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# Train Our Jurors

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## ABSTRACT

Lay jurors are often legally and logically unprepared for trial. In response, it is recommended that jurors receive training in how to make better legal decisions. This chapter suggests that jurors should receive comprehensive training in critical legal doctrines and in how to reason with legal evidence. Jurors who cannot be trained to achieve minimal levels of competence (in the law or in basic reasoning) should be excused from jury service. Suggestions are given as to how policy makers and researchers who are interested in jury reform may wish to proceed.

## INTRODUCTION

One of the central goals of a legal trial is the discovery of truth.<sup>1</sup> We want juries to determine what “really” happened and to provide accurate verdicts. However, verdict accuracy is not the only goal of a trial. Various process, policy, and individual rights concerns are important as well. Consequently, the search for truth proceeds within the confines of a strict set of procedures and rules, and the verdicts that juries render should reflect a balance of accuracy and policy concerns. This balancing act is most apparent, perhaps, in criminal cases where jurors are explicitly told to presume that the defendant is innocent and to return a guilty verdict only if the prosecution has overcome that presumption by meeting a very high standard of proof (“beyond a reasonable doubt”). Thus, when juries acquit defendants in cases where the evidence is more consistent with guilt than innocence, we remind ourselves that the elevated standard of proof serves an important policy goal, even if it sometimes hinders the production of accurate verdicts.

Research in psychology with mock jurors, as well as anecdotal observation of actual jurors, suggests that jury verdicts may also reflect systematic biases that arise from the mental shortcuts—some of which may qualify as

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<sup>1</sup> According to the United States Supreme Court, “the basic purpose of a trial is the determination of truth” (*Tehan v. United States ex rel. Shott* 1966, p. 416).

heuristics<sup>2</sup>—that jurors use when trying to apply the relevant rules of law and logic to a target case. Although some mental shortcuts that jurors use may have all of the desirable properties that accompany good heuristics (e.g., they save time, make the task manageable, positively correlate with outcomes given by normative rules in particular environments), I suggest that the shortcuts that untrained jurors use are often infused with a good deal of ignorance, misunderstanding, confusion, and illogic. Jurors misunderstand rules of law, legal presumptions, and applicable standards of proof. They rely on information that they are told not to use, ignore crucial evidentiary points, and make inappropriate inferences. Sometimes jurors falsely “recognize” elements of cases that are consistent with their preferred stories of what actually occurred, even when these elements were not present as evidence (Pennington and Hastie 1988). Other times jurors concoct theories “from left field” (Caplow 2002, p. 799).

In the sections below, I suggest that lay jurors are often legally and logically unprepared for trial.<sup>3</sup> There are many ways the law might respond to this problem. One way is to change the offending legal rules. For example, if jurors have trouble remembering evidence during deliberations, consideration might be given to allowing jurors to use various decision aids (e.g., personal notes, pre-trial conversations with fellow jurors). A second approach to the problem is to change the task environment in ways that compliment the heuristics that people are likely to employ when thinking about legal evidence. This solution should be appealing to psychologists who have demonstrated that decision performance can be improved by varying the task environment. A third way is to acknowledge the inherent value in the first two solutions, but to suggest that there may be value in training jurors to make better legal decisions. This third approach is my focal point in this chapter. I propose that jurors receive comprehensive training in critical legal doctrines (e.g., standards of proof) and in how to reason with evidence (e.g., how to assess evidentiary relevance).<sup>4</sup> The training in any particular case should be based on the parameters of the target case in conjunction with empirical research on misunderstandings jurors may have and ways to resolve those misunderstandings. In addition, I add my voice to those who have called for rule modifications that make jurors more active members of the trial process to improve the quality of their judgments. Finally, I anticipate criticisms of my plans and offer specific suggestions for how policy makers and researchers interested in jury reform may wish to proceed.

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<sup>2</sup> As other chapters in this volume indicate, there is no single, agreed-upon definition of what a heuristic is and is not. Having said this, I assume here that heuristics are shortcuts (or rules of thumb) for decision making that are associated with a mental process.

<sup>3</sup> Although I assume a criminal context throughout, the general points apply to civil trials as well.

<sup>4</sup> In suggesting that jurors are logically unprepared for trial, I am only tangentially concerned with the usual array of cognitive shortcomings (e.g., hindsight, overconfidence, and insufficient adjustment from anchors). My point is less psychological, though psychology may help provide solutions. My claim is that, absent training, jurors may not have the skills they need to achieve minimal levels of competence as legal decision makers.

## LEGAL IMPAIRMENTS

We exclude mentally impaired people from jury service and no one questions the wisdom of this. We exclude them because they cannot understand the law and they cannot reason well enough to make an informed legal decision. I suggest that there is another, larger group of prospective jurors who are *legally* impaired. These people have such a poor grasp of legal doctrine and/or have such inadequate reasoning skills that they should not be permitted to be on juries in their current state. As I note later in this section, some key legal doctrines are so hard to comprehend that mild legal impairment may be unavoidable.

Everyone agrees that jurors take their task seriously. They generally try to make judgments based on the evidence and the applicable rules of law.<sup>5</sup> This impression receives some support from jurors' post-verdict comments about their deliberations. According to Marder (1997), jurors most frequently comment on the relationship between their verdicts and the evidence, and between their verdicts and the applicable laws. This is the good news. The bad news is that jurors frequently misunderstand the law. To the extent this occurs, the judgments rendered by juries may be erroneous and our jury system loses credibility. As Pizzi (1996, p. 1035) notes, "no matter how well the evidence rules are crafted, or how well the investigatory procedures are designed, if the fact finders cannot be trusted, the system will be weak."

### Misunderstanding Instructions

Currently, in the United States, jurors typically receive information about the law through a set of verbal instructions delivered by the trial judge. These instructions, which are usually presented at the close of trial, cover procedural rules of the trial (e.g., do not talk about the case, the verdict must be unanimous), the requirements of proof (e.g., the presumption of innocence, the applicable standard of proof), and the applicable substantive law (e.g., definitions of the crimes charged, elements that must be proved). Jurors widely report that these instructions are helpful and understandable.

