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THE MORALITY OF STATISTICAL PROOF AND THE RISK OF MISTAKEN LIABILITY

David T. Wasserman*

INTRODUCTION

My thesis in this paper is that the moral acceptability of proof by statistical evidence does not depend on the adequacy of subjective probability theory as a model of legal proof. I will argue that we object to a reliance on statistical evidence only when it adds insult to the injury of a false finding of liability. The degree of insult depends on the issue in dispute, the source of the statistical evidence, and the assumptions made in employing that evidence. When, as in toxic tort cases, a particular use of statistical evidence does not demean the defendant or expose him to a wide-ranging risk of false liability, we may be willing to rely on that evidence to resolve disputed issues of fact.

The debate over statistical evidence has largely focused on the epistemology of legal proof, not on the moral issues involved in resolving factual uncertainty.¹ The debate has centered on the Baye-

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¹ See L.J. COHEN, *THE PROBABLE AND THE PROVABLE* (1977); 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 (P. Tillers & E. Green eds. 1988) [hereinafter *PROBABILITY AND INFERENCE*]; Edwards, *Summing Up: The Society of Bayesian Trial Lawyers*, in *PROBABILITY AND INFERENCE*, *Id.* at 337; Kaye, *Do We Need Calculus of Weight to Understand Proof Beyond a Reasonable Doubt?*, in *PROBABILITY AND INFERENCE*, *Id.* at 129; Callen, *Notes on a Grand Illusion: Some Limits on the Use of Bayesian Theory in Evidence Law*, 57 *IND. L.J.* 1 (1982); Cohen, *Discussion: On Analyzing the Standards of Forensic Evidence: A Reply to Schoeman*, 54 *PHIL. OF SCI.* 92 (1987) [hereinafter Cohen, *Reply to Schoeman*]; Cohen, *Subjective Probability and the Paradox of the Gatecrasher*, 1981 *ARIZ. ST. L.J.* 627 [hereinafter Cohen, *Subjective Probability*]; Kaye, *The Laws of Probability and the Law of the Land*, 47 *U. CHI. L. REV.* 34 (1981) [hereinafter Kaye, *The Laws of Probability*]; Kaye, *The Paradox of the Gatecrasher and Other Stories*, 1979 *ARIZ. ST. L.J.* 101 [hereinafter Kaye, *The Paradox of the Gatecrasher*]; Kaye, *Paradoxes, Gedanken Experiments and The Burden of Proof: A Response to Dr. Cohen's Reply*, 1979 *ARIZ. ST. L.J.* 635; Koehler & Shaviri, *Verdictal Verdicts: Increasing Verdict Accuracy Through the Use of Overly Probabilistic Evidence and Methods*, 75 *CORNELL L. REV.* 247 (1990); Schum, *A Review of a Case Against Blaise Pascal and His Heirs*, 77 *MICH. L. REV.* 446 (1979); Schoeman, *Cohen On Inductive Probability and the Law of Evidence*, 54 *PHIL. OF SCI.* 76 (1987); Tyree, *Proof and Probability in the Anglo-American Legal System*, 23 *JURIMETRICS J.* 89 (1982). Several authors have given prominence to ethical issues in statistical proof. See, e.g., Shaviri, *Statistical-Probability Evidence and the Appearance of Justice*, 103 *HARV. L. REV.* 530 (1989) [hereinafter Shaviri, *Statistical-Probability Evidence*]; Schoeman, *Statistical vs. Direct Evidence*, 21 *NOUS* 179 (1987); Tribe, *Trials By Mathematics: Precision and Ritual in the Legal Process*, 84 *HARV.*

sian model, which analyzes probabilities as degrees of rational belief. Proponents of that model claim that the probative value of evidence can be expressed in terms of numerical probabilities that conform to the axioms of standard probability calculus.² Critics of the model deny that evidence strength can be expressed in terms of such probabilities and argue that the attempt to do so leads to the kind of anomalies familiar in the wider debate about knowledge and probability: typically cases in which the mathematical odds, however great, do not generate belief or satisfy the applicable standard of proof.³

I suspect the critics are correct, but I will argue that their critique is largely irrelevant to the moral acceptability of proof by statistical evidence. We are sometimes willing to impose liability on a defendant when we do not believe him liable, just as we are sometimes unwilling to impose liability on a defendant even when we do believe him liable. The problem with the standard probabilistic model of legal fact finding is not, or not only, that it fails to explain burdens-of-proof and other rules of evidence, but that it ignores the circumstances that make a reliance on statistical evidence acceptable or unacceptable.

In order to separate the moral from the epistemic objections to the standard probabilistic model of legal proof, it is helpful to distinguish two components of the model: the quantification of evidence strength, and the decision theory which uses the resulting probabilities to determine the course of action with the greatest "expected util-

L. REV. 1329 (1971) [hereinafter Tribe, *Trial by Mathematics*]. Many have addressed them in passing. As far as I know, only Schoeman has addressed the type of concerns I discuss in this paper.

² See, e.g., Cullison, *Probability Analysis of Judicial Fact-Finding: A Preliminary Outline of the Subjective Approach*, 1 U. TOL. L. REV. 538 (1969); Finkelstein & Fairley, *A Bayesian Approach to Identification Evidence*, 83 HARV. L. REV. 489 (1970); Kaye, *The Laws of Probability*, *supra* note 1; Lempert, *Modeling Relevance*, 75 MICH. L. REV. 1021 (1977).

³ See, e.g., L.J. COHEN, *supra* note 1; Pollock, *Epistemology and Probability*, 55 SYNTHESE 231 (1983). Critics also argue the converse: that we often find the applicable standard of proof satisfied when the mathematical odds are very low. See L.J. COHEN, *supra* note 1, at 116-20; Allen, *A Reconceptualization of Civil Trials*, in PROBABILITY AND INFERENCE, *supra* note 1, at 21. Under the multiplicative rule, the probability of a conjunction is the product of the probability of each (independent) conjunct, and a plaintiff would often lose a case with several independent elements even if each element had a probability well over fifty percent—a result that seems to conflict with our practice and intuitions. Since I do not find any great moral offense in adhering to the conjunctive rule, I do not discuss this argument further. I do recognize that the mistaken failure to impose liability may be as objectionable as the mistaken imposition of liability, especially because morally irrelevant events in the history of a civil dispute may determine which disputant becomes the plaintiff.

ity.”⁴ The expected utility of an option is the sum of the utilities of each of its possible outcomes multiplied, or “discounted,” by its probability of occurrence. While the Bayesian probability calculus has received most of the critical attention, it is the decision theory which is morally problematic.

In using expected utility as the criterion for legal decision making, the Bayesian assumes that the goal of adjudication is to minimize weighted expected error: the sum of errors weighted by their comparative disutility.⁵ This decision theory accommodates values distinct from accuracy by the differential weighing of errors. Thus, a rule requiring a ninety five percent probability of guilt for conviction would be appropriate if we regard a false conviction as nineteen times worse than a false acquittal. Even in civil cases, higher odds may be required to upset than to preserve the status quo because of the greater disutility of judicially imposed error. Differential weighing can also accommodate concerns about the *distribution* of legal errors: although a preponderance rule would minimize overall error in mass toxic tort cases, it would result in one defendant, the majority or plurality of fender, paying all the damages. This bias can be transmuted into disutility by a heavier weighting of large errors against single parties, a weighting which would favor a market share liability rule.⁶

Thus, the Bayesian model of legal proof typically combines a theory of how the probative value of evidence should be assessed with a theory about how that assessment should be used in making legal decisions. The two positions are formally independent: we could regard the Bayesian calculus as the most appropriate way to assess the strength of evidence and the standards of proof, but refuse to use the probabilities it yielded in an error-minimizing or utility-maximizing model of decision making.⁷ Conversely, we could reject subjective

⁴ See Kaye, *Introduction: What Is Bayesianism?* [hereinafter Kaye, *What is Bayesianism?*], in *PROBABILITY AND INFERENCE*, *supra* note 1, at 1.

⁵ See generally *id.*; Lempert, *supra* note 2.

⁶ Kaye, *The Limits of the Preponderance of the Evidence Standard: Justifiably Naked Statistical Evidence and Multiple Causation*, 1982 AM. B. FOUND. RES. J. 487 (1982) [hereinafter Kaye, *Justifiably Naked Statistical Evidence*]. Bayesians also adopt the familiar utilitarian recourse of shifting the assessment from the consequences of a specific action to the consequences of adopting the rule on which that action is based. Thus, for example, Bayesians stress that a rule permitting the rodeo owner to recover from the spectators even if there were no other evidence available would discourage similarly situated plaintiffs from collecting better evidence. Kaye, *The Paradox of the Gatecrasher*, *supra* note 1. This strategy is generalized by Lempert in his call for: “Bayesian rational” rules of evidence and procedure. Lempert, *The New Evidence Scholarship: Analyzing the Process of Proof*, [hereinafter Lempert, *The New Evidence Scholarship*] in *PROBABILITY AND INFERENCE*, *supra* note 1, at 61, 67.

⁷ I am not claiming that the *concepts* of subjective probability and expected utility are independent. The subjectivist’s claim that degrees of rational belief conform to the standard

probability as a model for assessing legal proof, but still require the legal system to minimize expected error, however ill-fitted its rules of proof for that purpose.⁸ The two positions, though, have a natural affinity, since the decision theory requires a quantification of likelihood that the probability calculus is designed to generate.⁹ The Bayesian calculus has the added advantage of generating these probabilities for any type or combination of evidence.¹⁰

Not surprisingly, objections to the probability calculus and the decision theory have often been conflated by both critics and proponents of the Bayesian model. Its critics often assume without arguing that the perceived inadequacies of the probability calculus as a model of rational belief provide a moral reason for rejecting the decision theory,¹¹ while its proponents often equivocate between insisting that their model explains rational belief and dismissing belief as a morally irrelevant epiphenomenon in decision making.¹²

Moreover, epistemic and moral concerns are often confused in demands for more reliable, complete, or individualized evidence. A demand for evidence that yields "resilient" as well as high odds¹³ may express a claim that rational belief can only be sustained by robust evidence, or it may reflect a conviction that it would be wrong to base liability on evidence whose probative value would be drastically al-

probability axioms is often based on a demonstration that if our degrees of belief failed to conform to those axioms, our preferences would be incoherent. They would violate transitivity and other "laws of preference," allowing a cunning bettor to make book against us and win no matter what happened. See *STUDIES IN SUBJECTIVE PROBABILITY* (H. Kyburg & H. Smokler eds. 1980). But even if we accepted subjective probability on the strength of such a "Dutch Book" argument, we could reject the claim that rational decision makers were always compelled to maximize expected utility.

⁸ We might believe that the rules of evidence and proof were incompatible with the subjective probability calculus, but consider this a reason for reforming or overriding those rules, so as to minimize expected error.

⁹ See, e.g., Edwards, *Influence Diagrams, Bayesian Imperialism, and the Collins Case: An Appeal to Reason*, 13 CARDOZO L. REV. 1031 (1991) [hereinafter Edwards, *Influence Diagrams*].

¹⁰ See, e.g., Kaye, *What is Bayesianism?*, *supra* note 4, at 8-9.

¹¹ Such writers as Cohen and Wright express indignation about imposing liability based on naked statistical evidence. L.J. COHEN, *supra* note 1, at 116-20; Wright, *Causation, Responsibility, Risk, Probability, Naked Statistics, and Proof: Pruning the Bramble Bush by Clarifying the Concepts*, 73 IOWA L. REV. 1001 (1988). It is sometimes hard to tell if their outrage is merely intended for rhetorical effect, or whether they believe that imposing liability without belief is immoral as well as confused.

¹² I believe, for example, that Shaviro equivocates between these positions in *Statistical-Probability Evidence*, *supra* note 1, sometimes attempting to explain belief in probabilistic terms, sometimes dismissing its moral significance.

¹³ See Birmingham, *Remarks on 'Probability' in Law: Mostly, A Casenote and a Book Review*, 12 GA. L. REV. 535, 547-48 (1978).

tered by a wide range of ordinary circumstances.¹⁴ The demand for the individualized evidence lacking in the base-rate hypotheticals can likewise be seen either as a condition of rational belief or as a requirement of justice.¹⁵

While the epistemic critique of the probability calculus is normative, in setting conditions on rational belief incompatible with standard probability theory, its ethical implications are unclear. Why is it wrong to impose liability on someone we do not believe to be liable (as opposed to someone we believe to be not liable)? Some critics have tried to draw a moral conclusion from their epistemic objections, arguing that the Bayesian model mistakenly permits the correctness of liability judgments to be a matter of mere luck.¹⁶ This objection doesn't get very far, though, without an account of how a dependence on luck can be avoided, and why it is objectionable when the odds are sufficiently high.

