

Alternatives to Traditional Adversary Methods of Presenting Scientific Expertise in the Legal System

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Abstract: The twin goals of any litigation are to arrive at a correct outcome and provide the parties with a sense that they were treated justly, even if they do not prevail. Adversarial proceedings are often perceived to be superior to inquisitorial proceedings with respect to the second goal but inferior with respect to the first. This is especially the case when proceedings involve expert testimony. In this essay, we discuss several relatively minor changes to typical adversarial processes that offer the potential of improving trial accuracy without disrupting the overall structure of adversarial proceedings. These changes include 1) alterations to the organization of the trial, including concurrent expert testimony; 2) alterations to the role of the jury, including taking notes, asking questions, and receiving written expert reports; and 3) formal expert witness codes of conduct designed to better arm experts to resist the adversarial pressures that lead to biased testimony.

Before considering alternatives to traditional adversarial methods of presenting scientific evidence in court, we should ask why such alternatives are important in the first instance. What objectives are we seeking to achieve? In what respect do the existing methods fall short of those objectives? Federal Rule of Evidence 102, a rule that sets forth the purposes of the rules of evidence, is a useful place to begin this inquiry.

Rule 102. Purpose

These rules should be construed so as to administer every proceeding fairly, eliminate unjustifiable expense and delay, and promote the development of evidence law, to the end of ascertaining the truth and securing a just determination.¹

The rule sets forth several goals that inform the topic of our essay. Somewhat rearranged, they are:

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1) adopt “fair” procedures that produce just determinations; 2) ascertain the truth; and 3) control the time and expense of litigation. In this essay, we focus our attention on the first two goals, but we note the many occasions when time and expense issues undermine their implementation.

As Rule 102 suggests, ascertaining the truth is not the sole objective of the rules controlling the admissibility of evidence. Nor is it the sole goal of the legal system. Procedural and evidentiary rules should be fair and should secure a just determination of the issues. “Fair” and “just determination”: these terms do not define themselves.

A particularly useful approach to understanding what just determinations entail is the procedural justice perspectives of social psychologists John Thibaut, E. Allan Lind, and Tom R. Tyler, often collaborating with legal scholar Laurens Walker.² Their research tells us that the decision maker’s perceived neutrality, the level of respect the decision maker gives the parties, the amount of voice and control the parties have over the litigation, and the trust parties have in the decision maker’s motive to be fair all contribute to perceptions of procedural justice.³ Moreover, these perceptions are remarkably robust across demographic groups and societies.⁴ Although each of these factors matters when disputes are litigated, the most important components of perceived procedural fairness appear to be voice and control.⁵

Perhaps the most significant finding of the procedural justice literature is that perceptions that procedures are fair and just matter because when losers perceive that procedures have been fair and just, they are more likely to accept unfavorable outcomes.⁶ Procedural fairness is a heuristic that signals how a person is likely to respond to an outcome.⁷

Rule 102 also calls for ascertaining the truth. This lofty goal is best understood as a desire to achieve factual accuracy. Factual

accuracy is more easily defined than justice, but it is at least as difficult to measure. Moreover, unlike perceptions of procedural justice, which are to a large extent subjective, factual accuracy is ostensibly about objective truth, albeit a truth that is not easy to ascertain.

Individuals, both in and out of the legal system, may have opinions about how litigation structures affect outcome accuracy. These opinions may be more or less grounded in observations of the outcomes of actual cases, but objectively there are many disputes in which it is impossible to know for certain the truth against which to measure the accuracy of a case outcome.⁸ Even when cases turn on expert testimony, ascertaining outcome accuracy with respect to the subject matter of the expert testimony may sometimes – not always – be possible.

We review the social science research on how these two goals map onto dispute settlement styles, specifically adversarial and inquisitorial forms of litigation. This research suggests that while adversarial processes score relatively high on procedural justice measures, they perform less well in terms of accuracy. We then discuss a number of alternatives to traditional adversary methods that may improve outcome accuracy, without sacrificing procedural fairness.

Scholars frequently divide legal systems into two categories: those that adopt adversarial processes and those that adopt inquisitorial processes.⁹ However, no actual dispute resolution system perfectly exemplifies either an inquisitorial or an adversarial system. Rather, it is better to think of these as what Max Weber called “ideal types.”¹⁰ Several of the proposed changes discussed below move U.S. procedures away from a pure adversarial system, but not all the way to an inquisitorial system.

Among the important attributes of an inquisitorial system is investigation and

control of fact-finding by a neutral decision maker; among the important attributes of an adversarial system is party control of fact-finding and the evidence presented to the decision maker.¹¹ Legal scholar Oscar Chase, for example, included the following three adversarial system components in his essay on what he called American procedural exceptionalism: the use of party-controlled pretrial investigation, the relatively passive role of the judge at the trial or hearing, and the method of obtaining and using expert opinions (that is, parties hire and prepare experts).¹² Collectively, these components reinforce the idea that expert knowledge is a partisan resource.

How do the objectives of procedural justice and factual accuracy map onto these dispute resolution processes? We review the evidence on perceptions of justice and accuracy, followed by research that attempts to measure the objective effects of the adversarial process on accuracy.

Thibaut and Walker asked U.S. students to imagine different mechanisms for resolving hypothetical conflicts. The alternatives included mediation, investigation and resolution by a neutral decision maker, and arguments presented by advocates for each side to a third-party decision maker. The third alternative is most similar to adversarial procedures. A substantial majority of students declared this alternative to be the most just.¹³

Numerous other studies have reproduced this result.¹⁴ Of particular interest is a recent study by litigation scholar Justin Sevier.¹⁵ He presented his subjects with a pair of vignettes, the most relevant of which involved an expert witness in a products liability drug case. In that vignette, the subjects read a dispute concerning whether a drug manufacturer's product caused the plaintiff's illness. Some subjects were told that the case would be decided using an ad-

versarial process and some that it would be decided using an inquisitorial process. The adversarial procedure manipulations track Chase's components of adversarialism discussed above: party-controlled pretrial investigation, passive judiciary, and party selection and employment of experts. As in earlier research, the subjects rated the adversarial procedure higher on the justice dimension, but they rated the inquisitorial procedure as more likely to produce accurate and correct outcomes.

Two things are worth mentioning with respect to this and other studies. Although the studies produce consistent results about the perceived strengths and weaknesses of adversarial processes, the effects are, as Sevier notes, modest. It is not the case that respondents perceive adversarial processes as wholly devoid of accuracy or inquisitorial processes as wholly devoid of procedural fairness. Based on these results, it would be a mistake to believe that, even at the level of perceptions, the situation is either-or: a choice between justice and accuracy.

