BOOK REVIEW

HUMAN INFERENCE: STRATEGIES AND SHORTCOMINGS OF SOCIAL JUDGMENT. By RICHARD NISBETT* & LEE ROSS.** Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1980. Pp. xvi, 334. $14.95.

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In *Human Inference*, authors Richard Nisbett and Lee Ross explore the limitations of individuals' capabilities for drawing factual inferences from data. Nisbett and Ross test human inferential performance against norms of rational decisionmaking, including accuracy of prediction and lack of bias, and find human performance generally wanting. In this regard *Human Inference* is as much a normative as a positive work. The book surveys and organizes a great deal of social psychological literature that documents these limits by focusing on Nisbett and Ross' informal model[1] of human thought. People, they claim, use two basic sorts of cognitive tools to solve inferential problems—" 'knowledge structures' which allow the individual to define and interpret the data of physical and social life and 'judgmental heuristics' which reduce complex inferential tasks to simple judgmental operations."[2]

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Since I am not a social psychologist, and since I am unfamiliar with the literature relied on by the authors of HUMAN INFERENCE, I am assuming, for the purposes of this review, the correctness of their thesis. This review explores some legal ramifications of the authors' conclusions, with specific emphasis on the law of evidence and trial procedure.

1. The model is not new. Its elements can be found in works cited by the authors. *See, e.g.*, F. HEIDER, THE PSYCHOLOGY OF INTERPERSONAL RELATIONS (1958); Kahneman & Tversky, *Subjective Probability: A Judgment of Representativeness*, 3 COGNITIVE PSYCH. 430 (1971); Kelley, *The Process of Causal Attribution*, 28 AM. PSYCH. 107 (1973); McArthur, *The Lesser Influence of Consensus than Distinctiveness Information on Causal Attribution: A Test of the Person-Thing Hypothesis*, 33 J. PERSONALITY & SOC. PSYCH. 733 (1976).

2. R. NISBETT & L. ROSS, HUMAN INFERENCE 6-7 (1980).

Knowledge structures are essentially theories about how the world works. A *tree*, for instance, sits still on (and in) the ground and grows leaves at the ends of its branches, whereas a *dog* tends to bark and move quickly over the surface of the ground. Nisbett and Ross' theory of knowledge structures is broad: Knowledge structures may be either *propositional*—"Rotarians are public spirited."—or *schematic*—"the knowledge underlying one's awareness of what happens in a restaurant."[3] The authors do not insist on this distinction,[4] preferring instead to stress knowledge structures' roles in resolving ambiguities both in information and in situations individuals must confront.

Judgmental heuristics are rules of thumb and short cuts which help to create, maintain, alter or summon particular knowledge structures. The availability heuristic, which is "used to judge the frequency and likelihood of events and event-relations,"[5] allows the individual to generalize from available data. The individual will consult his perceptions, memory, or (perhaps) imagination, determine the relative frequency of an event or event-relation, and then conclude that the event or event-relation occurs with the same relative frequency in the general population. If one were asked how often a driver's braking so hard that his car skids is followed by an accident, the questioned subject might consult his memory of skidding cars and accidents that follow, determine a percentage of accidents following skids to all skids, and then generalize to the driving population. The representativeness heuristic, which is somewhat more complicated, aids the process of categorization. An individual making a judgment will "assess the degree to which the salient features of the object are representative of, or similar to, the features presumed to be characteristic of the category."[6] Then, depending on the degree of resemblance, he will (or will not) associate the object with the category. For example, if one were trying to decide whether a process were random, he might examine the process' outcomes to determine whether the outcomes displayed obvious, organized patterns. If no such pattern were easily observable, the individual would conclude that the generating process was random.[7]

Nisbett and Ross amplify these theories considerably through-

3. *Id.* at 28.
4. *Id.* at 28-29.
5. *Id.* at 42.
6. *Id.* at 24.
7. *Id.*

out the course of the book, explaining and exploring these heuristics by organizing much experimental work, most of which was conducted within the last fifteen years. The authors focus on the shortcomings and limitations of the heuristics, pointing out many ways in which their misuse may lead individuals to serious inferential errors. Such errors, the authors claim, plague every phase of human inference—from perceiving and coding data, to detecting covariation between categories of data, to constructing theories of causation, to predicting outcomes in future cases based on theories of causation, and to revision of existing theories because of new data.