The moral critique of Bayesian decision theory has not been clearly articulated, in part because it has not been distinguished, or has been assumed to follow, from the epistemic critique of the Bayesian calculus.¹⁷ The demand for "individualized evidence" is notoriously vague, and Bayesians respond that evidence which places the defendant into a high-frequency class may be as individualized as evidence that matches his features with a residue or exemplar.¹⁸ The failure to define individualized evidence and explain why it should be required to impose liability have enabled Bayesians to dismiss their opponents as naive, sentimental, or cynical; as failing to see, or per-

¹⁴ Shoeman, *Statistical vs. Direct Evidence*, *supra* note 1, at 185-86, seems to equivocate between these two concerns.

¹⁵ See generally Tribe, *Trial By Mathematics*, *supra* note 1; Wright, *supra* note 11; J. THOMSON, *Liability and Individualized Evidence*, in RIGHTS, RESTITUTION, AND RISK 225 (1986) [hereinafter J. THOMSON, *Individualized Evidence*].

¹⁶ Wright, *supra* note 11; J. THOMSON, *Individualized Evidence*, *supra* note 15.

¹⁷ A distinctly moral objection to Bayesian decision theory was raised by Lawrence Tribe, who began the debate on Bayesian modeling with his attack in *Trial By Mathematics*, *supra* note 1. Tribe argued that it was often impossible to give, as Bayesian decision theory required, a meaningful answer to the question of how much regret we would feel or disutility we would suffer from an erroneous conviction:

It depends in part upon the *character* of the error itself; mistaken identity might be worse . . . than misjudged intention and worse still than a mis-calculated statute of limitations. And it depends even more significantly upon the *process* that led to the error; one cannot equate the lynching of an innocent man with his mistaken conviction after a fair trial.

Id. at 1381. But one also cannot equate a lynching with a civil verdict based on naked statistical evidence. Critics after Tribe have not been very successful, or interested, in identifying competing values.

¹⁸ Shaviro, *Statistical-Probability Evidence*, *supra* note 1; Edwards, *supra* note 9, at 1059-61.

versely trying to obscure, the generalities to which conventional evidence owes its probative value.¹⁹ From the other side, epistemic critics of the Bayesian model have dismissed moral constraints on the use of statistical evidence, such as those concerning the defendant's voluntary acts, as hopelessly ad hoc.²⁰

I will attempt to develop a coherent moral account of the resistance to proof by naked statistical evidence, which does not require (but is consistent with) the rejection of the standard probability calculus as a model of rational belief or legal proof. I will argue that resistance to imposing liability in hypothetical cases of "naked statistical evidence" is not an artifact of those cases, but a reflection of values which pose a significant barrier to the actual use of statistical evidence.

In Part I, I will analyze our attitudes toward the risk of false liability in the context of a broader critique of expected utility theory, which maintains that the source of a threatened harm may be as important as its magnitude and probability. I will apply this critique to Bayesian decision theory, arguing that while we seek to reduce the incidence of mistaken findings of liability, we are especially concerned about falsely attributing misconduct to a defendant based on the frequency of similar misconduct by others or by the defendant himself. In Part II, I will suggest how this approach to the risk of mistaken liability helps to explain our acceptance of statistical evidence in toxic tort cases, where the defendant's misconduct is conceded.

In Part III, I will examine L.J. Cohen's attempt to link the claimed epistemic deficiencies in Bayesian theory with the moral objections to naked statistical evidence. I will argue that he fails to show how his model of legal proof avoids a dependence on luck, or why such a dependence is morally objectionable when the odds of error are sufficiently low. I will conclude that the rules of legal proof do not serve to avoid a dependence on luck, which is inescapable, but a dependence on certain kinds of luck, which offends our sense of ourselves as autonomous individuals.

I. RISKS AND VALUES: MINIMIZATION ISN'T EVERYTHING

Among the many risks we face in a modern society is that of being wrongly held liable for a crime or tort. We are more willing to bear that risk from some sources than others. We may accept, as inherent in the kind of social life we have chosen to lead, the danger

¹⁹ See, e.g., Shaviro, *Statistical-Probability Evidence*, *supra* note 1; Schoeman, *Statistical vs. Direct Evidence*, *supra* note 1.

²⁰ L.J. COHEN, *supra* note 1; Cohen, *Letter to the Editor*, 1980 CRIM. L. REV. 747, 749.

that we will be betrayed by friends or neighbors who bear false witness, mistaken for someone else because of our appearance or manner, or seen to engage in innocent but suspicious activities. But we may feel outraged at being held liable merely because our association with a group, or our past conduct, makes us especially likely to have engaged in criminal or tortious acts.

A critic of expected utility as a normative decision theory would insist that our attitudes toward the risk of false liability, like our attitudes towards other risks, reflect moral values that can neither be expressed in terms of expected consequences nor dismissed as irrational. Thus, psychologists and anthropologists have observed that people are more willing to accept risks they see as voluntary, familiar, or controllable;²¹ philosophers argue that this preference reflects moral values about consenting to and fairly distributing risk, not irrational fear of the unknown or exaggerated confidence in our ability to avoid harm.²²

In order to make an analogous claim about our attitudes toward the risk of false liability, we must first identify the values that constrain legal proof. It is not enough to claim that certain legal errors, like the conviction of an innocent person, are worse than their complements; as I noted earlier, an expected utility model can easily accommodate such asymmetries.²³ Rather, it is necessary to show how certain forms of proof offend important moral values, and do so regardless of the identity of the parties. While there may be no way to convince a skeptic that our attitudes toward the risk of false liability express moral values rather than cognitive errors or conditioned reflexes, their moral character is suggested by their strength, stability and consistency with other strongly held values.

A. *The Base-Rate Hypotheticals*

I will examine the values constraining the use of statistical evidence in a group of hypothetical cases on which much of the debate over probabilistic modeling has focused, involving "naked statistical

²¹ See M. DOUGLAS & A. WILDAVSKY, *RISK AND CULTURE* (1982); Fischhoff, Slovic, Lichtenstein, Read & Combs, *How Safe is Safe Enough? A Psychometric Study of Attitudes Towards Technological Risks and Benefits*, 9 POL'Y SCI. 127, 143 (1978).

²² See MacLean, *Risk and Consent: Philosophical Issues for Centralized Decisions*, in *VALUES AT RISK* (D. McLean ed. 1986); Anderson, *Values, Risks, and Market Norms*, 17 PHIL. & PUB. AFFAIRS 54 (1988).

²³ Moreover, it is important to distinguish the claim that restrictions on proof that sacrifice short term accuracy may be justified because they produce greater long-term accuracy, for example, by generating more reliable evidence, see generally Kaye, *The Paradox of the Gate-crasher*, *supra* note 1. This is just another way to accommodate such restrictions in an expected utility model.

evidence.”²⁴ In each case, the odds of liability exceed any numerical threshold that might plausibly be claimed to express the relevant burden of proof. In each, those odds derive from a base-rate, from the frequency with which an event or condition associated with liability is found in some appropriate population: the defendant attended a rodeo at which 501 of the 1,000 spectators crashed the gate (“gate-crasher”),²⁵ was exercising in the prison yard when twenty-four of the twenty-five inmates present murdered a guard (“prison yard”),²⁶ owns sixty percent of the cabs in the town where the plaintiff was struck by a hit-and-run cab (“hackcident”),²⁷ or flies sixty percent of the jet flights over a farm damaged by a sonic boom (“overflight”).²⁸ The gate-crasher and prison yard cases involve group base-rates, which give the frequency of liability in a group with which the defendant is associated; the overflight and hackcident involve individual base-rates, which give the proportion of some activity associated with liability that is attributable to the defendant.

Proponents of the Bayesian model of legal proof insist that they are not committed by their calculus to a finding of liability in these cases, since the factfinder’s degree of rational belief need not mirror the relative frequencies in the hypotheticals. Because the failure to produce other evidence may itself have probative value, the judge or jury need not find the prosecutor’s or plaintiff’s burden of proof satisfied by any given base-rate.²⁹

The authors of these hypotheticals, however, go to great lengths to make the lack of other evidence unavoidable, or “justifiable,” so that it does not create an adverse inference against the party with the burden of proof. When the lack of other evidence is adequately accounted for, and there is no danger of discouraging the discovery of more reliable evidence in similar cases, most Bayesians maintain that it is proper to find the defendant liable.

Our resistance to acting as Bayesian decision theory requires helps to expose the values which constrain the use of statistical evidence. I will argue that what is objectionable is the reliance on others’ conduct, or the defendant’s past conduct, to infer his commission of a

²⁴ Kaye, *Naked Statistical Evidence*, 89 YALE L.J. 601 (1980) (Book Review).

²⁵ L.J. COHEN, *supra* note 1, at 75.

²⁶ Nesson, *Reasonable Doubt and Permissive Inferences: The Value of Complexity*, 92 HARV. L. REV. 1187, 1192-94 (1979).

²⁷ Kaye, *Justifiably, Naked Statistical Evidence*, *supra* note 6, at 487-88. Kaye attributes the example to Richard Lempert.

²⁸ Based on *Sawyer v. United States*, 148 F. Supp. 877 (M.D. Ga. 1956).

²⁹ This response does not satisfy critics who deny that base-rates contribute at all to the case against the defendant.

wrongful act. We object to this inference because it ignores the defendant's capacity to diverge from his associates or from his past, thereby demeaning his individuality and autonomy. Conversely, when the defendant's commission of a wrongful act is conceded or not at issue, or when the inference that he committed the act is not based on the frequency of such misconduct, we may not object to relying on statistical evidence to impose liability.

The basic idea is this: when we infer that the defendant acted like a majority of the people in the stadium or prison yard, we treat him as someone randomly selected from the crowd, who can be assumed to have engaged in the modal behavior. When we infer that the defendant caused this accident because he caused a majority of prior accidents or owned a majority of cabs, we treat his present misconduct as inferable from his past, or his accident rate from his ownership rate. In many contexts, these would be reasonable inferences to make in the absence of other information. But they are felt to be inconsistent with the law's commitment to treat the defendant as an autonomous individual, free to determine and alter his conduct at each moment. Bayesians may find it highly perverse to express this commitment by sacrificing relevant information, somewhat as critics of the exclusionary rule question whether the constable's blunder should deprive the court of reliable evidence. My purpose is not to defend the exclusion of base-rate evidence, but merely to point to a concern for autonomy as its source.

An implication of my position is that statistical proof will be more acceptable when its use does not involve an inference to the defendant's conduct from the frequency of similar conduct. No such inference is made in relying on evidence about the relative frequency of a physical characteristic like a ballistic marking or a fingerprint, although that evidence may be equally statistical. My claim is that what we object to in the base-rate cases is not, or not only, the statistical character of the proof, but the source and character of the statistics. Since other values may be offended by different forms of statistical proof, I am less confident of the converse: that statistical proof will be acceptable if it does not offend the defendant's autonomy in the manner I have described.

To advance my position, I will challenge the interpretations of the base-rate hypotheticals offered by defenders and critics of the Bayesian model. Defenders claim that any resistance we feel to imposing liability is an artifact of the hypotheticals, reflecting the lack of other evidence. Critics claim that the hypotheticals provoke resistance because numerical probabilities cannot sustain belief. Against

the former, I will argue that our resistance to base-rate liability cannot be fully explained by concerns about the reliability or completeness of the evidence; against the latter, I will argue that we are willing to impose liability without belief when the defendant's autonomy is not demeaned. In developing this argument, I will consider objections to the group and individual base-rate cases separately, since the two types of base-rates may not be equally objectionable, or may offend different values.

B. *Suspect Variables and Group Base-Rates*

Adrian Zuckerman complains that proof by base rate is "analogous to corporate punishment, as the judgment will rest on nothing more than the defendant's membership in a group most of whose members did not pay. . . . [It] hold[s] an entire social group responsible for the transgressions of its individual members."³⁰ As stated, this objection appears to confuse the reason for imposing liability with the explanation for imposing it mistakenly: The reason for imposing liability is simply that the defendant is, on the available facts, likely to be liable; if he is not liable, the explanation for the mistake is that he had the misfortune to fall in with a tort-feasing crowd. A reliance on group base-rates does not even operate extensionally like a rule of corporate liability: the defendant is not liable unless a *majority* of the group engages in misconduct. Because the finding against the defendant is not based on a principle of corporate liability, a rejection of that finding cannot rest on a denial of that principle.

