. And if the results are significant at the two percent or one percent level, the social scientist will point out that these results are more robust than those that are significant only at the five percent level; they are "highly significant" rather than just "significant." There is no magic to the five percent criterion; to exclude *from a trial* statistical evidence that failed to reach the five percent significance level would imply that eyewitness testimony, too, should be inadmissible unless the probability that the testimony would have been given even if the event testified to had not occurred was less than five percent.

What is true is that the higher the significance level of a statistical study, the more reliable the study is as evidence; and the lower that level, the less reliable it is. A low significance level may reflect an unsound method of statistical estimation, an incorrect specification of the hypothesis being tested, or the omission of relevant variables that if included would have caused the hypothesis to be rejected. When any of these factors is present, the same kind of suspicion should arise as in the bus case. But if the study has been conducted responsibly and has withstood a hammering from the opponent's expert, failure to reach the conventional five percent significance level would not be a good reason for excluding the evidence just because a social scientist who violated the conventions of his discipline by reporting results that do not attain the conventional significance level might be considered untrustworthy. The five percent convention is rooted in considerations that have no direct relevance to litigation, such as the need to ration pages in scientific journals.⁷² And fears that jurors are dazzled by evidence which involves explicit probability estimates, and so give such evidence more weight than a good Bayesian would do, appear to be unfounded; jurors appear to give statistical evidence *less* weight that they should.⁷³

significance levels as criteria of admissibility, see Richard Lempert, *Statistics in the Courtroom: Building on Rubinfield*, 85 COLUM. L. REV. 1098, 1098-1103 (1985), and see generally DAVID L. FAIGMAN, DAVID H. KAYE, MICHAEL J. SAKS & JOSEPH SANDERS, 1 MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY 118-21 (1997).

72. A similar point is made in an emerging economic literature on clinical trials and other social experiments: benefits from adherence to statistical conventions (randomization, sample size, significance, and so on) must be traded off against costs. See, e.g., Tomas Philipson, *The Evaluation of New Health Care Technology: The Labor Economics of Statistics*, 76 J. ECONOMETRICS 375 (1997).

73. See Brian C. Smith, Steven D. Penrod, Amy L. Otto & Roger C. Park, *Jurors' Use of Probabilistic Evidence*, 20 LAW & HUM. BEHAV. 49 (1996). Wells attributes this to a cognitive quirk and suggests that it might be offset by a redescription of statistical evidence. See Wells, *supra* note 66, at 748-50. He states, with reference to a paternity suit in which blood tests showed a 99.8% probability that the defendant was indeed the father, that "one suspects that the plaintiff

One must not overlook the *cost* of weak statistical evidence. The less robust the results of a statistical study offered as evidence, the more time will have to be spent at trial exploring the design of the study. Given the difficulty that judges and jurors have in understanding and weighing statistical evidence, there is an argument (akin to that for the hearsay rule) for excluding statistical evidence that the relevant profession, for whatever reason, considers weak.

4. *The product rule.*

Another feature of the mathematical theory of probability that has drawn fire from evidence professors also relates to the burden of persuasion. This is the rule that the probability that two or more independent events is true is the product of the probabilities that each of them is true. For example, the probability of coming up with heads on three consecutive fair tosses is .125 ($.5 \times .5 \times .5$). This leads to the paradox emphasized by Ronald Allen that the standard burden of proof instruction to a jury in a civil case, at least if taken literally, will often imply that the jury should find in favor of the plaintiff even if the probability that his claim is valid is much less than .5.⁷⁴ The jury will be instructed to render a verdict for the plaintiff if it is satisfied that he has proved each of the elements of his claim by a preponderance of the evidence even if the elements are independent that is, their probabilities are uncorrelated. It is as if the court were telling the jury, that as soon as it finds one element proved by a preponderance of the evidence, it should assume that that element has been proved to a certainty. In other words, the jurors are being told to be bad mathematicians! In the simple case in which the plaintiff, to prove his case (*C*), must prove just two elements (*A* and *B*), and the burden of persuasion is proof by a preponderance of the evidence, and the elements are both independent and equiprobable, so that $p(C) = p(A) \times p(B)$ and $p(A) = p(B)$, then for the plaintiff actually to carry his burden of persuasion ($p(C) > .5$) the jury would have to find $p(A) = p(B) > .707$, that is, that the probability of each element exceeds .707, not, as it will be instructed, .5.

But perhaps the real function of the instruction is different: to indicate to the jury that a chain of inferences cannot be stronger than its weakest link. Even if the plaintiff has proved the defendant's negligence to a certainty, if the probability that the defendant's negligence caused the injury of which the plaintiff is complaining is .5 or less the plaintiff should still lose, since cau-

would have won the suit if the expert had reframed his testimony to say that 'based on a blood test that is 99.8% accurate, I conclude that the defendant is the father' rather than 'based on a blood test, there is a 99.8% probability that the defendant is the father.'" *Id.* at 749.

74. See Ronald J. Allen, *The Nature of Juridical Proof*, 13 CARDOZO L. REV. 373, 409-20 (1991); Ronald J. Allen, *A Reconceptualization of Civil Trials*, 66 B.U. L. REV. 401, 405-08 (1986).

sation is an essential element of the negligence tort. As in this example, moreover, the number of elements of the plaintiff's claim is, except for purely formal requirements, rarely more than two, and the two are rarely independent.

Most important, as Allen points out, the realistic benchmark for evaluating the plaintiff's case is not the null hypothesis but the defendant's case. Suppose, in a case in which the plaintiff's case has two elements—that a person hit him and that the person was the defendant's employee, elements which are independent of each other—the jury reckons the probability of the first element at .6 and of the second at .7, for a joint probability of .42. This still leaves the question: What *did* happen? Did the plaintiff fabricate his claim? Was he injured, but by someone else? If the injurer was not the defendant's employee, what was his status? Mulling over these questions, the jury may rationally conclude that the plaintiff's story, even though it has doubtful features, is more plausible than the alternative story told by the defendant, and therefore that the plaintiff should win. This was Hume's argument against miracles.⁷⁵ No doubt it was unlikely that the laws of nature could explain the phenomena attested as miraculous. But it was even less likely that the laws of nature had been suspended in these cases; to put it differently, it was more likely that the witnesses of the alleged miracles were lying or mistaken. Thus, as we might put it, the naturalists had proved their case by a preponderance of the evidence. Notice, however, that in Hume's case there were only two possibilities: Either the alleged miracles were miracles, or they were not. In a legal case, the plaintiff might tell one story (the story that if true shows that he should win the case), the defendant might tell another, less probable story, and yet there might also be additional possible stories. If the plaintiff's story had a probability of .42 of being true, the defendant's story a probability of .30 of being true, and the probability that another story or stories is true was .28, then the plaintiff should lose because he has failed to prove that his story is more likely than not true.

Nothing in the mathematical theory of probability forbids working backwards from a joint probability to individual probabilities. After considering all the alternatives, the jury might be quite confident that an employee of the defendant hit the plaintiff. Suppose the jury reckoned that joint probability at .7. If one pointed out to the members of the jury that they could not have come to this conclusion consistently with reckoning the individual probabilities at .7 and .6, they would quickly be led to recalculate those probabilities. They would say something like, "Until we considered the case

75. See DAVID HUME, AN INQUIRY CONCERNING HUMAN UNDERSTANDING § 10, pt.1 (Charles W. Hendel ed., Liberal Arts Press 1955) (1748); see also William Kruskal, *Miracles and Statistics: The Casual Assumption of Independence*, 83 J. AM. STAT. ASS'N 929 (1988) (emphasizing the importance to a proper evaluation of Hume's thesis of whether the testimony of the various witnesses to miracles was independent).

as a whole we didn't realize how *much* more likely than not it was that the plaintiff was indeed hit and that the person who hit him was indeed the defendant's employee."

This discussion bears also on the criticism that Bayes' theorem does not recognize that the weight and completeness of the evidence bearing on a hypothesis, and not just the odds that we might give on its correctness if we are betting folk, are important to people's judgments.⁷⁶ In fact, weak evidence and missing evidence do affect the odds that a person would be willing to give that some hypothesis was correct. In the bus case, for example, it would be reckless to give odds of 51 to 49 that the plaintiff was hit by a bus owned by Company *A* if there were no other evidence beyond the bare statistic. The failure of the plaintiff to come up with any other evidence would give rise to an inference that it was actually *B*'s bus that struck the plaintiff, that the plaintiff knows this, and that he has sued *A* only because *B* is judgment-proof. Here it should be mentioned that one does not have to be a gambler to be interested in odds. A nongambler deciding whether to undergo an operation will be interested in the odds of the operation's success. Or maybe this example shows that we are all gamblers in a sense.

5. *The biased factfinder and the peremptory challenge.*

The significance of Bayes' theorem for thinking about the law of evidence is mainly as a reminder that estimating probability is a useful and rational way of dealing with uncertainty, that one should update one's estimates as new information flows in, and that the impact of new information on one's ultimate conclusion depends on one's prior odds—that is, on the probability that one estimated before beginning to consider evidence. The last point suggests a possible way of thinking about "bias" as a ground for excusing a prospective juror or recusing a judge. Ideally we want the trier of fact to work from prior odds of 1 to 1 that the plaintiff or prosecutor has a meritorious case. A substantial departure from this position, in either direction, marks the trier of fact as biased. This has the bad effects that I discussed earlier in reference to the judge who has strong prior odds in a system in which judges rather than juries make the decisions. Although bias is clearest when the judge or jury not only has a prior belief about the proper outcome of the case but also holds the belief unshakably—that is, refuses to update it on the basis of evidence—it is not a complete response to a charge of bias that the judge or juror has an "open mind" in the sense of being willing to adjust his probability estimate in the light of the evidence presented at

76. The philosopher L. Jonathan Cohen has made this criticism a number of times. See, e.g., L. Jonathan Cohen, *The Role of Evidential Weight in Criminal Proof*, in *PROBABILITY AND INFERENCE IN THE LAW OF EVIDENCE: THE USES AND LIMITS OF BAYESIANISM* 113 (Peter Tillers & Eric D. Green eds., 1988).

the trial. Any rational person will do that. (What I just called the “clearest case” of bias is thus a case of irrational bias.) His prior odds, if he is a Bayesian, will still have an influence on his posterior odds and hence (at least in a close case—an important qualification for reasons explained earlier) on his decision.

This discussion implies that inquisitorial systems will be less concerned with bias than adversarial ones. If the judge dominates the search for evidence, the problem that his strong (albeit accurate) prior odds would discourage search by the lawyers and so eventually make his prior odds less accurate by reducing the flow of relevant information to him is less serious, because the role of the lawyers in the search process is smaller.