Nisbett and Ross present an example which is adopted from other work:

> Subjects are asked to assess the relative likelihood of three particular sequences of births of boys (B) and girls (G) for the next six babies born in the United States. These sequences are i) BBBBBB, ii) GGGBBB, iii) GBBGGB.[8]

Naive subjects, who rely on an intuition guided by the representativeness heuristic, tend to view the last sequence (GBBGGB) as being far more likely than either of the others. The other two sequences, especially the first, display an obvious pattern, which is uncharacteristic of a random process. In contrast, the last sequence shows no such obvious pattern, and therefore is regarded as a far more likely outcome of a random process. In actuality, as Nisbett and Ross point out, because male births are slightly more likely than female births, the first sequence is slightly more likely than either of the others, and the second and third sequences are equally likely.

Reliance on the availability heuristic may also produce inferential error. For example, Nisbett and Ross cite the following observation:

> A pollster who asks a sample of American adults to estimate the "percentage of the work force who are currently unemployed" (sic) finds an "egocentric bias." That is, currently unemployed workers tend to overestimate the rate of unemployment, but currently employed workers tend to underestimate it.[9]

This phenomenon can be explained by an individual's reliance on the availability heuristic in conjunction with biased sampling tech-

8. *Id. See generally* Kahneman & Tversky, *supra* note 1.
9. *Id.* at 19.

niques. Unemployed people are more likely than employed people to meet other unemployed people. Someone who is unemployed is likely "to share the neighborhood, socioeconomic background, and occupation of other jobless individuals. He is also likely to encounter other unemployed people in such everyday endeavors as job-hunting, visiting employment agencies, collecting unemployment benefits."[10] When the individual consults his own experience in an effort to answer the pollster's questions, he is naturally led into error. The unemployed person overestimates the percentage of unemployed workers, while the employed person underestimates the same statistic.

The *vividness* of certain data may also cause errors. Nisbett and Ross present this scenario:

> Let us suppose that you wish to buy a new car and have decided that on grounds of economy and longevity you want to purchase one of those solid, stalwart, middle-class Swedish cars—either a Volvo or a Saab. As a prudent and sensible buyer, you go to *Consumer Reports*, which informs you that the consensus of their experts is that the Volvo is mechanically superior, and the consensus of the readership is that the Volvo has the better repair record. Armed with this information, you decide to go and strike a bargain with the Volvo dealer before the week is out. In the interim, however, you go to a cocktail party where you announce this intention to an acquaintance. He reacts with disbelief and alarm: "A Volvo! You've got to be kidding. My brother-in-law had a Volvo. First, that fancy fuel injection computer thing went out. 250 bucks. Next he started having trouble with the rear end. Had to replace it. Then the transmission and the clutch. Finally sold it in three years for junk."[11]

Although a logical, dispassionate response to such an encounter ought to be a very slight revision of the statistical data contained in *Consumer Reports*, few people will so act. Instead, because the story of the brother-in-law is more vivid, more emotionally interesting, easier to remember and easier to deal with than is statistical data, most people assign too much weight to the story and alter

10. *Id.* at 19-20.

11. *Id.* at 15 (quoting Nisbett, Borgida, Crandall & Reed, *Popular Induction: Information is Not Always Informative*, in 2 COGNITION AND SOCIAL BEHAVIOR 227, 229 (J. Carroll & J. Payne eds. 1976)). Nisbett and Ross report much experimental work involving inferential error, then explain it according to their model of human thought. This review makes no attempt to recount their survey of such research in any detail, since the book is itself a survey.

their purchases irrationally. Thus, in sum, reliance on common inferential techniques may lead one to serious inferential error.