Rather, the rejection of liability based on group frequencies seems to be based on a belief that certain information should not be used to assess liability, even if it minimizes expected error.³¹ We sometimes prohibit public officials from justifying their actions toward individuals even in part by generalizations about the groups to which they belong. Thus, Judge Fuchsberg of the New York Court of Appeals in *People v. McRay*³² objected to considering neighborhood crime rates even as one factor in establishing probable cause for an arrest:

Arrests are made of individuals, not of neighborhoods. When we single out the latter, more likely than not congested areas peopled

³⁰ Zuckerman, *Law, Fact or Justice?*, 66 B.U.L. REV. 487, 499 (1986).

³¹ The concern about corporate liability could also reflect the fact that the logic by which liability is imposed in the group base-rate cases would lead to a finding of liability against all members of the group, and hence to certain error. In contrast, the credibility of eyewitnesses would be severely reduced if the number of people they identified exceeded the number of offenders, so we would not be similarly lead into absurdity.

³² 51 N.Y.2d 594, 416 N.E.2d 1015, 435 N.Y.S.2d 679 (1980).

in the main by those who are socially and economically deprived, we subject all its residents, the vast majority of whom are sure to be free of criminal taint, to an immeasurably greater risk of invasion than those who live elsewhere.³³

Nor is this constraint imposed only on agents of the state. In *Arizona Governing Committee v. Norris*,³⁴ the United States Supreme Court prohibited private employers and insurers from using sex as a basis for setting annuity benefits, even though women were likely to live, and collect, significantly longer than men. And Bernard Goetz, the New York "subway vigilante," was excoriated for his apparent reliance on the race of the four teenagers he confronted in deciding to open fire.³⁵

To explain these concerns, however, is to suggest their irrelevance to the group base-rate hypotheticals. For Judge Fuchsberg, what mattered was that the residents of poor, congested inner-city neighborhoods already bore a disproportionate share of society's burdens. In subjecting them to a higher risk of false arrest, the state was increasing rather than relieving their victimization, a perversion of its basic role. In the pension cases, the Supreme Court based its decision on the conclusion that sex was a suspect variable,³⁶ since women have suffered pervasive discrimination. And the suspicion faced by young black men in urban settings has played a significant role in consigning them to a permanent underclass.

In contrast, the individuals at the rodeo or in the prison yard have no common history or identity—it is the very fortuity of their association that makes the finding of liability seem so unreasonable. If we lived in a society where such collections of unrelated individuals were frequently subject to dragnet sweeps, we might regard random association as a "suspect variable." But this is not our social history, and it cannot be the reason for our resistance to imposing liability in the group base-rate cases.

It could be argued that *any* reliance on group frequencies to make adverse inferences about individual conduct would unfairly penalize one person for the actions of others, even when that was not its intent. L.J. Cohen seems to express this sentiment in arguing:

³³ 51 N.Y.2d at 606-07, 416 N.E.2d at 1021-22, 435 N.Y.S.2d at 686 (Fuchsberg, J., concurring).

³⁴ 463 U.S. 1073 (1983) (per curiam).

³⁵ G. FLETCHER, A CRIME OF SELF-DEFENSE 203-06 (1988); Williams, *Spirit-Murdering the Messenger: The Discourse of Finger Pointing as The Law's Response to Racism*, 42 U. MIAMI L. REV. 127, 152-54 (1987).

³⁶ *Los Angeles Dep't of Power & Water v. Manhart*, 435 U.S. 708 (1978); *Arizona Governing Committee v. Norris*, 463 U.S. 1073 (1983).

A person who deliberately runs his life in such a way as not to commit torts or break contracts is not to be put at risk by the probative procedures of the system just because he falls into a category of which the majority happen to be tort-feasors or contract-breakers.³⁷

What is objectionable is not the fact that the person's liability is based on mere probabilities; what matters is the source of those probabilities. His attempt to lead a life beyond legal reproach has been subverted, not by his general bad luck, but by the misconduct of his statistical "cellmates." Because we require the legal system to treat him as an autonomous individual, we reject information on the conduct of his neighbors or associates, even if using that information would reduce expected error.

The independence of this objection from those made against the probabilistic modeling of rational belief is suggested by the fact that our misgivings are not limited to the *diagnostic* use of group base-rates. We also have strong misgivings about the *predictive* use of group base-rates in risk classification. Since most predictions do not even purport to express beliefs about specific actions, as critics of the Bayesian model would be the first to insist, these misgivings cannot arise from the inadequacy of that model to explain rational belief.

The predictive use of base-rates is, however, two-edged. When the classification is not suspect, we sometimes tolerate the use of group base-rates in predictive tasks, even in assessing the likelihood that we will incur liability. Most automobile insurance plans, for example, charge higher premiums to single male drivers under twenty-five than to other drivers. While this difference "punishes" safe young male drivers for the actions of their irresponsible cohorts, most of us accept the need to base premiums on such group variables. Moreover, we accept economic and practical constraints on how finely the classes may be drawn, even if we think that present classes are too coarse or heterogeneous.³⁸

One reason we may be less tolerant of group base-rates in liability determination than risk classification is that the consequences are generally more severe: criminal, and even civil liability, is usually more costly and stigmatizing than higher premiums or even the outright denial of coverage. But this cannot be a complete explanation, since the stakes involved in the two enterprises are far more variable than our resistance to using group base-rates. The denial of health insur-

³⁷ Cohen, *Reply to Shoeman*, *supra* note 1, at 94.

³⁸ For a discussion of accuracy-equity in risk-classification, see K. ABRAHAM, *DISTRIBUTING RISK* ch. 5 (1987).

ance may be at least as costly and degrading as a finding of liability for breach of contract, but we might still find a reliance on group base-rates no more, and possibly less, acceptable in the contract litigation.

The difference may be better accounted for by the distinct cognitive tasks involved predicting the future and determining the past: while the insurer need not believe that a specific young male driver poses a higher than average risk of accident, a factfinder must believe that a preponderance of the evidence supports the defendant's liability, and that belief cannot rest exclusively on group base-rates. This account seems to undermine the distinction between epistemic and moral objections to the use of statistical evidence. It could be argued that the *moral* difference between the use of statistical evidence in liability determination and risk classification was just that the former, but not the latter, required a belief which statistical evidence could not sustain.³⁹

Two points can be made in response. First, an explanation based on the distinction between prediction and fact finding suffers from the same rigidity as an explanation in terms of differential consequences. We reject many predictive as well as liability-determining (or "diagnostic") uses of group base-rates, and the difference in our response seems too much a matter of degree to reflect a sharp epistemic dichotomy. We may sometimes object as strongly to a very damaging predictive use of group base-rates (e.g., in setting bail) as well as to a less harmful diagnostic use (e.g., in finding the defendant liable for a parking violation). Still, there is an overall difference in our response to predictive and diagnostic uses of group base-rates that needs to be explained.

The explanation I wish to develop takes account of the predictive or diagnostic character of the decision in a different way than the epistemic objection. The contingency of the future is morally relevant not because it allows us to withhold belief, but because it allows the agent to disassociate himself from the group and display his autonomy.⁴⁰ A person forecast to misbehave based on his group member-

³⁹ It may also be, as a psychological matter, that we have a keener sense of the deficiency of base-rate evidence in liability determination than in prediction, because a wider array of evidence is usually or potentially available in the former—we may assess the sufficiency of evidence by the type and strength of evidence generally or ideally available in similar judgment tasks, whether or not such evidence could be expected in the case at hand. But while this implicit comparison may explain, it does not clearly justify our refusal to find liability when circumstances preclude the kind of evidence that is generally or ideally available.

⁴⁰ Someone who favored an epistemic account might respond that we still object to the use of group base-rates when the defendant *has* the opportunity to disassociate himself by offering evidence that he diverged from the group norm. If we exclude base-rates even when other,

ship can defy the odds by diverging from the group norm, vindicating his autonomy, if not lowering his premiums. There is no analogous possibility in liability determination: the agent's subsequent action cannot discredit a judgment against him in the direct and unambiguous way that it can defy a prediction. While a factual judgment may be as qualified as a prediction, the defendant lacks the same capacity to except himself from it.

A related explanation for our greater resistance to using group base-rates in liability determination concerns the scope of the risk to which it exposes us. While the occasions for the predictive uses of group base-rates are limited and often under the agent's control, for example, applying for a mortgage or an insurance policy, the occasions for liability determination do not have such obvious limits. We rarely can control, or even foresee, the conduct of the people around us; as we go about our daily business, we repeatedly enter and leave zones of high-density misconduct. It is disturbing to think that, simply by passing through, we can fall victim not only to that misconduct, but to a false claim of engaging in it ourselves. Worse, we may be grouped in an indefinite number of ways for statistical analysis; there is no map which can tell us which neighborhoods to avoid.⁴¹ The predictive use of group base-rates, in contrast, seems to pose a

more individualized evidence is available (which many Bayesians would deny), it might suggest that our main reason for rejecting base-rates is that they do not engender rational belief, either by themselves or in combination with other evidence. But the moral account I favor could also explain the complete exclusion of base-rates. We may object to letting the conduct of other people count against the defendant at all, effectively shifting the burden of proof to him. We may also feel that the defendant's opportunity to stand out from the group by offering individualized evidence depends on too many circumstances beyond his control, unlike his opportunity to defy a group-based prediction by his subsequent conduct. But the moral offense in admitting group base-rates in combination with other, more individualized evidence would be less severe than in relying on it exclusively.

The greater offense in relying exclusively on base-rate evidence may explain Vince Brannigan's observation that what is objectionable in the group base-rate cases is the *certainty* that at least one of the defendants did not act wrongfully. Brannigan, *Probability and Toxic Torts: The Blue Bus Hits Schroedinger's Cat 6* (unpublished manuscript) (copy on file at Cardozo Law Review). If we lacked that certainty, it would be because we had evidence that all the defendants were liable, for example, one of four eyewitnesses claims to have seen all twenty-five inmates assault the guard. But in such a case, we would have some other evidence, however weak, of the defendant's liability—we would not be relying exclusively on a base-rate. Still, the extent of reliance makes the moral offense a matter of degree. Brannigan thus seems mistaken in claiming that we take a "binary" approach, objecting to base rates only when we are certain of the non-liability of at least one defendant.

⁴¹ We may feel particularly indignant about a prosecutor's use of his overall conviction rate against the defendant just because the prosecutor himself has placed the defendant into the group on whose base-rate he relies. We may also regard criminal defendants as a suspect class, as a traditionally despised and mistreated group deserving special protection.

less pervasive threat, however much it may limit our freedom and opportunities.

The feeling of vulnerability aroused by the diagnostic use of group base-rates is somewhat akin to that provoked by Jon Harris's survival lottery, in which each person's organs are subject to the life-maximizing imperatives of the whole society.⁴² Many or most of us would reject such a scheme even if we believed it would increase our life expectancy, not only because we feel proprietary about our organs but because there is something dreadful about having our survival depend on the vicissitudes of so many other lives. While the risk of false liability is less grave, the prospect of facing it from any fortuitous association is deeply disquieting. Many of us would rather face higher overall odds of false liability from a more limited range of sources.

Thus, the reliance on group base-rates to impose liability triggers very strong self-protective reflexes. In rejecting the use of group base-rates to impose liability, we defend our conception of ourselves as autonomous individuals whose fates should depend on our own choices and conduct, and on our own mental and physical endowment.⁴³

A concern for this self-conception, however, might seem too vague and abstract to explain the outrage we feel at the use of a group base-rate in cases like the prison yard killing. But while the perceived insult to our individuality and autonomy may not *fully* explain our vehement response to such cases, I suggest that the residue is attributable to deficiencies in the hypotheticals that Bayesians like David Kaye and Richard Lempert have already pointed out. It is one thing to stipulate that no other evidence is available, another to make it plausible. Surely there must have been *some* additional evidence against *some* of the twenty-four perpetrators, if not fingerprints, bloodstains, or hair or clothing residues, then a recent record of discontent, violence, or hostility toward the victim. We may simply be unable to suspend our disbelief that the state cannot come up with

⁴² Harris, *The Survival Lottery*, 50 *PHILOSOPHY* 81 (1975).

⁴³ See T. NAGEL, *THE VIEW FROM NOWHERE* (1986), which provides:

[O]ur ordinary conception of autonomy . . . presents itself . . . as the belief that antecedent circumstances, including the condition of the agent, leave some of the things we will do undetermined: they are determined only by our choices, which are motivationally explicable but not themselves causally determined.