Research with both mock jurors and actual jurors, however, suggests that something is deeply amiss in the world of jury instructions. Studies reveal that jurors do not understand jury instruction terminology and cannot remember, recognize, or paraphrase the instructions after they have heard them. In one study of actual jurors, only 3% of jurors said they were confused about their instructions, but these jurors could not answer 30% of questions that were central to the legal judgments they had just made (Saxton 1998). Similarly, Ellsworth (1989) showed that jurors missed 35% of important true–false legal questions

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<sup>5</sup> At the same time, jurors often resolve disagreements by splitting differences. This tactic enables jurors to go home more quickly, an extra-legal goal that frequently emerges during difficult deliberations.

shortly after hearing judicial instructions. Smith (1991) reported that instructed jurors were not able to apply the law to the instant case better than uninstructed jurors. Sometimes, jurors' understanding of certain key legal concepts actually *diminished* following judicial instruction (Ellsworth 1989).<sup>6</sup>

### Misunderstanding Key Legal Concepts

Confusion about the presumption of innocence and the standard of proof ("beyond a reasonable doubt") are of special concern. Only one in five jurors can paraphrase the presumption of innocence (Lieberman and Sales 1997), and half of the jurors mistakenly believe that defendants must provide evidence of their innocence. Forty percent of jurors believe that the charge itself constitutes evidence of guilt, whereas 20% believe that the charge constitutes "strong" evidence of guilt. Though a Bayesian might find such beliefs to be reasonable, they are inconsistent with the presumption of innocence.<sup>7</sup>

The standard of proof is also widely misunderstood. Nearly seven in ten people who received jury instructions in actual cases erroneously believed that one must be "100% certain" before voting to convict in a criminal case (Saxton 1998). One in ten of these jurors agreed with this statement: "In a criminal trial, all that the state has to do is to convince the jury that it is more likely than not (i.e., that there's a better than 50–50 chance) that the defendant committed the crime that the defendant is accused of" (Saxton 1998). At this 10% rate, the chances are nearly 3 in 4 that at least one juror in a group of 12 will enter the jury room believing that a 51% chance of guilt suffices for conviction. Jurors are also confused about what exactly it is that the prosecution must prove beyond a reasonable doubt. Reifman et al. (1992) as well as Ellsworth and Reifman (2000)

<sup>6</sup> An anonymous legal reviewer dismissed all of the experiments cited in this chapter that indicate that people have trouble with legal rules and reasoning because the experiments do not document erroneous verdicts. The reviewer wrote that, without such documentation, "there is literally no evidence" of a problem. On the one hand, this criticism need not be taken seriously. If there is a connection between ability to engage in elementary reasoning operations and the ability to produce accurate verdicts, then evidence that people fail to understand judicial instructions or fail to understand relations among items of evidence certainly constitutes evidence of a problem, even in the absence of proof of verdict error in a particular case. On the other hand, I am sympathetic to the idea that social scientists should be sensitive about the inferential limits of laboratory data. I also think that social scientists who wish to affect policy should conduct studies that lawyers and legal policy makers are most likely to find persuasive. To this end, see the discussion in the section on **Research Reform** below.

<sup>7</sup> In unpublished written comments on this chapter, Rick Lempert wrote, "I don't share Koehler's concern with confusion about the presumption of innocence and standard of proof. For me, the most meaningful operational definition of overcoming the presumption of innocence through proof beyond a reasonable doubt is the fact that 12 jurors will concur on guilt." In response, I suggest that the agreement 12 jurors achieve as an operational matter is orthogonal to the confidence we should have that those jurors interpreted the proof standard appropriately. To suggest otherwise confounds the descriptive (what jurors do) with the prescriptive/normative (what jurors should do).

report that many jurors mistakenly believe that the prosecution must prove motive, opportunity, and other individual elements of their theory of the case beyond a reasonable doubt.

Post-verdict interviews with actual jurors indicate shocking degrees of naiveté about the trial process and standards. In one interview, jurors revealed that a secret ballot for jury foreman yielded 18 ballots from the 12 voting jurors. Apparently, two of the twelve jurors mistakenly believed that they were voting for “four men” rather than a single foreman. In another case, jurors indicated that they relied heavily on impermissible evidence to find against a defendant. An appellate court brushed aside this complaint on grounds that it “ignores the jury’s thorough analysis of the totality of the evidence during their deliberations” (*United States v. Taubman* 2002). In general, Appellate courts are reluctant to correct jury error, even when jurors profess confusion. In *State v. Ronquillo and Sarausad II* (1998), two jurors said they convicted a defendant of second-degree murder because they mistakenly believed they were obliged to do so once they had convicted his codefendant of first-degree murder. The appellate court upheld the conviction.

*Standard of Proof in State of Texas v. Baker Steven Lucas* (1994): Ten years ago I watched the televised murder case of Texas businessman Steven Lucas on Court television. Lucas was accused of murdering his mother by throwing her over a staircase. The jury convicted Lucas of murder on the second day of deliberations. In a post-verdict interview with the jury, one juror revealed that he was one of four who supported acquittal on the first day of deliberations. However, when he awoke the following morning, he switched his vote because he realized that there was “a preponderance of evidence” against the defendant. Following weeks of testimony from numerous witnesses, at least one juror apparently switched his vote from not guilty to guilty based on a misunderstanding of the criminal standard of proof. The fact that no juror corrected him during the interview hints that this improper standard may have been used by others as well.

### **The Beyond-a-Reasonable-Doubt Instruction**

I would not be surprised if the problem that arose in the Lucas case is widespread. However, at least part of the problem may be endemic to the reasonable doubt standard or to inadequate descriptions of the standard. Consider a typical “reasonable doubt” instruction:

A reasonable doubt is an honest and reasonable uncertainty in your minds about the guilt of the defendant after you have given full and impartial consideration to all of the evidence. A reasonable doubt may arise from the evidence itself or from a lack of evidence. It is a doubt that a reasonable person hearing the same evidence would have (*State of New Jersey v. Medina* 1996).