In evaluating bias, one must distinguish between prior beliefs about the proper outcome of the case and prior beliefs about the factfinding process itself—prior beliefs that constitute “common sense,” such as the belief that witnesses are likely to shade evidence to make themselves look good. The ideal factfinder is not a *tabula rasa*; he simply reserves judgment on whether the plaintiff or defendant in this particular case should win. But even if impartiality thus means only lacking a belief prior to hearing evidence in the case about the outcome of the case, it still has a downside: ignorance and inexperience. The problem is particularly serious in the case of trial by jury. The strength of the jury system, constituting at least a partial offset to jurors’ lack of expertise in adjudication, is its pooling of persons of diverse experience and perspective. When lawyers for both sides are free (as they are) to use peremptory challenges to exclude jurors who seem predisposed in favor of the opposing party, the epistemic diversity of the jury is impaired.⁷⁷ Deliberation might be fostered if the system, instead of striving to have jurors whose prior odds in favor of the plaintiff are 1 to 1, created balanced panels of jurors having equal but opposite odds in favor of (and against) the plaintiff. But this seems infeasible. Alternatives include reducing the number of peremptory challenges and increasing the size of the jury.

C. *Judge versus Jury; or, What Is a Fact?*

A judge, whether the trial judge or an appellate judge, obviously has a comparative advantage over a jury when it comes to deciding questions of law. But the line between a question of fact and a question of law is not always clear. Negligence is a legal concept; but is the question whether the defendant was negligent a legal or a factual question? The answer usually given is that it is both or neither and is perhaps best described as a “mixed” question of law and fact or a question about the application of a legal concept

77. See Edward P. Schwartz & Warren F. Schwartz, *The Challenge of Peremptory Challenges*, 12 J.L. ECON. & ORG. 325 (1996).

to a set of facts. I believe, on the contrary, that it is a pure question of fact, and so the law is right to leave it to the jury subject to the same deferential review as other factual determinations that juries make. This is most easily seen when the concept of negligence is expressed in the terms of the Hand formula.⁷⁸ The defendant is negligent if $B < PL$, that is, if the burden (cost) of avoiding the accident was less than the cost of the accident (L for loss) discounted (multiplied) by the probability that the accident would have occurred had the burden of avoidance been shouldered. Each determination required to apply the formula is factual rather than legal in character: estimating B , P , and L , multiplying P and L , and determining whether PL is larger than B . No legal knowledge is required to make any of these determinations (as would be the case if the jury were asked to decide what negligence is), which when made answer the question whether the defendant was negligent. I believe, but will not try to demonstrate here, that most other "mixed" questions of law and fact, such as possession, voluntariness, and good faith, could similarly be decomposed into pure questions of fact.

III. THE FEDERAL RULES OF EVIDENCE

The Federal Rules of Evidence, enacted by Congress in 1975 and since amended from time to time (most recently in 1998), together with the Notes of the Advisory Committee on the Rules of Evidence, constitute a compendious as well as authoritative guide to the modern law of evidence. I shall use these rules⁷⁹ as the skeleton of my further discussion of evidence law, skipping however a number of the less important or less problematic provisions. For example, Rule 201, involving judicial notice of incontestable facts (that is, no evidence is required to prove the obvious), is important, but it is obviously sound as a matter of economics as well as common sense: Evidence of what is obvious would involve some cost and yield no benefit.⁸⁰ Rule 301, dealing with presumptions, is important and nonobvious, but it need not be discussed here because of my earlier discussion of the *McDonnell Douglas* rule.⁸¹

78. See *United States v. Carroll Towing Co.*, 159 F.2d 169 (2d Cir. 1947) (L. Hand, J.); LANDES & POSNER, *supra* note 15, at 85-88.

79. They are published, together with the Advisory Committee Notes and excerpts from the congressional history, as *Rules of Evidence for United States Courts and Magistrates*, in FED. CIV. JUD. P. & R. 340. The rules apply to criminal as well as civil cases, and so are published in West's *Federal Criminal Code & Rules* as well. For text plus helpful commentary, see also SECTION OF LITIGATION, AMERICAN BAR ASSOCIATION, EMERGING PROBLEMS UNDER THE FEDERAL RULES OF EVIDENCE (3d ed. 1998). Although the rules govern only federal court proceedings, the rules of evidence used by state courts are similar and indeed often identical.

80. See FED. R. EVID. 201.

81. See FED. R. EVID. 301.

Besides these omissions from the present discussion, it is important to note that the formal rules codify only a fraction of the law of evidence. Some of the most important rules, being limited to particular fields of substantive law, are classified as parts of their substantive fields rather than as parts of the law of evidence. Examples from tort law include the doctrine of *res ipsa loquitur*, the awarding of damages for loss of a chance (eliding intractable issues of proof), and (to the same end) rules allocating liability among negligent defendants when the causal contribution of each cannot be determined. Examples from contract law include the parol evidence and “four corners” rules, as well as the statute of frauds, all designed to reduce the number of intractable credibility issues in trials for breach of contract. Likewise affecting the evidentiary process are the laws punishing perjury, which are classified with criminal law rather than evidence law, and statutes of limitations, which reduce the likelihood that questions concerning events in the distant past will have to be answered at trial. Of particular importance in criminal trials today, the federal sentencing guidelines direct the sentencing judge, in cases in which the defendant testifies, to impose additional punishment (for obstruction of justice) if the judge determines that the defendant perjured himself.

The evidentiary rules embedded in tort and contract law, the imposition of criminal sanctions for perjury and obstruction of justice, and statutes of limitations show, incidentally, that the law is not entirely naive about the ability of judges and juries to resolve credibility issues. In most cases, as the law recognizes, there are no completely reliable methods of determining whether a witness is testifying truthfully. A witness may be a good actor, in the sense of a person able to create the appearance of honesty, or a good liar, in the sense of a person able to weave a plausible and internally consistent fiction, or both. Judges and juries are easily fooled by good liars.⁸²

A. *Harmless Error*

Rule 103(a) provides (among other things) that a ruling admitting or excluding evidence cannot be made the basis of a motion for a new trial or of reversal on appeal “unless a substantial right of the party [against whom the ruling went] is affected.”⁸³ In other words, harmless errors will be overlooked. The harmless error doctrine is not limited to evidentiary rulings, but, partly because such rulings are so frequent in a trial, they are common candidates for harmless error treatment. More important, judgments of harmlessness depend on assumptions about the understanding of the trier of fact.

82. See Michael J. Saks, *Enhancing and Restraining Accuracy in Adjudication*, 51 L. & CONTEMP. PROBS. 243, 263-64 (1988).

83. FED. R. EVID. 301(a).

Harmless error plays a particularly important role in criminal appeals, and they will be the focus of my discussion. Because most criminal defendants do not pay for their lawyer, they will appeal their conviction or sentence even if the probability of reversal is slight; although the expected benefits of appealing may be slight, the expected costs are zero. Minor errors therefore figure prominently in criminal appeals, and this makes clear the need for a doctrine of harmless error to head off remands that would be all costs and no benefits. But despite the common-sense (and economic) appeal of the harmless error principle, it may often confer an undeserved, or at least unintended, advantage on prosecutors.⁸⁴ The rule is biased in their favor because the appellate court, not having witnessed the trial (and, especially, not having observed the jury), lacks good information for assessing the likelihood that the errors affected the outcome. The appellate court performs as if it assesses the likely effect of the errors on the *average* jury, whereas the prosecutor may know that the jury in a particular case has an above average propensity to acquit. The result is that he may have to manipulate the jury's emotions if he is to secure a conviction. So an error may look harmless to the appellate court yet actually have been harmful. Moreover, it takes a highly disciplined judge to vote to reverse a conviction when he thinks the defendant is guilty, even if he acknowledges to himself that the defendant might have been acquitted but for an error at trial and so is entitled by law to a new trial.

The foregoing analysis can be formalized as follows. Let p be the probability of conviction; a the probability of affirmance given conviction (the prosecutor is assumed to be unable to appeal, and the defendant is assumed to appeal in every case in which there is a conviction), so that $1 - a$ is the probability of reversal; b the benefit to the prosecutor or prosecution-minded judge of a conviction; c the cost of a trial to the prosecutor (for simplicity, assume that the cost to him of defending an appeal by the defendant is zero—it will in fact usually be quite low relative to the cost of trial); x the set of tactics that involve violating procedural and evidentiary rules that favor the defense;⁸⁵ and y the other inputs into getting a conviction. Increases in x and y increase p , the probability of conviction; increases in x also decrease a , the probability that a conviction will be affirmed; increases in y also increase c .

84. For a more complete treatment, see William M. Landes & Richard A. Posner, *Harmless Error* (Nov. 19, 1998) (unpublished manuscript, on file with the *Stanford Law Review*). As a practical matter, only prosecutors benefit from the rule in criminal cases, because appeals by prosecutors are so rare.

85. Perhaps the most common such tactic is inviting (without actually asking—that would be reversible error) the jury to infer the defendant's guilt from his failure to take the stand. Notice that this "abuse" is an artifact of the existence of the privilege against being forced to incriminate oneself—a privilege that, as we shall see, is not easy to justify on economic or other grounds.

If the prosecutor employs x tactics, there are three possible states of the world: conviction followed by affirmance; conviction followed by reversal followed by a retrial at which, we can assume, the variables are as they would have been in the first trial if $x = 0$; and acquittal, which generates no gain to the prosecutor and leaves him with a net loss measured by c . The prosecutor's net expected gain (G) when he employs x is therefore the sum of his gain if there is an affirmed conviction ($p(x,y)b - c(x,y)$), his gain if there is a reversed conviction followed by a retrial ($p(x,y)(p(y)b - c(y))$), and his gain if there is acquittal ($0 - c(x,y)$), with the first gain being discounted by the probability of affirmance (a) and the second by the probability of reversal ($1 - a$). Thus,

$$G = a(x)(p(x,y)b - c(x,y)) + p(x,y)(1 - a(x))(p(y)b - c(y)) - c(x,y). \quad (6)$$

(The reason that p and c in the reversal-retrial state of the world are not shown as functions of x is that by assumption $x = 0$ in that state.)