Second, while these perceptions come from individuals who have relatively little experience with the day-to-day workings of the adversarial process, similar judgments are shared by those who do.¹⁶ A well-known article by legal scholar John Langbein argued that German inquisitorial civil procedure was superior to adversary procedures in terms of fact-finding.¹⁷ Other academics have expressed similar views.¹⁸

Not surprisingly, U.S. judges and practitioners for the most part have praised the adversarial system – in whole or in part – as a vehicle for uncovering the truth, although, to be sure, there are dissenters.¹⁹ Three of the most notable judicial critics of adversarial procedures as a way to ascertain the truth are Federal Appellate Judge Jerome Frank, FDR's attorney general Thurman Arnold, and U.S. Federal Judge Marvin Frankel.²⁰ Describing adversarial proceedings as a "fight model," they reject the

argument that this approach is a particularly useful way to assess the truth. Consider, for example, this statement from Arnold:

Bitter partisanship in opposite directions is supposed to bring out the truth. Of course no rational human being would apply such a theory to his own affairs. . . . [M]utual exaggeration of opposing claims violate(s) the whole theory of rational, scientific investigation. Yet in spite of this most obvious fact, the ordinary teacher of law will insist (1) that combat makes for clarity, (2) that heated arguments bring out the truth, and (3) that anyone who doesn't believe this is a loose thinker.²¹

There is a fair amount of empirical evidence indicating that, with respect to expert testimony, a full-blown adversarial model presents challenges to accurate fact-finding. This is not the place for a full discussion of this literature.²² However, two types of studies are worth mentioning: those suggesting the process produces biased witnesses and those suggesting that jurors experience some difficulty with expert testimony.

Even though many judges support the adversarial system as a method of trying cases, surveys indicate that many also agree with at least one of the critiques of Frank, Arnold, and Frankel: expert witness bias. The most frequently articulated problem is that party experts abandon objectivity and become advocates for the side that hired them.²³ Several studies support this concern, indicating that simply being part of an adversarial process results in a skewed presentation of facts and opinion.²⁴

In one study by business administration scholar Max Bazerman and colleagues, the subjects were professional auditors. Each of the 139 subjects was given five ambiguous auditing vignettes and asked to judge the accounting. Half the subjects were asked to suppose that they had been hired by the

company they were auditing and half were asked to suppose they were hired by a different company doing business with the company in question. They were then asked to state whether or not the firm's financial reports complied with generally accepted accounting principles (GAAP). For all five vignettes, the auditors were on average 30 percent more likely to find that the accounting behind the company's financial report complied with GAAP if they were playing the role of auditor for the firm.²⁵

Because parties select witnesses, bias may also arise from the selection process itself. As a number of scholars have noted, lawyers commonly consult multiple experts until they find some who reflect their position, even if this position is well out of the mainstream of expert opinion on the issue.²⁶ Neither of these concerns means that the experts are intentionally lying. Experts perceive others to be more biased than they themselves are, sometimes called a bias blind-spot.²⁷ As long as experts are chosen by parties, we should anticipate expert bias. But even within a system of adversarial selection, steps can be taken to reduce partisanship.

Although experts may present skewed, and even incomplete, evidence, this does not mean that factfinders necessarily reach erroneous decisions. In the United States, where jury trials are a central part of civil and criminal litigation, the degree to which expert bias affects outcome accuracy is typically framed in terms of jury competence. One suggested source of error in civil cases – criminal cases reflect different biases as we describe below – is that jurors uncritically accept expert testimony, a fear sometimes expressed in appellate opinions.²⁸ However, considerable evidence suggests that, at least when both sides present expert testimony, if anything, the opposite is true. Where there is a battle of experts, jurors are very skeptical of party experts.²⁹

Although skepticism about the testimony of expert witnesses may be a good starting point for juror efforts to sort out the truth, this does not ensure accuracy if skepticism simply causes jurors to disregard expert testimony. Perhaps the clearest statement of this problem is to be found in one juror's comment offered in an asbestos case studied by law and psychology researchers Jane Goodman, Edith Greene, and Elizabeth Loftus: "The expert testimony was not a real factor in our decision, except in the very backhanded sense that it lent medical credence to any result."³⁰

Skepticism seems likely to be increased by cross-examinations that cast doubt on the qualifications and biases of expert witnesses and their testimony. But in the laboratory, even "strong" cross-examinations that focus on the specific weaknesses of an expert's testimony appear to be of limited efficacy in persuading jurors to reject testimony based on faulty science.³¹

A more useful way to think of juror responses to expert testimony is to consider the distinction between central and peripheral processing.³² In central or systematic processing, people examine the content of a communication to assess its validity.³³ In peripheral or heuristic processing, people do not attend to the quality and validity of arguments. Rather, they take shortcuts to determine the value of a persuasive attempt. People rely on factors such as the number of arguments made (rather than their quality) or attributes of the communicator such as credentials or attractiveness.

The principal question for those interested in how factfinders respond to expert witnesses concerns the degree to which the factfinders employ central processing and the degree to which they employ peripheral processing.³⁴ Studies have found that people centrally process information, which is to say they then engage in a high degree of cognitive processing of the message content, when they are knowledge-

able about the topic, when the topic is relevant to their concerns, when they are motivated, and when the information is comprehensible to them.

In many ways, a trial is a nearly ideal setting for inviting central processing. By virtue of the role into which jurors are cast, the formality of proceedings, and the obligation that at the end of the day they will make critical decisions, jurors should be motivated to understand and reach correct conclusions based on the substantive information presented, and studies of actual jurors find almost uniformly that jurors take their task quite seriously. On the other hand, if expert evidence is complex or hard to understand to the point of being almost inaccessible, jurors are less likely to centrally process it. The other evidence in the case, which they can comprehend, will be centrally processed, while hard to comprehend expert evidence may be more peripherally processed, if not entirely ignored.

Not all peripheral processing is a bad thing. For example, a wise juror would assign some weight to the credentials and experience of experts. However, some research suggests that in assessing experts, laypeople focus more on the background and experience of witnesses than on the empirical support for a proposition.³⁵ While jurors may also benefit from a sense of where the weight of expert opinion lies on a particular issue, an adversarial trial often makes this difficult. Adversarial methods of selecting and cross-examining witnesses, combined with limits on the number of experts (one or two for each side on any given issue) may well make all experts appear qualified and all contested questions ones about which reasonable experts can disagree.³⁶

Other peripheral cues, apart from credentials and experience, are less diagnostic of expert knowledge. For litigators, the best strategy is always to make the expert content as clear as possible and the peripheral

cues as favorable as possible, even those peripheral cues, such as an expert witness's personality and appearance, that are not at all diagnostic of the merits of an expert's arguments.³⁷ But if one side clearly has the worst of the science on its side, an equally plausible strategy is to make the substantive issue as confused and complex as possible, pushing jurors toward more peripheral processing or even toward discounting the expert testimony entirely.