Human Inference may require a substantial reevaluation of the legal doctrines surrounding, among others, burdens of proof (production and persuasion),[12] motions for a directed verdict, and admissibility of evidence at trial. The typical United States trial process divides factfinding functions between the judge and the jury.[13] The jury is to observe the evidence and determine whether the fact in question has been established according to the appropriate standard of certainty. Such standards vary in the certainty they require. Although the case law reveals a dizzying array of verbal formulations,[14] three very common burdens of persuasion can easily be ranked: The "beyond a reasonable doubt" standard requires more certainty than does the "clear and convincing" standard, which requires more certainty than does the "mere preponderance" test. Put differently, evidence establishing a fact beyond a reasonable doubt also establishes the fact in clear and convincing style and beyond a preponderance of the evidence. If a preponderance of the evidence establishes fact X, however, that fact has not necessarily been proved in either clear and convincing style or beyond a reasonable doubt. For example, in a suit for breach of a bilateral executory contract the plaintiff must usually prove that the defendant entered into a contract.[15] This task includes proving that

12. "Burden of producing evidence of a fact" means the burden which is discharged when sufficient evidence is introduced to support a finding that the fact exists.

"Burden of persuasion of a fact" means the burden which is discharged when the tribunal which is to determine the existence or non-existence of the fact is persuaded by sufficient evidence to find that the fact exists.

MODEL CODE OF EVIDENCE rule 1(2), (3) (1942).

13. It is, of course, possible for a judge to fulfill both of these roles at once if the parties agree to try the case to the judge. There are actually three sets of actors who draw inferences at trials—judges, juries and witnesses. Witnesses report their observations and knowledge to the judge and jury. However, these "observations" are actually inferences, based upon the witnesses' experiences, and as such may be subject to many of the same criticisms which this review will direct at juries' decisions. Perhaps these criticisms should prompt a reevaluation of the legal doctrines pertaining to testimony—particularly the rule against allowing lay witnesses to state opinions. Aetna Life Ins. Co. v. Kelley, 70 F.2d 589, 593 (8th Cir. 1934). A well-delineated exception to this rule allows witnesses to state opinions about (or inferences from) facts they cannot describe accurately. *See* FED. R. EVID. 701.

14. *See* J. MAGUIRE, J. WEINSTEIN, J. CHADBOURN & J. MANSFIELD, EVIDENCE 1039 (1973).

15. *See, e.g.*, Black & Yates, Inc. v. Negros-Philippine Lumber Co., 32 Wyo. 248, 231 P. 398 (1924).

the defendant made a promise. If the applicable burden of persuasion is a preponderance, the plaintiff must convince the jury that a preponderance of the evidence supports the inference that the promise was made. If the plaintiff fails to shoulder this burden, the jury will fail to find that the promise was made, and the defendant will win the suit.

The judge fills, among other roles, a checking function upon the jury's discretion. The judge is often asked, through various procedural devices, whether a jury may be permitted to find that a fact has been established. More particularly, at the close of both parties' presentation of evidence, either party may move the court for a directed verdict. Such a motion by a defendant requires the court, in a typical civil action, to answer the question "could a reasonable juror conclude that the requisite facts have been established by a preponderance of the evidence presented?" In a typical criminal trial, a motion for directed verdict by a defendant usually asks a court "could a reasonable juror find that the requisite facts have been established beyond a reasonable doubt by the evidence presented?"[16] Only if the judge answers these questions affirmatively may the jury be permitted to find for the plaintiff. Similar motions by plaintiffs require the court to answer whether a reasonable juror could fail to conclude that the requisite facts had been established.[17] Only if the judge answers these questions by saying "yes" may the jury be permitted to find for the defendant.

Each of these motions asks the court to focus on an ideal reasonable juror and to decide what inferences such a juror would or would not make from the evidence. In order to rule on such a motion, a court must necessarily choose or construct some (inchoate) model of human inference, apply it to the evidence, and decide whether the interaction of the model and the evidence could produce, with the requisite degree of certainty, the inference at issue. For example, in the hypothetical breach of contract case discussed above, if the defendant moved for a directed verdict the court would have to rule whether a reasonable juror could decide that all requisite facts, including the defendant's making a promise, had been proved by a preponderance of the evidence presented. If

16. This is the prevailing criterion for judging motions for acquittal in Federal courts. Jackson v. Virginia, 443 U.S. 307, 318 n.11 (1979).