The effect of x (abusive tactics) on G is complex. It raises G by increasing the probability of a conviction but lowers it by increasing the probability of a reversal of the conviction and by increasing the prosecutor's costs. We cannot exclude the possibility that the net effect is to increase G . The possibility is increased if we consider the substitutability of x for y (of violating procedural or evidentiary rules for other inputs into obtaining a conviction). For then the effect of using abusive tactics, while it includes as before reducing the probability of a conviction that will stick and thus increasing the likelihood of having to incur the cost of a second trial ($c(y)$), is also to reduce the cost of the first trial. This is an additional reason to believe that if the effect of the abusive tactics in reducing the probability that the defendant's conviction will be affirmed is low because of the harmless error rule, the rule encourages deliberate error by the prosecution. It is especially likely to do so if the substitution effect of x on y is large—that is, if the abusive tactics are a cheap and effective substitute for legitimate forensic tactics.

Even if the doctrine of harmless error thus invites prosecutors to commit deliberate errors, this might be efficient if prosecutors committed such errors only when faced with a jury *irrationally* prone to acquit. That might indeed be the consequence of the doctrine if appellate courts were omniscient, for then they would forgive prosecutorial errors if but only if the defendant was in fact guilty. If, however, the appellate court cannot tell whether the defendant really is guilty, if all it knows is whether an average jury would have convicted the defendant had it not been for the errors, then the prosecutor may have an incentive to use deliberate errors to convict the innocent. How great an incentive one does not know; it depends on the weight of purely ca-

reerist ambitions in prosecutorial utility functions. To be on the safe side, one might wish to modify the doctrine of harmless error to exclude from its operation *deliberate* errors committed or induced by prosecutors and make these cause for automatic reversal.

B. *Limiting Instructions*

Federal Rule of Evidence 105 directs the judge to instruct the jury to limit its consideration of evidence admissible for one purpose (or against one party) but not for another. The assumption is that although the jury heard the inadmissible evidence, it is capable of disregarding it if instructed to do so. The assumption is not always indulged. For example, if the admissibility of a confession is contested, the issue must be heard outside the jury's presence,⁸⁶ since if the confession were to be ruled inadmissible the jurors could not be expected to put it out of their minds in deciding whether the defendant was guilty. But in general, limiting instructions are deemed efficacious, not only in the circumstances with which Rule 105 deals but also when used to "cure" the erroneous or inadvertent admission of inadmissible evidence: The judge tells the jury to disregard it.

Empirical evidence as well as common sense suggests that courts exaggerate the efficacy of limiting instructions.⁸⁷ A limiting instruction is likely to be ineffectual unless the judge is able to explain why, as with certain types of hearsay, the evidence is not probative. If it is probative (or emotionally compelling),⁸⁸ though inadmissible, the limiting instruction is more likely to rivet the jurors' attention to the evidence than to persuade them to disregard it, even if the judge explains the basis for the instruction.⁸⁹ For this reason, lawyers often will not request a limiting instruction even when they are entitled to one. In a criminal trial, the deemed but doubtful efficacy of limiting instructions operates in conjunction with the doctrine of harmless error to encourage prosecutors to resort to abusive tactics if they fear that acquittal is otherwise likely. The likeliest response to an improper question or comment is neither a mistrial nor a reversal but an impotent limiting instruction.

There is, it is true, a difference between belief and acceptance. Belief is involuntary—telling someone not to believe something without giving him a reason why it is not credible will not alter his beliefs; that is the basis of

86. See FED. R. EVID. 104(c).

87. See Saks, *supra* note 7, at 26, and studies cited therein.

88. The standard example is a gruesome photograph of a murder victim. On the capacity of such photographs to prejudice the jury's consideration of the logically distinct issue of guilt, see generally Kevin S. Douglas, David R. Lyon & James R.P. Ogloff, *The Impact of Graphic Photographic Evidence on Mock Jurors' Decisions in a Murder Trial: Probative or Prejudicial?*, 21 LAW & HUM. BEHAV. 485 (1997).

89. For evidence, see Kerri L. Pickel, *Inducing Jurors to Disregard Inadmissible Evidence: A Legal Explanation Does Not Help*, 19 LAW & HUM. BEHAV. 407, 422-23 (1995).

skepticism about limiting instructions. But antiskeptics might argue that one can refuse to act on a belief. You might believe the defendant guilty yet accept that he should be acquitted because you don't believe it with the requisite degree of certitude.⁹⁰ In other words, burden of persuasion is properly regarded as involving acceptance rather than belief. The prior odds, the posterior odds, and the likelihood ratios created by particular pieces of evidence are all matters of belief; but what posterior odds are necessary to give the victory to plaintiff or defendant is a matter of acceptance. This is a distinction that jurors should be able to understand.

The problem with using the distinction between belief and acceptance to rehabilitate the limiting instruction is that, when a jury is deliberating, it is very difficult for it to disregard inadmissible evidence and base judgment only on admissible evidence, even if it wants to. If jurors were explicit Bayesians and calculated likelihood ratios for each bit of evidence, they could disregard evidence that they had heard but been told to ignore. They do not proceed in this fashion but instead assess evidence intuitively. They cannot be expected to determine the posterior odds on the basis of less than all the evidence they heard, and posterior odds are founded on belief rather than on acceptance.

When the ineffectuality of limiting instructions is pointed out, judges tend to respond that the jury system *presupposes* that jurors obey the judge's instructions.⁹¹ By this the judges seem to mean that the jury system would have to be abandoned if the presupposition were acknowledged to be incorrect. That is untrue. The jury system presupposes *some* degree of compliance by jurors with the rules laid down by the judge to guide them, but not 100 percent. Perfect compliance with rules is rarely attained in any department of life and is particularly unlikely in the case of an ad hoc body that has only weak incentives to comply—jurors are neither penalized for bad performance nor rewarded for good. It is not even clear that jurors pay much attention to the instructions on the law, as opposed to instructions to disregard particular evidence. Yet, as we saw earlier, such lack of attention need not fatally undermine the rationality of the jury system.

90. See L. JONATHAN COHEN, AN ESSAY ON BELIEF AND ACCEPTANCE 117-25 (1992).

91. See *Francis v. Franklin*, 471 U.S. 307, 324 n.9 (1985) (A "crucial assumption underlying our constitutional system of trial by jury [is] that jurors carefully follow instructions."); *Opper v. United States*, 348 U.S. 84, 95 (1954) ("Our theory of trial relies upon the ability of a jury to follow instructions."); *United States v. Castillo*, 140 F.3d 874, 884 (10th Cir. 1998) ("A central assumption of our jurisprudence is that juries follow the instructions they receive."). Not all judges fool themselves. Learned Hand, for example, called the limiting instruction "the recommendation to the jury of a mental gymnastic which is beyond, not only their powers, but anybody's else." *Nash v. United States*, 54 F.2d 1006, 1007 (2d Cir. 1932). Occasionally courts concede the ineffectuality of a limiting instruction. See, e.g., *Bruton v. United States*, 391 U.S. 123, 126 (1968) (reversing conviction where jury was permitted to consider a codefendant's confession that implicated the defendant).

C. *Relevance*

The Federal Rules of Evidence define relevance as “having any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence.”⁹² The rules make relevant evidence admissible and irrelevant evidence inadmissible,⁹³ but relevant evidence “may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury, or by considerations of undue delay, waste of time, or needless presentation of cumulative evidence.”⁹⁴ These rules make economic sense. In Bayesian terms (and well illustrating the heuristic value of Bayes’ theorem for understanding the law of evidence), evidence is relevant if its likelihood ratio is different from one and irrelevant if it is one.⁹⁵ Irrelevant evidence so defined has zero social benefits, though it may confer a private benefit on one side of the lawsuit by confusing or prejudicing the jury.

The Advisory Committee Notes to Rule 401 point out that evidence can be relevant even though it bears on an undisputed fact, because it may help to make the fact clear and thus assist in establishing correct likelihood ratios. If a relevant fact is unclear, though undisputed, the jury may not assign it the proper weight in its deliberations. A related point, borrowed from signaling theory, is that a certain amount of redundancy may increase rather than reduce the intelligibility of a communication.⁹⁶

Rule 403, in requiring an explicit comparison of benefit and cost, is central to an economic analysis of the law of evidence in much the same way that the Hand formula is central to the economic analysis of the law of torts. It sets forth a cost-benefit formula for deciding the most common question in the law of evidence—whether to admit or exclude evidence. It bears the same relation to Equation (4) ($-p_x S = c_x$),⁹⁷ the economic formula for the optimal amount of evidence, as the Hand formula does to the economic formula for the optimal amount of care ($-p_x L = c_x$).⁹⁸ The cost-benefit formula im-

92. FED. R. EVID. 401.

93. See FED. R. EVID. 402.

94. FED. R. EVID. 403.

95. See Richard Lempert, *Modeling Relevance*, 75 MICH. L. REV. 1021, 1025-26 (1977).

96. See SCHUM, *supra* note 6, at 443.

97. See text accompanying note 15 *supra*.

98. I have relabeled D as L and A as c , in LANDES & POSNER, *supra* note 15, at 60 eq. 3.9, to highlight the isomorphism of the formula for the optimal amount of care with Equation (4). For mention of the cost-benefit interpretation of Rule 403, see Louis Kaplow, *The Theoretical Foundation of the Hearsay Rules*, 93 HARV. L. REV. 1786, 1789 (1980). See also Thomas Gibbons & Allan C. Hutchinson, *The Practice and Theory of Evidence Law—A Note*, 2 INT’L REV. L. & ECON. 119, 122-23 (1982).

plicit in Rule 403 also can be used to evaluate particular rules of evidence,⁹⁹ just as the Hand formula is used in economic analysis of law as a standard for evaluating specific rules of tort law. Rule 403 does, it is true, place a thumb on the scale (“*substantially* outweighed”),¹⁰⁰ but this may be necessary to prevent the judge from taking over the factfinding task from the jury by excluding evidence that favors the side the judge thinks should lose.

Rule 403 is not as carefully drafted as it could be. It runs together three distinct grounds for excluding relevant evidence: (1) emotionality (one source of “unfair prejudice” and of “misleading the jury”), (2) cognitive overload (“confusion” and other forms of “misleading the jury”), and (3) “waste of time” (which seems synonymous with “undue delay” and “needless presentation of cumulative evidence”).¹⁰¹ At first glance, the grounds I have numbered (1) and (2) relate to the cognitive limitations of the trier of fact and so go to the benefits of the evidence in determining truth, while the third goes to cost, the right-hand side of Equations (1) through (4). This characterization is not precise. To begin with, two distinct types of cognitive limitation should be distinguished. The first, often called “bounded rationality,” arises because people do not have zero costs of absorbing and analyzing information and so encounter problems of overload. This type of cognitive limitation is entirely consistent with rationality, which does not presuppose zero costs of acquiring and processing information. The second type of cognitive limitation, however, is the domain of the cognitive illusions and emotional distractions, the domain of irrational thinking. Ground (1) (what I have called emotionality) corresponds to this second type of cognitive limitation, and ground (2) (cognitive overload) corresponds to the first. Keeping evidence from the jury is an alternative to what might otherwise be time-consuming and ineffectual efforts at enlarging and debiasing the jury’s cognitive capacities.