Id. at 114. The use of group base-rates to establish liability might also threaten vital, constitutionally-protected activities, as Ferdinand Schoeman suggests with the example of a finding that *Lolita* readers are twenty-five times more likely to be child molesters than members of the general population. The use of that statistic in a child-abuse case would expose the defendant to liability for the constitutionally protected activity of reading. Schoeman, *Statistical vs. Direct Evidence*, *supra* note 1, at 192-94. The concern for a "chilling effect" on such protected activities provides a strong but narrow basis for rejecting the use of group base-rates.

such evidence, and we may feel that it is deeply wrong, on quasi-*Brady* grounds, to fail to develop evidence that would lower the odds against some defendants by implicating others.

The danger in this recourse is that it may explain too much: a Bayesian would argue that if we could really accept the stipulation that no other evidence was available (and dismiss any "spoliation" concerns about the effect of permitting liability on the development of better evidence in other cases), we would on balance support a finding of liability, despite the insult to the defendant's autonomy. Lempert invokes market share liability to make this point, claiming that we accept naked statistics in toxic tort cases just because of the obvious unavailability of more specific evidence and the limited danger of spoliation.⁴⁴ I will argue that the use of base-rates in such cases also does not pose the same threat to the defendant's individuality and autonomy, but I do not think I can decisively reject the alternative explanation.

C. *Individual Base-Rates, Propensities, and Self-Determination*

The threats to individuality, autonomy, and security posed by the use of group base-rates to impose liability cannot account for our discomfort with cases in which the base-rate does not express the frequency of misconduct in a random collection of individuals, but rather the frequency with which the individual himself engages in potentially injurious conduct: running cabs or overflights.⁴⁵ The concerns raised by individual base-rates seem quite distinct from those raised by group frequencies; the defendant's share of the cab fleet, or his proportion of overflights, expose him to a limited, well-defined risk that he will suffer false findings liability for a certain kind of conduct.⁴⁶ Moreover, the defendant can be seen as partly responsible, in some sense, for that risk. If he has the largest cab or jet fleet, he has,

⁴⁴ Lempert, *The New Evidence Scholarship*, *supra* note 6, at 60-102.

⁴⁵ The hackcident and overflight are actually poor examples for discussing the use of individual base-rates, since the "individual" in question is a corporate entity, only vicariously liable for the actions of its employees. I use these cases because they are widely discussed in the literature and because any objections we have to imposing liability on such corporate defendants based on market share or past conduct should apply a fortiori to flesh-and-blood individuals.

⁴⁶ It might be argued that the defendant's liability in the individual base-rate cases also depended on the behavior of other people; in the hackcident, on his competitors. But what exposes him to liability is not their misconduct: the more cabs owned by his competitors, or the more accidents caused by them, the *less* likely the defendant would appear to be liable. Moreover, the defendant is not lumped together with others, as in the group base-rate cases, but distinguished from them. Thus, the use of the defendant's market share or accident record does not threaten his individuality, but only, I will argue, his autonomy.

however blamelessly, made himself an object of suspicion for any injury caused by a cab or jet in his territory.

One common feature in the group and individual base-rate cases is the absence of a causal explanation for the defendant's alleged misconduct. Cohen notes that the relative frequency of gate-crashing among the rodeo spectators reveals nothing about the propensity of individual spectators to gatecrash.⁴⁷ Joel Feinberg goes even further:

[S]tatistical discrimination . . . despite its effectiveness in reducing harm, is obviously illegitimate, and the reason is clear. The correlation between statistical class membership and a specified type of behavior . . . does not connect that behavior to any causally relevant factor operating in each member of the class.⁴⁸

Similarly, the defendant's share of cabs or flights, while providing information specific to him, reveals nothing about a propensity for accidents. Studies by psychologists have shown that in strictly predictive tasks, people make greater use of base-rates that have causal significance,⁴⁹ suggesting that even in predicting events, people seek to explain them.

But while it might have some psychological appeal to require proof of an individual causal propensity, that requirement is not satisfied in many conventional cases, nor does its satisfaction make the imposition of liability in base-rate cases acceptable. A standard eyewitness or circumstantial case may give us no clue about why or how the defendant acted as he did; as prosecutors are fond of telling juries, the state need not establish a motive.⁵⁰ Even Ronald Allen, who proposes that trials be reconceptualized as competitions to present the more plausible version of events, concedes that this is not how trials are presently conceived.⁵¹

Moreover, few opponents of naked statistical evidence would be satisfied with base-rates which did suggest a propensity. Statistics showing that the Green Cab company caused sixty percent of the accidents would not be an acceptable basis for liability, even if that was a disproportionate share of accidents, for example, if Green Cab operated only twenty percent of the cabs. Yet such statistics would cer-

⁴⁷ Cohen, *Subjective Probability*, *supra* note 1, at 633-34.

⁴⁸ J. FEINBERG, HARM TO OTHERS 201 (1984) (volume 1 of Joel Feinberg's multivolume work, *The Moral Limits of the Criminal Law*).

⁴⁹ See, e.g., Bar-Hillel, *The Base-Rate Fallacy in Probability Judgments*, 44 ACTA PSYCHOLOGICA 211 (1980).

⁵⁰ Obviously, we must have evidence of a causal connection between the defendant and an event or condition if we are trying to prove that the defendant *caused* that event or condition. But causation is frequently not at issue: the dispute often concerns whether the defendant engaged in conduct that is conceded to have caused harm to the plaintiff.

⁵¹ Allen, *supra* note 3, at 49-50.

tainly suggest that Green Cabs were accident prone, providing evidence of a "causally relevant factor" operating in the defendant.⁵²

Rather, the objection to statistically-evidenced propensities, as to non-causal base-rates, is that they treat the defendant as if his present conduct could be inferred from his past conduct; as if he were determined rather than free. The reliance on market share evidence in the hackcident makes the defendant's liability depend on his volume of business. However reasonable this might be for predictive purposes, it treats the defendant as lacking control over the safety of his operation, as if he were a mechanism with a known failure rate.

The moral offense is still significant when the base-rate reflects the comparative frequency of accidents rather than the comparative volume of business. Although the defendant's past performance is more reliable for predictive purposes, its use to find liability still treats him as a mechanism: while the use of market share treats him as a standard model, with an average failure rate, the use of accident share may treat him as a defective one, with a high failure rate. In either case, the use of the base-rate denies the defendant's capacity for self-determination.⁵³

Our discomfort with relying on individual base-rates, causal or not, may have much the same source as our discomfort with other individualized but strictly predictive evidence. Character, habit or prior similar act evidence, though not statistical, also uses the defend-

⁵² In contrast, there would be no evidence of a propensity in the more "particularized" statistic that the Red Cab company was responsible for sixty percent of the accidents within a mile radius of the accident, since that figure might represent a disproportionately large or small share of its traffic.

⁵³ Cohen offers an apparent counter-example to this account of individual base-rates in the case of *TNT Management*, where Judge Murphy discusses a hypothetical in which a truck carrying two TNT employees and one non-employee is demolished in an accident caused by driver negligence, leaving only the $\frac{2}{3}$ probability that a TNT employee was driving and hence that TNT was vicariously liable for the damages. Cohen, *Subjective Probability*, *supra* note 1, at 628. Why should TNT's share of the potential drivers be any less objectionable as evidence of liability than Green Cab's share of the cabs in town? One possibility is that the fortuitous base-rate in *TNT* does not pose the same *recurring* threat of mistaken liability as does Green Cab's market share. But while this would explain a preference for proportional liability in the hackcident, it would not explain the rejection of *any* liability there. (Besides, the circumstances in which no other evidence of cab ownership is available are so unusual as to minimize the risk of recurrence.) One moral difference between the two cases may lie in the assumptions underlying the use of the base-rate. In *TNT*, each of the three passengers was equally likely to have taken the wheel; in the "hackcident," each cab or hack was equally likely to have been involved in the accident. The former assumption seems less offensive because it concerns the innocuous threshold action of taking the wheel, while the latter concerns conduct—the cab's involvement in an accident—that cannot be readily partitioned into an innocent threshold act and a culpable consequence. If the three victims in *TNT* had been seen emerging drunk from a roadhouse, the act of taking the wheel would be culpable and the use of the base-rate to attribute that action to TNT more objectionable.

ant's prior conduct to establish his subsequent conduct. We may feel that the defendant's exposure to liability should not depend on standing indicators of propensity. The restrictions we impose on admitting prior bad acts in criminal cases may reflect a reluctance to create an underclass of "usual suspects," convicted by default in the absence of better evidence. We may feel the same concern, albeit less sharply, in civil cases, preferring to exclude the defendant's history, even if that results in less accurate judgments.

Our attitude towards *predictive* uses of individual propensity evidence, however, is strikingly different. If the moral standards for evaluating legal proof were the same as those for a predictive task like risk classification, statistical evidence of accident proneness would certainly be acceptable. The defendant's rating would not rest on his "status" as a member of a group, but on his "experience": on his own past performance in areas that were within his control and causally relevant to the injury in question.⁵⁴ The risk of mistakenly implicating a defendant with a history of similar misconduct might seem at least as acceptable as the risk of being falsely identified because of a common appearance. This contrast might appear to give the epistemic critic of Bayesian theory a powerful argument: if we are willing to punish an individual for his past misconduct with higher premiums, but not with an equally costly liability judgment, it must be because of the fundamentally different nature of the two "sanctions." The defendant's record, however egregious, cannot support our belief in his present liability, however much it may raise our expectation of his future liability. What prevents us from imposing liability is not fairness to the defendant, who has made himself an object of suspicion, but fidelity to our own standards for rational belief, which requires evidence that is more fully grounded in the circumstances of the case.

This argument seems stronger than the analogous one in the case of group-base rates, because the contrast between liability determination and prediction is much sharper. My response, however, is essentially the same. First, it is not clear why we should feel morally constrained about imposing liability on a past offender very likely to be liable in this case just because the evidence against him will not support a belief in his liability. As I will argue in Part II, we are not constrained by our lack of belief in cases where the defendant's wrongful acts, but not their harmful effects, are conceded.

Second, the contingency of the future is relevant not only in suspending our beliefs about the defendant's liability, but in giving him

⁵⁴ The moral significance of, and the distinction between, causation and controllability in risk-classification are discussed in K. ABRAHAMS, *supra* note 38, at ch. 6.

the opportunity to vindicate his autonomy. The defendant faced with a predictive use of propensity evidence can defy the odds by improving his conduct, thus reducing the proportion of accidents caused by his cabs or jets. There is no analogous possibility against a finding of liability: a change in the defendant's conduct after a finding of liability can almost always be taken to reflect the impact of the judgment on his subsequent conduct rather than its inaccuracy as evidence of his past or present conduct.

A third reason for regarding the moral objection to individual base-rate liability as distinct from the epistemic is that our willingness to rely on a propensity in imposing liability varies with the defendant's responsibility for acquiring or manifesting it. We would be less willing to rely on a genetic predisposition than a criminal record, even if the odds of liability we assigned on the strength of that evidence were the same.⁵⁵ We might even prefer to rely on non-propensity evidence that was less offensive to the defendant's autonomy. Thus, if there were only two possible suspects in an assault, we might prefer to base a finding of liability on the finding that one suspect's commuting route took him closer to the victim's house than on the finding that he had a stronger genetic predisposition to violence.

The refusal to rest a finding of liability exclusively on individual, as on group, base-rates also serves to limit the risk of mistaken liability to which we are exposed. While a reliance on suspicious behavior at the scene exposes us to liability only for one particular incident, a reliance on our propensity for a *type* of conduct exposes us to liability for an indefinite number of instances of that conduct. If we must suffer a mistaken finding of liability, we may prefer that it result from a singular event—an unfortunate coincidence or malicious act—rather than a factor which presents a chronic risk of the same kind of error.⁵⁶ While a reliance on mere presence in high liability zones creates an unacceptable "horizontal" risk of being found liable for being in the wrong place at the wrong time, a reliance on mere propensity creates

⁵⁵ To anticipate a possible response by Cohen, the inductive generalizations in these cases might be equally weak, in the sense that many relevant variables wouldn't have been considered equally.

⁵⁶ I do not think our concern is merely that the use of such base-rates creates an outcome bias, with the usual suspects found liable for *all* the offenses in jurisdictions where they are only responsible for the majority or plurality. I think we would object almost as strongly to the use of base-rates to impose proportional liability, which would correct for that bias. Our objection, say, to "allocating" liability among the five New York mob families by their comparative volume of criminal activity (in the absence of any agreement between them on that subject) would be twofold: first, to basing a finding about present conduct on past conduct; second, to treating crimes in the aggregate, as if liability for individual crimes did not matter.

an unacceptable "vertical" risk of being found liable for similar incidents.