17. This does not apply to criminal cases, since the state cannot move for a judgment notwithstanding the jury's verdict. State v. Mantia, 101 R.I. 367, 223 A.2d 843 (1966) (*dictum*).

not, the judge would direct a verdict for defendant. If the answer is yes the jury would be permitted to decide whether or not *they* had been persuaded that all requisite facts had been proved by a preponderance of the evidence. In sum, the jury must make inferences, with varying degrees of required certainty, about the ultimate facts in the case, whereas the judge must make inferences about permissible inferences that may be drawn, with the required degree of certainty, about the case's ultimate facts.

If *Human Inference*'s thesis about the myriad shortcomings of human judgment is correct, then legal scholars should reexamine the fact-finding roles of both judge and jury. *Human Inference* basically impeaches the jury's *capability* of performing its function. If people are, in general, prone to commit inferential error by relying on judgmental heuristics, there is no reason to believe that such erring will suddenly cease once people become jurors.[18] Nisbett and Ross marshal much evidence to support their thesis. Particularly crucial to a discussion of jury competence, for example, is the well-documented difficulty most people have in dealing with the concept of probability. I will focus on this phenomenon because it may imply that juries are generally incompetent to decide whether a fact has been proved with the requisite degree of certainty.[19]

One of the most basic rules of both probability theory and common sense is that given two different events, A and B, the probability of *both* A *and* B happening cannot be greater than the

18. It is, of course, possible, that once people become jurors they will be impressed by the seriousness of their task and try harder. If Nisbett and Ross' thesis is correct, however, and the errors are engendered by inappropriate inferential strategies, trying harder to make correct decisions will not necessarily help matters. To the extent that trying harder does have some beneficial effect, my discussion assumes that that effect is small. Even if such an effect is large, inferential error may still be quite important, for two of the important mechanisms which guard against harm from inferential error—delegation of the inferential task to an expert and failure to take any action based on an inference—are both missing in the jury context.

Professor Eugene Borgida, of the University of Minnesota Department of Psychology, has indicated in correspondence that while he suspects that the rules of evidence and procedure currently provide safeguards against inferential errors in a *trial setting*, this issue must ultimately be resolved empirically. Although I agree with Professor Borgida that this issue can be resolved only through empirical work, I am not as hopeful as he that current procedures provide much protection against inferential error.

19. This discussion assumes that a juror's evaluating the facts to determine whether the elements have been shown with the required degree of certainty is basically a probabilistic inquiry. *See* Lempert, *Modeling Relevance*, 75 MICH. L. REV. 1021 (1977); Tribe, *Trial by Mathematics: Precision and Ritual in the Legal Process*, 84 HARV. L. REV. 1329, 1358, 1378-93 (1971).

likelihood of the less likely of *either* A *or* B, happening. For example, if event A is applicant Taney's admission to the University of Southern California Law Center and event B is Taney's admission to the University of Chicago School of Business, then the likelihood of Taney's admission to *both* the USC Law Center *and* the UC School of Business cannot be greater than the less likely of his admission to USC or UC. If he has a 15% chance of getting into USC but only a 5% chance of getting into UC, then Taney can have no greater than a 5% chance of being admitted to both.

Nisbett and Ross recount evidence which shows that people violate this simple rule in making judgments.[20] For example, in one set of experiments the subjects "were given personality profiles for various target persons and then were asked to rate the compound likelihood that particular persons both belonged to a particular political party *and* held a particular job."[21] The subjects were also asked, at a separate time, to rate the individual likelihoods that the particular person in the profile was a member of a particular profession *or* belonged to a particular political party. In direct contradiction to the rule of probability, someone rated likely to be a Republican (but quite unlikely to be a lawyer) was rated *moderately* likely to be a Republican lawyer by some of the subjects. The principle above, of course, requires that the person quite unlikely to be a lawyer be no more than quite unlikely to be a Republican lawyer.[22]

Nisbett and Ross explain this phenomenon by reference to the representativeness heuristic. In trying to decide whether a target personality belongs to the category of Republican lawyer, a subject examines the target personality's features to determine how representative he is of the common Republican lawyer. Features likely to be Republican but not associated with lawyers are only moderately likely to apply to both. In this manner, the subject is led to violate one of the simplest and most basic notions of probability. Nisbett and Ross also report the results of another set of experiments which test subjects' evaluations of the likelihood of sequential events.[23] Once again, subjects routinely violated the fundamental notion of probability described above.