Another way to think about this function of Rule 403 (and to conceptualize the rules of evidence generally) is as a corrective to the jury’s lack of incentive to overcome its cognitive limitations by “thinking hard” about the issues that it is asked to resolve. Jurors have no monetary incentives to weigh evidence carefully: By screening from them evidentiary materials that would make their job even more difficult and thus require them to exert greater uncompensated mental efforts without any compensation, the rules of evidence reduce the jurors’ costs and so improve their product.

Ground (2) also interacts with (3) (waste of time): Repetition and protraction can make it harder for the trier of fact to reach a correct judgment, as

99. This was essentially Bentham’s approach. He thought that there should be no rules of evidence, but that in particular cases the judge should be allowed to exclude particular items of evidence on grounds of “vexation, expense, and delay.” BENTHAM, *supra* note 19, at 1.

100. FED. R. EVID. 403 (emphasis added).

101. *Id.*

well as increase the direct costs of the trial. As more and more evidence is introduced, additional evidence, even if relevant, is likely both to be wasteful in the sense of yielding diminishing benefits (in terms of accuracy) with no corresponding diminution in cost and confusing in the sense of actually reducing accuracy.

This point suggests that the optimal length of a jury trial may in most cases be quite short, because the benefits of additional evidence are likely to decline at an accelerating rate while the costs are constant or even rising, as the litigants cast further and further afield. To help see this, we can modify Equation (1) to allow the amount of evidence (x) to have both a positive and a negative effect on the probability of a true result, as in

$$B(x) = p(b_1x - b_2x^2)S - c(x) \quad (7)$$

where b_1 measures the effect of a unit of x in increasing the accuracy of the trial and b_2 its effect in decreasing that accuracy by confusing or overloading the jury. Equation (7) assumes that the latter effect will increase at an increasing rate with increases in the amount of evidence (hence the squaring of x). Depending on the values of b_1 and b_2 , adding evidence may, beyond some point, actually diminish accuracy and thus reduce efficiency, even if the additional evidence is costless. Alternatively, confusion and overload could be considered indirect costs that increase with the amount of evidence, in which event the last term in Equation (1) ($c(x)$) might be approximated by $c_d x + c_i x^2$, where c_d is the direct costs of the evidence and c_i the indirect costs.

Evidence that is cumulative must be distinguished, however, from evidence necessary to complete a mosaic of proof. A costly bit of "additional" evidence might be cost-justified because it fits in with other evidence to establish the truth convincingly.

By excluding irrelevant—and also relevant but on balance unhelpful—evidence, Rules 402 and 403 counteract the incentive of the parties in some cases to overinvest in evidence from a social standpoint. We should expect these rules to be invoked most often in big-money cases, for it is in such cases that the risk of overinvestment is greatest. This suggests a possible direction for empirical research.

D. *Character Evidence*

The subsequent rules in Article 4 of the Federal Rules of Evidence particularize the general standard of Rule 403 with reference to recurrent issues.

The first of these rules, Rule 404,¹⁰² excludes (with various exceptions)¹⁰³ evidence of a person's character when used to show that he probably acted "in character" on the occasion involved in the litigation. The principal consequence is to exclude evidence that a criminal defendant has a criminal record (unless, as we shall see, he testifies). Such evidence is relevant, because a person who has committed a crime in the past has by doing so indicated a propensity to violate the criminal laws. It is only weakly probative, because repeat offenders are punished more heavily than first-time offenders in part precisely to offset any greater propensity to commit crimes that their previous convictions have revealed. If recidivists are punished severely enough, the propensity to commit a subsequent offense may be reduced to the same level as the propensity to commit a first offense.

The principal concern with this class of evidence, however, is not lack of probative value. It is the danger that a jury will give such evidence too much weight, or more likely that it will convict on insufficient evidence believing that it does not much matter whether the defendant is innocent of the particular crime for which he is being tried since he is a member of the criminal class and probably has committed other crimes for which he has not been punished.

The Rule 404 exclusion is somewhat porous, though. For one thing, evidence of prior crimes may be used to prove facts other than propensity, such as motive, absence of mistake, or *modus operandi*.¹⁰⁴ If, for example, the defendant were being tried for the murder of a witness who had been responsible for the defendant's earlier conviction, that conviction would be admissible to prove the defendant's motive for committing the present crime. There is also a blanket exception allowing the admission of prior-crimes evidence when the defendant is charged with rape or child sexual molestation and the prior crimes involved similar acts.¹⁰⁵ The exception may have an economic rationale—most clearly in the molestation case—that is closely related to the motive exception in Rule 404(b). Most people do not have a desire to sexually molest children. Between two suspects, only one of whom has a history of such molestation, the history establishes a motive that enables the two suspects to be distinguished; prior-crimes evidence is admissible to prove motive. Unlike a molester, a thief, unless he is a kleptomaniac, does not have an overwhelming desire to steal. Theft is merely instrumental to his desire for money, and there are many substitute instruments. Committing a prior theft does not show that a defendant "likes" theft and so does not

102. FED. R. EVID. 404.

103. Most of the rules contain exceptions. This qualification should be borne in mind throughout, because I will not repeat it.

104. See FED. R. EVID. 404(b).

105. See FED. R. EVID. 413, 414; *cf.* FED. R. EVID. 415 (addressing admissibility of evidence about prior sexual assault or child molestation in civil litigation).

furnish a motive for his committing the current theft with which he is charged.

It has been argued that a rational juror, aware of the inadmissibility of prior-crimes evidence and so knowing that he will not find out whether the defendant is a habitual or first-time offender, will assume that there is some probability greater than zero but less than one that the defendant is indeed a habitual offender. As a result, he will underestimate the guilt of the habitual offender and overestimate that of the first-time offender.¹⁰⁶ The assumption that jurors behave in such a way is unrealistic, and the scholars who support this theory present no evidence that it is, nevertheless, correct. Their better point is that if prior-crimes evidence were freely admissible, and jurors were highly prone to convict habitual offenders whether or not the evidence established their guilt, deterrence would be undermined. The expected cost of punishing habitual offenders would fall, because that cost is a function not only of the probability of punishment per se, but also, as I noted earlier, of the difference between the probability of punishment given guilt and the probability of punishment given innocence. (A partial offset, however, is that there would be an additional disincentive to *becoming* a habitual offender.) The expected cost of punishing first-time offenders also would fall. Prosecutors would find it so much easier to convict habitual offenders, guilty or not, that their incentives to prosecute first-time offenders would be impaired (assuming that prosecutors operate with a budget constraint and, as suggested earlier, want to maximize convictions weighted by length of sentence, subject to that constraint).

The most important exception to the exclusion of character evidence, found in Rule 609, concerns the use of such evidence in cross-examination. If a defendant or a witness has been convicted within the previous ten years of a crime involving fraud or other deceit, the prosecutor or plaintiff (the rule applies to civil cases as well as criminal ones and to all witnesses, not just the parties) has a right to use that conviction on cross-examination to "impeach" (challenge the credibility of) his testimony. Any other felony conviction within the preceding ten-year period can be used for this purpose as well if the judge concludes that its probative value outweighs its prejudicial effect.

The rationale of the rule is that a person who has flouted the criminal law in the past cannot be trusted to testify truthfully. This may be, but it is doubtful that he is *more* unlikely to take his oath seriously than a first-time

106. See Joel Schrag & Suzanne Scotchmer, *Crime and Prejudice: The Use of Character Evidence in Criminal Trials*, 10 J.L. ECON. & ORG. 319, 337 (1994). This is related to one of the objections discussed earlier to letting the bus case go to the jury.

offender who thinks he can lie his way to an acquittal.¹⁰⁷ There is no basis for supposing that recidivists are more likely than first-time offenders to lie; both are criminals, and the incentive of a criminal to lie is unrelated to whether he has committed one crime or more than one. What is probably true, though only loosely related (through the heavier punishment of recidivists) to whether the defendant is a recidivist, is that a defendant's incentive to lie increases in proportion to the severity of the punishment he faces if convicted. The relevant datum is the punishment he faces, not whether he is a recidivist. On balance, there is probably no benefit in enhanced accuracy to allowing the use of prior-crimes evidence in cross-examination. But there is a cost—the same cost as the cost of allowing prior-crimes evidence to be used to prove a criminal propensity. Despite the limiting instruction to which the defendant is entitled, the jury cannot be expected to confine its consideration of prior-crimes evidence to the issue of the defendant's credibility. Rule 609 thus undermines the deterrence of habitual offenders by reducing the probability that a habitual offender who testifies will be acquitted, thereby deterring habitual offenders from testifying. The jury is apt to infer guilt from the defendant's failing to testify (and this, once again, regardless of any limiting instructions).

E. *Repairs and Settlement Offers*

1. *The subsequent-repairs rule and the issue of cognitive illusion.*

Rule 407 excludes evidence that the defendant took steps after the accident or other incident that is the basis of the plaintiff's suit to prevent a recurrence.¹⁰⁸ This evidence might be probative, because the steps that the defendant took may show that the accident could have been prevented at modest cost. I mentioned the rule earlier but return to it here in order to examine the argument that the trial of accident cases is contaminated by the cognitive illusion known as "hindsight bias."¹⁰⁹ Rule 407 may be designed not only to reduce the cost of accidents by encouraging remedial measures but also to combat hindsight bias—what in prospect may have been highly unlikely may in retrospect appear to have been inevitable. I am not sure how important this function of the rule is. Hindsight bias is a cognitive illusion of which we are all aware, as is indicated by the currency of such expressions as "the wisdom of hindsight." What is more, the concept of a "freak accident" is familiar, and it encapsulates the idea that accidents can be *very* low probability

107. If the defendant is innocent, presumably he will give truthful testimony. My criticism is limited to the case in which evidence of a prior conviction is used to impeach a criminal defendant, as opposed to other witnesses.