How helpful is this instruction? Does it clarify the proof standard for one who has never been asked to apply it? How exactly does the circular explanation that

a reasonable doubt is “a doubt that a reasonable person . . . would have” clarify the standard? A separate question, and one that resides at the heart of the matter, is whether jurors who hear this explanation will make better legal decisions than those who do not.

In fairness, the instruction above, which was crafted by the New Jersey Supreme Court from various other recommended jury charges, continues as follows:

Proof beyond a reasonable doubt is proof, for example, that leaves you firmly convinced of the defendant’s guilt. In this world, we know very few things with absolute certainty. In criminal cases the law does not require proof that overcomes every possible doubt. If, based on your consideration of the evidence, you are firmly convinced that the defendant is guilty of the crime charged, you must find him guilty. If, on the other hand, you are not firmly convinced of defendant’s guilt, you must give defendant the benefit of the doubt and find him not guilty (*State of New Jersey v. Medina* 1996).

Note that the Court’s attempt to define the beyond-a-reasonable-doubt standard, actually produces a new standard, namely a “firmly convinced” standard. That is, a case against a defendant is proved “beyond a reasonable doubt” if it leaves jurors “firmly convinced that the defendant is guilty.” It is hardly clear that a state of “firm conviction” is identical to a state in which reasonable doubt is absent. The latter standard appears to be weaker than the former. Jurors may be firmly convinced about the truth of many propositions about which they cannot say that they have no reasonable doubt. If so, then the “firmly convinced” language may induce juries to convict in cases where they would otherwise acquit.

Jurors in the recent high profile Martha Stewart trial heard another popular instruction on reasonable doubt:

[Reasonable doubt] is a doubt based on reason and common sense and arising from the evidence or lack of evidence. It is a doubt that a reasonable person would have after carefully weighing all of the evidence. It is a doubt that would cause a reasonable person to hesitate to act in a matter of importance in his or her personal life. Proof beyond a reasonable doubt must, therefore, be proof of such a convincing character that a reasonable person would not hesitate to rely and act upon it in the most important of his or her own affairs (Blodget 2004).

As before, this definition includes the circular logic in which reasonable doubt is defined as “doubt that a reasonable person would have.” In addition, this definition explains that such doubt would cause a reasonable person to “hesitate” before taking an action. However, it is not clear to me that whether somebody would or would not “hesitate” before taking action is an adequate proxy for whether that person does or does not have reasonable doubt. A thoughtful person is likely to “hesitate” before making *any* momentous decision, yet surely such hesitation provides an insufficient basis on which to infer reasonable doubt.

In light of the difficulty clarifying the meaning of beyond a reasonable doubt, perhaps it is best to leave the standard undefined. Alternatively, we should replace this standard with one that jurors can understand. The “firmly convinced” language from the New Jersey instruction is one possibility. Whereas few laymen have occasion to ponder whether they believe something “beyond a reasonable doubt,” most people probably have thought about the degree to which they are *convinced* of a proposition. Thought should also be given to which among many possible adverbs—if any—should precede the word “convinced” (e.g., strongly, completely, etc.).<sup>8</sup>

What about quantifying the burden of proof? The notion that the beyond-a-reasonable doubt standard should be associated with a subjective probability threshold (e.g., 90% or 95%) has been proposed and debated from time to time. The clarity that such a standard provides is part of its appeal. However, quantifying the burden of proof raises numerous policy problems (Tribe 1971) and is unlikely to generate much political support.

## LOGICAL IMPAIRMENTS

Just as jurors must understand legal rules, standards, and policies to perform their duties effectively, they also need to be able to think appropriately about these rules, standards, and policies. Judges often instruct jurors to use “reason and common sense” to draw conclusions from the evidence that they have heard (Devitt 1992). Presumably, then, if a juror possessed neither sufficient reason nor sufficient common sense, he/she would or could not abide by this legal requirement and should be excused from jury service. I doubt that there exist agreed-upon standards of common sense. If not, then it would be hard to say whether a juror met a minimal threshold for this requirement.

However, there are various rules associated with proper reasoning. Some of these rules appear in normative theories of logic and probability.<sup>9</sup> For example, if all members of set A have characteristic B, and element C does not have characteristic B, then C cannot be a member of set A. This is an elementary rule of logic, and failure to abide by it constitutes poor reasoning. We also know that if two events are independent and the probability of each event is 0.60, then the probability that both events occur is given by the product of their individual probabilities,  $0.60 \times 0.60 = 0.36$ . This is an elementary rule of probability and failure to abide by it likewise constitutes poor reasoning.

The credibility of our legal system rests, in part, on the ability of jurors to reason properly with evidence. Of course, this does not mean that all jurors must

<sup>8</sup> The French actually do use such a standard. According to Newman (1993), the French Code of Criminal Procedure instructs panels that consist of three judges and nine lay jurors a single question: “Are you thoroughly convinced?”

<sup>9</sup> Although ability to reason encompasses more than the ability to follow the rules of logic and probability, the present discussion of shortcomings in reasoning focuses on statistical shortcomings largely because there is much empirical work in this area.



reach the same conclusions. After all, jurors may disagree about whether C is, in fact, a member of set A, or whether the unconditional probability of an event really is 0.60. However, jurors should not be free to reason according to their own unique brands of logic to obtain a desired result.

This is not to say that a qualified juror would never violate a logical rule. After all, Kahneman and Tversky (see, e.g., Kahneman et al. 1982) taught us that nearly everyone can be seduced into violating some normative principle on occasion. However, prospective jurors who broadly fail to understand and accept the rules of logic and probability theory when applied to everyday matters have questionable reasoning skills. Because evidence presented at trial is increasingly complex and statistical in character (Feinberg 1989), the system should impose minimal standards to ensure that our legal fact finders are up to the task.