D. *Res Gestae*

Is there some more general, or positive, account of the relationship the evidence must bear to the defendant, or to the incident, to make the risk of a false conviction more acceptable? The intuition that base-rate cases lack evidence specific to the case might be refined into a requirement that the defendant be implicated by (alleged) facts about the incident other than the mere occurrence of the events necessary for the offense. In conventional cases, there is always something associated with the liability-creating event that links the defendant to it. Because his liability is based on facts related to the incident, but not necessary to establish the *corpus delicti*, he can be seen as the victim of specific, occasion-bound circumstances, for example, the fact that the perpetrator looked enough like the defendant to cause a misidentification. Such circumstances are peculiar to the incident, unlikely to expose the defendant to false liability in other settings.

The difficulty lies in characterizing the relationship between the evidence and the incident needed to adequately restrict the risk of mistaken liability. We might, as suggested, require that the evidence implicating the defendant be linked to the liability-creating incident as a cause or effect of events that are not part of the *corpus delicti* but are close to it in time and space. We could call this the *res gestae* requirement for liability: the evidence against the defendant must be "borne of" the disputed incident.

The problem is that we can tease out evidence satisfying this requirement in both individual and group base-rate cases. Judith Thomson observes that in the "hackcident", we have evidence that the pedestrian was struck by a *cab*;⁵⁷ similarly, we have evidence in the "overflight" of the fact that the sable farm was damaged by a *jet*. This evidence—testimony concerning a fleeing cab or sonic boom—is caused in part by facts associated with the liability-creating events but not part of the *corpus delicti*, and it implicates the defendants as the most frequent drivers or fliers. On a Bayesian analysis, the fact that the injury was inflicted by a cab or jet would increase the prior odds of liability we assigned to the defendant, with the size of the increase depending in part on the defendant's share of the cabs or overflights: the larger his share of a fixed number of cabs or jets, the lower the

⁵⁷ J. THOMSON, *Individualized Evidence*, *supra* note 15, at 232.

odds that a cab or jet would have been observed if the defendant weren't liable.

In the group base-rate cases, the defendant's presence in a place of high-density misconduct is also a fact related to the specific incident, but not part of the *corpus delicti*. Reliable evidence that the defendant was at the rodeo or in the prison yard makes him more likely than a random member of the general or prison population to have engaged in gate-crashing or assault, raising the prior odds that he is liable—this is Lempert's suggestion for making evidence of the defendant's attendance at the rodeo relevant to his liability.⁵⁸ Moreover, the evidence that he was at the rodeo or in the prison yard would be, in part, a consequence of his having engaged in gate-crashing or assault.

In terms of its relevance and causal relations, this evidence is no different than fingerprint or other trace evidence, whose probative value depends on the proportion of the population which shares some feature with the defendant. If we reject base-rate evidence, then, it cannot be because it fails to be specific or relevant to the case (though a Bayesian analysis would show its relevance to be more complicated than it might appear).⁵⁹ Rather, what is offensive is the *source* of its probative value: the conduct of others in the group cases, and the defendant's past activity in the individual cases. The odds might not been sufficient for liability if more spectators had paid or more inmates had kept out of the assault; if the defendant owned less of the cab or jet fleet. We object to making liability depend on *these* fortuities.

While the probative value of trace evidence is equally fortuitous, its use is less demeaning. The less common the physical residues which match the defendant or his possessions, the more probative the match will be against him. If he is falsely held liable, however, he will simply be the victim of an unfortunate coincidence: of having had facial features, a car, or a gun similar to the offender's. A reliance on the distribution of physical markings or possessions does not deny the defendant's individuality or autonomy in the same way as a reliance

⁵⁸ Lempert, *The New Evidence Scholarship*, *supra* note 6 at, 454-56, n.44. While it may seem artificial to treat the defendant's rodeo attendance as evidence of gate-crashing, since only spectators are suspect, it seems natural to treat the defendant's presence in the prison yard as evidence of his involvement in the killing, since the whole inmate population might initially be suspect.

⁵⁹ The relevance of group base-rates, treated as subsequent evidence, would be more complicated because Bayes' Theorem does not compare the frequency of misconduct in the group against the rest of the population, but the frequency of group membership among those engaged in misconduct against those who are not.

on group or individual base-rates: it does not make his liability depend on the frequency of misconduct around him or on the dead hand of his own past.

II. NAKED STATISTICAL EVIDENCE IN CONTEMPORARY LITIGATION

In Part I, I argued that the use of group or individual base-rates is objectionable when it denies the defendant's individuality or autonomy, or exposes him to a wide-ranging risk of mistaken liability. In the rest of the paper, I will consider the converse: that the use of base-rates and other statistical evidence is not objectionable when it does not give such offense or pose such a threat. Specifically, I will argue that (1) we are willing to accept base-rate proof on issues other than the defendant's commission of a tortious act, and (2) we are willing to accept statistical proof of a tortious act when that proof is not based on the frequency of such misconduct by the defendant or his neighbors, but rather on the distribution of a physical characteristic in the population or the accuracy of identification or forensic evidence.

In this part of the paper, I will address the first claim. In three types of cases, some courts have relied on naked statistics to assess liability for the contested consequences of conceded misconduct: (1) lost-chance-of-recovery cases, where the defendant, usually a doctor, destroys the plaintiff's quantifiable chance of recovery;⁶⁰ (2) indeterminate-defendant cases, where the plaintiff can show that a particular toxic substance caused his affliction but cannot identify the manufacturer who produced the substance to which he was exposed; and (3) indeterminate-plaintiff cases, where it is known that exposure to a toxic substance increases the incidence of a naturally occurring disease, but it is not possible to identify which victims of that disease would not have been afflicted without exposure.⁶¹ In all three types of cases, courts have not only based liability on naked statistics, but shifted from a preponderance to a proportionality rule, basing the defendant's share of the damages on the odds that he caused the injury

⁶⁰ See King, *Causation, Valuation, and Chance in Personal Injury Torts Involving Preexisting Conditions and Future Consequences*, 90 YALE L.J. 1353 (1981).

⁶¹ See Delgado, *Beyond Sindell: Relaxation of Cause-in-Fact Rules for Indeterminate Causation*, 70 CALIF. L. REV. 881 (1982), for the indeterminate defendant/plaintiff classification. I ignore discrimination cases with nakedly statistical evidence, since the defendant's misconduct is *not* conceded and the statistics are offered as evidence of his intent, as reflected in a pattern of employment. The odds are expressed in the *P*-statistic—the probability that such a pattern could have been generated without discriminatory intent, by chance. Formally, they function like the probabilities accompanying trace evidence—that the evidence in question could have had another source.

or on his share of the risky activity, a measure which, in the absence of other information, is equivalent to those odds.⁶² I will focus on indeterminate-defendant cases, which rely on the defendant's share of the risky activity to assess his liability, much like the "hackcident" and "overflight."

On the moral account I have been developing, the critical difference between the indeterminate-defendant and base-rate cases lies in the assumptions we make in using statistical evidence to impose liability. While it demeans the defendant's autonomy to assume that his share of wrongful acts corresponds to his share of the market, it is innocuous to assume that the harm caused by his conceded misconduct is proportionate to his share of misconduct.⁶³ Because the occurrence of harm is beyond the defendant's control and carries no further moral onus, the use of a base-rate to determine liability poses no threat to the defendant's autonomy. It is just because further acts *are* needed for harm in the hackcident and overflight that we object to imposing liability. While operating cabs or jets may have a known accident rate, each accident results from tortious actions and omissions, and we object to proof which treats such acts and omissions as an inevitable incident of the defendant's business activity.⁶⁴

⁶² The most obvious distinction between these cases is that in lost-chance cases, the defendant raised the risk to a certainty, which may be psychologically and perhaps morally different than merely increasing a prior risk, or creating a risk where none previously existed. But there is a distinction cutting the other way: in the toxic tort cases, the defendant has indisputably caused actual harm—the question is only to whom. Yet although the factual uncertainty may seem broader in the lost-chance cases, it is there that the courts first awarded damages proportionate to the probability that the defendant had actually caused harm.

⁶³ In this vein, Vincent Brannigan has suggested that we would not object to finding the Green Cab company liable if it was agreed that all the cabs in town had been driven negligently on the night of the hackcident. Brannigan, *supra* note 40, at 6.

⁶⁴ A Bayesian might be tempted to explain this difference by the differing magnitude of the errors in the two kinds of cases. In the base-rate hypotheticals, we risk imposing liability on a defendant who may have done nothing to cause harm or increase the risk of harm, while in the toxic tort cases, the defendant is conceded to have wrongfully risked harm; by finding him liable for an injury his misconduct could have caused, we merely deprive him of a gratuitous benefit conferred by chance. In contrast, we would risk errors of the same magnitude in *refusing* to impose liability in the two kinds of cases, denying recovery to a plaintiff injured by the defendant. The injury would be greater in the base-rate hypotheticals only if it were aggravated by the defendant's refusal to admit his commission of a wrongful act, but it would be hard to find such aggravation cases where the defendant lacked firsthand knowledge of the incident, as in the overflight and hackcident.

This difference in consequences, however, cannot fully account for our greater reluctance to use base-rates in the hypothetical cases. First, as I will argue in Part III, we are willing to rely on other kinds of statistics to prove the defendant's commission of a wrongful act. Second, we would still feel queasy about relying on base-rate evidence in the hypothetical cases if the defendant somehow turned out to be liable. Even though we would not have committed an error at all, we would feel that we had obtained the right result for the wrong reason. While a utilitarian can always treat our misgivings about improper means as negative consequences,

What makes the statistical inference objectionable is not merely that the act required for liability is voluntary, but also that it is wrongful: it is the use of a group or individual base-rate to find *misconduct* that offends the defendant's autonomy. This position has several interesting implications and extensions for statistical proof:

(1) If liability were truly strict, based on acts regarded as utterly without fault, we would be far more tolerant of base-rate proof. Thus, if the plaintiff had been injured by flying debris from one of two blasting operations, both conducted as safely as possible but classified as "ultrahazardous," we might accept base-rate evidence about the blasting frequency to determine liability.

(2) If the physical act itself was conceded, we would strongly object to the use of group base-rates evidence to establish *mens rea*. Thus, if the defendant nurse claimed that he had poisoned the patient accidentally, we would reject evidence that nine out of ten of such hospital poisonings were deliberate. (We might, however, accept evidence that the defendant had deliberately poisoned several other patients; while we would be using past conduct to establish present conduct, the defendant's history of deliberate poisonings would be evidence of a continuing project, not a mere propensity).

(3) If the plaintiff's claim rested on morally *praiseworthy* acts, we might also object to the use of group or individual base-rates to establish his entitlement. Thus, if the defendant promised to reward the cab company whose driver scared off his would-be mugger, we would object to rewarding the Green Cab company on the basis of its greater market share; we object to the use of base-rates to infer any morally significant act, whether wrongful or commendable.

If the use of base-rate evidence is more acceptable to establish *consequences* of a conceded act than the act itself, what of its use to establish *circumstances* necessary for liability? (Roughly, a *consequence* is a condition caused by the defendant's action, while a *circumstance* is a pre-existing condition. The distinction is vague but familiar, and I see no harm in employing it in this context.) The United States Supreme Court has upheld the (rebuttable) presumption that all heroin is imported, an assumption based on the high proportion of seized heroin that is imported.⁶⁵ This presumption effectively allows proof by naked statistical evidence of an element of

that is not the way we see our misgivings. We see them as concerns to be addressed, not consequences to be reckoned with. As critics of utilitarianism have pointed out, we can only treat scruples as consequences by alienating ourselves from our own internal process of decision making.

⁶⁵ *Turner v. United States*, 396 U.S. 398 (1970).

a federal narcotics offense. While the defendant's liability depends on the activities of other drug dealers, the use of this presumption does not demean his autonomy. But what if the "circumstances" were more central to the offense—like the very identity of the substance as a narcotic? Assume that the defendant conceded selling what he fully believed to be heroin, and that his seized stash was placed in a police lab along with twenty-four other stashes. Reliable tests showed that twenty-four of the twenty-five were heroin but that one was talcum powder. The relevant attempt law provides an impossibility defense for non-narcotic substances. Before the reports can be filed, the lab holding the drugs is torched by narco-terrorists (so that the state is not responsible for the lost evidence). Can the defendant be convicted on the strength of the 24-to-1 odds that what he was selling was in fact heroin?