108. See FED. R. EVID. 407.

109. See Jolls et al., *supra* note 36, at 1523-25.

events. One might expect a defendant's lawyer to be able to explain to a jury that, while of course the accident did happen, the probability that it would have happened was slight.¹¹⁰ Furthermore, hindsight bias is often rational (for example, when the occurrence of an accident shows that a hypothetical possibility was a real one) and thus not an illusion at all.¹¹¹

There is experimental evidence that juries are subject to the irrational form of hindsight bias.¹¹² But the evidence is limited and also weak—though not because it is based on experiments using mock juries. Although the behavior of mock juries cannot automatically be extrapolated to real ones, an experiment designed to test a difference (such as between an *ex ante* and an *ex post* determination of care) need not be invalidated by the discrepancy between experimental and real-world conditions.¹¹³ To reject studies of hindsight because the experimental subjects were not real jurors requires a reason to think that if mock jurors exhibit hindsight bias, real ones do not; and it is by no means obvious what that reason would be. The problems with the studies are particularistic rather than fundamental. In neither the LaBine and LaBine nor the Kamin and Rachlinski study was the jury instructed on burden of proof; in neither did the jury deliberate; and in both they may have favored liability in the *ex post* situation not because of hindsight bias but because of their substantive views on liability (many jurors probably believe that people who cause accidents should pay for them regardless of fault).¹¹⁴ There is experimental evidence that deliberation increases the accuracy of jury verdicts.¹¹⁵ And the fact that an instruction which warned the jury about hindsight bias had no effect in the Kamin and Rachlinski study (no such instruction was given in the LaBine and LaBine study) supports the conjecture that what looks like hindsight bias is really just a difference in substantive

110. For experimental evidence that hindsight bias can be reduced or even eliminated by emphasizing the role of chance in human affairs and hence the probabilistic character of many events, see generally David Wasserman, Richard O. Lempert & Reid Hastie, *Hindsight and Causality*, 17 PERSONALITY & SOC. PSYCHOL. BULL. 30 (1991).

111. See Mark Kelman, *Behavioral Economics as Part of a Rhetorical Duet: A Response to Jolls, Sunstein, and Thaler*, 50 STAN. L. REV. 1577, 1584 (1998); Mark Kelman, David E. Follas & Hilary Folger, *Decomposing Hindsight Bias*, 16 J. RISK & UNCERTAINTY 251, 253-54 (1998).

112. See generally Kim A. Kamin & Jeffrey J. Rachlinski, *Ex Post ≠ Ex Ante: Determining Liability in Hindsight*, 19 LAW & HUM. BEHAV. 89 (1995); Susan J. LaBine & Gary LaBine, *Determinations of Negligence and the Hindsight Bias*, 20 LAW & HUM. BEHAV. 501 (1996). In contrast, in an experimental study using state court judges as the experimental subjects, Viscusi, *supra* note 51, found much less hindsight bias than the previous studies had found.

113. See Saks, *supra* note 7, at 8.

114. See Kamin & Rachlinski, *supra* note 112, at 100-01; Kelman, *supra* note 111, at 1584; LaBine & LaBine, *supra* note 112, at 512. Hence Rule 411 excludes evidence that the defendant had liability insurance.

115. See, e.g., Gail S. Goodman, Ann E. Tobey, Jennifer M. Batterman-Faunce, Holly Orcutt, Sherry Thomas, Cheryl Shapiro & Toby Sachsenmaier, *Face-to-Face Confrontation: Effects of Closed-Circuit Technology on Children's Eyewitness Testimony and Jurors' Decisions*, 22 LAW & HUM. BEHAV. 165, 200 (1998); Hastie et al., *supra* note 47, at 305.

standards. Of course, this point cannot be of much comfort to supporters of trial by jury, since it implies that the jury is disobeying the law. Such disobedience will generate legally unsound outcomes as surely as will cognitive illusions.

I am left uncertain as to what weight concern with hindsight bias should have in the design of rules of evidence for negligence cases. The broader issue, which I cannot adequately address within the compass of this article and which in any event is not primarily an economic issue, is whether cognitive illusions seriously undermine the accuracy of the factfinding process in trials, and if so what ought to be done, given that judges may be subject to them to the same or almost the same extent as jurors. But I note that if the direction of the resulting bias is known, it can be offset by revising other features of the legal process. Suppose, for example, that juries have a propensity to acquit guilty defendants but judges do not have a propensity either to acquit guilty defendants or to convict innocent ones. Then, as we saw earlier, the innocent defendants will tend to waive their right to a jury; so we need to worry only or mainly about the guilty ones. We can discourage them from exercising their right to trial by jury by increasing the reward for "acceptance of responsibility," which under the federal sentencing guidelines is essentially a sentencing discount for pleading guilty and thus waiving all trial rights. This need not be done by reducing the sentences of those who plead guilty, thus undermining deterrence. It can be done by increasing the sentences of those who do not plead guilty.

2. *The inadmissibility of settlement offers.*

The rationale for excluding settlement offers from evidence is straightforward. Although such information would be relevant in showing how the party who made the offer evaluated the strength of his case and therefore how strong his case probably is, allowing this type of evidence to be presented at trial would increase the cost of settling cases and so reduce the number of settlements.¹¹⁶ Plaintiffs would tend to make unrealistically high demands in order to signal (in the event of trial) the strength of their case, and defendants would tend to make unrealistically low offers for the same reason. As a result, it would be more difficult to negotiate to a mutually acceptable settlement. This would be a bad thing, unless the social costs of settlement exceed the social cost of trials, which is unlikely in an era of heavy caseloads. And the evidence of settlement offers would not improve trials because it would be manipulated by the parties to create misleading signals.

116. See Andrew F. Daughety & Jennifer F. Reinganum, *Keeping Society in the Dark: On the Admissibility of Pretrial Negotiations as Evidence in Court*, 26 RAND J. ECON. 203, 214-16 (1995).

F. Hearsay

Hearsay or secondhand evidence is evidence of what an out-of-court declarant said, offered to establish the truth of that statement. One might have thought that a rule governing the admissibility of hearsay evidence would be a footnote to Rule 403, but instead, because of its complexity, it gets its own article of the Federal Rules of Evidence (Article VIII). More radically, one might wonder why there needs to be a hearsay rule at all. The only reason to have rules excluding evidence that does not impose indirect costs (such as subsequent-repairs evidence) is that the inexperienced trier of fact, the jury, will give too much weight to the evidence, even if given a limiting instruction or other guidance by the judge. Much of the "evidence" on which people act in their personal lives and their careers *is* hearsay, so one might expect jurors to be experienced in sifting and weighing hearsay evidence.

Even so, the hearsay rule probably can be justified by the "waste of time" factor in Rule 403, or more precisely the costs of the trial process. Because the jury, unlike the judiciary in an inquisitorial system, does not engage in an active search for evidence, it cannot terminate the evidentiary process at the point at which the benefits of a further search would exceed the costs. The hearsay rule helps to do this for the jury by excluding an indefinite mass of generally dubious evidence.¹¹⁷ The many exceptions to the rule allow into evidence those forms of hearsay that have probative value equivalent to that of first-hand evidence (for example, a statement against interest—a kind of statement that one is unlikely to make unless it is true). The hearsay rule can also be understood as working in tandem with Rules 402 and 403 to counteract incentives to overinvest in evidence.

G. Testamentary Privileges and Exclusionary Rules

Rule 501 deals with privilege but does not enumerate the privileges recognized in federal litigation. It provides merely that the existence of privilege shall be governed by federal or, where appropriate, state common law, except as superseded by statutes or the Constitution. I shall examine the major privileges briefly.

1. *The marital privileges.*

The rationale of the marital privileges¹¹⁸ is similar to that of the repair and settlement rules: collateral costs. A confession to one's spouse that one

117. For a contrary view, argued from a broadly economic perspective, see Kaplow, *supra* note 98, at 1794-1804.

118. There are two marital privileges. The testimonial privilege applies to all communications, whether made before or during the marriage, the public disclosure of which might undermine the marriage, but only the spouse asked to testify can invoke this privilege. The marital-

had committed a crime would be highly probative evidence of guilt and no more confusing, prejudicial, time-wasting, etc. than any other confession offered in evidence. It is excluded out of fear of weakening a marriage by making spouses distrustful of each other. Whether this fear is justified is doubtful. The privilege might actually induce some people to marry who would not otherwise do so, and marriages induced by a desire for evidentiary advantage are unlikely to be stable. More important, by lowering the cost of crime for married people, the privilege encourages (though no doubt only very slightly) such people to commit crimes; and the commission of a crime by a spouse is a highly destabilizing event for a marriage. A stronger argument could be made for the privilege if it were limited to civil cases.

Even if the benefits of marital privilege are slight, the costs in valuable evidence forgone also may be slight; so, on balance, there may be little gain from abolition. If the privilege were abolished, and this were widely known, spouses would be much less likely to make damaging admissions to each other; so abolition (just as with the settlement-offer rule) would not create a cornucopia of valuable evidence. Compare the repair rule. Allowing evidence of subsequent repairs to be introduced at a trial would reduce the incentive to make such repairs but would not eliminate it, because the benefits of the repairs in averting future liability would probably outweigh future evidentiary costs. So abolishing the subsequent-repairs rule would generate some evidence, though the social cost of the evidence in reduced safety might exceed its social benefit in more accurate determinations of liability. The benefits of admitting wrongful conduct to one's spouse are smaller (and so abolishing marital privilege might cause such admissions to dry up), though perhaps not wholly negligible; the admission may be necessary in order to elicit valuable assistance from the spouse in evading punishment.

2. *The lawyer-client privilege.*

The most important testamentary privilege is the lawyer-client privilege. The lawyer cannot be forced to divulge statements made to him by his client in the course of their professional relationship. I want to focus on the application of the privilege to statements made in the course or contemplation of litigation, rather than to statements made in the course of seeking legal advice with respect to contemplated acts.¹¹⁹ As in the case of a confession to one's spouse, a confession to one's lawyer would be highly probative evidence of guilt. The rationale for its exclusion is that the adversary process

communications privilege, which is the one I shall focus on, can be invoked by either spouse, but it is limited to communications made during the marriage.

119. The different considerations applicable to the two types of statement are emphasized in Louis Kaplow & Steven Shavell, *Legal Advice About Information to Present in Litigation: Its Effects and Social Desirability*, 102 HARV. L. REV. 565 (1989).

would not work well if parties could not speak to their lawyers in confidence. To evaluate this rationale, we must consider, as with the subsequent-repairs rule and the marital privileges, what consequences would result from abrogating the lawyer-client privilege. One consequence would be to make clients much more guarded about what they told their lawyers. As a result, not much valuable evidence would be obtained by making lawyers subject to being called as witnesses against their clients. Once again the benefits of abolishing the privilege would be slight, unless "chilling" lawyer-client conversations were considered a public good. Another consequence of abolishing the lawyer-client privilege would be that potential litigants would invest more in learning at least the rudiments of law, so that they could speak to their lawyers with minimum risk of making damaging admissions. Abrogating the privilege might thus increase enrollment at law schools!

