

CHAPTER 2

THE VALUE OF TRAINING IN QUANTITATIVE METHODS FOR JUDGES

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1. INTRODUCTION

Judges face a significant skills gap that threatens to undermine their ability to properly adjudicate civil matters. Although modern disputes frequently involve decisions that hinge on quantitative or theoretically sophisticated economic evidence, few judges have backgrounds sufficient to prepare them for these decisions. Courses on statistics, economics, and finance are almost entirely absent in legal education programs even though judicial analysis of these matters affects untold resources throughout the world on a daily basis.

With few exceptions, the individuals who sort into law do not have scientific or quantitative backgrounds. In the US, the majority of law school applicants have undergraduate degrees in the humanities and the non-quantitative social sciences.¹ In most of the rest of the world, where law is a first degree, the situation is likely even worse. Judges are not unaware of this problem. Tasked by the Supreme Court with serving as the gatekeeper with respect to scientific evidence, the 9th Circuit opinion in the follow up to *Daubert* laments: “As we read the Supreme Court’s teaching in *Daubert*, therefore, though we are largely untrained in science and certainly no match for any of the witnesses whose testimony we are reviewing, it is our responsibility to determine whether those experts’ proposed testimony amounts to ‘scientific knowledge,’ constitutes ‘good science,’ and was ‘derived by the scientific method.’”²

In a presentation at the 2008 symposium “The Supreme Court and Useful Knowledge”, Linda Greenhouse, the Pulitzer Prize winning reporter who

¹ See Nieswiadomy, Michael, LSAT Scores of Economics Majors: The 2008–2009 Class Update (June 25, 2009). Available at SSRN: <http://ssrn.com/abstract=1430654> or <http://dx.doi.org/10.2139/ssrn.1430654>.

² *Daubert v. Merrell Dow Pharms., Inc.*, 43 F.3d 1311, 1316 (9th Cir. 1995).

covered the Supreme Court for the *New York Times* from 1978 to 2007, concluded “A good judge is not necessarily one who knows everything, but one who is willing to learn.”³ Presumably judges do want to get these issues “right”, and while most are likely willing to learn⁴, at least in theory, reality often gets in the way.

Given the demands placed upon judges in most jurisdictions, it is unlikely they will have resources or the inclination to remedy this shortcoming despite recognising the problem, especially in an environment where the remuneration of judges appears to fall short of compensating them for doing even the bare minimum. As the U.S. Chief Justice, John Roberts, notes repeatedly, poor judicial pay is already depleting the ranks of the federal judiciary.⁵ Under such circumstances, it is unreasonable to think judges will be motivated to incur the expense of improving their facility with scientific evidence on their own. Also, given that the gap between judicial pay and private practice pay is largest in the area of corporate law, it is likely that those with some background knowledge of finance and microeconomics will be especially under-represented within the judiciary.

As recognised by the Court in *Daubert*, however, it is not reasonable to simply hope that the adversarial posture of the US courts will lead to a scenario where sound science (or statistics, or economics, etc.) trumps bad science. Junk science can always be dressed up in elegant-sounding claims, wherein the more charismatic expert with the more aesthetically pleasing flow charts beats the bumbling but methodologically sound expert.

Inquisitorial systems generate their own problems with respect to scientific or quantitative evidence as well. While such systems may be less susceptible to manipulation due to hired-gun experts in the courtroom, the problem does not go away as the parties in front of the judge will have used such experts in framing the dispute and preparing their arguments. Further, even if the judge in such a system can rely on a hopefully disinterested court-appointed expert for guidance, lacking any background skills in these areas, the judge will be poorly positioned

³ Greenhouse, Linda (2010), “How Do Judges Know What They Know?” *Proceedings of the American Philosophical Society*, 154(3): 287–293.

⁴ However, many judges may view this as a practical impossibility or even beyond the scope of their duties. David L. Faigman quotes a remarkable line by Justice Brennan from *Craig v. Boren* (429 U.S. 190 (1976)) while rejecting statistical evidence: “There is no reason to belabor this line of analysis. It is unrealistic to expect either members of the judiciary or state officials to be well versed in the rigors of experimental or statistical technique. But this merely illustrates that proving broad sociological propositions by statistics is a dubious business...” Faigman expresses shock at this statement, suggesting that it would be unthinkable that a Supreme Court justice would be as willing to disclaim any ability to read history, or presumably a similar unwillingness to wrestle with arguments grounded in tools from the liberal arts. See David L. Faigman, *Judges As “Amateur Scientists”*, 86 *Boston University Law Review* 1207, 1210–1211 (2006).