In this revised version of the prison yard case, I suspect that most of us would feel far less reluctant than in the original case to find any one, or all, of the defendants liable; I suggest that any lingering misgivings arise from the fact that we will be certain to impose one erroneous verdict. The reason we are more willing to rely on the group base-rate in this case than in the original, I would argue, is that its use in a typical case does not offend the defendant's individuality by inferring his voluntary acts from the frequency of those acts in a group with which he is associated.⁶⁶ We would be more reluctant to use this evidence if each of the defendants was offering a "scam" defense, claiming that he or she had sold procaine hydrochloride to unsuspecting buyers. In that case, the evidence would be used to establish an act—selling heroin—that the defendant denied committing, rather than to rebut a defense of which he would have been the accidental beneficiary. It would be like convicting the defendant on the strength of a finding that twenty-four out of twenty-five scam defenses were false.⁶⁷

⁶⁶ Our willingness to impose liability may also reflect our discomfort with the impossibility defense which the lost evidence might establish. If we believe that the defendant should be liable for an attempt regardless of the actual nature of the substance he fully believed to be heroin, we may not be disturbed by his lost opportunity to raise an inappropriate defense. But we would have a similarly begrudging attitude even if we support the defense, as in statistical proof of harmful consequences beyond the defendant's control. While the occurrence of harm is hardly a "technicality" nor a defense based on its absence "inappropriate," the defendant seems almost as culpable despite the defense, a gratuitous beneficiary of circumstances beyond his control.

⁶⁷ It would be wrong to conclude, however, that statistical proof is unacceptable to establish voluntary acts or mental states and acceptable elsewhere. As I have argued, naked probabilities will sometimes be acceptable to establish identity, while there may well be uses of statistical evidence which are objectionable merely to establish circumstances or consequences, for example, while we would not object to evidence of D's marksmanship in establishing that

While the moral account I have developed explains the courts' willingness to impose liability in lost-chance and toxic tort cases based on naked statistical evidence, it does not explain their preference for proportional over all-or-nothing liability—for assigning damages in proportion to the odds that the defendant actually injured the plaintiff. If naked statistics are acceptable as proof whenever their use does not demean the defendant, why do we reject proportional division unless the defendant can be seen as having inflicted a risk? Why do we object to making the defendant liable for forty percent of the damages if the ballistics evidence leaves a forty percent probability that the bullet came from his gun? For now, I merely wish to point out that a preference for proportional liability also poses a challenge for a Bayesian interpretation of lost-chance and toxic tort cases.

For Bayesians, the acceptance of naked statistics in toxic tort cases suggests that rejection of liability in the base-rate hypotheticals arises on the unreliability and incompleteness of the evidence, not from its statistical character. Indeterminate-defendant cases offer naked statistics in settings which preclude more particularized evidence and reduce the danger of spoliation—the danger that a finding of liability would hinder the discovery of more particularized evidence in cases where it was available. The fact that courts sometimes accept naked statistical evidence in the absence of such infirmities seems to support the Bayesian model.⁶⁸

In Part I, I acknowledged that specific infirmities in the base-rate hypotheticals accounted for some of our resistance to liability, but I claimed that our primary concern was the offense to the defendant's individuality and autonomy. The difficulty in distinguishing these competing explanations is that in cases where the defendant's voluntary acts are in dispute, it is especially hard to accept the stipulation that there is no other evidence. Surely, the defendant must remember if he gate-crashed, assaulted the guard, or was involved in an accident, and there must be some evidentiary value to his recollection. If he is aware of his own innocence, a stipulation that he has no evidence to that effect seems like a gag order, or a gag. And even if "he" is a corporate entity, like the Green Cab Co., there should still be someone who has firsthand knowledge about his liability—the driver of the cab actually involved in the accident. A holocaust, or a lapse of several generations, is needed to remove these sources of evidence, and it

he hit the target he fired at, we would certainly object to statistical evidence that members of his ethnic group were particularly good marksmen. What matters is the source of the statistical evidence, and the assumptions involved in applying it to the defendant.

⁶⁸ See Lempert, *The New Evidence Scholarship*, *supra* note 6, at 61.

does so only at the price of rendering the situation too artificial and contrived to elicit robust intuitions.

It is far easier to accept the stipulation of no further evidence when the question is whether acts concededly done by the defendant had particular consequences or took place in particular circumstances: it is more plausible to suppose that the defendant knows nothing about specific consequences or circumstances than to suppose that he has no idea if he acted at all. But issues about the consequences of the defendant's actions are also ones on which a reliance on base-rate evidence does not offend the defendant's individuality or autonomy.⁶⁹

The Bayesian account also faces the problem of how to explain the courts' preference for proportional liability. As Kaye points out, overall expected error is minimized by a preponderance rule which imposes liability on the defendant most likely to be liable when it is more than fifty percent likely that *some* defendant is liable. Bayesians like Kaye explain the shift from a preponderance to a proportionality rule in terms of the long-term consequences of applying the former: in

⁶⁹ The critical importance of the disputed issue to the use of statistical evidence is suggested by a variation on the gate-crasher hypothetical proposed by Lempert, in which we seem willing to impose liability based on a group base-rate despite the difficulty of plausibly stipulating that no other evidence is available:

501 people pay to attend a rodeo. They pay their money and are allowed in but receive no stubs. Then 499 people crash the gate. The incensed manager calls off the production before it begins and does not refund the money. A suit is brought by *X* to recover the admission fee. *X* can offer only the statistical evidence and—although it is difficult to imagine the situation—his failure to offer other evidence has no implications for the likelihood that he paid his way in. Will the rodeo manager be allowed to deny recovery to *X* and everyone like him? Why should the resolution of the gate-crasher's paradox turn in the pure case on the identity of the moving party?

Lempert, *The New Evidence Scholarship*, *supra* note 6, at 462. In one respect, this case is like the lost-chance and toxic tort cases in that the defendant's wrongful conduct is conceded. While in another respect, it is quite different, the injustice to the plaintiff depends not on circumstances beyond the control of either party but on the plaintiff's acts, on whether he paid or gate-crashed.

Because the plaintiff's voluntary acts are at issue, we would not rely on the group base-rate in deciding whether, or how much, to compensate the spectators. If we required the manager to fully compensate every spectator, it would be because we thought that he should bear the burden of the uncertainty he had created by failing to return stubs, however reasonable that omission, not because a majority of the spectators had paid. We would still require full payment if a majority of the spectators had gate-crashed. If we were only willing to pay each spectator a proportional share of the ticket price, it would be because we preferred undercompensating the paying spectators to this extent to overcharging the manager and further rewarding the gate-crashers, with full compensation. The strength of this preference might vary with the proportion of paying spectators. We might even decline to charge the manager anything if only ten percent paid, but whether the paying spectators were in a minority or majority would have no independent significance.

settings of recurring injury, that rule would require one harmdoer to pay for the injuries inflicted by all the others; in settings of uncertain loss, it would overcompensate the victims and overdeter the defendants.⁷⁰ I believe, however, that we would still accept a proportional division for single injuries, where the adverse consequences of adopting a preponderance rule would be much less acute.⁷¹

Not surprisingly, critics of the Bayesian model do not find it confirmed by the reliance on base-rates in toxic tort cases. Cohen argues that these cases merely establish rules for "determining an issue on which there is no evidence." But since Cohen ridicules the suggestion that each rodeo spectator pay .501 of the ticket price, how can he require Abbott Labs to pay Sindell⁷² a share of the damages that likewise corresponds to the probability that it caused her injury? The difference between the cases cannot be in the evidence, since Cohen would insist that inductive support for the defendant's liability is utterly lacking in both cases. Rather, the difference seems to lie in the fact that Abbott is in any case guilty of the tortious act of putting a toxic drug onto the market, while the paying spectators are wholly without fault. While there may be no evidence that Abbott's drug harmed Sindell, there is no doubt that Abbott's conceded acts placed Sindell at risk, which gives us a moral basis for imposing liability lacking in the gate-crasher case.

A critic of the Bayesian model might construe the distinction between the gate-crasher and DES cases differently, denying that Abbott's conceded misconduct justified the use of base rates to find it liable for actually harming Sindell, but arguing that the risk imposed by Abbott provided an independent basis for recovery. Richard Wright suggests that proportional liability in toxic tort cases is best explained by treating risk itself as a recoverable injury: if the risk to the defendant constitutes the injury, we do not need to justify the imposition of liability by a makeshift rule, which applies only to cases where the actual victims cannot be determined.

The treatment of risk as injury has the advantage of explaining the courts' preference for proportional over all-or-nothing liability,

⁷⁰ See Kaye, *Justifiably Naked Statistical Evidence*, *supra* note 6, at 499-501.

⁷¹ A personal communication with Lempert suggests that while we may feel this way even about one-shot cases, it is because our sense of fairness rests on a projection of the long-run consequences of a preponderance rule. But most of us would reject proportional division where the defendant's basic liability was in dispute. For example, we would object to fining each rodeo spectator .501 of the admission price. Lempert must explain why consideration of the long-term consequences leads us to see proportional division as fair in one setting but not in another.

⁷² The defendant and plaintiff, respectively, in *Sindell v. Abbott Laboratories*, 26 Cal.3d 588, 607 P.2d 924, 163 Cal. Rptr. 132 (1980).

which is hard to explain on both the Bayesian model and the moral account I have been developing. The risk-as-injury approach, however, is difficult to apply to indeterminate-defendant cases. In *Summers v. Tice*,⁷³ each (negligent) hunter may have created only a slight risk of injury, say one twenty-fifth, but that risk materialized for one of them. To require each hunter to pay one-half of the damages is not to penalize him for the risk he imposed, but for the odds that *his* risk materialized. That is a different, much higher, probability, with only a tenuous connection to the probability of harm he imposed on the plaintiff. As the overall (ex ante) risk to the plaintiff increases with more hunters, the odds that the risk inflicted by the defendant materialized go down, but the ex ante risk imposed on the defendant remains constant.

In *Sindell*, the defendant's market share reflects the ex post probability that it, rather than some other DES producer, caused the injury the plaintiff suffered. But this probability is quite different than the ex ante risk Abbott Lab imposed on the yet unconceived plaintiff by putting DES on the market a generation ago. It is hard to understand, let alone assess, that ex ante risk—mediated by the decision of the plaintiff's mother to take DES—and there is no reason to treat *Sindell*'s market share as even a rough approximation. While the ex post odds of liability, like the actual occurrence of it may be an appropriate measure of damages despite its partly fortuitous character, it cannot be claimed that in imposing that measure of damages, we are making the defendant liable for the risk he created—the creation of a risk may serve as a condition for liability, but it does not provide a measure of damages.

If the analysis of inflicted risk as recoverable injury is not sufficient to explain the toxic tort cases, it may not be necessary either. Proportional division may be warranted whenever there is an appropriate basis for a compromise verdict; whenever the nature of the *dispute* (as opposed to the state of the evidence) supports a middle ground. While the defendant's market share may not reflect the risk he inflicted on the plaintiff, it does offer an equitable basis for apportioning damages, even in a one-shot injury case: the defendant is being assessed for the *share* of the risk attributable to his conceded activity, which seems a fair measure of damages.

III. NAKED STATISTICS WITHOUT BASE-RATES

The "results" of Part II were inconclusive: the willingness to re-

⁷³ 33 Cal. 2d 80, 199 P.2d 1 (1948).

solve indeterminate-defendant cases by base-rate evidence is subject to quite different interpretations by Bayesians and their critics. The former argue that these cases reveal the general willingness to accept statistical proof in the absence of concerns for missing evidence and spoliation; the latter argue that the statistics in these cases are not used as proof of liability at all, but merely as a measure of damages when liability is either conceded or imposed for "policy reasons." Against the Bayesians, I argued that it was the nature of the disputed issue, not the limited danger of spoliation, that made the use of statistical proof acceptable; against the critics, that the base-rates in the indeterminate-defendant cases functioned as proof of liability as well as a measure of damages. Given the confused and unsettled state of the law in toxic torts cases, however, they are not likely to provide a "critical test" of competing accounts of the role of probability in legal proof.

In this part of the paper, I shift to a consideration of cases where (1) the defendant's misconduct is *not* conceded, (2) the statistics offered against him clearly serve as proof of liability, not as a measure of damages, but (3) these statistics do not concern the frequency of misconduct by the defendant, or in a group with which he is associated. I will argue that while we have the same epistemic objection to imposing liability in these cases—that the evidence leaves the defendant's liability a matter of "mere luck"—we are far more willing to accept such proof, since it does not demean the defendant by inferring his misconduct from his neighbors' or his own past actions. I will review the leading epistemic critique of the Bayesian model of legal proof, developed by L.J. Cohen, to see whether it can plausibly deny that such cases share the epistemic deficiencies of the base-rate cases.