One caveat to the preceding discussion is in order. Expert testimony has different resonance in criminal than in civil cases. It is rare that criminal cases become battles between equally competent prosecution and defense experts. Too often the adversaries are not of equal stature and lack equal resources. Rules of criminal procedure are unlikely to level the playing field. The federal criminal rules, for example, permit discovery of the basis for an expert's testimony, but do not permit the kind of robust fact discovery that occurs in civil cases.³⁸ Appointed counsel have a difficult time getting the state to pay for their experts at a level that would attract the best in their profession; the government has no such problem. As a result, rather than coequal dueling experts, the more typical pattern is that the government offers expert witnesses and the defendant seeks to exclude or challenge them on *Daubert* grounds, but does not offer its own expert.³⁹ This is especially the case with respect to the forensic sciences, a number of which, like bite mark evidence and hair analysis, as David Baltimore, David S. Tatel, and Anne-Marie Mazza discuss in this volume, have been discredited following DNA exonerations.⁴⁰

In some criminal trials, the judicial role is simultaneously passive and active. It is passive with regard to the admission of government experts, and active in the exclusion of defense experts.⁴¹ The process produces biased government experts, de-

fense counsel without the tools to challenge them, and jurors who have no problem finding government experts credible, notwithstanding the heightened burden of proof in criminal cases.

The imbalance is exacerbated by the fact that the vast majority of criminal cases end in guilty pleas. The difference in resources and in judicial attitudes toward forensic evidence offered by the government as compared to the defense plays out in differences in bargaining power, which may not be immediately apparent. Since the prosecutor reasonably predicts that the trial court will be more likely to accept a government expert, however flawed or subject to meaningful challenges, and unlikely to accept a similarly situated defense witness, the government comes to the bargaining process with far more expert tools at its disposal (for example, "they identified your bite marks on the victim, so even though you say you are not guilty, the court is likely to admit the evidence and the jury to convict."). Indeed, too often defense counsel will not be prepared to offer defense expert witnesses of any caliber because she predicts the court will reject them and does not want to waste scarce resources on the effort. Government expert witnesses then become bargaining chips, their deficiencies unexamined.

Where expert testimony on traditional forensic sciences is offered in criminal cases, an imperfect adversarial process compromises both procedural fairness and truth. Ironically, in this context, most reforms seek to make that imperfect adversary system more adversarial, with discovery reforms, expert compensation, and defense training.

In sum, the perception of laypeople, academics, and judges is that adversarial processes are preferable in terms of procedural justice but may produce less accurate results. What empirical data we have suggest

that these perceptions have merit, especially with respect to expert testimony in civil cases. Given this state of affairs, some have suggested wholesale changes to the ways expert testimony is introduced into civil cases and changes in the training and makeup of factfinders.⁴² Some of these changes are discussed in the contributions of Daniel Rubinfeld and Joe Cecil, and Valerie Hans and Michael Saks in this volume.⁴³ Criminal cases, as we have noted, raise entirely different challenges and may require even more fundamental reforms.

Our goal is more modest and hopefully achievable. We explore changes in the presentation and reception of expert testimony that fall largely within the existing adversarial structure but that promise some modest improvement in outcome accuracy. These changes have two goals: to counter the biasing effect that party witness selection has on expert testimony and to reduce the perceived complexity of expert testimony so as to facilitate factfinder central processing. We discuss several proposed changes and note how they work toward these two goals.

Since the order of presentation – at least in civil cases – is within the court’s discretion, a judge could make adjustments for the purpose of making expert presentations more understandable to jurors, which could minimize the bias that comes from testimony shaped by party examination.⁴⁴ For example, the court could allow each side to present experts with one following the other, enabling a dialogue between them.⁴⁵ Likewise, the court could require that all experts testify at the conclusion of the merits trial, building on all the facts in the record.

To be sure, whether these measures affect procedural fairness depends on other orders of the court; for example, the extent to which the parties have been given discovery of expert opinions, and the timing of that discovery. And, as with concur-

rent testimony described below, the procedure may not be appropriate for all cases. It works best when the experts at least share some common premises, are speaking similar methodological languages, and so on.

Moreover, since the gross order of the trial is typically keyed to the burden of proof – the party bearing the burden of proof goes first and last – absent a rule change, diverging from that order would require the consent of the parties. A defendant in a civil case, intending to challenge the sufficiency of the evidence at the conclusion of the plaintiff’s case, may well object to offering the defense expert for examination until he or she has had an opportunity to make such a motion.⁴⁶ Nonetheless, it would still be possible to adjust the order of expert testimony so that opposing experts, if they did not appear back-to-back, testified in closer proximity than they currently do when the parties are left to their own devices.

Even if a rule altering the order in which expert testimony is presented would aid in the evaluation of scientific evidence, such a rule would be particularly problematic in criminal cases. There is no constitutional obligation to present a defense at all. Defense counsel may well oppose presenting its expert testimony in proximity to the government expert, after the court has ruled that the government’s case was sufficient to avoid a defense motion to dismiss. The government would resist an offer to delay its scientific evidence until the defense presented its experts because without the scientific evidence, the court might have to dismiss the case. These same considerations mean that rearranging the order of expert testimony by agreement is also less likely in criminal cases.

The second proposed change would follow courts in Australia, which have adopted a practice known as “hot-tubbing” or “concurrent evidence.” The parties’ experts, although selected in the usual way with the

usual biases, present their opinions in an unusual way after all of the lay evidence has been admitted. They are sworn as witnesses, but rather than sit with their “side,” or even in the witness box, they are seated at the same table. Prior to their joint appearance, they will have filed a summary of their positions in light of the evidence. One expert then gives an oral narrative presentation, followed by questioning conducted not by counsel, but by the opposing expert; then the procedure is reversed. Each expert gives a final summary – again as a narrative, presumably accounting for more of the opposing expert’s concerns – followed by conventional cross-examination by the parties.⁴⁷ In effect, as one scholar has described it, this is a procedure that has been “grafted onto” existing adversarial processes, with conventional cross-examination following a jointly presented narrative.⁴⁸ While in the usual trial, experts prepare through formal written responses and depositions led by counsel, when there is hot-tubbing, the experts are given an opportunity to speak, to comment on the evidence offered by their counterpart, and to ask questions. Moreover, they are required to meet pretrial, preferably without lawyers, on at least one occasion.⁴⁹

In Australia, all players in the litigation have to consent to this deviation from usual adversarial procedure. The judge must also consent because her role is greatly transformed. She is necessarily a critical and active player: she suggests topics for discussion and may well pose questions to the experts.⁵⁰ The parties must agree to changes in the presentation of evidence, either concurrent evidence (the hot-tubbing approach) or consecutive.⁵¹ Likewise, the experts who appear must agree to be bound by a code of conduct for expert witnesses, one that makes it clear that their paramount duty is to the court and not to any party in the proceedings.⁵² We discuss this code of conduct below.

Hot-tubbing works best when the expert testimonies concern the same evidence or related evidence. Not only is it available in civil cases, it is recommended in Australian criminal trials as well. However, in Australia, the procedure takes place in a procedural setting that guarantees far more discovery than in the usual U.S. criminal case. Moreover, the same kinds of constitutional and pragmatic issues that are likely to limit the consecutive presentation of opposing evidence in U.S. criminal cases may also affect the likelihood that hot-tubbing becomes an accepted way of presenting expert evidence in the United States.