⁵ For the first public instance of this, see John Roberts, 2005 Year-End Report on The Federal Judiciary 3 (2006).

to choose an adequately trained expert. Beyond that, often the core of a dispute involves judging how relevant a scientific finding or literature is in answering a particular legal question. Non-legal experts are often ill equipped for such inquiries that require some familiarity with both the science and the law.

Thus, reliance on a judge's own ambition to be a better consumer of scientific and quantitative evidence is overly optimistic; nor will institutional safeguards remedy the knowledge deficit of judges worldwide. While this challenge may seem insurmountable, the potential to educate judges has been demonstrated in the U.S. setting.

The available evidence suggests that judges desire the training that would be necessary to fill in these gaps. There is also evidence that such training can lead to improved judicial decision making. The evidence regarding judicial desire is related to the publication of the Federal Judicial Center's Manual on Scientific Evidence in the wake of the Supreme Court's *Daubert* ruling which left federal judges in the clear role of gatekeepers regarding expert evidence. Qualitative evidence suggests that judges are indeed interested in easily available, well-done resources to improve their ability to make judgments regarding the kind of sophisticated quantitative evidence that arises in modern cases. Further, there are indications that the influence of the FJC's work spread beyond the nominal audience of the federal judiciary, potentially improving the work of state judges as well.

As the following discussions demonstrate, providing judges with attractive and low-cost educational opportunities and resources has the potential to mitigate the gaps they otherwise have in their backgrounds. Expanding such opportunities both in the US and abroad will likely generate a very high social return.

2. REFERENCE MANUAL ON SCIENTIFIC EVIDENCE

Beginning in the early 1990s, there was a general recognition that there was a need to educate federal judges in matters related to scientific evidence. One manifestation of this was the creation of the Federal Judicial Center's Science and Technology Resources Center (STRC). In addition to developing educational programs, the STRC was tasked with developing a handbook on science and technology for judges.⁶

The perceived need for this kind of guidance was heightened when the Supreme Court abandoned the traditional Frye rule in *Daubert v. Merrell Dow*

⁶ For background on these developments, see Carnegie Commission on Science, Technology, and Government (1993), *Science and Technology in Judicial Decision Making: Creating Opportunities and Meeting Challenges*.

*Pharmaceuticals, Inc.*⁷ Whereas the *Frye* rule had limited the inquiry regarding the admissibility of scientific evidence to asking whether the evidence was generally accepted in the relevant academic community, *Daubert* demanded that judges themselves serve a gatekeeper function, evaluating the soundness of the underlying methodology used by the expert to arrive at her conclusions. This inquiry involved a determination of whether the underlying methods were reliable and whether they were appropriately applied in the given legal context (i.e., is the application relevant to the legal point being advanced by the evidence).

While the Court did provide some potential indicators of methodological soundness (i.e., whether the expert's theory could be tested/falsified; whether the theory had been subjected to a peer review process; whether the error rate of an expert's empirical method was known; acceptance in the relevant scientific community), the discretion of the judge in making these determinations was left quite broad. This discretion point was later made clear in *General Electric Co. v. Joiner* which held that the appellate standard on an admissibility determination under *Daubert* is abuse of discretion.⁸ The final case in the *Daubert* trilogy, *Kumho Tire Co. v. Carmichael*, made clear that this standard applied even to fields like economics and finance, in addition to the hard sciences.⁹

The Federal Judicial Center published the first Reference Manual on Scientific Evidence in 1994, with subsequent editions published in 2000 and 2011. The manual, written with the aim of being accessible to individuals with no scientific or quantitative training, includes chapters on statistics, multiple regression, survey research, microeconomics, epidemiology, and toxicology, among other technical fields.

The judiciary embraced this manual. In preparation for the third edition, the Federal Judicial Center engaged in survey research which found that judges at both the state and federal levels consult the manual when they are faced with scientific or technical evidence. This reinforces the FJC's view that the manual has been highly successful based on the fact that it has sold more than 100,000 copies. Even this latter evidence is likely understated, given that the manual is available for free in an electronic format.¹⁰ In its assessment of the impact of the manual, the Federal Judicial Center concludes: "The Manual continues to be an extremely important resource for judges handling cases in which scientific evidence plays a role. While no manual for general distribution can anticipate and address the particular questions a judge or jury may need to decide, the Manual appears to provide a general introduction that can help judges dealing with scientific issues pertaining to the subject of a dispute. The Manual has

⁷ 509 U.S. 579 (1993).