I will begin by presenting modified versions of the base-rate cases, in which we seem willing to impose liability despite the nakedly statistical character of the evidence. We can readily alter the base-rate cases so that they provide "particularized" evidence as probabilistic as the original base-rates. In the "overflight," we can suppose the sable farmer recorded the sonic-boom pattern left by the offending jet and offered undisputed expert testimony that such a pattern could be produced by only two jets: an Air Force Alpha and an Army Beta. Alphas produce this pattern sixty percent of the time they break the sound barrier; Betas, forty percent of the time. In the hackcident, we can suppose that the offending taxi left tire-tracks that could have come from sixty percent of the red fleet and forty percent of the green fleet.

In terms of the evidence presented, the revised cases are as "na-

kedly statistical" as the originals: the base-rates in the original cases are dressed in business records or observations of relative frequency, while the odds in the revised cases are clothed in expert opinion or sonic boom patterns or tire tracks.⁷⁴ While the revised cases offer particularized evidence that the defendant was actually involved in the overflight or hackcident, the correctness of a verdict based exclusively on that evidence would remain, as in the original cases, a matter of luck. The epistemic uncertainty for the factfinder is equally great, and equally quantifiable.

At one time, I believed that these revised cases could be distinguished from the originals by the introduction of ex post evidence of liability—evidence generated during or after the liability-creating event and causally dependent on it. As discussed in Part I, however, Thomson and Lempert have argued that such evidence is present in the original base-rate cases as well: we can regard an eyewitness report that the defendant was in the rodeo or prison yard, or that the plaintiff was struck by a cab, as evidence available only after the liability-generating events and explained by the putative fact that the defendant crashed the gate, assaulted the guard, or hit the plaintiff.⁷⁵

Of course, such evidence would fail to "uniquely individuate" the defendant, as Thomson demands,⁷⁶ since it could have been generated by facts consistent with the defendant's non-liability. But this is also true of ballistic markings and most other trace evidence. The difference is a matter of degree, not kind: the odds of this evidence's emerging if the defendant was not liable are simply much lower with forensic matches.

In fact, the courts have shown a willingness to tolerate verdicts resting on naked statistics not arising from a "suspect source" when the odds are sufficiently high. In *Trombetta v. California*,⁷⁷ the Supreme Court rejected a requirement that the state preserve breath samples for defense testing. *Trombetta* affirmed a conviction based solely on a breathalyzer reading of blood alcohol content ("BAC"). Assuming the accurate administration of the test, as the Court did, the state's case appears to have come down to the odds of a true over a false positive. Admittedly, these odds are high, but that is not the

⁷⁴ Nor are the probabilities any more reliable or resilient in the revised cases; it may be that the Air Force rarely uses Alphas over the sector in which the plaintiff's sable farm is located, or that most of the Red Cabs assigned to the area of the accident had recently changed to a different type of tire. In both cases, the probabilities given by the experts may be generally, but not "locally," accurate.

⁷⁵ *Supra* notes 56-57 and accompanying text.

⁷⁶ J. THOMSON, *Individualized Evidence*, *supra* note 15, at 255.

⁷⁷ 467 U.S. 479 (1984).

point; the machine will give false positive readings in a known or estimable percentage of cases. In states like New York, where driving above a specified BAC is a per se violation of the statute,⁷⁸ the case against the defendant may be exclusively statistical. But, in contrast to the base-rate cases discussed in Part I, the defendant's liability rests on a statistical inference about the behavior of a machine, not about his own voluntary conduct.⁷⁹

Trombetta is a case where the concern for spoliation was central and explicit—the failure to preserve the breath ampoule deprived the defendant and the court of a means for checking the reliability of the reading on which the defendant's liability was based. Yet the Court not only upheld the verdict, but refused to require the preservation of breath samples *prospectively*. If a concern for more reliable evidence lay behind our resistance to base-rate liability, we might have expected a different result.

Thus, I believe that cases like *Trombetta* suggest by “negative implication” that our principal concern in the base-rate cases is neither a concern for missing evidence nor a dependence on “mere luck.” If statistical evidence does not come from an objectionable source, like group or individual base-rates, we are willing to impose liability even when there is a danger of spoliation or an obvious dependence on luck. There is, however, an alternative we need to consider: that evidence is sufficient to impose liability only if it is adequate to ground belief. L.J. Cohen argues that the rules of legal

⁷⁸ N.Y. VEH. AND TRAF. LAW § 1192(2) (McKinney 1986 & Supp. 1991).

⁷⁹ Similarly, in a Swedish case cited by Tribe, a conviction for overtime parking rested on the very low odds that the car's tire air valves would have been in the same position if, as the defendant claimed, he had driven away and returned to the same spot. Tribe, *Trial by Mathematics*, *supra* note 1, at 1340. While the appellate court found the odds offered at trial low enough to leave a reasonable doubt, it suggested that reasonable doubt could have been eliminated by higher odds. *Id.* Since the precise rotation of his car's tires is outside the defendant's knowledge or control, the use of such tire-rotation statistics would not offend his autonomy. *Id.*

A reliance on tire-rotation statistics might seem even less problematic than a reliance on the error rate of the breathalyzer, to which operator error may contribute. However, I think that even if operator error were the only possible source of inaccuracy, a reliance on the breathalyzer reading would be much more acceptable than the uses of group or individual base-rates discussed in Part I. We are willing to regard people in some capacities as automata, with fixed error rates from which inferences may be drawn about *other* people's misconduct. We do not object to treating people this way when they are functioning as machines; for example, as quality control inspectors on an assembly line. We would, however, object to relying on a fixed rate of morally significant misconduct, like the operator's perjury rate. We would also object if the nature of the case *made* the operator's error morally significant; for example, if the operator himself were being sued by a defendant claiming to have been falsely implicated, we would object to resolving the case for the operator based on his high overall rate of correct readings.

proof establish a process of hypothesis testing, which requires the plaintiff or prosecutor to exclude all plausible exceptions and qualifications to a causal generalization supporting the defendant's liability.⁸⁰ On Cohen's approach, the kind of proof found in *Trombetta* is acceptable whenever it excludes any plausible reason to doubt the reliability of the test results, and thereby grounds a belief in the defendant's liability.

A. *Baconian Induction and the Justification of False Liability*

L.J. Cohen argues that legal proof proceeds in the manner of scientific or lay induction: the plaintiff or prosecutor offers a causal generalization or generalizations to the effect that "all *R*'s are *S*'s," where *S* is what he needs to establish, and *R*, the evidence he presents.⁸¹ The trial process tests this generalization against a series of relevant variables: factors that are known to falsify or weaken it. If the generalization, or a modified version of it, survives these tests, the plaintiff or prosecutor prevails; if it does not, the defendant does.⁸²

On an inductivist approach, the defendant cannot be found liable in the base-rate hypotheticals discussed in Part I simply because he has not been brought under any causal generalization. In the gate-crasher hypothetical, for example, the plaintiff does not even offer "any inductively supported generalization from which it could be inferred that [the defendant] did not pay for admission,"⁸³ let alone attempt to rule out exceptions to such a generalization. The accidental frequencies found in the base-rate hypotheticals do not constitute evidence at all.⁸⁴

An inductivist approach measures the strength of the evidence by its exhaustiveness: by the number of relevant variables the generalization has been tested against; the number of exceptions that have been accounted for.⁸⁵ Proof by a preponderance of the evidence requires that the generalization survive the defendant's attempts to discredit it, a condition that may or may not be associated with a greater than fifty percent probability that the generalization is valid. Proof beyond a reasonable doubt requires a generalization to survive testing by all relevant variables, a process which may yield a very high probability of liability but is not measured by that probability.⁸⁶ While a high

⁸⁰ L.J. COHEN, *supra* note 1, at 245-56.

⁸¹ *Id.* at 121-28.

⁸² *Id.* at 121-28, 245-56.

⁸³ *Id.* at 271.

⁸⁴ *Id.* at 271.

⁸⁵ *Id.* at 129-40.

⁸⁶ *Id.* at 245-56. The antecedent of an inductive generalization can consist of *ex post* or *ex*

probability is no guarantee of inductive completeness, a low probability may reflect the failure to test the generalization with variables likely to discredit it.

Cohen recognizes that a plaintiff's or prosecutor's case may be largely based on trace or other ex post evidence which yields a very high numerical probability of guilt, but he maintains that it is not that high probability which satisfies the relevant burden of proof. Rather, it is the failure to weaken the inference, for example, by showing that hairs found at the scene could have come from many people besides the defendant, or to provide an innocent explanation for their presence, for example, a social visit by the defendant the day before.⁸⁷

In cases involving fingerprint and ballistic matches, Cohen would maintain that what satisfied the relevant burden of proof was not the high numerical probability of inclusion, but the lack of any plausible basis for exclusion. The fingerprint expert who finds a match on the minimum number of features is claiming that no two people, let alone two possible perpetrators, could match on all those features; he offers his finding as a practical certainty.⁸⁸

Cohen would argue that any attempt to define the particularity of admissible evidence is doomed to failure: what matters is not (merely) the relationship between the evidence and the incident or the defendant, but the process by which the evidence is brought to bear on the issue in dispute. Thus, Cohen rejects the argument that group base-rates are unacceptable as proof because they do not focus on the defendant stating:

The "focus" theory . . . does not succeed in explaining why a quantitative mathematical probability may not be valid evidence in relation to a single individual in some cases but not in others. The real explanation seems to be, as I suggested, that a quantitative mathematical probability may, if sufficiently high, be valid evidence in relation to a single individual when it is rooted in the causal process of events in the world at large and so can fit into the Baconian

ante evidence, although it may often be easier to discredit or impeach a generalization based solely on the latter. There are an indefinite number of variables required to connect an antecedent condition to the alleged result, and doubts about any one of them may be fatal to the plaintiff's or prosecutor's case. Thus, ex post evidence may enjoy a practical advantage over ex ante evidence, but there is nothing in theory to prevent a case from being based entirely on the latter, and no objection in principle to mixing the two kinds of evidence. Thus, although Wright invokes Cohen in rejecting naked statistics and ex ante probabilities, their accounts of legal proof differ significantly.

⁸⁷ Cohen, *The Role of Evidential Weight in Criminal Proof*, *supra* note 1, at 123-24.

⁸⁸ *Id.* In the revised hypotheticals offered against Wright, where there is a substantial probability that the sonic boom or tire tracks were left by someone other than the defendant, Cohen would probably maintain that merely by presenting the alternative, the defendant would place the burden of excluding it on the plaintiff.

framework of reasoning. . . .⁸⁹

For Cohen, epistemic assurance is not to be found in "particularized" evidence, but in the *process* of testing the hypothesis of liability—it is the fact that the hypothesis has survived testing against all relevant variables, in criminal cases, or against all relevant variables offered by the defendant, in civil cases. In other words, all plausible exceptions (in civil cases, raised by the defense) have been ruled out. If the proponent satisfies this burden of proof, the correctness of the verdict will not be a matter of luck, because the verdict will be correct in the absence of some specific, avoidable infirmity. Thus, Cohen argues:

[W]hen all questions of law are correctly determined and the trier of fact, in accordance with accepted inductive standards, correctly assesses the . . . probabilities on the facts before the court, the inductivist analysis implies that injustice may be done—in the sense that victory may go to the party that is actually wrong—only because some of the evidence is incorrect, or because some of the relevant circumstances have not been put before the court, or (much more rarely) because some commonly accepted generalization is just a popular fallacy. . . .⁹⁰

The moral reason for accepting only injustices that result from specific infirmities is that the court, or the legal system, cannot be blamed for such injustices:

[T]hat kind of injustice would be the fault or the bad luck of the litigant who suffers from it: perhaps his advisors are incompetent or his witnesses are reluctant to testify. *No injustice would be attributable to the standard of proof, in the way that the mathematicist interpretation seems to permit.*⁹¹

For Cohen, then, the acceptability of an injustice depends on the characterization of the evidence as "incorrect"; on whether we can attribute the mistake to an infirmity in the evidence, or in its discovery or presentation, rather than to the standard of proof. The problem is that when the inductive proof process does not yield a practical certainty but a naked probability of error, we can equally well attribute any actual error to an infirmity in the evidence or to the standard of proof; we can always demand better evidence than we have, and we can always hold our evidence to standards of precision we have not yet attained.

Thus, in *Trombetta*, the state conceded a minuscule possibility of

⁸⁹ Cohen, *Letter to the Editor*, 1980 CRIM. L. REV. 257, 259.

⁹⁰ L.J. COHEN, *supra* note 1, at 271.

⁹¹ *Id.* (emphasis added).

instrument error, which there was no way to rule out without retesting the breath sample.⁹² If Cohen regarded this as a setting in which injustice could only result from an infirmity in the evidence—a false positive—he might find his inductive proof requirement satisfied.