Nevertheless, the approach deserves more study if only because Australian judges are generally pleased with this procedure. They believe it enhances communication, comprehension, and decision-making, and reduces partisanship through the “physical removal of an expert from his party’s camp to the proximity of a (usually) respected colleague.”⁵³ The method is even praised for increasing judicial economy.⁵⁴ Experts reportedly are happy with the approach because their testimony is less skewed by conventional cross-examination. They are allowed to expand on their opinions, not limited by the traditional – and misleading – “yes or no” responses that advocates in the United States are typically allowed to insist on.⁵⁵ Presumably, the process also enhances the decision maker’s ability to assess the testimony.⁵⁶

But there are additional, perhaps even more fundamental, problems. Hot-tubbing is not easily adapted to trials with juries. Civil juries are not currently used in the Australian federal court system. While it is ironic that concerns about juror comprehension is the reason a hot-tub procedure has been proposed for U.S. trials, the jury substantially complicates its application. The parties may well be concerned about testimony by narrative, rather than testimony controlled through question and an-

swers. Admissibility issues are more complex before the jury, particularly with respect to the factual predicates of experts' opinions. And the judge's more active role in hot-tubbing could well raise concerns about showing an apparent bias for one side or the other before lay decision makers.

Even if methods are developed to use hot-tubbing with juries, criminal cases raise the additional problems of finding and paying for experts of equivalent firepower to be placed in the hot tub.⁵⁷ When substantial differences in resources between the parties result in large differences in the quality of the parties' experts, the procedure could well be problematic.

Nor is hot-tubbing appropriate for all kinds of cases, let alone all kinds of experts. As one scholar explains: "the kind of compromises that can be negotiated between town planners or geographers in relation to the size of a building or the uses of land, for example, might not be appropriate in a professional negligence proceeding or between forensic scientists in criminal matters."⁵⁸

The verdict on hot-tubbing or consecutive experts then is: it depends – on the case, criminal and civil, on other more fundamental procedural reforms, and on judicial training.

Many of the reforms that address the adversarial system's skewing of expert testimony propose an enhanced role for the judge. Indeed, as described above, the desirability of such a change is the premise at the heart of the Supreme Court's decision in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*⁵⁹ Yet, although the Supreme Court's decision in *Daubert* was expected to initiate a new era of the judge as a more active gatekeeper in evaluating forensic evidence, it has not done so, especially in criminal cases. The 2009 National Research Council (NRC) report *Strengthening Forensic Science in the United States*, for example, criticized lawyers and judges for being "utter-

ly ineffective in addressing the problem" of the limitations of forensic science disciplines.⁶⁰ Notwithstanding the admonitions of the NRC report and the more recent report of the President's Council of Advisors on Science and Technology (PCAST), little has changed.⁶¹ Judges have continued to be passive with respect to the admission of expert testimony on trace evidence in criminal cases, even when scientific weaknesses have been documented, while being relatively more aggressive in screening experts in civil cases.⁶²

Given this track record, it is not at all clear that U.S. judges will willingly involve themselves in meaningful supervision of a procedure like hot-tubbing. If their *Daubert* review in criminal cases has been perfunctory, as is often the case, judges will be confronting experts who are testifying based on widely divergent premises; for example, the government bite mark expert announcing that a bite mark is a match, the defense expert calling the conclusion "junk science" and challenging the field's fundamental validity. On the civil side, where judges are already more engaged, at least at the federal level, because of the resources of the parties and the judge's role in case management under Rule 16 of Federal Rules of Civil Procedure, for example – more active judicial participation may well be possible. But again a caveat: unless a judge engages with the issues and carefully examines the expert reports, judicial participation runs the risk of being more about efficiency than substance, more about case management than fairness.

"Management" sounds neutral, even salutary. One can "manage" a trial to ensure that experts are speaking to the critical issues, addressing methodological problems, and presenting their testimony clearly to a lay decision maker. Or one can "manage" a trial to ensure that it is efficient – that it ends on time and does not interfere with the court's docket – without engaging sub-

stantively with the issues. Management to promote efficiency is important, but it may or may not enhance truth seeking or procedural fairness. The critical question is the *content* of the judicial intervention, not the *fact* of it.

To change the patterns described here with respect to criminal cases may require a sea change on a number of fronts: judicial training, the allocation of resources, even the criminal rules.

One way of enhancing juror comprehension is to allow jurors to ask questions and take notes during the trial. Giving the jurors a more active role, having them behave more like adult learners, will facilitate their paying attention, their engaging with the issues, and their understanding the science they are offered. Written jury instructions, organized like a handbook, with a table of contents to accompany the jurors to the jury room, could enhance their ability to understand what the expert evidence they have heard implies for the legal issues.⁶³ Courtroom technology is also critical. Jurors, particularly younger jurors, are used to getting information through screens.⁶⁴ Some courts are experimenting with technology in the jury room: white boards and computers (disconnected from the Internet), for example. In addition, jurors typically perform better when they have an opportunity to take notes.⁶⁵ In one experiment, jurors permitted to use checklists and keep notebooks achieved better understanding of scientific issues than jurors who did not use these tools.⁶⁶ A more radical proposal would be to give jurors the written reports of the experts. Psychologist Lynne Forster Lee and colleagues found that jurors who received written reports summarizing an expert's testimony before the expert testified showed enhanced understanding of the testimony.⁶⁷ Still other reforms are discussed in the essay by Hans and Saks in this volume.⁶⁸

Permitting jurors to ask questions requires careful administration because juror questions can tread on areas that are inadmissible, irrelevant, or prejudicial. The judge should inform the jurors at the beginning of the trial that it may not be possible for the court and parties to answer all of their questions. Judicial control should be exercised by requiring questions to be submitted by jurors in written form, previewing questions in advance, and sharing and discussing them with counsel outside the hearing of the jury. Studies of juror questions for witnesses during civil trials indicate that the vast majority are relevant and permissible. In particular, juror questions for expert witnesses indicate that jurors take the opportunity to submit questions for experts in an effort to understand and evaluate the content of the testimony. Similar studies have not been conducted on criminal trials, where juror questions about whether the defendant has a criminal record may be more challenging to deal with than the ubiquitous questions about insurance in civil cases.⁶⁹

Many proposals have been advanced that alter the role of the expert by reducing allegiance to a party. Some propose greater use of court appointed experts under Federal Rule of Evidence 706. Other proposals suggest more modest alterations in the unbridled discretion of parties to select their own experts.⁷⁰ Rubinfeld and Cecil discuss some of these options in their essay in this volume.⁷¹

A still more modest proposal is a more complete code of ethics designed to arm an expert to resist adversarial pressures. Numerous professional organizations have adopted provisions in their codes of professional ethics dealing with expert witnesses. Although the codes differ in several ways, they share one common theme. Insofar as possible, the expert is urged to act as an objective, disinterested partici-

pant whose job is to educate the court by providing specialized knowledge on issues relevant to the case.⁷² In effect, the expert's role is that of an educator.