These experiments suggest that a jury may, through use of a

20. R. NISBETT & L. ROSS, *supra* note 2, at 146-47.
21. *Id.* at 146.
22. *Id.*
23. *Id.* at 146-47.

representativeness heuristic, commit inferential errors while trying to determine whether all material facts have been established with the requisite degree of certainty. For example, where a defendant's alibi consists of several sequences of movements, one of which is extremely unlikely but all of the others are quite likely, the jury may be tempted to conclude that it is moderately likely, on the whole, that the defendant could not have been present at the scene of the crime. For another example, let us return to the breach of contract situation discussed above. Assume that the plaintiff must prove: (1) a promise by the defendant; (2) a promise by the plaintiff; (3) full performance by the plaintiff; and (4) breach by the defendant. Further assume that the evidence presented shows that the first, second, and fourth elements are quite likely, whereas the third element is rather unlikely. In such a circumstance, a juror using a representativeness heuristic may determine it likely that the plaintiff fits the category of "wronged merchant." Both the inference about the alibi and the inference about the breach of contract may be inappropriate. It seems that the alibi should be judged no stronger than its weakest link, and that the plaintiff's right to recovery on the contract should be judged no more likely than his full performance under the contract.

Nisbett and Ross also report some work showing that laypersons are often ineffective at putting together different types of information to produce likelihood estimates. Original work by Kahneman and Tversky[24] demonstrated that people tend to make very little use of "base rate" information when "target" information is available. Kahneman and Tversky gave one half of their subjects the following instructions:

> A panel of psychologists has interviewed and administered personality tests to 30 engineers and 70 lawyers, all successful in their respective fields. On the basis of this information, thumbnail descriptions of the 30 engineers and 70 lawyers have been written. You will find on your forms five descriptions, chosen at random from the 100 available descriptions. For each description, please indicate your probability that the person described is an engineer, on a scale from 0 to 100.[25]

Remaining subjects were given identical instructions in all respects except for the number of engineers and lawyers in the subject

24. Kahneman & Tversky, *On the Psychology of Prediction*, 80 PSYCH. REV. 237 (1973).

25. *Id.* at 241.

pool. This second set of instructions claimed that there were 70 engineers and 30 lawyers. According to one of the basic results of probability theory (Bayes' law), a person should judge any target personality as more likely to be an engineer when that personality was chosen at random from a base population of 70% engineers than when the person was chosen from a base population of 30% engineers. The subjects seemed to violate this law, however, finding a target personality equally likely to be an engineer regardless of the base population from which it came. The subjects appeared to base their estimates entirely upon the perceived match between the personality profile and their model of a stereotypical engineer. For example, the personality profile which was judged only .05 likely to be an engineer when sampled from the 30% engineer population was also judged .05 likely to be an engineer when sampled from the 70% engineer population. According to Bayes' law, the subject who finds the personality .05 likely to be an engineer when sampled from the 30% engineer population *should* revise his estimate to over .20 when the personality is sampled from the 70% engineer population. The results are summarized in figure 1, reproduced from Nisbett and Ross.[26]