Third, lawyers, fearful of extracting damaging admissions from their clients, might fail to elicit information that the client was unaware would help his case.¹²⁰ Fourth, and probably most important, abrogation would encumber the trial process and confuse juries. The same person might be appearing both as the advocate for a party and as a witness against that party or the party would have to change lawyers as soon as he discovered that he had made a damaging admission to his current lawyer. He might have to change lawyers more than once, since he would be telling his story to each new lawyer in turn.

The case for an evidentiary privilege is greatly weakened if the people entitled to invoke it either do not know about it or would not be affected by its abrogation.¹²¹ In the limiting case, where abolition of a privilege would have no deterrent effect on the creation of evidence, abolition would be all benefits and no costs. Consider the psychotherapist-patient privilege. Apparently most people are unaware that such a privilege exists.¹²² How many people (of the few who are aware of its existence) who decide to consult a psychotherapist despite the continuing stigma that mental illness carries in our society would be deterred by fear that the psychotherapist might someday be called as a witness against him?¹²³

120. This point is emphasized in Ronald J. Allen, Mark F. Grady, Daniel D. Polsby & Michael S. Yashko, *A Positive Theory of the Attorney-Client Privilege and the Work Product Doctrine*, 19 J. LEGAL STUD. 359 (1990).

121. See SECTION OF LITIGATION, AMERICAN BAR ASSOCIATION, *supra* note 79, at 100-02.

122. See Daniel W. Shuman & Myron S. Weiner, *The Privilege Study: An Empirical Examination of the Psychotherapist-Patient Privilege*, 60 N.C. L. REV. 893, 925 (1982).

123. In some cases, the dispute giving rise to litigation might cause psychological distress that would make one consult a psychotherapist, provided it would not hurt one's litigation chances.

3. *The exclusionary rule in search and seizure.*

The point I have been emphasizing—that abrogating rules of privilege might yield only a meager evidentiary harvest—is applicable to other exclusionary rules, notably the much-criticized rule excluding evidence obtained by an illegal search or seizure. Such evidence is generally highly probative, and sometimes essential, and its exclusion has seemed a disproportionate sanction for police misconduct. Yet most of the people who make this criticism do not argue that the misconduct should be condoned or redefined as proper conduct; they merely advocate the substitution of other sanctions that would not involve excluding the fruits of the illegal search. If the substitute sanctions were effective in deterring the misconduct, there would not be any fruits, and so there would be no net gain from the standpoint of accuracy in adjudication. Instead, the critics should be advocating either that the standard for determining whether a search is illegal should be redefined, and specifically that searches should be deemed illegal only if the evidentiary benefits do not equal or exceed the costs of the search to the victim; or that the only sanction for an illegal search should be a suit for compensatory damages. The latter approach would require the police, in effect, to “buy” the fruits of their “illegal” searches from the victims, which they presumably would do when the evidentiary benefits exceeded the costs to the victim of the search.

4. *Compulsory self-incrimination.*

The most hallowed, and yet at the same time one of the most questionable, of the evidentiary privileges is the constitutional privilege against compulsory self-incrimination. Concerns with the use of torture to extract confessions are understandable and could be given an economic rationale, but these concerns could be allayed by prohibiting torture (including its attenuated forms, such as relay questioning and the “third degree”) and making punishment for contempt of court, whether by fine, imprisonment, or forfeiture of the right to defend, the sole sanction for a refusal to testify. The privilege denies the court highly probative evidence, and the benefits of the privilege are exceedingly difficult to pin down. The best argument for it is the

strong policy in favor of government’s leaving people alone [T]he government should not disturb the peace of an individual by way of compulsory appearances and compulsory disclosures which may lead to his conviction unless sufficient evidence exists to establish probable cause. Obviously, if the in-

dividual's peace is to be preserved, the government must obtain its prima facie case from sources other than the individual.¹²⁴

But this concern (which parallels the argument discussed earlier for placing the burden of producing evidence on plaintiffs rather than defendants) could be taken care of by cutting off the privilege as soon as the government has gathered enough evidence from independent sources to indict, and by limiting the amount of time that the government could demand of the suspect for answering questions.¹²⁵

One way to pose the issue of abolishing the privilege is to adopt, in a manner congenial to economists, the *ex ante* perspective and ask whether, if the privilege protects only (or mainly) the guilty, people choosing behind the veil of ignorance, and so not knowing whether they will be victims of crime or criminals (or mistakenly prosecuted), would support or reject the privilege. Since only a modest fraction of the community will become criminals or even criminal suspects, and since the only cost to the criminal from the abrogation of the privilege would be to make it more difficult for him to avoid his just deserts, there might be an overwhelming vote in favor of abrogation.

The preceding paragraph began to relax the implicit assumption that the only people who make damaging admissions are guilty. An innocent person can be suspected of crime, and he may say things that can be used to weave the net of suspicion more tightly around him; or he may simply have a suspicious cast of countenance. The greater the danger that the abolition of the privilege would lead to some erroneous convictions, the stronger the case for the privilege. This point bears on an unraveling problem that the right to waive privilege creates. Suppose that only guilty people would make the kind of damaging admissions that the privilege against compulsory self-incrimination (and also the lawyer-client and marital privileges) enables defendants to avoid or conceal. Then the innocent would always waive the privilege in order to signal their innocence.¹²⁶ Anyone who did not waive the privilege would properly be considered guilty. This is the basis on which jurors often infer guilt from the defendant's refusal to take the stand, even though they are told not to draw any inference of guilt from such a refusal. If, however, the innocent too bear a cost of waiving privilege, then the refusal to waive it cannot be reliably interpreted as a sign of guilt. Judges who want jurors to take seriously the principle that guilt should not be inferred

124. 8 JOHN HENRY WIGMORE, *EVIDENCE IN TRIALS AT COMMON LAW* § 2251, at 317 (John T. McNaughton ed., rev. ed. 1961). McNaughton's entire discussion of the arguments for the privilege is exemplary. *See id.* at 295-318.

125. I do not consider the quite distinct problems presented by the assertion of the privilege in nonlitigation settings, such as hearings before congressional committees.

126. *See generally* Daniel R. Fischel, *Lawyers and Confidentiality*, 65 U. CHI. L. REV. 1 (1998).

from a refusal to waive the privilege against self-incrimination will have to come up with a credible explanation for why an innocent person might fear the consequences of testifying. I am not sure there *is* a credible explanation; the danger of an innocent person's making admissions that would lead the jury to think him guilty may be theoretical rather than real.

The criminal defendant's decision whether to testify, thus waiving his privilege against compulsory self-incrimination, can be modeled as follows:¹²⁷

$$p = p_1x_1 + (1 - t)p_2 + tp_3tx_2 \quad (8)$$

where p is the probability that the defendant will be found guilty, p_1 the probability of guilt generated by the other evidence in the case (x_1), p_2 the probability of guilt that the jury will infer if he does not take the stand, p_3 the probability of guilt that the jury will infer if he takes the stand and testifies (with x_2 being the testimony that he will give), and t being the decision whether to testify (with t taking a value of 1 if he testifies and 0 if he does not). If he testifies, the middle term on the right-hand side of Equation (8) is wiped out, but if his testimony is damaging to him, then the third term (which becomes simply p_3x_2) will be positive. If he declines to testify, the third term disappears but the second term is positive. The decision to testify will depend, therefore, on a comparison of the middle term in the decline-to-testify case with the third term in the testify case.

This approach can be used to model any case in which the absence of evidence gives rise to an inference, as in versions discussed earlier of the *McDonnell Douglas* scenario and the hypothetical bus case, and in cases of statistical evidence with low significance levels. In the bus case, for example, p would be the probability that the owner of the bus that injured the plaintiff was Company *A* (the defendant); p_2 would be the contribution to p if the only evidence is the percentage of buses owned by *A* and if this implies that the plaintiff is withholding evidence that the bus in question was actually owned by *B* (that is, if $t = 0$); and p_3 would be the contribution to p if the plaintiff puts in additional evidence (x_2), beyond the bare statistic, concerning ownership.

H. *Expert Witnesses*¹²⁸

Articles VI and VII of the Federal Rules of Evidence contain a number of provisions relating to witnesses, especially expert witnesses. The most

127. I am indebted to Anup Malani for this formulation.

128. The discussion in this section draws upon Richard A. Posner, *The Law and Economics of the Economic Expert Witness*, 13 J. ECON. PERSP. (forthcoming 1999).

important are Rule 602, which confines nonexpert witnesses to testifying from first-hand knowledge, and Rule 702, which permits an expert witness to testify about matters within his area of expertise "in the form of an opinion."¹²⁹ An opinion is an inference drawn from a combination of first-hand observation and background knowledge. If one sees dark clouds and offers an opinion that it is about to rain, the opinion represents a combination of the observation of the clouds with one's background knowledge about weather signs. The extensive background knowledge that denotes a person as an expert in some field enables him to offer opinions that would be irresponsibly speculative from a lay person.

Because of the technical complexity of many of the issues that arise in modern lawsuits, heavy reliance on expert witnesses seems to be the only alternative to moving to a system of specialized rather than (largely) generalist courts (a system which would have its own problems).¹³⁰ There is considerable dissatisfaction with the use of expert witnesses. This dissatisfaction has two main sources, which are related. First, because the experts are paid by the respective parties, it is feared that they are partisans of whoever hired them, "hired guns" rather than disinterested, and hence presumptively truthful, witnesses. This of course does not distinguish them sharply from a number of other types of witness, notably the parties themselves, who once were forbidden on this ground to testify. Second, it is feared that expert witnesses can mislead judges and juries more readily than lay witnesses, because experts are more difficult to pick apart on cross-examination; they can hide behind an impenetrable expertise expressed in an unintelligible jargon. Even if they are demolished on cross-examination by a lawyer who has carefully prepared with his own expert, the jury may not understand the questions and answers in the cross-examination well enough to realize that the expert *has* been demolished. A subordinate concern, closely related to the concern with intelligibility, is that opposing experts often simply cancel each other out. The expected outcome is unaffected, and so the use of the experts creates added costs without any benefits.

None of these concerns, however, seems especially grave, provided—a vital qualification to which I'll return—that the expert is testifying in an area in which there is a consensus on the essential substantive and methodological premises

1. *Partisanship.*

Regarding the first concern, four points need to be made:

129. FED. R. EVID. 702. However, Rule 701 also permits very limited opinion testimony by lay witnesses.

130. See POSNER, *supra* note 26, at 244-72. But it is important to realize that specialized courts are a possible solution to the perceived problems with using expert witnesses.