### **Problems Understanding the Random Match Probability**

One hundred years ago, probabilities were dismissed by most courts as “speculative” evidence. As one appellate court noted, “Quantitative probability ... is only the greater chance. It is not proof, nor even probative evidence of the proposition to be proved” (*Day v. Boston and Maine R.R.* 1902, p. 774). Today, probabilities are widely admitted as evidence and form the backbone of scientific testimony in many cases. Juries routinely hear testimony that includes Z values, p values, regression coefficients, and a host of other statistics and probabilities that they are expected to understand using “reason and common sense.”

Consider a murder case in which DNA evidence recovered from a crime scene reportedly matches the DNA of the defendant. The strength of this match is generally identified via a random match probability (RMP). The RMP identifies the theoretical probability that a randomly selected person from the general population would match these samples. Though the suspect population or the potential source population are more appropriate sample spaces from which to construct an RMP, the RMP can inform jurors who have some question about whether the match may be the result of coincidence. As the RMP becomes smaller, coincidence becomes an increasingly unlikely explanation for the reported match.

However, there is substantial evidence that people are easily confused and misled by small probabilities such as RMPs. When DNA statistics are presented in conditional probability form (e.g.,  $P(\text{Reported Match} \mid \text{Suspect is Not the Source})$ ), jurors commonly invert the conditional probability (Koehler 1996). Though one would hope that the lengthy testimony that DNA experts ordinarily provide at trial help jurors understand the meaning of the probabilities and statistics they hear, I remain skeptical.

Several years ago, Stuart O’Brien interviewed four jurors shortly after they convicted a defendant of murder in a case that included extensive DNA testimony (reported in Koehler 2001). O’Brien asked the jurors questions about the

meaning of DNA statistics and found that the jurors understood little or nothing about them despite exposure to extensive adversarial discussion of these numbers at trial. O'Brien provided the jurors with a written murder scenario in which DNA evidence recovered from clothing worn by a suspect matched the DNA profile of the victim. The RMP was 1 in 100. One of the jurors indicated that this probability meant that there was a 99% chance that the victim is the source of the evidence. This is a logical error. The source probability (i.e., the probability that a particular person is or is not the source of material recovered from a crime scene) cannot be computed as one minus the RMP (see Koehler 1993a).

The statistical error committed by the other three jurors was worse. They concluded that the 1 in 100 RMP indicated that there was only a 1% chance that the blood belonged to the victim. By equating the profile frequency with the source probability, these veteran jurors revealed that they have no idea what the RMP mean. If the profile frequency actually did equal the source probability, then a rare blood match (e.g., 1 in 1,000,000) would be *less* probative than a common blood match (e.g., 4 in 5)! Apparently, then, jury service on a case that includes testimony about DNA evidence provides insufficient reason to believe that jurors will understand how to reason with that evidence.

## TRAINING JURORS

There is good reason to believe that jurors are confused about the law and have difficulty reasoning with evidence (statistical evidence in particular). One drastic solution is to replace jurors with judges. Presumably judges have a much better understanding of the law as well as better reasoning skills. In England, jury trials have practically been eliminated in favor of three-judge panels. However, this solution is likely to be quite unpopular in the United States where the public is broadly suspicious of elite decision-making authorities. A second solution is to employ blue-ribbon juries, particularly in cases that include complex or technical evidence. These juries could include people who are familiar with the specific, technical issues of the instant case. Such juries are sometimes used in complex civil cases in areas such as intellectual property, medical malpractice, products liability, and toxic tort injuries (Kondo 2002). Though specialized juries have some appeal and I would support their expansion, it is unrealistic to imagine that blue-ribbon juries could broadly replace layperson juries.

Thus I propose that we train layperson juries to improve their ability to make effective legal decisions. An effective legal decision is one that helps achieve the various process, policy, and accuracy goals of our legal system. Jurors and juries can only make judgments that help achieve these goals if they understand what the goals are and have a few basic cognitive tools at their disposal.

Regarding the process and policy goals, jurors should receive training in the trial process, the goals of a trial, and the standards that should be applied during deliberations. This training should seek to correct widely held misconceptions

about legal goals and policies that could affect jurors' judgments. As noted earlier, the training should be based on empirical research that identifies both the shortcomings in legal reasoning and ways to overcome those shortcomings. Following training, jurors should be required to agree to uphold legal and logical principles, and demonstrate (through testing) that they understand much of what they have been taught.

Regarding accuracy, jurors must understand basic rules of logic and inference. They must be able to distinguish between weak and strong items of evidence for different hypotheses, and they must have some sense of how to combine multiple items of evidence. Therefore, jurors should probably receive basic training in how to think generally, and how to reason with legal evidence in particular. The content of the jurors' training should be determined by theory-driven empirical research that identifies (a) shortcomings in intuitive reasoning, and (b) lesson content that demonstrably improves the judgments and decisions people reach. As before, jurors should demonstrate that they understand much of what they have been taught, and agree to reason according to those principles.

### **Training Jurors in the Law**

Although trial judges currently instruct jurors prior to sending them off to deliberate, there is broad agreement that these instructions are inadequate. As Ellsworth and Reifman (2000) note, jurors are "poor at remembering, understanding, and applying the relevant laws." Assuming that this is not a hopeless state of affairs, I recommend that the current practice of providing jurors with a short, canned set of verbal instructions immediately prior to deliberations be replaced by a comprehensive pretrial training program. As noted throughout, the style and substance of the program should be an on-going process rooted in empirical research and feedback. Some training modules would likely be common across all criminal trials (e.g., instruction on presumptions and burdens of proof), whereas other modules would be tailored to reflect the issues in the focal case.

The program could include a series of short, videotaped instructional segments delivered to jurors over the course of several hours. The trial judge, guided by relevant statutes, would select the segments and materials for individual juries. The taped segments should convey a wealth of essential information in a way that maintains a high level of juror interest and participation. For example, jurors could answer key questions as the training proceeds, or request reviews of particular topics.