To our knowledge, no court in the United States has adopted such a provision. In contrast, the Civil Procedure Rules of New South Wales, Australia, includes a basic statement of the expert's "general duty to the court":

An expert witness has an overriding duty to assist the court impartially on matters relevant to the expert witness's area of expertise.

An expert witness's paramount duty is to the court and not to any party to the proceedings (including the person retaining the expert witness).

An expert witness is not an advocate for a party.

The code of conduct also includes a section on "[e]xperts' reports" that, *inter alia*, contains the following provisions:

If an expert witness who prepares an expert's report believes that it may be incomplete or inaccurate without some qualification, the qualification must be stated in the report.

If an expert witness considers that his or her opinion is not a concluded opinion because of insufficient research or insufficient data or for any other reason, this must be stated when the opinion is expressed.

The code of conduct must be provided to each expert and the expert's testimony or the written report cannot be entered into the case unless the expert acknowledges the receipt of the code of conduct and agrees to be bound by it.

Setting aside quibbles over the specific language in this code, the underlying purpose is salutary. It emphasizes that the expert's duty is to the court and reinforces the ideal of a disinterested educator role for experts.⁷³ Even if the code of conduct

is entirely hortatory without any sanctions for its violation, it could effect some improvement.⁷⁴

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Why should we wish to change the ways in which expert testimony is presented in U.S. courts? There are several possible answers. One could argue that alternatives could produce more efficient trials, or could reduce the very high cost of litigating cases involving expert testimony. In this essay, we focus on still another reason. The alternatives presented above attempt to balance the twin goals of producing more accurate outcomes and retaining procedures that are perceived to be fair. For example, hot-tubbing puts some limits on the parties' control over their testimony, but it still permits parties to choose their own experts. And because the experts' frank exchange will be witnessed by the parties, this diminution in party control may not reduce a party's sense of fair procedure.

Unfortunately, we cannot say much more than this. These suggested changes should reduce adversarialism and remove some impediments to accurate fact-finding, but empirical evidence about these effects is quite limited. What is called for is more experiments involving these procedures: a possibility if some judges would urge the parties to adopt these procedures in their courtroom.⁷⁵ Only in these ways will we be able to ascertain whether we can achieve greater accuracy within the overall structure of an adversarial system.

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ENDNOTES

- ¹ Federal Rules of Evidence, Rule 102.
- ² John W. Thibaut and Laurens L. Walker, *Procedural Justice: A Psychological Analysis* (Hillsdale, N.J.: Erlbaum, 1975); Tom R. Tyler, *Why People Obey the Law* (New Haven, Conn.: Yale University Press, 1990); and E. Allan Lind, Ruth Kanfer, and Christopher P. Earley, "Voice, Control, and Procedural Justice: Instrumental and Noninstrumental Concerns in Fairness Judgments," *Journal of Personality and Social Psychology* 59 (5) (1990): 952–959.
- ³ As MacCoun notes, a better term perhaps would be procedural fairness, but the term "procedural justice" is so entrenched in the literature that there is no point in adopting a different nomenclature. Robert J. MacCoun, "Voice, Control, and Belonging: The Double-Edged Sword of Procedural Fairness," *Annual Review of Law and Social Science* 1 (2005): 171.
- ⁴ *Ibid.*, 171, 187–188; and Ellen S. Cohn, Susan O. White, and Joseph Sanders, "Distributive and Procedural Justice in Seven Nations," *Law and Human Behavior* 24 (5) (2004): 553–579.
- ⁵ Other variables play a more important role in other fora, such as interactions with the police. Tom R. Tyler, "What is Procedural Justice? Criteria Used by Citizens to Assess the Fairness of Legal Procedures," *Law and Society Review* 22 (1) (1988): 103, 127 (Table 6).
- ⁶ Joel Brockner and Batia M. Wiesenfeld, "An Integrative Framework for Explaining Reactions to Decisions: Interactive Effects of Outcomes and Procedures," *Psychological Bulletin* 120 (2) (1996): 189, 191; and Robert J. MacCoun, E. Allan Lind, and Tom R. Tyler, "Alternative Dispute Resolution in Trial and Appellate Courts," in *The Handbook of Psychology and Law*, ed. Dorothy K. Kagehiro and William S. Laufer (New York: Springer Verlag, 1992), 95–118.
- ⁷ Kees Van den Bos and E. Allan Lind, "Uncertainty Management by Means of Fairness Judgments," *Advances in Experimental Social Psychology* 34 (2002): 1, 25. However, this does not mean that procedures always trump outcomes. When people have a better sense of the outcome of those similarly situated, the procedural fairness associated with greater voice is less important than outcome fairness. A good example of this effect comes from the 9/11 fund for people killed in the World Trade Center. No amount of procedural fairness could overcome the sense of outcome unfairness when family members knew of very different awards to other families based on the standard tort criteria that focus on damages for wrongful death.
- ⁸ Geoffrey Hazard, *Ethics in the Practice of the Law* (New Haven, Conn.: Yale University Press, 1978).
- ⁹ Mirjan R. Damaska, *The Faces of Justice and State Authority: A Comparative Approach to The Legal Process* (New Haven, Conn.: Yale University Press, 1991) [describing the Anglo-American and Continental legal procedures as adversarial and nonadversarial]; Robert A. Kagan, *Adversarial Legalism: The American Way of Law* (Cambridge, Mass.: Harvard University Press, 2001); and Oscar G. Chase, "American 'Exceptionalism' and Comparative Procedure," *American Journal of Comparative Law* 50 (2) (2002): 277.
- ¹⁰ Max Weber, *The Methodology of the Social Sciences*, ed. and trans. Edward Shils and Henry Fitch (New York: Free Press, 1949).