⁸ 522 U.S. 136 (1997).

⁹ 526 U.S. 137 (1999).

¹⁰ For more information on this claim, see Committee on the Evaluation of the Reference Manual on Scientific Evidence; National Research Council, Evaluation of the Reference Manual on Scientific Evidence: Letter Report (2009).

gained a reputation for providing judges with a frame of reference to approach such disputes with confidence and with a sufficient level of comfort to listen, learn, and ultimately make a decision on a matter involving scientific content.”¹¹

This conclusion accords with some empirical evidence on the matter suggesting that judges have become much more comfortable in questioning expert evidence during the period where this manual has been available. A 2001 RAND study found that post 1994, federal judges were more likely to challenge expert evidence and to ultimately exclude said evidence.¹²

While RAND speculated that this was a function of the more demanding *Daubert* rule, this conclusion is found to be lacking in work comparing federal and state courts in this period. A 2005 *Virginia Law Review* article by Edward Cheng and Albert Yoon, found no meaningful difference between state jurisdictions retaining the old Frye rule and state courts adopting the *Daubert* rule as well as federal courts. Their study focused on analysing changes in removal rates to federal court after *Daubert* is adopted. The intuition behind this research design is that if judges are more demanding under *Daubert* regarding scientific evidence, defendants will have a stronger incentive to remove the case to federal court when a plaintiff files in a state court operating under Frye than if the plaintiff files in a state court that has already adopted *Daubert*. They find no evidence of a differential effect, stating, “[*Daubert*] has a vanishingly small effect on removal rate. DAUBERT contributes only five-thousandths of a percentage point to a state’s removal rate, and the result is statistically insignificant. This result suggests that, in making removal decisions, defendants place little weight on whether a state follows Frye or *Daubert*.”¹³

For *Daubert* to not make a difference between state and federal court practice, as found in Cheng and Yoon, but to have been associated with increasing scrutiny at the federal level, as found in the RAND study, it is likely the case that state courts were becoming increasingly demanding as well. While we cannot be certain judges were more demanding due to their reliance on the Reference Manual on Scientific Evidence, the survey results collected from judges by the Federal Judicial Center surely indicate that the judges themselves claim the manual has had an effect.

However, as the RAND study makes clear, this increasing scrutiny may not necessarily imply that judges are handling scientific evidence better. Perhaps during this period, judges were excluding evidence that is scientifically valid. While a systematic study of this possibility is likely impossible, since it would require making independent determinations regarding an unmanageable number of evidence determinations by scholars with expertise in both law and

¹¹ Id, 16.

¹² See Lloyd Dixon and Brian Gill (2001), Changes in the Standards for Admitting Expert Evidence in Federal Civil Cases Since the *Daubert* Decision, RAND Monograph Report.

¹³ Edward K. Cheng and Albert H. Yoon, Does Frye or *Daubert* Matter? A Study of Scientific Admissibility Standards, 91 *Virginia Law Review* 471, 498 (2005).

science, there is some indirect evidence that the state of science in the courtroom was actually improving in this time period.

In data collected by Eric Helland and Jonathan Klick for their 2012 article “Does Anyone Get Stopped at the Gate? An Empirical Assessment of the Daubert Trilogy in the States”,¹⁴ they too confirm the Cheng and Yoon result that Daubert itself does not make much of a difference on objective indicators of an expert’s quality (publication record, years of experience, affiliation with a top 10 university) but they do find that these indicators are improving everywhere, Daubert adopters and non-adopters alike, over time, suggesting that the increasing demands identified by RAND are likely the result of an improvement in the rigor of the evidence that gets admitted.

Again, this improvement in the demands made by judges in the post-Daubert era shows up in both state and federal courts. While there are likely many factors driving this, judges themselves appear to credit the Reference Manual on Scientific Evidence. However, the FJC’s survey results suggest that the judges believe they could substantially benefit from actual training in the topics covered in the manual. Specifically, the FJC commented, “Judges expressed interest in educational programs that would allow them to work through material encountered at Daubert hearings. A Science for Judges Program on Evidence-Based Medicine attempted to accommodate this desire by placing participants in small break-out groups to analyse studies from speaker presentations. Judges liked this format. The advantages of this model might be harnessed using interactive computer exercises dealing with, for example, statistical issues.¹⁵ While the FJC has organised some limited training sessions, this demand goes largely unmet via public channels. There are, however, more extensive privately-financed programs that apparently generate substantial improvements to judicial human capital.