The tapes should take pains to rebut commonly held misconceptions. This is important because research shows that jurors rely on their preexisting beliefs about legal constructs, even when the judge's instructions are clear (Diamond and Casper 1992). Jurors should also receive supplementary materials that they may rely on during deliberations. Minimal comprehension standards should be

identified, and jurors who fail to meet those standards should either be retrained or excused from the jury panel for cause.

### **Reducing the Influence of Attorney Spin**

A comprehensive jury training program can reduce sources of systematic and random error across trials and juries. For example, jurors who learn about legal doctrines from training sessions may be less likely to rely on adversarial attorneys' descriptions of those doctrines. This is a good thing, because attorneys commonly spin legal requirements in ways that can adversely affect jurors' understanding of those principles.

Consider, once again, the "beyond a reasonable doubt" standard of proof. This is a heavy burden of proof that defense attorneys often try to make even heavier through linguistic sleight of hand. Some defense attorneys implore juries not to convict if they have *any* doubt that is reasonable. By introducing and emphasizing the word "any," defense attorneys subtly convey a stronger standard of proof. With the assistance of a strategic pause between the phrases "any doubt" and "that is reasonable," defense attorneys may even be able to get convince jurors to require proof "beyond *any* doubt" for conviction.

Similarly, some defense attorneys refer to the standard of proof as "beyond *all* reasonable doubt." By inserting the word "all," attorneys—and some Supreme Court Justices (see e.g., Justice Blackmun's dissent in *Victor v. Nebraska* 1994, p. 1254)—may create a higher threshold for a guilty verdict than the actual standard requires. For now, the significance of this linguistic distortion remains an unexplored empirical question.

A more insidious distortion occurs when defense attorneys imply that jurors must apply the "beyond a reasonable doubt" standard to each contested fact at trial. This strategy was used, perhaps successfully, in the criminal O. J. Simpson case (Bugliosi 1996). I contend that a thoroughly trained jury would have a firmer grasp of the standard of proof and therefore be less vulnerable to attorneys' linguistic machinations.

### **Training Jurors to Reason**

Jurors should be able to employ elementary rules of logic and inference to make sense of the evidence and arguments that come before them. Toward this end, jurors should receive training in how to think logically about evidence. Studies by Richard Nisbett and colleagues in the 1980s and 1990s indicate that people can be trained to reason in relatively short order (e.g., Fong and Nisbett 1991; Nisbett et al. 1987). According to this research "even brief formal training in inferential rules may enhance their use for reasoning about everyday life events" (Nisbett et al. 1987, p. 625). For example, less than 30 minutes of abstract instruction on samples, populations, parameters, and sample size variation, produced significant and lasting improvements in people's understanding of the

law of large numbers. Importantly, this training session improved statistical reasoning “for problems that people rarely think of in terms of probability” (p. 628).

Research by Gerd Gigerenzer and colleagues offers even more reason for optimism. Whereas Nisbett and colleagues can improve performance in less than 30 minutes using rule-based techniques, Gigerenzer and colleagues can turn laymen into full-blown Bayesians “in less than two hours” using a different technique (Sedlmeier and Gigerenzer 2001). These researchers obtained substantial improvements in statistical reasoning ability by teaching people how to construct frequency representations. Apparently, people can reason quite well with information that is presented simply and in ways that clarify the underlying sample space. Hoffrage et al. (2000) demonstrated the significance of this idea for legal decision making. They showed that when powerful DNA statistics were presented as natural frequencies (which clarify the sample space), law students and future judges treated the evidence as much more compelling proof of guilt than they did when the evidence was presented as probabilities.

This research hints that jurors who are exposed to carefully constructed training modules<sup>10</sup> may improve their ability to reason about legal matters, both when the evidence is explicitly probabilistic and otherwise.<sup>11</sup> Though definitive studies have yet to be conducted, the training might include instruction on the rules of conjunctive and disjunctive probability, base rates, likelihood ratios, sample spaces, and different ways to represent information. I stop short of recommending that jurors receive training in Bayes’s theorem.

## Conjunction

The issue of conjunction often arises in cases involving scientific evidence. For example, jurors who hear DNA testimony are commonly told that the RMP is based on a multiplication process in which the probabilities of a random match at each of several DNA loci are multiplied together to form an aggregate RMP. Thus, if there is a 0.10 chance of a random match at locus A, and a 0.05 chance of a random match at locus B, then there is a  $(0.10)(0.05) = 0.005$  chance that a random person would match at both loci. This use of the “product rule” is justified because empirical study shows that the characteristics at each locus are roughly independent of the characteristics at all other loci. (See National Research Council [1996, p. 122] for a “conservative” computation method that takes account of possible dependencies.) Because DNA samples are typically tested at multiple loci, aggregate RMPs are often quite small.

Laypeople are often suspicious of the product rule in any context. For many, it is not intuitively clear why the individual probabilities are multiplied together

<sup>10</sup> Modules should take into account the limits of teaching reasoning; e.g., training in abstract rules of logic is ineffective unless concrete examples are also provided (Nisbett et al. 1987).

<sup>11</sup> If future studies demonstrate that particular statistical formats facilitate more accurate verdicts, the courts might consider requiring witnesses to present statistical evidence in those formats.

rather than, say, added. A brief hands-on training session could be helpful here.<sup>12</sup> Implications of the conjunctive rule should also be taught. For example, jurors should know that the joint probability of a pair of events (e.g., “he planned the murder” and “he committed the murder”) cannot be greater than either of the relevant unconditional probabilities (e.g., “he committed the murder”).

### Disjunction

Consider the juror who wishes to identify the probability that a reported DNA match between a crime scene sample and a defendant is due to either laboratory error or coincidence. If  $A$  = the chance of an incriminating error, and  $B$  = the chance that the defendant matches the crime scene sample by coincidence then, by the disjunctive rule of probability,  $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ . When the probability of event  $A$  is several orders of magnitude higher than the probability of event  $B$  (as it is here), then a reasonable approximation of the disjunctive probability is, simply,  $P(A)$  (Koehler et al. 1995).