- ¹¹ Full-blown adversarialism is apparently a late-eighteenth-century phenomenon. Stephen Landsman, “The Rise of the Contentious Spirit: Adversary Procedure in Eighteenth Century England,” *Cornell Law Review* 75 (3) (1990): 497.
- ¹² Chase, “American ‘Exceptionalism’ and Comparative Procedure,” 277, 287 [see note 9]. For a valuable discussion of each of these components, see Sam Gross, “Expert Evidence,” *Wisconsin Law Review* 1991 (1991): 1113 – 1232. For articles comparing the use of experts in the United States and other countries, see Gary Edmond and Joëlle Vuille, “Comparing the Use of Forensic Science Evidence in Australia, Switzerland, and the United States: Transcending the Adversarial-Nonadversarial Dichotomy,” *Jurimetrics Journal* 54 (3) (2015): 221; Andrew W. Jurs, “Balancing Legal Process With Scientific Expertise: Expert Witness Methodology in Five Nations and Suggestions for Reform of Post-*Daubert* U.S. Reliability Determinations,” *Marquette Law Review* 95 (4) (2012): 1329; Andrew J. McClurg, Adem Koyuncu, and Luis Eduardo Sprovieri, *Practical Global Tort Litigation: United States, Germany and Argentina* (Durham: Carolina Academic Press, 2007), 83 – 97; Petra T. C. van Kampen, “Expert Evidence: The State of the Law in the Netherlands and the United States,” in *Adversarial Versus Inquisitorial Justice: Psychological Perspectives on Criminal Justice Systems*, ed. Peter J. van Koppen and Steven D. Penrod (New York: Kluwer, 2003), 210 – 235; Sven Timmerbeil, “The Role of Expert Witnesses in German and U.S. Civil Litigation,” *Annual Survey of International and Comparative Law* 9 (1) (2003): 163, 171; and M. Neil Browne, Carrie L. Williamson, and Linda L. Barkacs, “The Perspectival Nature of Expert Testimony in the United States, England, Korea, and France,” *Connecticut Journal of International Law* 18 (2002): 55, 66.
- ¹³ Thibaut and Walker, *Procedural Justice* [see note 2].
- ¹⁴ Pauline Houlden, Stephen La Tour, Laurens Walker, and John Thibaut, “Preference for Modes of Dispute Resolution as a Function of Process and Decision Control,” *Journal of Experimental Social Psychology* 14 (1) (1978): 13 – 30; and Tyler, “What is Procedural Justice?” 103, 127 (Table 6) [see note 5]. This result has been replicated in European samples. See E. Allan Lind and Tom R. Tyler, *The Social Psychology of Procedural Justice* (New York: Plenum Press, 1988). We are not aware of any studies of this nature that use judges as subjects.
- ¹⁵ Justin Sevier, “The Truth-Justice Tradeoff: Perceptions of Decisional Accuracy and Procedural Justice in Adversarial and Inquisitorial Legal Systems,” *Psychology, Public Policy, and Law* 20 (2) (2014): 212.
- ¹⁶ Loretta Stalans and E. Allan Lind, “The Meaning of Procedural Fairness: A Comparison of Taxpayers’ and Representatives’ Views of Their Tax Audits,” *Social Justice Research* 10 (3) (1997): 311 – 331.
- ¹⁷ John Langbein, “The German Advantage in Civil Procedure,” *University of Chicago Law Review* 52 (4) (1985): 823.
- ¹⁸ See Franklin Strier, “Making Jury Trials More Truthful,” *University of California Davis Law Review* 30 (1996): 95; Dan Simon, “Criminal Law at the Crossroads: Turn to Accuracy,” *Southern California Law Review* 87 (3) (2014): 421, 436 [adversarial presentation “might indeed be well suited for debates over moral issues, value judgments, and political choices. But zealous argument seems poorly suited as a means for proving objective factual matters.”]; Susan Haack, “Epistemology Legalized: Or, Truth, Justice, and the American Way,” *American Journal of Jurisprudence* 49 (1) (2004): 43, 49 [“Inquiry is a very different enterprise from advocacy.”]; Erin Murphy, “The Mismatch Between Twenty-First-Century Forensic Evidence and Our Antiquated Criminal Justice System,” *Southern California Law Review* 87 (3) (2014): 633 [“Ultimately, this Essay argues that almost every aspect of the adversarial process as currently conceived is ill-suited to ensuring the integrity of high-tech evidence.”]; and Christopher Slobogin, “Lessons from Inquisitorialism,” *Southern California Law Review* 87 (3) (2014): 699 [proposing greater judicial control over the adjudication process and nonadversarial treatment of experts as ways of improving trial accuracy].
- ¹⁹ Most famous, perhaps, is Wigmore’s statement that cross-examination is the “greatest legal engine ever invented for the discovery of truth.” John H. Wigmore, *A Treatise on the Anglo-Amer-*

- ican System of Evidence in Trials at Common Law, 3rd ed. (New York: Little, Brown and Company, 1940), 29. More generally, see Monroe H. Freedman, "Judge Frankel's Search For Truth," *University of Pennsylvania Law Review* 123 (1975): 1060; and Lon Fuller, "The Adversary System," in *Talks On American Law*, 2nd ed., ed. Harold J. Berman (New York: Vintage Books, 1971), 34–47. For a useful overview of the arguments defending adversarialism against inquisitorial approaches, see David Alan Sklansky, "Anti-Inquisitorialism," *Harvard Law Review* 122 (2009): 1634.
- ²⁰ See Jerome Frank, *Courts on Trial: Myth and Reality in American Justice* (Princeton, N.J.: Princeton University Press, 1949); Thurman W. Arnold, *The Symbols of Government* (New York: Harcourt, Brace and World, 1962); and Marvin E. Frankel, *Partisan Justice* (New York: Hill and Wang, 1978).
- ²¹ Arnold, *The Symbols of Government*, 185 [see note 20].
- ²² There is at least one way in which adversarial processes seem to further accuracy. Inquisitorial judges who are in complete control of fact-finding are more likely than judges in an adversarial setting to reach premature conclusions. John Thibaut, Laurens Walker, and E. Allan Lind, "Adversary Presentation and Bias in Legal Decision Making," *Harvard Law Review* 86 (2) (1972): 386. None of the alternatives proposed in this paper would cede complete control over the production of expert testimony to a judge. In any event, when the cases go to trial, a jury, not a judge, will be the ultimate factfinder if a party prefers this.
- ²³ Anthony Champagne, Daniel Shuman, and Elizabeth Whitaker, "An Empirical Examination of the Use of Expert Witnesses in American Courts," *Jurimetrics Journal* 31 (4) (1991): 375; Daniel W. Shuman, Elizabeth Whitaker, and Anthony Champagne, "An Empirical Examination of the Use of Expert Witnesses in the Courts – Part II: A Three City Study," *Jurimetrics Journal* 34 (2) (1994): 193; and Carol Krafka, Meghan A. Dunn, Molly Treadway Johnson, et al., "Judge and Attorney Experiences, Practices, and Concerns Regarding Expert Testimony in Federal Civil Trials," *Psychology, Public Policy and Law* 8 (3) (2002): 309, 328 (Table 6).
- ²⁴ John Thibaut and Laurens Walker, "A Theory of Procedure," *California Law Review* 66 (3) (1978): 541, 541–553; Blair H. Sheppard and Neil Vidmar, "Adversary Pretrial Procedures and Testimonial Evidence: Effects of Lawyer's Role and Machiavellianism," *Journal of Personality and Social Psychology* 39 (2) (1980): 320; and Neil Vidmar and Nancy MacDonald Laird, "Adversary Social Roles: Their Effects on Witnesses' Communications of Evidence and the Assessments of Adjudicators," *Journal of Personality and Social Psychology* 44 (5) (1983): 888.
- ²⁵ Max H. Bazerman, George Lowenstein, and Don A. Moore, "Why Good Accountants Do Bad Audits," *Harvard Business Review* 80 (11) (2002): 97, 100–101. See also Lawrence A. Ponemon, "The Objectivity of Accountants' Litigation Support Judgments," *Accounting Review* 7 (3) (1995): 467, 484.
- ²⁶ Michael J. Saks and Richard Van Duizend, *The Use of Scientific Evidence in Litigation* (Williamsburg, Va.: National Center for State Courts, 1983); Gross, "Expert Evidence," 1113 [see note 12]; and Jennifer Mnookin, "Expert Evidence, Partisanship, and Epistemic Competence," *Brooklyn Law Review* 73 (587) (2008): 1009.
- ²⁷ Emily Pronin, Daniel Lin, and Lee Ross, "The Bias Blind Spot: Perceptions of Bias in Self Versus Others," *Personality and Social Psychology Bulletin* 28 (3) (2002): 369–381.
- ²⁸ See, for example, *O'Conner v. Commonwealth Edison Co.*, 807 F. Supp. 1376, 36 Fed. R. Evid. Serv. 589 (C.D. Ill. 1992), judgment aff'd, 13 F.3d 1090, 38 Fed. R. Evid. Serv. 945, 24 Envtl. L. Rep. 20689 (7th Cir. 1994).
- ²⁹ Nicholas Scurich, Daniel A. Krauss, Lauren Reiser, et al., "Venire Jurors' Perceptions of Adversarial Allegiance," *Psychology Public Policy and Law* 21 (2) (2015): 161; Sanja Kutnjak Ivkovic and Valerie P. Hans, "Jurors' Evaluations of Expert Testimony: Judging the Messenger and the Message," *Law and Social Inquiry* 28 (2) (2003): 441, 445–446; and Neil Vidmar, "Expert Evidence, the Adversary System, and the Jury," *American Journal of Public Health* 95 (S1) (2005): S137, S137–S142. Complexity also tends to cause jurors to give less weight to expert testimony. Shari Diamond and Jonathan Casper, "Blindfolding the Jury to Verdict Consequences: Damages, Experts and the Civil Jury," *Law and Society Review* 26 (3) (1992): 513, 543 ["lack of clarity,