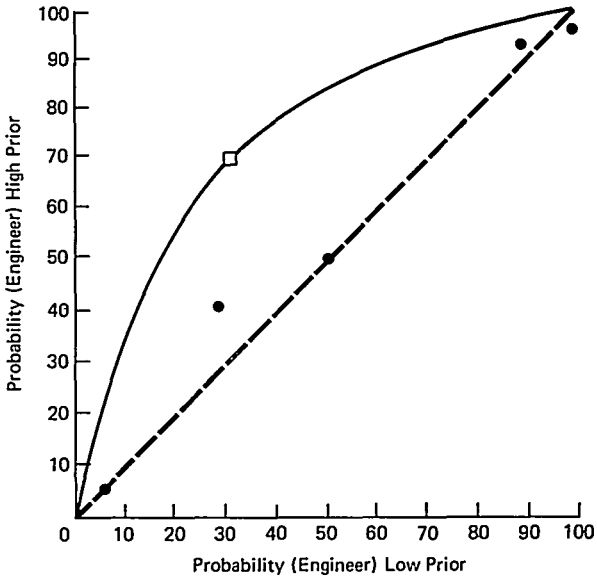

Fig. 7.1 Median judged probability (engineer) for five descriptions and for the null description (square symbol) under high and low prior probabilities. (The curved line displays the correct relation according to Bayes's rule. (From Kahneman & Tversky 1973.)

26. R. NISBETT & L. ROSS, *supra* note 2, at 145.

These results cast further doubt upon a jury's ability to decide whether relevant facts have been proved with the requisite degree of certainty. For example, in a case involving lost profits the jury may be called upon to decide whether a company lost a particular potential customer's business. The jury may be given data about both the nature of the typical customer and the percentage of inquiring potential customers who ultimately purchase from the firm. These results indicate that the jury may pay insufficient attention to the base rate data and decide, instead, upon the fit between the particular potential customer and the business' typical customer.

These two different examples of typical inferential error represent only a tiny fraction of the evidence presented in *Human Inference*. The various types of errors discussed all have ramifications for the ability of a jury to perform its function. In sum, they strongly suggest that juries may be incompetent. Unfortunately, two of the mechanisms listed by Nisbett and Ross as life's most important safeguards against the consequences of inferential error—reliance on the inferences of experts and the failure to take any action on the basis of mistaken inferences—[27]are necessarily missing in the courtroom. First, expert testimony cannot even begin to provide an adequate safeguard. Although expert testimony is often allowed on certain complex issues, Nisbett and Ross hypothesize that inferential errors extend to *all* phases of the judgment process. Second, any inferential errors by a jury will be important, for action almost always hinges on the jury's inferences. Admittedly, in some circumstances a jury's mistaken inference will have no practical significance. For example, if a cause of action contains several necessary elements, and a jury has correctly concluded that the first element has not been shown with the requisite degree of certainty, then the mistaken conclusion that the second element of the cause of action has not been shown will have no practical significance; recovery will be denied regardless of any inferential error with respect to the second element. Such examples, however, are unlikely to represent the vast majority of cases. Indeed, wherever the jury finds that all the elements of a cause of action have been established, an error as to any one element becomes crucial. Furthermore, errors on the issues of damages will also be important. In sum, pending more definitive research, it seems safe to assume that jury error probably has significant and practical importance.

27. *Id.* at 255-71.

How should one deal with this problem of jury error? One approach would be to claim that I have misperceived the institutional significance of a jury. One could contend that *rational* inferences are exactly those a jury wishes to make. Such an approach avoids the problem of a jury's potential inferential errors by making the jury's inferences the *normative standard* of correctness. Yet this approach seems flatly inconsistent with the role of the judge. As I discussed above, when one party moves the court for a directed verdict, the judge is asked whether a reasonable juror could fail to find that a particular set of facts has been established with the requisite degree of certainty. If the jury's inferences were to be the normative standard of correctness, the judge's model of rational human inference would contain no principles of rationality (other than observations of what, in fact, the jury ultimately decides). Before the jury would have an opportunity to evaluate the evidence, the judge would have no opportunity to observe the jury's behavior and hence would have no ground for deciding that a particular inference is irrational. As a consequence a judge would never be justified in keeping any question from the jury. This conclusion would represent a radical break with established doctrine, for judges are often upheld in excluding certain questions from the jury's consideration. If such a conclusion is unacceptable then one must abandon the purely behavioral definition of rationality suggested above.