Suppose a juror believes that the chance of an incriminating laboratory error is 1 in 1,000, and the chance of a coincidental match is 1 in 1,000,000,000. This juror should believe that the chance that either of these events occurred is about 1 in 1,000. Untrained jurors are unlikely to intuit this implication of the disjunctive rule. Instead, they are likely to average the two small probabilities and, in doing so, arrive at estimates that increase the chance that they will return guilty verdicts against the defendant (Koehler et al. 1995; Lempert 1991a).

### Base Rates

Jurors are also likely to be unsure about the significance of background probabilities, or base rates. It is well known that people often attach relatively little weight to base rates in many probabilistic judgment tasks. Although greater base rate usage may improve verdict accuracy (Koehler and Shaviro 1990; Koehler 1993b), explicit use of base rates will often be outweighed by various legal policy goals (e.g., perceptions of fairness). Sometimes higher courts vehemently oppose the introduction of base rates at trial, but other times they uphold verdicts based on base rates alone (Koehler 2002). This is a messy area of law and it is not clear what sort of training jurors should receive in base rate usage. Though accuracy may suffer, jurors should probably be cautioned against relying on base rates related to sex, race, ethnicity, etc. during deliberations.

### Relevance, Probativity, and Likelihood Ratios

Federal Rule of Evidence 401 (FRE 401) defines relevant evidence as “evidence having any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be

<sup>12</sup> The session should also teach jurors that the product rule does not hold for dependent events.

without the evidence.” This definition is consistent with a likelihood ratio (LR) test of relevance in which LRs that deviate from unity are relevant because they change one’s prior probabilities. Although LRs are closely associated with Bayesian reasoning, a likelihood-based approach to relevance or probative value “can be embraced without a commitment to Bayesian reasoning” (Kaye 1995, p. 678). That is, one may test whether evidence *E* makes hypothesis *H* more or less probable by determining whether the LR,  $P(E|H)/P(E|\neg H)$ , is greater than or less than 1. If this ratio is significantly greater than 1, then *E* is relevant and it makes *H* more probable (i.e.,  $P(H|E) > P(H)$ ). If the LR is significantly less than 1, then *E* is also relevant and it makes *H* less probable (i.e.,  $P(H|E) < P(H)$ ). Small LRs (e.g., 1/0.001) and large LRs (e.g., 1000/1) are more probative than LRs that are closer to 1 (e.g., 1/3 and 3/1).

Laymen often fail to seek the information that they need about evidence *E* to determine whether the *E* is relevant. People intuitively understand that  $P(E|H)$  helps determine whether *E* supports *H*, but they fail to realize that  $P(E|\neg H)$  is also required (Doherty et al. 1979). Even trial judges, who are responsible for admitting relevant evidence and excluding irrelevant evidence, use inappropriate shortcuts for assessing relevance. For example, in cases involving allegations of child sexual abuse, some judges admit symptom evidence if the symptoms are “common” among abused children, even when those symptoms are equally common among non-abused children (Lyon and Koehler 1996). Other times, judges exclude proffered symptoms because the symptoms appear in some children who have not been abused. These results suggest that laymen and judges alike do not think about evidence against the backdrop of different hypotheses.

If judges sometimes subscribe to illogical methods for determining evidentiary relevance, there is even more reason to train jurors to make such judgments as well. Even if jurors find it difficult to quantify the available evidence, some training in the ideas that underlie LRs may help dislodge misconceptions about how to assess evidentiary relevance and strength.

### **Selective Evidence**

The problem of identifying the relevance and strength of evidence is complicated by the fact that the evidence that jurors hear at trial is not a representative sample of the available evidence. Instead, it is a selective sampling of facts that are biased to suit the interests of the litigants. Some evidence exists that jurors are only sensitive to selection biases in the production of evidence when the sample space within which evidentiary “matches” are found is made explicit. Koehler and Thompson (unpublished) showed that jurors who were aware of the number of leads that police investigated (i.e., the number of chances that the police had to find a “match” against the defendant) used this information to discount the strength of incriminating “matches” that were found. But when jurors

were unaware of the number of leads police investigated, they treated incriminating matches as very strong proof of guilt.

Can jurors be trained to consider the significance of the search process that produced seemingly incriminating evidence? If so, can jurors be trained to assign appropriate weights to evidence found using different search techniques? Though we do not yet have the answers, the research cited earlier on the beneficial effects of natural frequency presentations indicates that it should be possible to sensitize people to this sample space issue.

### *What about Bayes?*

Though jurors should receive some training in the principles that lurk behind likelihood ratios, it may not be a good idea to train jurors to use Bayes's theorem. Bayes's theorem provides a mathematical technique for combining one's prior beliefs with one's assessment of the strength of new evidence. Though Bayes could be a valuable aid to legal decision making, the disadvantages of trying to produce Bayesian jurors probably outweighs the advantages.

First, introduction of Bayes could create a misperception that final judgments about guilt or innocence reside in the cold mechanical inner workings of a mysterious formula rather than in the warm, compassionate hands of thoughtful, fair-minded humans. Second, jurors may have trouble translating the relevant evidence into a workable Bayesian form. This concern is most worrisome in complex cases. Likewise, jurors may become confused about input values. Identifying the correct values for priors and LRs can be quite tricky and even counterintuitive. Furthermore, jurors may confuse  $P(A|B)$  with  $P(B|A)$  and with  $P(A \text{ and } B)$ . They may also confuse LRs with posteriors (Koehler 1996). Such errors could wreak havoc with the outcome of a Bayesian analysis. Of course, jurors may become confused by evidence even without trying to use Bayes. But Bayes may give jurors who misuse it an unjustified confidence in the accuracy of their conclusions. Ultimately, whether Bayes helps or hinders jurors is an empirical question.

## CRITICISM

Resistance to a comprehensive jury training program is likely to be broad and stiff. The proposal will likely be attacked as unrealistic, unnecessary, unconstitutional, expensive, and time-consuming. I consider these criticisms briefly below.