that is, perceived complexity and difficulty, discourages the jurors from accepting an expert's position, rather than inducing them to accept it"].

- ³⁰ Jane Goodman, Edith Green, and Elizabeth Loftus, "What Confuses Jurors in Complex Cases," *Trial Magazine*, November 1985, 65, 68. Information about difficulties with eyewitness identifications induced skepticism in experimental jurors but did not improve their ability to distinguish between accurate and inaccurate identifications. See Angela Jones, Amanda Bergold, Marlee Dillon, and Steven Penrod, "Comparing the Effectiveness of *Henderson* Instructions and Expert Testimony: Which Safeguard Improves Jurors' Evaluations of Eyewitness Evidence," *Journal of Experimental Criminology* 13 (1) (2017): 29.
- ³¹ See Shari Seidman Diamond, Jonathan Casper, Cami Heiert, and Anna-Maria Marshall, "Juror Reactions to Attorneys at Trial," *Journal of Criminal Law and Criminology* 87 (1) (1996): 17; and Jacqueline Austin, Margaret Bull Kovera, and Michael Lamb, "Cross-Examination Educates Jurors about Missing Control Groups in Scientific Evidence," *Psychology, Public Policy and Law* 21 (3) (2015): 252.
- ³² Richard E. Petty and John T. Cacioppo, *Communication and Persuasion: Central and Peripheral Routes to Attitude Change* (New York: Springer-Verlag, 1986).
- ³³ Joel Cooper, Elizabeth Bennett, and Holly Sukel, "Complex Scientific Testimony: How Do Jurors Make Decisions?" *Law and Human Behavior* 20 (4) (1996): 379.
- ³⁴ We should note that everyone both centrally and peripherally processes information. Moreover, as noted below, some peripheral processing is to be desired.
- ³⁵ Jonathan J. Koehler, N. J. Schweitzer, Michael J. Saks, and Dawn E. McQuiston, "Science, Technology, or the Expert Witness: What Influences Jurors' Judgement About Forensic Science Testimony?" *Psychology, Public Policy and the Law* 22 (4) (2016): 401.
- ³⁶ Joseph Sanders, "From Science to Evidence: The Testimony on Causation in the Bendectin Cases," *Stanford Law Review* 46 (1) (1993): 1, 47.
- ³⁷ As one Texas trial attorney pithily remarked, "there have been cases where . . . after I met [the experts], I said 'you know, they are just not going to look too shiny and I need to go get a show dog and do a handoff.'" Joseph Sanders, "The Merits of the Paternalistic Justification for Restrictions on the Admissibility of Expert Evidence," *Seton Hall Law Review* 33 (4) (2003): 881, 913–914.
- ³⁸ Federal Rules of Criminal Procedure, Rule 16 (1) (G).
- ³⁹ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993).
- ⁴⁰ David Baltimore, David S. Tatel, and Anne-Marie Mazza, "Bridging the Science-Law Divide," *Dædalus* 147 (4) (Fall 2018). See National Research Council, *Strengthening Forensic Science in the United States: A Path Forward* (Washington, D.C.: National Academies Press, 2009), 8; and President's Council of Advisors on Science and Technology, *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods* (Washington, D.C.: Executive Office of the President, 2016).
- ⁴¹ D. Michael Risinger, "Navigating Expert Reliability: Are Criminal Standards of Certainty Being Left on the Dock?" *Albany Law Review* 64 (1) (2000): 99, 110; and Joseph Sanders, "Applying *Daubert* Inconsistently? Proof of Individual Causation in Toxic Tort and Forensic Cases," *Brooklyn Law Review* 75 (4) (2010): 1367, 1368.
- ⁴² See Gross, "Expert Evidence," [see note 12] proposing two ways in which the judiciary could move toward court-appointed experts. Also, here we are thinking of devices such as blue-ribbon juries. Alan Feigenbaum, "Special Juries: Deterring Spurious Medical Malpractice Litigation in State Courts," *Cardozo Law Review* 24 (3) (2003): 1361; and Franklin Strier, "The Educated Jury: A Proposal for Complex Litigation," *DePaul Law Review* 47 (1) (1997): 49.
- ⁴³ Daniel L. Rubinfeld and Joe S. Cecil, "Scientists as Experts Serving the Court," *Dædalus* 147 (4) (Fall 2018); and Valerie P. Hans and Michael J. Saks, "Improving Judge & Jury Evaluation of Scientific Evidence," *Dædalus* 147 (4) (Fall 2018).