A second approach would be to use Nisbett and Ross' model of human thought as the standard of rationality to which jurors would be held. In other words, a party would have the right to try his case to jurors who used heuristics. Where these heuristics might produce a particular mistaken judgment, a party would have no right to object. To return to the hypothetical case involving lost profits discussed above, if the plaintiff could show that the jury's failure to award lost profits would be error, but the error would stem from paying insufficient attention to base rate data and relying instead on the representativeness heuristic, then the plaintiff would have no grounds for a directed verdict. Where a particular mistaken judgment could not be explained as a result of common mental errors then that inference would be labeled "unreasonable" and would be the proper subject of a directed verdict. In sum, this approach would create two classes of inferential error—those errors that are caused by common inferential strategies and those that are not. Those errors that *are* so caused would be treated as though they were not errors.

Although this approach would be consistent, in theory, with the existence of a directed verdict, it is difficult to understand the basic normative appeal of such a scheme. If jurors make inferential errors which are either more or less explainable within Nisbett and Ross' framework, it is not clear why the judge should provide a checking function only on relatively more explainable errors.[28] The basic normative objection to "error" likely stems from an aversion to violating the axioms of probabilistic decisionmaking, rather than from violating a positive model of human thought. If a judge can recognize an inferential error then perhaps he should act with respect to all such error, and not just those errors that are difficult to explain within the *Human Inference* framework. If this second approach to juror rationality proves to be normatively unjustifiable, then one might instead incorporate those normative principles used in *Human Inference* (including, for example, the two principles of probabilistic inference discussed above) into the judge's model of rational human inference. Once one embraces these principles the theories and evidence in *Human Inference* demand attention. One must confront both the problem of recognizing inferential error and the challenge of minimizing the costs of such errors.[29]

First, a judge must face the difficulties in recognizing inferential error. When he is asked through a motion for a directed verdict whether a reasonable juror could fail to find a certain set of facts, the judge must decide whether an alternative verdict would represent inferential error. To decide this issue, however, the judge—a human being—must draw his own inferences from the evidence presented. If Nisbett and Ross are correct, the judge will be using versions of the same heuristics that the jurors use, complete with the potentials for significant errors. To adequately rule on a motion for a directed verdict, therefore, a judge must be able to differentiate between his own errors and those of the jury. Perhaps this observation suggests greater use of experts by the court

28. A debate on this point would likely focus on the parties' expectations. For example, a criminal defendant might expect that if he were to show that one of two events upon which the charge was based had not been established beyond a reasonable doubt, the jury would conclude that the *combination* of the two events had not been established beyond a reasonable doubt. Such a proposition sounds so fundamental that every defendant might have a right to expect treatment in accordance with it. On the other hand, a defendant may reasonably expect only a jury of humans, complete with inferential weaknesses. Any greater demands on a jury may amount to a demand for treatment in a superhuman manner.

29. The costs of such errors may be thought of as the sum of their direct costs and the costs of preventing them.

in dealing with such motions,[30] but this may raise both theoretical and practical difficulties. First, "experts" may be using versions of the very same heuristics that cause juries to err. If this is so, then perhaps there should be experts' experts. Such reasoning can easily lead to an infinite regression. But even if we put such problems to one side, practical difficulties arise. For example, if experts are allowed to aid the court, then perhaps the parties should be allowed to depose and question the court's experts. Further, perhaps the parties should have a voice in *selecting* the experts. These possibilities suggest even more questions about procedure and practice, but this review will rest with having suggested the appropriate direction of investigation.

Second, one must evaluate possible tactics for minimizing the costs of such errors. Such tactics may take two general directions. First, one may attempt to manipulate the flow of information to jurors. Second, one may attempt to directly alter jurors' methods of information processing. The first tactic takes jurors' mental processes as given and then tries to mold the flow of data to the jury so that after utilizing the information with heuristics, the inferences tend to appear as if they had issued from an ideal jury. In this regard, Professors Saks and Kidd have suggested that jurors be given probabilistic data, and particularly base rate data.[31] Saks and Kidd argue that since experimental evidence suggests that people tend to underutilize such data, rather than overutilize it as Professor Tribe contends,[32] there is no good reason to keep it from the jury.[33] Such information, they claim, will aid jury factfinding, for without it the jury would be incapable of acting rationally (except accidentally). Although such a suggestion may be a good place to start, it is not necessarily the place to stop. Perhaps, if certain information tends to be underutilized, the rules of evidence should be shaped so as to counteract this tendency. For example, perhaps a party should not only be allowed to introduce base rate informa-

30. A recent article reviewing much of the same data used in HUMAN INFERENCE suggests the use of experts in court with respect to base rate arguments. Saks & Kidd, *Human Information Processing and Adjudication: Trial by Heuristics*, 15 LAW & SOC. REV. 123 (1981).