But what precludes a less apologetic characterization of the evidence? The false positive rate can be regarded as an operating characteristic of the machine, as in signal detection theory. The discovery that the machine had falsely implicated one defendant in *X* would merely confirm this characteristic, not call for repairs. In contrast, an improperly calibrated or set machine might be regarded as yielding incorrect evidence (unless, that is, we also accepted a low rate of human error as an operating characteristic). We may demand a very low false-positive or human-error rate for a conviction, but the injustice of a false conviction resting on either error would be as “attributable to the standard of proof” as a conviction resting on base-rate evidence.

As we come increasingly to rely on scientific trace evidence to resolve issues of identity, cases like *Trombetta* may become increasingly common: the state will rely on evidence which leaves a small but quantifiable probability of error while the defense presents no evidence. DNA typing cases may sometimes take this form, with the jury offered little but the naked probability—always very low—that the semen found in the victim or the blood found on the rifle could have been contributed by anyone besides the defendant. In one sense, there will be a mistake or failure underlying a false conviction, even if the tests were properly performed. If someone else did contribute the semen, there will doubtless be some polymorphism that could have distinguished him from the defendant, that a more refined typing procedure would have exploited.⁹³ Unless researchers develop DNA profiles that *cannot* be shared by two people, there will always be a possibility of error, and that error can be characterized as a deficiency in the evidence.

If false positives from a breathalyzer or DNA typing procedure can be attributed to infirmities in the evidence or proof process, so can “false positives” in the rodeo and prison yard hypotheticals. It is cer-

⁹² Cohen, of course, might agree with the defense that the prosecutor's failure to preserve that sample for retesting should prove fatal to his case. But let us assume the technology for sample preservation did not exist, so that the state couldn't be blamed for the lost opportunity to rebut its evidence.

⁹³ See OFFICE OF TECHNOLOGY ASSESSMENT, *GENETIC WITNESS: FORENSIC USES OF DNA TESTS* (1990) [hereinafter *GENETIC WITNESS*]. Moreover, the absence of a plausible alibi or other exculpatory evidence could also be regarded as a lapse or failure, if any such evidence could have been uncovered.

tainly possible to describe the false liability imposed on a paying rodeo spectator or innocent inmate as the "fault or bad luck of the litigant." If only he had a witness or a ticket stub, the odds would have been in his favor and he would have incurred no liability. Cohen might respond that since the factfinder knows that there is a significant possibility of innocent presence in both cases, a possibility that the plaintiff failed to exclude and circumstances prevented the defendant from establishing, it would be disingenuous to attribute a false finding of liability to the defendant's "bad luck."⁹⁴ The injustice would instead result from a standard of proof which permitted a finding of liability in the face of such unexcluded possibilities.

But isn't this also true in the breathalyzer and DNA cases? The possibility of error is much slighter and less salient in those cases, but these are hardly differences on which Cohen could rely. In order to justify the imposition of liability, Cohen would have to argue that, unlike in the base-rate cases, any injustice could be attributed to incorrect evidence or bad luck. The argument would begin by distinguishing the breathalyzer and DNA cases from the base-rate cases by the fact that the former rely on causal generalizations: in the breathalyzer case, that the machine will read $>.1$ if and only if the person blowing into it has a BAC $>.1$; in the DNA cases, that two samples will display the same profile if and only if they come from the same person. Both generalizations are obviously mistaken in their unqualified form, but that is what the process of testing relevant variables is all about: the proponent must show that none of the known exceptions to the generalization apply.

This account seems to fit the breathalyzer case more naturally, since there are indeed conditions which invalidate the breathalyzer results or render them less reliable. Cohen's approach, however, appears to make the deterministic assumption that all such conditions can in theory be identified, and that once they are excluded, the test will be perfectly accurate. There seems to be no room in Cohen's account for irreducibly random error. Moreover, this approach is not even superficially compatible with the scientific theory underlying DNA typing, which holds that as the number and variability of the polymorphisms utilized in the typing procedure increases, the odds of two people having the same profile become vanishingly small.⁹⁵ The

⁹⁴ Cohen could respond in similar fashion to the attempt to attribute a mistaken verdict in the base-rate cases to "incorrect evidence." Given the very high false positive rate of the "rodeo attendance" test for gate-crashing, and the much lower but highly salient possibility of error in the "prison yard" test for homicide, it might seem disingenuous to explain a false finding of liability in these cases by claiming that the test results were "incorrect."

⁹⁵ See, e.g., GENETIC WITNESS, *supra* note 89; Evett & Werrett, *Bayesian Analysis of Sin-*

theory does not claim, however, that two people could *never* have the same profile—that is always a possibility, however slight. While there may well be variables relevant to the probabilistic generalization in DNA cases (for example, whether or not the perpetrator or suspect both come from the same *heterogenous* sub-population), their incorporation still leaves the chance, however minute, that two people will have the same profile—that will remain a matter of “mere luck.” A false conviction resulting from such an unfortunate coincidence would, in Cohen’s terms, be attributable to our standard of proof, not to an infirmity in the evidence.

Even if we could agree on when an injustice resulted from an infirmity in the evidence rather than from the standard of proof, the question remains: Why is a standard of proof that ensures that the verdict will be correct without such an infirmity or lapse morally preferable to one which permits error less frequently, but in the absence of such an infirmity or lapse? There are several possibilities. One is that in a Baconian system, the falsely implicated defendant gets a consolation prize: an explanation of what went wrong that may ease the pain of a mistaken judgment. In contrast, the defendant convicted by naked statistics has nothing but a policy to explain his misfortune: he is simply the victim of a stochastic process. This seems a pretty thin consolation, though, and most of us would trade the promise of such an explanation for significantly reduced odds that we would stand in need of one.

A second possibility is that the state is more directly implicated in a finding of false liability based solely on its stochastic norms or standard of proof. Under a Baconian system, it is the specific infirmity or lapse which bears the taint of a false conviction. But even if we thought there was a moral basis to the notion of tainting, the distinction seems merely rhetorical: it is the state that decides what evidence it will allow in determining liability, and it is the state that bears the taint for a mistaken finding of liability, whether it is based on infirm evidence or group base-rates.

A third possibility is that the process of hypothesis testing is required as a matter of procedural justice. This gives Baconian induction the kind of justification provided for various procedural rules, like the criminal defendant’s right to represent himself, that may actually impair the accuracy of the fact-finding process. This form of justification, however, requires a clear alternative value, more obvious in pro se representation than Baconian proof. Research on the adver-

sary system has suggested that much of the system's conciliatory effect on losing disputants arises from the often spurious or exaggerated sense of participation it confers on them (something like the illusory feeling of control felt by the die-tossing subjects in Langer's experiments on locus of control).⁹⁶ If this is the procedural virtue of adversary hypothesis testing, it hardly seems a moral one. Alternatively, the requirements of Baconian proof may reflect the mores of adversary combat, in which the contestants must engage in a structured exchange of thrusts and parries until one goes down to complete defeat. But this account seems more a critique than a justification. As one of the most forceful legal critics of the winner-take-all rule argues:

The combative aspects of the search for reality in our courts obviously puts a premium upon the assertion of polarized persuasions. . . . The sublimation of battle is a high office of law. What cathartic shall replace it if the battle is drawn? . . . The contribution of *l'esprit de guerre* to the preservation of winner-take-all may be greater than we realize.⁹⁷

There may, however, be a value beyond participation or combat in the process of hypothesis-testing prescribed by Cohen. Baconian induction seems to do a much better job than Bayesian probability in capturing the moral significance of the burden of proof. It is not that errors against one party have a greater disutility than errors against the other, which a suitable probabilistic "handicap" can equalize, but that the party seeking to change the status quo must rule out the exceptions and qualifications to his "theory of the case" that would be consistent with maintaining the status quo. This conservative requirement ensures that our holdings will not be disturbed by the state unless our entitlement has been subject to a forceful and thorough challenge. Requiring such a challenge may not minimize the odds of false liability, but it ensures that we will only suffer that injustice when our most carefully tested common-sense judgments prove to be mistaken. This restriction on the scope of false liability, however, does not have the strong, obvious ethical moorings of the concern for autonomy and individuality discussed in Part I; the assurance it provides seems to have greater psychological than moral significance.

Cohen might respond that in focusing so narrowly on the characterization of mistaken evidence, I have missed the forest for the trees. The larger issue is the morality of imposing liability without belief. Cohen claims that belief cannot be sustained merely by high

⁹⁶ Langer, *The Illusion of Control*, 32 J. PERS. SOC. PSYCH. 311 (1975).

⁹⁷ Coons, *Approaches to Court Imposed Compromise—The Uses of Doubt and Reason*, 58 NW. U.L. REV. 750, 788-89 (1933-34).

probability. And he might argue that if we do not believe a proposition to be true, despite the high probability that it is, we have no reason to act on it, and it would be wrong to do so if it has adverse consequences for a disputant.

But we may often have reasons for acting as if a proposition were true without believing that it is. Solomon's maternity test may not have revealed the biological mother, but it gave him a good reason for acting as if it did: it ensured that the child was given to a woman who cared deeply for its welfare. Accepting the most probable hypothesis gives us another sort of reason, which it will sometimes be reasonable to adopt.

I say "sometimes" because there may often be good reason for *not* choosing the most probable hypothesis, even when there is no reason for erring in favor of one side. The low resilience of the odds may be one such general reason. We would hesitate to base a judgment on odds that may be drastically altered by a wide range of information, even if that other information is not presently available. We may also have specific doubts about the evidence which resist quantification but make us reluctant to rely on even very high odds. These concerns may be captured by Cohen's analysis of inductive support; I merely claim that they do not preclude reliance on high probabilities in a wide range of legal disputes.

CONCLUSION

The most important moral function served by Cohen's demand for causal generalization may simply be to exclude inferences based on the mere frequency of liability. This function can be illustrated with reference to the Warren Court cases on police authority to stop and frisk individuals whose conduct provokes a "reasonable suspicion" of criminal activity: *Terry v. Ohio*, *Peters v. New York*, and *Sibron v. New York*.⁹⁸ The Court did not find that standard satisfied in *Sibron*, where the police did not observe conduct which could play a causal role in the suspected crime. As George Fletcher describes the case:

The only evidence the officer had to go on before the stop-and-frisk was that he had observed the suspect in the presence of "six or eight" known heroin addicts at one location in the course of an afternoon or evening. As a statistical matter, the officer's hunch . . . was as likely to be correct as the judgment in *Terry* and *Peters* that the suspect was preparing to commit a theft offense. Yet the

⁹⁸ *Terry v. Ohio*, 392 U.S. 1 (1968); *Sibron v. New York*, 392 U.S. 40 (1968); *Peters v. New York*, 392 U.S. 40 (1968).

likely accuracy of the officer's judgment was not the controlling issue. The problem was the type of evidence he relied upon in formulating his judgment.⁹⁹

A Bayesian might insist that the officers in *Terry* and *Peters* were relying, no less than the officer in *Sibron*, on beliefs about the frequency with which conduct like the defendant's, whether active or passive, was associated with criminal acts. But the inference from the defendant's conduct in *Terry* and *Peters* was not based on the frequency with which those who "cased" stores went on to burgle them—it was based on the officers' understanding of the role that "casing" played in burglary.

Cohen could argue that what was lacking in *Sibron* was a similar causal generalization linking the evidence of association to the crime of drug possession. While addicts may congregate to obtain drugs, paraphernalia, or protection, no specific facilitating role was revealed or suggested by Sibron's presence in the group. In the absence of a causal generalization connecting Sibron's conduct to a criminal activity, the officer was relying on little more than the high odds that someone associating with addicts would himself possess drugs, subjecting the defendant to a forcible stop-and-frisk based on the misconduct of addict-associates as a group.¹⁰⁰ While the requirements of Baconian induction preclude findings of liability based entirely on the frequency of similar misconduct in a group or class to which the defendant belongs—perhaps the most demeaning use of base-rate evidence—they also preclude a reliance on base-rates to resolve issues besides the defendant's commission of a wrongful act, and a reliance on other types of statistics to prove such wrongful acts. The account I have offered explains why the latter forms of statistical proof are acceptable, when the proof offered in the base-rate hypotheticals is not. Our concern for treating the defendant as an autonomous individual may seem too abstract to bar a finding of liability more likely than not to be correct. Nevertheless, it does provide a distinctly moral reason for rejecting certain familiar types of statistical proof—something Cohen's comprehensive epistemic critique fails to do.

⁹⁹ G. FLETCHER, *RETHINKING CRIMINAL LAW* 229 (1978).

¹⁰⁰ The offense in relying on the frequency of drug possession among addict-associates was compounded by the fact that the conduct linked with criminality was mere association. The officer's action not only subjected the defendant to detention based on the misconduct of other people, but chilled his freedom of association.