- ⁴⁴ Federal Rules of Evidence, Rule 611.
- ⁴⁵ Murphy, “The Mismatch Between Twenty-First-Century Forensic Evidence and Our Antiquated Criminal Justice System,” 633, 665 [see note 18].
- ⁴⁶ Laurens Walker, John Thibaut, and Virginia Andreoli, “Order of Presentation At Trial,” *Yale Law Journal* 82 (2) (1972): 216.
- ⁴⁷ Frances P. Kao, Justin L. Heather, Ryan A. Horning, and Martin V. Sinclair Jr., “Into the Hot Tub: A Practical Guide to Alternative Expert Witness Procedures in International Arbitration,” *International Law* 44 (3) (2010): 1035, 1038. For additional changes in the ethical rules governing Australian experts, see note 73.
- ⁴⁸ David Sonenshein and Charles Fitzpatrick, “The Problem of Partisan Experts and the Potential for Reform Through Concurrent Evidence,” *Review of Litigation* 32 (1) (2003): 1, 59.
- ⁴⁹ Gary Edmond, “Secrets of the ‘Hot Tub’: Expert Witnesses, Concurrent Evidence, and Judge-Led Law Reform in Australia,” *Civil Justice Quarterly* 27 (1) (2008): 51, 56; Gary Edmond, “Merton and the Hot Tub: Scientific Conventions and Expert Evidence in Australian Civil Procedure,” *Law and Contemporary Problems* 72 (1) (2009): 159; and Stephen E. Snyder, Daniel Luecke, and John E. Thorson, “Adversarial Collaboration: Court-Mandated Collaboration Between Opposing Scientific Experts in Colorado’s Water Courts,” *Natural Resources and Environment* 28 (1) (2013): 8.
- ⁵⁰ Edmond, “Secrets of the ‘Hot Tub,’” 51, 56 [see note 49].
- ⁵¹ See Supreme Court of Victoria, “Practice Note No 2 of 2014 Expert Evidence in Criminal Trials,” <https://www.supremecourt.vic.gov.au/law-and-practice/practice-notes/practice-notes-archive/practice-notes-trial-division-archive-80>.
- ⁵² Edmond, “Secrets of the ‘Hot Tub,’” 51 [citing as an example the Uniform Civil Procedure Rules, sch. 7 (N.S.W.); see note 49].
- ⁵³ Peter Heerey, “Recent Australian Developments,” *Civil Justice Quarterly* 23 (2004): 386, 391; and Edmond, “Merton and the Hot Tub,” 159, 168 – 169 [see note 49].
- ⁵⁴ Megan A. Yarnall, “Dueling Scientific Experts: Is Australia’s Hot Tub Method a Viable Solution for the American Judiciary,” *Oregon Law Review* 88 (1) (2009): 311.
- ⁵⁵ Murphy, “The Mismatch Between Twenty-First-Century Forensic Evidence and Our Antiquated Criminal Justice System,” 633 [see note 18].
- ⁵⁶ Sonenshein and Fitzpatrick, “The Problem of Partisan Experts and the Potential for Reform Through Concurrent Evidence,” 1, 63 [see note 48].
- ⁵⁷ Erin Murphy, “The New Forensics: Criminal Justice, False Certainty, and the Second Generation of Scientific Evidence,” *California Law Review* 95 (3) (2007): 721, 753.
- ⁵⁸ Edmond, “Merton and the Hot Tub,” 159, 180 [see note 49].
- ⁵⁹ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993).
- ⁶⁰ National Research Council, *Strengthening Forensic Science in the United States*, 53 [see note 40]. This is so “[f]or a variety of reasons – including the rules governing the admissibility of forensic evidence, the applicable standards governing appellate review of trial court decisions, the limitations of the adversary process, the common lack of scientific expertise among judge and lawyers who must try to comprehend and evaluate forensic evidence – the legal system is ill-equipped to correct the problems of the forensic science community.”
- ⁶¹ President’s Council of Advisors on Science and Technology, *Forensic Science in Criminal Courts* [see note 40].
- ⁶² See Risinger, “Navigating Expert Reliability,” 99, 149 [see note 41], comparing “the heightened standards of dependability imposed on expertise proffered in civil cases” with “expertise proffered . . . in criminal cases [which] has been largely insulated from any change in pre-*Daubert*

standards or approach.” See, for example, Nancy Gertner, “Commentary on the Need for a Research Culture in the Forensic Sciences,” *UCLA Law Review* 58 (2011): 89, 790.

- ⁶³ See, for example, Sara Gordon, “Through the Eyes of Jurors: The Use of Schemas in the Application of ‘Plain Language’ Jury Instructions,” *Hastings Law Journal* 64 (2013): 643, 645 [reforms for improving juror comprehension].
- ⁶⁴ Nancy Gertner, “Videoconferencing: Learning Through Screens,” *William and Mary Bill of Rights Journal* 12 (3) (2004): 769, 776.
- ⁶⁵ Lynne ForsterLee and Irwin Horowitz, “The Effects of Jury-Aid Innovations on Juror Performance in Complex Civil Trials,” *Judicature* 86 (4) (2003): 184.
- ⁶⁶ B. Michael Dann, Valerie P. Hans, and David H. Kaye, “Can Jury Trial Innovations Improve Juror Understanding of DNA Evidence?” *Judicature* 90 (4) (2007): 152.
- ⁶⁷ Lynne ForsterLee, Irwin Horowitz, Elizabeth Athaide-Victor, and Nicole Brown, “The Bottom Line: The Effect of Written Expert Witness Statements on Juror Verdicts and Information Processing,” *Law and Human Behavior* 24 (2) (2000): 259.
- ⁶⁸ Hans and Saks, “Improving Judge & Jury Evaluation of Scientific Evidence” [see note 43].
- ⁶⁹ Nicole L. Mott, “The Current Debate on Juror Questions: ‘To Ask or Not to Ask, That Is the Question,’” *Chicago-Kent Law Review* 78 (3) (2003): 1099; and Shari S. Diamond, Mary R. Rose, Beth Murphy, and Sven Smith, “Juror Questions During Trial: A Window into Juror Thinking,” *Vanderbilt Law Review* 59 (6) (2006): 1927.
- ⁷⁰ See Gross, “Expert Evidence” [see note 12]; Christopher Tarver Robertson, “Blind Expertise,” *NYU Law Review* 85 (1) (2010): 174; and Jurilytics, “About Us,” <https://jurilytics.com/about>.
- ⁷¹ Rubinfeld and Cecil, “Scientists as Experts Serving the Court” [see note 43].
- ⁷² Joseph Sanders, “Expert Witness Ethics,” *Fordham Law Review* 76 (3) (2007): 1539, discusses several of these codes.
- ⁷³ This code is not contrary to other legal statements about the expert’s role. Experts, like all witnesses, take an oath to tell the whole truth. Federal Rule of Evidence 702 envisions that the expert’s task is to “help the trier of fact to understand the evidence or to determine a fact in issue.” One interpretation of this language is that the law also views the ideal expert witness as a disinterested, unbiased educator. Steven Lubet, a professional responsibility scholar, adopts this position when he argues that “[t]he single most important obligation of an expert witness is to approach every question with independence and objectivity.” Steven Lubet, “Expert Witnesses: Ethics and Professionalism,” *Georgetown Journal of Legal Ethics* 12 (3) (1999): 465, 467.
- ⁷⁴ If a court does choose to adopt a code of ethics, it is important that it be given to the expert at the earliest possible time in the proceedings; ideally at the time the parties list their potential testifying experts. If the court waits until the time of trial to provide the expert with a code of ethics, it may be too late to have much impact on the expert’s testimony.
- ⁷⁵ Equally important are signals from appellate courts that procedures such as hot-tubbing are not grounds for reversal.