### **Unrealistic?**

Any proposal to change the current system is likely to encounter resistance from those who have the most to lose through change. Consider attorneys and trial



judges. They have little or no incentive to support calls for reform in general and instructional reform in particular. Currently, attorneys can take advantage of naïve jurors by presenting information to them at trial in ways that improve their odds for a favorable outcome. Attorneys may also propose special instructions that a trial judge may or may not approve. Trial judges are likely to resist a new training system, as they will be responsible for implementing the training.

### **Unnecessary?**

Some will oppose jury reform on grounds that we ought not tinker with the system of justice that has served us well so many years. But this conservative argument is vacuous unless and until a metric for “served us well” is identified. Furthermore, rules and procedures related to the trial system are in a constant state of flux—including the much revered standard of proof (Morano 1975). The relevant question is not whether a proposed reform is “necessary,” but whether it will enhance the quality of justice relative to the status quo. A related criticism is that there are different systems of reasoning, no one of which is demonstrably superior. By this reasoning, then, it will not be helpful to train jurors to reason, and it may even be harmful. I disagree with this version of intellectual relativism, but agree that the value of a juror training program turns largely on its demonstrable benefits.

### **Unconstitutional?**

My proposal requires that prospective jurors demonstrate some proficiency with legal standards, logic, and probability before serving on a jury. It may be hard to convince legislators that it’s a good idea—or even constitutional—to exempt the group of untrainables from jury duty. However, I note that other groups of prospective jurors are exempt from jury duty under current laws. In my county, people are ineligible for jury duty if they are (a) not qualified to vote (e.g., convicted felons, non-U.S. citizens, less than 18 years of age), (b) not proficient in English, or (c) “not of sound mind and good moral character.”<sup>13</sup> I suggest that the “sound mind” requirement—which is sometimes described as the absence of a serious physical or mental disability—should exclude those who cannot or will not abide by the most basic rules of law and reason. Because the rules of law require the ability to reason properly with evidence and arguments, those who cannot do so should not be entrusted to make legal decisions.

As a practical matter, the minimum proficiency standard should be relatively minimal so as not to produce an elite, unrepresentative decision-making body.

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<sup>13</sup> In addition, people are excused from jury in many jurisdictions if they (a) are a high school or college student, (b) have primary responsibility for children or others who cannot take care of themselves, (c) are employed by the legislative branch of government, (d) are at least 70 years old, or (e) suffer from particular medical conditions.

However, even if the proportion of people who fail to meet minimum proficiency standards following training is very low, the proficiency requirement may slightly increase jury representation of some racial or ethnic groups over others. To guard against this possibility, rules might be established that preserve representation among racial and/or ethnic groups. For example, excluded jurors might be replaced by jurors from the same racial or ethnic group.

### **Expensive?**

Implementation of a comprehensive jury training system will certainly be costly. Research will need to be conducted, personnel will need to be hired, and training modules will need to be written and produced. Video equipment, tapes, and other training materials will need to be purchased. Courtrooms will need to be equipped with the space and machinery to carry out the automated portions of the training. The training process will also add time to the jury process, particularly during the initial phase in periods. The additional time spent in training also increases the time and monetary costs on jurors, many of whom already feel stretched to the limit by the burdens that jury service entails.

However, the costs associated with reform should not doom these ideas any more than the costs associated with current trial procedures should doom the use of lay juries. The costs of reform should be traded off against the expected benefits, which could be enormous in terms of increasing the defensibility of jury verdicts, and increasing trust in a jury system that has come under fire in recent years. Moreover, if done well, the extra time that jurors spend training for their task may actually improve the jury service experience enough to offset the additional economic burden of attending training sessions.<sup>14</sup>

## **NEXT STEPS**

Jury reform projects have been conducted in California, Arizona, Washington, D.C., and Colorado (Anderson 2002). These projects evaluated state jury systems and made recommendations for improvement.<sup>15</sup> The recommendations made by these projects are not binding on the courts, though they carry considerable influence with state Supreme Courts which have responsibility for setting

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<sup>14</sup> Non-psychologists may find it hard to believe that one's experience may be improved through imposition of greater costs without any obvious offsetting benefit. However, such an outcome is predicted by a variety of well-documented psychological theories including cognitive dissonance (Festinger 1957) and self-perception theories (Bem 1967). For example, jurors who receive training may be more likely to view their service as part of an important and worthwhile activity.

<sup>15</sup> Reforms that I find most appealing are those that help create a more active role for the juror in the trial process. These include allowing jurors to take notes, submit questions (following screening by the trial judge), and engage in predeliberation discussions with fellow jurors. See Diamond et al. (2003) for evidence of the benefits of increasing juror participation in the trial.

trial standards. With this in mind, I recommend the formation of a *national* authority to investigate ways to improve decisions made by juries. I also recommend that social scientists who are interested in jury reform consider ways to produce data that policy makers—rather than other jury researchers—will find persuasive.

### **A National Research Council Panel on Jury Decision Making**

Though trials standards vary by state, I recommend the appointment of a National Research Council (NRC) panel to investigate the jury decision-making process. This panel should place special emphasis on how to reduce confusion and error in legal judgments.

The NRC is the research arm of the National Academy of Sciences, a non-profit society of distinguished scholars that advises the U.S. government on scientific and technical matters. The recommendations made by NRC panels often influence policy, including legal policy. For example, most of the key recommendations from an NRC report on how DNA evidence should be presented in courts were adopted throughout the U.S. (National Research Council 1996).

Membership on the proposed NRC panel should include leading judges, legal researchers, psychologists, decision theorists, statisticians, educators, philosophers, and others. The panel should be encouraged to identify procedures and policies that are likely to improve the quality of legal decisions and, perhaps, to improve public confidence in jury trials. The panel should base its recommendations on compelling empirical evidence rather than on legal traditions. This is not to say that the panel should ignore legal norms. Panel recommendations must conform to existing law, but they need not conform to legal traditions.