First, because most expert witnesses, unlike most lay witnesses, are repeat players, they have a financial interest in creating and preserving a reputation for being honest and competent. Any public judicial criticism of a witness (in an opinion, whether or not formally published, or even in the transcript of a trial or other hearing) is apt to impair the expert's career as a witness, sometimes fatally, because the criticism is likely to be brought up in subsequent cross-examination of this expert.¹³¹ Many expert witnesses, moreover, are employed by consulting firms, which have a corporate reputation that can be damaged by the errors of any of their employees. Professors may incur heavy nonpecuniary costs in diminished academic reputation (something they greatly value, or else they probably would not be in academia) if they are shown to be careless or dishonest witnesses.

This discussion does not provide a complete answer to the concern with partisanship, because it is also the repeat player who has an incentive to please his client, so that he will be hired in the future. Expert witnesses cannot lawfully be paid on a contingent basis. So the one-time expert witness has nothing to lose *or gain* from giving dishonest or slanted testimony.

Second, the expert witness who has a record of academic publication will be "kept honest" by the fact that, should he try to repudiate his academic work on the stand, he will be open to devastating cross-examination. This implies that a warning flag should go up whenever an expert witness either has no record of academic publication or is testifying about matters on which he has never published. Not only is such an expert less likely to testify truthfully, but the lawyer's choice of him as an expert witness implies that the lawyer was unable to find a genuinely knowledgeable person who was willing to testify in support of the client's position.

Third, because of the adversary character of the American system of litigation, and the requirement that the expert disclose his evidence during the pretrial discovery process (thus before the trial begins), expert evidence is subject to intense critical scrutiny.¹³² This should deter at least some irresponsible expert testimony. In the case of economics, where the tradition of replicating previous academic studies is relatively weak,¹³³ a study conducted

131. See Thomas R. Ireland, Walter D. Johnson & Paul C. Taylor, *Economic Science and Hedonic Damage Analysis in Light of Daubert v. Merrell Dow*, 10 J. FORENSIC ECON. 139, 156 n.10 (1997) ("A favorable mention in a reported case is of real benefit to a [forensic, that is, a testifying] economist, while an unfavorable mention is a major cost."). For an example of "unfavorable mention," see generally *In re Brand Name Prescription Drugs Antitrust Litigation*, 1996 WL 351178 (N.D. Ill. June 24, 1996).

132. As an example of what awaits expert witnesses in cross-examination, see Stan V. Smith, *Pseudo-Economists—The New Junk Scientists*, 47 FED'N INS. & CORP. COUNS. Q. 95 (1996).

133. This may be why academic researchers have adopted the 5 percent significance level rather than a 10 or 20 percent level. The less frequently studies are replicated, the more important it is to subject them to the internal discipline of a stiff significance test. See Lempert, *supra* note 95, at 1099.

for purposes of litigation is likely to receive more intensive scrutiny than an academic study, even one published in a refereed journal.

Fourth, an expert witness's evidence is inadmissible if it does not satisfy the methodological standards in the expert's field.¹³⁴ Because this is easier to determine than whether the evidence is sound, the rule acts as a screen against "junk science." The mesh of the screen may actually be too fine for statistical evidence, as we saw earlier. Notice that the existence of the screen may deter the preparation of subprofessional expert testimony, as the expert will worry that his reputation may be impaired if his evidence is excluded for failure to measure up to the standards of his discipline.

If market incentives kept experts fully honest, defendants' lawyers would often not introduce expert testimony at all, because they would find it difficult to locate a reputable expert who would contradict the plaintiff's expert. The "softer" the science relevant to the case, the more often both sides can be expected to present expert witnesses.

2. *Intelligibility.*

The second concern with the use of expert witnesses, intelligibility, has undoubted merit, but not as much as intuition might suggest. For it ignores incentive effects. A witness who cannot make himself understood by the court is unlikely to be persuasive. This is a particularly important consideration in jury trials, because jurors often give less weight to credentials than to clarity.¹³⁵ If expert testimony is clearer in jury than judge trials, juries may understand expert testimony as well as judges even if the average judge is somewhat brighter than the average juror.

This is not a complete answer to the criticism of unintelligibility. Many fields are so technical that it is unrealistic to expect the average juror *or judge* to be able to understand all the criticisms of a study conducted by an expert in the field. (That is why increased technical complexity of evidence is not a powerful argument against the use of juries.) A partial solution, suggested by a study, is that jurors give great weight to credentials when the expert testimony is very complex.¹³⁶ This is rational. The more credentialed expert has a larger potential reputation loss from giving evidence that falls below acceptable professional standards.

134. See, e.g., *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993); *Navarro v. Fuji Heavy Industries, Ltd.*, 117 F.3d 1027, 1031 (7th Cir. 1997); *People Who Care v. Rockford Board of Education*, 111 F.3d 528, 537 (7th Cir. 1997); *Rosen v. Ciba-Geigy Corp.*, 78 F.3d 316, 318-19 (7th Cir. 1996); FAIGMAN et al., *supra* note 67, at 2-45.

135. See Daniel W. Shuman, Anthony Champagne & Elizabeth Whitaker, *Juror Assessments of the Believability of Expert Witnesses: A Literature Review*, 36 JURIMETRICS J. 371, 379 (1996).

136. See Joel Cooper, Elizabeth A. Bennett & Holly L. Sukel, *Complex Scientific Testimony: How Do Jurors Make Decisions?*, 20 LAW & HUM. BEHAV. 379, 391-92 (1996).

Another way to deal with the problem of the unintelligibility of complex expert testimony would be more frequent appointment of court-appointed experts. The power to make such appointments is explicitly conferred on federal judges by Rule 706, yet it is rarely exercised.¹³⁷ The usual objection is that it is impossible for a judge to know whether he is picking a genuine neutral to be the court's expert. This objection can be overcome by borrowing a leaf from a common method of selecting arbitrators: Each party chooses an arbitrator and the two arbitrators choose a neutral, who generally casts the deciding vote. The parties' experts could, similarly, agree on a neutral expert who would be appointed by the court and would testify either along with or instead of the parties' experts.¹³⁸ His neutrality would quite properly give his views decisive weight with the jury. It would not matter whether the jurors understood him; his conclusion would be credible because of his neutrality and expertise. Things can be rationally believed though not understood. People rationally believe that airline travel is safe without knowing what keeps the plane in the air.

The use of a court-appointed expert is problematic when (for example, in the damages phase of the case) the expert witness's bottom line is a number. For then, in the case of opposing witnesses, the trier of fact can "split the difference," after weighting each witness's estimate by its plausibility. (Without such weighting, the defendant's expert would testify to zero damages and the plaintiff's to infinite damages.) An estimation derived in this manner may be superior to that of a solitary expert witness.¹³⁹

3. *The expert cancel-out effect.*

The third concern about expert testimony, that opposing experts often cancel each other out, would also disappear if the parties' experts selected a neutral expert to be the only expert witness. But is it a real concern? It might seem that whenever the opposing experts canceled each other out, the parties would agree not to call them, in order to reduce the expense of litigation. This happens occasionally, but not often—maybe because a lawyer

137. See JOE S. CECIL & THOMAS E. WILLING, COURT-APPOINTED EXPERTS: DEFINING THE ROLE OF EXPERTS APPOINTED UNDER FEDERAL RULE OF EVIDENCE 706 (1993); FAIGMAN et al., *supra* note 71, at 43-44.

138. For the origin and discussion of this proposal, see Daniel L. Rubinfeld, *Econometrics in the Courtroom*, 85 COLUM. L. REV. 1048, 1096 (1985). A variant of this procedure has been employed in at least one case. See *Leesona Corp. v. Varta Batteries, Inc.*, 522 F. Supp. 1304, 1312 (S.D.N.Y. 1981); see also SECTION OF LITIGATION, AMERICAN BAR ASSOCIATION, *supra* note 79, at 246.

139. See LUKE M. FROEB & BRUCE H. KOBAYASHI, COMPETITION IN THE PRODUCTION OF COSTLY INFORMATION: AN ECONOMIC ANALYSIS OF ADVERSARIAL VERSUS COURT-APPOINTED PRESENTATION OF EXPERT TESTIMONY (George Mason Univ. Sch. of Law, Law & Econ. Working Paper No. 93-005, 1993).

who suggested it would be understood to be signaling that he thought his expert less credible than the opponent's expert.

The use of expert witnesses is most problematic when there is insufficient common ground to keep the witness honest. This used to be, and to some extent still is, the situation with regard to antitrust economics. A perfectly respectable economist might be an antitrust "hawk," another equally respectable economist a "dove." Each might have a long list of reputable academic publications fully consistent with systematically pro-plaintiff or pro-defendant testimony. A judge or jury would therefore have little basis for choosing between them, especially since each witness might be reasoning with impeccable logic from his premises—premises equally plausible to a lay audience. There might be no neutral expert with relevant expertise, in which event a court-appointed expert would perforce be a partisan. I do not have a solution to this problem.

4. *An additional social cost of expert testimony.*

A social cost of expert evidence that is not discussed at all in the literature on expert witnesses is the deflection of academic researchers, especially those with tenure, from scholarly work to testifying. Although by giving academics access to data that they would not otherwise have testifying may occasionally pay academic dividends, the net output of American universities (weighting quantity by quality) probably is not greater as a result of professors' being in demand as expert witnesses. If academic salaries were equal to the social marginal product of academics, the deflection of academics from research would not reduce social welfare. But if academic research produces social gains not captured by the researcher, and if that surplus is less than the surplus created by academics testifying, then the practice of hiring academics to testify does impose social costs. The second "if," however, is indeed iffy. Accurate adjudication creates social benefits (in particular, enhanced deterrence of wrongful conduct) not wholly captured by the expert witnesses in the fees they charge. In addition, the opportunity to make extra income may draw able people into academia who would otherwise choose some other occupation. But this is a weaker point. Moonlighting opportunities may enable universities to pay lower salaries to professors, and so may not affect the supply of academics. And since testimonial opportunities are randomly distributed across the academic spectrum in relation to value of research output, the principal effect of moonlighting income, even if it is not offset by lower academic salaries, may be to alter the distribution of academics across fields without regard to social product.

5. *Recommendations for reform.*

Expert testifying is here to stay. We should consider how it might be improved. I have suggested greater use of court-appointed experts selected by the method used to pick a neutral arbitrator. I have also mentioned judicial criticism as a method of bringing reputation costs to bear on the errant expert. Although there is a danger that such criticism may be uninformed, if so the damage to the expert's reputation will be less. The next time he testifies he will have an opportunity to try to rebut the criticism if it is thrown up at him on cross-examination. And his lawyer may be able to persuade the judge in the new case to prevent the use of the earlier judge's criticism on cross-examination, on the ground that its probative value is slight in relation to its prejudicial effect.