31. *Id.* at 148.

32. Tribe, *supra* note 19, at 1360-62.

33. Saks and Kidd also find untenable the distinction between particularistic and base rate data; they contend it should be discarded because it helps support the dishonest, unhelpful symbolism of certainty in the factfinding process. Saks & Kidd, *supra* note 30, at 151-54.

tion but should also be allowed to emphasize such data.[34] To implement such an approach, one would have to trace out the effects of the various heuristics on different types of evidence and then shape the rules of evidence and procedure so as to optimize inferential output in general.[35]

The second tactic—attempting to alter jurors' methods of information processing—takes the flow of information as given and then tries to mold the jurors' ratiocination to model the ideal. One could attempt to reduce the number of errors by screening out those potential jurors who are likely to make mistakes. For example, one could administer tests, much like the tasks which were given to Kahneman and Tversky's subjects, and evaluate the quality of each potential juror's judgments. If a juror failed these tests, then one might allow any party to challenge that juror for cause. Of course, such a system might have to be justified in the face of fairness complaints from both parties and disappointed potential jurors.[36] Alternatively, one might try to mold jurors' information-processing through use of jury instructions. These instructions, of course, would have to be quite lengthy and involved. For example, if a judge perceived possible problems because of a need to deal with compound probabilities, then the instructions might repeat much of the discussion of that subject in this review. Such an instruction, however, might not be understood by the jurors and therefore might be of little value. Other considerations, such as the value of the time involved in educating the jurors about inferential principles, should also be taken into account.

Many of these philosophical and practical questions apply equally to other legal considerations. For example, whenever a party offers physical evidence to the court, the opposing party may require the court to pass on its relevance. At this point, "[t]he

34. This echoes, in part, the suggestion that redundant evidence may sometimes be admissible despite its lack of relevance. *See* Lempert, *supra* note 19, at 1046-52.

35. Such work has just begun. *See* Borgida, *Legal Reform of Rape Laws: Social Psychological and Constitutional Considerations*, in 2 APPLIED SOCIAL PSYCHOLOGY ANNUAL (L. Bickman ed. 1980); Borgida, *Character Proof and the Fireside Induction*, 3 LAW & HUMAN BEHAVIOR 189 (1979); Borgida & White, *Social Perception of Rape Victims*, 2 LAW & HUMAN BEHAVIOR 339 (1978).

36. To the extent that large classes of people do not wish to spend time on jury duty, some people may fail such a test on purpose, in the hopes that they will be released from jury duty more quickly. However, such effects may be quite marginal, for it is possible to fake bias or prejudice under current jury selection systems, thereby achieving much the same result.

court's function is . . . only to decide whether a reasonable man might have his assessment of the probabilities of a material proposition changed by the piece of evidence sought to be admitted. If it may affect that evaluation it is relevant and, subject to certain other rules, admissible."[37] An analysis of the philosophical underpinnings of relevance would, like the analysis of directed verdicts, first focus on the ideal of a reasonable juror. Alternative models of juror rationality would require evaluation. If such a model were to contain the normative principles which shaped *Human Inference*, difficult questions, much like those discussed above, would have to be answered. Answering these questions would lead one to examine, I believe, the possibilities regarding controlling the flow of information to jurors and molding jurors' methods of information-processing. In this way, *Human Inference*, as applied to the rules on relevance, leads the scholar to ask many of the same, difficult questions which were discussed in this review. Regardless of the legal starting place, however, *Human Inference* remains a valuable and important contribution, and its implications should be worked into the jurisprudence of evidence and procedure.

37. United States v. Schipani, 289 F. Supp. 43, 56 (E.D.N.Y. 1968).