### **Research Reform**

A large body of research on jury decision making—much of it published in *Law and Human Behavior*—hints that jurors would make better judgments if various changes were implemented. However, this research, like most jury research, has had stunningly little impact on legal policy. One explanation is that jury researchers do not design their studies with the reactions of the courts and other legal policy makers in mind. Below, I offer two recommendations to increase the impact of jury research on legal policy.

#### *Increase Realism*

Jury research generally is conducted with college student subjects who read portions of fictitious trial transcripts or listen to recreations of videotaped evidence. Live witnesses are uncommon, as are objections and other intrusions that enter into real trials. The presentation of the trial is compressed, deliberations of small

groups are abbreviated, and real consequences are virtually nonexistent. Interestingly, research indicates that the results of jury studies do not depend much on how realistic the stimulus materials are or on the composition of the subject pool (Bornstein 1999). This is good news for those who wish to continue to develop scientific theory using traditional jury research methods.

But judges and other legal policy makers are unlikely to be persuaded by psychologists' assurances that highly artificial mock studies provide a sufficient basis for drawing inferences about the behavior of actual jurors. *Free v. Peters* (1993) provides a case in point. Defendant Free argued that the instructions jurors received before sentencing him to death were confusing and misleading. In support, Free produced a study by Hans Zeisel that showed that mock jurors who heard the Free instructions misinterpreted much of what they were told. Sometimes the mock jurors thought that the instructions actually conveyed the very opposite points that they were intended to convey. Writing for the 7<sup>th</sup> Circuit Appellate Court, Judge Richard Posner dismissed Zeisel's study in its entirety because there was a "lack of comparability between the test setting and the setting of the sentencing hearing," and because the study did not include "a control group consisting of persons administered a test containing what Zeisel (or Free's lawyers) would consider adequately clear instructions" (p. 705). Though a social scientist is unlikely to be persuaded by Posner's critique, the more important point is that Posner and others who have power to change the legal system are unlikely to be persuaded by social scientists' protestations.

If jury researchers wish to advance scientific theory, then traditional laboratory studies are fine. But if they seek to have an impact on trial policy, they must give judges, policy makers, and advisory groups (e.g., a diverse National Research Council panel) evidence that an alternative approach yields better results than an existing approach under realistic conditions (cf. Lempert 1991b).

### *Focus on Accurate Decision Making*

Jury researchers generally try to identify factors that do and do not influence jurors. Sometimes consideration is given to whether these factors *should* exert an influence, or whether the degree of influence is reasonable. However, little consideration is given to the bottom line, namely, did the jurors produce an accurate verdict? One obvious reason for this shortcoming is that verdict accuracy is usually unknown. As Shari Diamond (2003, p. 150) writes, "To assess how the jury operates as a decision maker, we cannot compare the jury's verdict with some gold standard of truth because no such dependable standard exists." However, I submit that jury research can and should be designed in settings where such a gold standard of truth *does* exist. When this is done, researchers will be able to identify at least some conditions under which proposed reforms do and do not enhance verdict accuracy. I suspect that policy makers would be more interested in such data.

Jurors' judgments are rarely compared against a truth criterion that the legal community would find convincing. On the few occasions when normative comparisons are made, jurors' probability judgments are contrasted with those given by a stylized Bayesian model (Smith et al. 1996). Although such studies provide *some* basis for assessing the accuracy of jurors' judgments, real jurors do not provide explicit probability judgments. Consequently, policy makers may remain unpersuaded by probability judgment studies, even when normative standards exist.

Occasionally, jury researchers use expert judgment as a proxy for truth. Smith (1991) used the consensus judgments of four Stanford Law School professors as a benchmark for truth in a study on the efficacy of pretrial instructions. This technique has merit though, again, the results of these studies may not persuade policy makers. Whereas law professors know more about legal standards and evidentiary probativity than novice jurors, a sizable leap of faith is required to conclude that the experts' verdicts are a reliable proxy for truth.

A paradigm that policy makers may find more persuasive is one in which juries provide verdicts in cases where truths are known or knowable (to people other than the participants and jurors). For example, detailed credible confessions by defendants and others sometimes arise after a trial has ended. If the contents of these trials have been preserved (e.g., on videotape or in transcripts), mock juries could be provided with the evidence and asked to render verdicts under various conditions.

Alternatively, experimenters might consider staging crimes. In this manner, ground truths would exist (i.e., the identity of a perpetrator) and mock juries could hear testimony from actual witnesses to the staged crime. Perhaps trace evidence could also be introduced in such studies. Conducting these types of studies will be more complex and time-consuming than usual. But the time spent may be worthwhile for researchers interested in trial reform.

## CONCLUSION

We Americans confidently proclaim our jury system to be "the best in the world," though most of us know nothing about other systems and very little about our own. The bravado inherent in this proclamation could be dismissed with a wink if there was good reason to believe that our legal decision makers make judgments based on the applicable law and evidence. But, in reality, the available evidence indicates that many of our prospective jurors harbor misconceptions about the law and logic that may interfere with their ability to make accurate and effective legal decisions. In response, steps should be taken to improve jurors' capabilities.<sup>16</sup>

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<sup>16</sup> I do not mean to imply that all of the ills in the jury system can be pinned on the untrained juror.

Calls for jury reform are not new, and the reforms I favor are certainly not a panacea. However, my suggestion to provide broad training to jurors in the law and in basic reasoning is more ambitious than most pleas for reform. I envision a comprehensive, empirically based, standardized set of training modules that not only teaches jurors what they need to know to make effective legal decisions, but that also disabuses jurors of misconceptions and, in some cases, heuristic approaches that hinder their performance. Implementation of such a program will be challenging, and will encounter resistance from those who are loath to criticize the status quo, the juror, or the heuristics that people instinctively apply to complex problems. However, a justice system that cares deeply about the production of accurate verdicts should not ignore shortcomings of the untrained legal decision maker.

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