Two further measures for improving the quality of expert evidence are worth considering. First, each professional association from whose membership expert witnesses are drawn could maintain a roster of all testimonial appearances by members. The roster would contain abstracts of each member's testimony and any criticisms of the testimony by the judge in the case or by the lawyers or experts on the other side of the lawsuit. This would enable the profession to monitor its members' adherence to high standards of probity and care in their testimonial forays. Procedures could be established to enable members to challenge inaccuracies, and, having thus been validated, the roster could be made available to the courts.

I am not appealing to altruism in making this suggestion. Each association, which is to say the members (or rather the majority of them) of the association, would benefit from the maintenance of the roster. The effect of the roster in deterring the hiring as expert witnesses of disreputable members of the profession represented by the association would increase the association's prestige. It would also increase the consulting incomes of its reputable members by reducing the competition of the disreputable members of the profession. The incentive to maintain such a roster would thus be the same as that of any other form of professional self-policing: to reduce the external cost that the misbehavior of one member of a profession imposes on other members.

Second, lawyers who call an expert witness could be required to disclose the name of all the experts whom they approached as possible witnesses before settling on the one testifying. This would alert the jury to the problem of "witness shopping." Suppose the lawyer for the plaintiff hired the first economist, agronomist, physicist, physician, etc. whom he interviewed, and the lawyer for the defendant hired the twentieth one whom *he* interviewed. A reasonable inference is that the defendant's case is weaker than the plaintiff's. The parallel is to conducting twenty statistical tests of a hypothesis

and reporting (as significant at the five percent level) the only one that supported the hypothesis being tested.

CONCLUSION

The length of this article and the number of distinct issues discussed in it require a recapitulation of some of the more important and interesting points:

1. The process by which evidence is obtained, presented, and evaluated in a trial can be fruitfully modeled in economic terms, using either a search model or a cost-minimization model and incorporating Bayes' theorem as a guide to rational decisionmaking under uncertainty.¹⁴⁰ Economic analysis captures the major concerns about evidence law (including "noneconomic" concerns), of which the most important from an economic standpoint are accuracy (because accuracy usually, though not always, promotes deterrence) and cost. Economic analysis of evidence reveals, among other things, that the amount of evidence generated in an unregulated adversary system may be more or less than the social optimum. Economic analysis also and relatedly provides a guide to optimal regulation of evidence. It can thus be used as a criterion for evaluating the law of evidence. This article, like much positive economic analysis of core doctrines and institutions of the legal system, finds a considerable, although far from complete, congruence between the law and the dictates of efficiency.
2. Although the inquisitorial system (which is predominant outside of the Anglo-American legal sphere) is superficially more efficient than the adversarial system, because *in principle* it facilitates the optimum amount of evidence gathering, economic analysis furnishes no convincing basis for choosing between the systems. Among frequently overlooked considerations bearing on this conclusion are (a) that the rules of evidence enable the judge in the adversarial system to ameliorate the problem of socially excessive evidence search, while at the same time the rules governing burden of production enable him to ameliorate the problem of socially insufficient search; (b) that rational (but socially inefficient) bias is apt to be a more serious problem with judges in an inquisitorial system than with juries in an adversarial system; and (c) that the competitive and highly visible character of the adversarial system operates to correct incentive problems created by an inquisitorial system.
3. The greater public visibility of the adversarial system, especially in jury trials, creates an exaggerated impression of the failures of the system relative to those of inquisitorial systems. The latter, operating with less

140. In Part II.B *supra*, I attempted to counter some of the criticisms that have been made of applying Bayes' theorem, or mathematical probability more generally, to trials.

public visibility, are better able to bury their mistakes. Similarly, the more that plea bargaining is disfavored, as is common in inquisitorial systems, the more accurate the criminal justice system will *appear* to be, because more one-sided cases will be tried in such a system than in one in which plea bargaining (settlement) is encouraged and where, therefore, most one-sided cases are pleaded out before trial.

4. Economic comparison of the inquisitorial and the adversarial systems leads to specific predictions, such as that the former will be less concerned with judicial bias, burden of production, and burden of persuasion.
5. A principal social value of the right of cross-examination is deterrent: The threat of cross-examination deters some witnesses from testifying at all and others from giving false or misleading evidence. Merely observing cross-examination, therefore, does not give a complete picture of its social value.
6. Burdens of persuasion and production (including the seemingly “artificial” burdens of production in discrimination cases) are economizing devices. The heavier burden on the plaintiff (prosecutor) in criminal than in civil cases reflects not only the greater cost of a mistaken conviction than a mistaken acquittal, as stressed in the earlier economic literature, but also game-theoretic factors arising from the inequality of resources between prosecution and defense in almost all cases.
7. Contrary to widespread belief, rational allocation of prosecutorial resources reduces the probability of convicting the innocent to minute levels when crime rates are high, while, also for economic reasons, the error rate in civil cases is far lower than what the preponderance (“more likely than not”) standard of proof implies.
 - a. The first of these points implies that in times of rising crime rates, it is socially efficient to reduce the procedural rights of criminal defendants (as the Supreme Court has done), unless prosecutorial resources are expanding as rapidly as crime rates are rising (which they have not been).
 - b. The second point implies that if a class of cases can be identified in which, after a thorough search for evidence, the probability that the plaintiff’s claim is meritorious barely exceeds fifty percent, the legal system should refuse to litigate these cases. The social benefits of the very slight gain in accuracy obtained by litigating them are unlikely to be as large as the social costs of conducting trials in these cases. This may be the answer to the question whether a plaintiff who presents merely “naked” statistical evidence of the defendant’s liability should be allowed to get to a jury.

8. It is a mistake, however, to use the five percent significance level that is conventional in statistical research as a criterion of the admissibility of a statistical study in a trial. Significance levels are relevant to the weight to be given a study. Their academic use as criteria of publishability is a function of considerations that do not apply in litigation, such as the need to ration space in scholarly journals.
9. If juries are competent to resolve factual disputes, they should also be competent to resolve disputes over the application of law to fact, notably a dispute over whether the defendant was negligent. Judge Learned Hand's negligence formula shows that such a dispute is purely factual.
10. The formal rules of evidence (for example as codified in the Federal Rules of Evidence) cover only a portion of evidence law. Many so-called substantive rules, such as the parol evidence rule of contract law, are in actuality field-specific evidence rules. Most rules of evidence, however classified in law, exhibit economizing properties, though there is much room for reform.
11. When the doctrine of harmless error is modeled in economic terms, it can be shown that the doctrine creates an incentive for prosecutors to commit *deliberate* errors, and so should perhaps be modified.
12. Limiting instructions are ineffectual unless the judge is able to persuade the jury that the excluded evidence is not probative. In other cases, no such instruction should be given unless requested by a party, and if given, it should not be regarded as curative of any error in the admission of evidence.
13. Rule 403 of the Federal Rules of Evidence is an explicit cost-benefit formula for determining the admissibility of evidence. It is central to the economic theory of evidence in much the same way that the Hand formula is central to the economic theory of torts. The benefits relevant to Rule 403 are benefits in greater accuracy. The costs are both reductions in accuracy (for example, because the evidence sought to be excluded under the rule is confusing) and costs of administering the legal system. The hearsay rule and a number of the other specific rules of evidence can be subsumed under Rule 403.
14. Evidence of a defendant's prior crimes should generally be excluded from criminal trials whether it is offered to demonstrate a propensity to commit crimes or, on cross-examination, is offered to demonstrate a propensity to lie under oath. There is no reason to suppose that previously convicted defendants are greater liars than current defendants *who are guilty in fact* (if they are not guilty, they are less likely to lie and, as a practical matter, it doesn't matter whether they do). Since recidivists are punished more heavily than first offenders, it is not even clear that previously convicted defendants have a greater *net* propensity to commit

crimes than persons who have not been convicted previously.¹⁴¹ In the case of certain sex crimes, however, as recent amendments to the Federal Rules of Evidence recognize, a history of prior crimes may demonstrate the defendant's inelastic demand for this type of conduct.

15. The rules forbidding the introduction into evidence of subsequent repairs by a tort defendant and of settlement offers by either party are justified by the external costs of such evidence in reducing safety and reducing the settlement rate, respectively. The subsequent-repairs rule may also be justified by concerns with hindsight bias, but these concerns seem exaggerated and in any event could be dealt with by other measures.
16. The importance of external costs in the law of evidence is further illustrated by the many rules of privilege (such as the marital privileges, the privilege against compulsory self-incrimination, and the lawyer-client privilege) and of exclusion (for example, of illegally obtained evidence). Many of the conventional justifications for the privileges and exclusions are weak, but one strong argument is that abrogating them would not produce a rich harvest of evidence but rather would discourage people from talking to spouse, lawyer, priest, and so on.¹⁴² Substituting other equally effective sanctions for illegal searches and seizures would (by definition of "equally effective") reduce the amount of illegally seized evidence by as much as is currently accomplished by the exclusionary rule. The principal exception to these points is the self-incrimination rule. There is a distinct economic objection to forcing people to offer potentially incriminating evidence. It is much the same as the economic reason for placing the burden of production on the plaintiff rather than the defendant in ordinary civil litigation. By forcing prosecutor or plaintiff to bear a significant cost of litigation, we reduce the frivolous or harassing use of the courts. But this is an argument for requiring probable cause to require a potential defendant to testify rather than for the current absolute privilege against compulsory self-incrimination.
17. The growing complexity of evidence, resulting from scientific and technological progress, has placed new strains on a system that relies on lay people (and judges are lay people in this domain) to determine facts. But many of the criticisms of the use of expert witnesses are superficial. To know and to understand are different things. Jurors may be able to place warranted confidence in the testimony of an expert witness, on the basis of signals of competence and incentive (there are market incentives for

141. If they do, however, then there is an argument for allowing prior-crimes evidence, but it is offset by the effect of allowing such evidence on the incentives of prosecutors. They will overinvest in prosecuting prior rather than first offenders because the former may be easier to convict regardless of guilt if such evidence is allowed.

142. When, however, abolition would not deter the creation of evidence because the people entitled to invoke the privilege were unaware of it, the case for abolition is strong.

experts to testify honestly), without being able to make an informed evaluation of the expert's testimony. The use of expert testimony can, however, be improved by various measures—including the maintenance by professional associations of a roster of the forensic activities of their members.