3. THE EFFECT OF TRAINING IN ANTITRUST LAW

Competition law is an area where sophisticated quantitative and theoretical evidence largely determine the outcome of a given case. Given judicial backgrounds, competition law is also an area where the skills gap is likely to be quite large.

There is a systematic treatment of the effects of this kind of training on the sophistication of judges in the area of antitrust law. In a 2011 article in the

¹⁴ Eric Helland and Jonathan Klick, *Does Anyone Get Stopped at the Gate? An Empirical Assessment of the Daubert Trilogy in the States*, 20 *Supreme Court Economic Review* forthcoming (2012).

¹⁵ Committee on the Evaluation of the Reference Manual on Scientific Evidence; National Research Council, *Evaluation of the Reference Manual on Scientific Evidence: Letter Report* (2009), 12.

Journal of Law and Economics, Michael Baye and Joshua Wright analyse data on the effect of attending judicial training seminars organised by the Law and Economics Center of George Mason University and performance in antitrust cases.¹⁶ Their study analysed 714 antitrust cases over the period 1996–2006, suggesting a fairly broad sample unlikely to be inordinately affected by a few idiosyncratic judges or cases.

Antitrust is an area where judges are especially likely to be under-prepared. Modern antitrust law has departed substantially from its historic approach of applying per se rules to challenged activities. Under modern law, most cases are decided via a rule of reason approach that examines the effect of the challenged activity on consumer welfare as judged by modern economic theory and sophisticated statistical analyses. Presumably because of this, an ABA survey found that less than one fourth of antitrust economists responded that judges usually understand the economic issues in an antitrust case.¹⁷

For a measure of performance, Baye and Wright examine the appeals rate on the assumption that a higher quality decision at the trial stage is less likely to be appealed. They also code the decisions according to their economic complexity, focusing on whether the case involved complicated econometric evidence, game theory, or other elements requiring greater economic sophistication.

In short, after controlling for trends over time, they find that cases decided by judges who have gone through training programs were about 10 percent less likely to be appealed, and this result is statistically significant. The basic result holds even when the authors control for the specific type of antitrust case (e.g., merger, monopolisation, etc.), the plaintiff type (private, DOJ, FTC, or state Attorney General), and the federal circuit where the case was decided. Interestingly, this effect was most pronounced in the more simple cases, suggesting that the value of the training is primarily in remedying fairly basic skills deficits. To reinforce confidence in the positive effects of judicial training, Baye and Wright replicate their results after including controls for the antitrust experience of the judge, the political party of the judge, and a measure of whether the judge has an advanced degree. These controls mitigate concerns that the results are driven by certain judges, who might happen to be naturally better positioned to write a high quality antitrust opinion, being more likely to attend programs at the Law and Economics Center. By including a measure of experience, Baye and Wright are also able to conclude that “on the job training” does not appear to be as effective as basic judicial training.

¹⁶ Michael R. Baye and Joshua D. Wright (2011), “Is Antitrust Too Complicated for Generalist Judges? The Impact of Economic Complexity and Judicial Training on Appeals”, *Journal of Law and Economics*, 54(1): 1–24.

¹⁷ See Baker, Jonathan B., and M. Howard Morse. 2006. Final Report of the American Bar Association Antitrust Division Economic Evidence Task Force. Chicago: American Bar Association. www.abanet.org/antitrust/at-reports/01-c-ii.pdf.

While the effect of privately financed judicial training has not been studied systematically in other areas, these antitrust results suggest that an expansion of such opportunities could significantly improve judicial performance. A better equipped judiciary is likely to improve social welfare substantially.

4. CONCLUSION

Every day judges are asked to make extremely important decisions, potentially worth millions of dollars, which hinge on complicated determinations involving scientific and quantitative evidence. Judges are generally ill-equipped to make these determinations. Basic economics, statistics, and science are subjects that are absent in legal education throughout the world. Judges generally do not have the time, resources, or inclination to get themselves up to speed on these issues, much to the detriment of legal outcomes.

Fortunately, there are some reasons to be optimistic. The popularity of the FJC's Reference Manual on Scientific Evidence shows that judges will avail themselves of cheaply available high quality resources. The performance of judges who receive privately funded training gives even more reason to be optimistic, as demonstrated clearly in the antitrust area.

Given the importance of a well-trained judiciary, in the context of under-funded judicial systems, there should be an attempt to expand these educational opportunities and to encourage judges to make use of them.

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