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Introduction to the Symposium

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SCIENCE FOR JUDGES VII INTRODUCTION

*Margaret A. Berger**

The Journal of Law and Policy is once again privileged to publish extended versions of papers relating to science and law that were presented at a conference for federal and state judges.¹ The conference, which took place at Brooklyn Law School on March 3 and 4, 2006, was the seventh in a series of Science for Judges programs funded by the Common Benefit Trust established in the Silicone Breast Implant Products Liability Litigation. It was held under the auspices of Brooklyn Law School's Center for Health, Science and Public Policy in collaboration with the Federal Judicial Center, the National Center for State Courts, and the Committee on Science, Technology and Law of the National Academies of Science.

Four of the articles that follow deal with a central concern of the Science for Judges program from its inception—the proof of causation in toxic tort litigation. It is certainly not surprising that this topic was addressed at several of the earlier conferences.² The

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¹ Papers from previous Science for Judges programs can be found in 12 J.L. & POL'Y 1, 1-53 (2003) (papers discussing the practice of epidemiology and the science produced by administrative agencies); 12 J.L. & POL'Y 485, 485-639 (2004) (papers discussing toxicology and epidemiology); 13 J.L. & POL'Y 1, 1-179 (2005) (papers discussing the integrity of scientific research and forensic evidence in criminal proceedings); 13 J.L. & POL'Y 499-647 (2005) (papers discussing Agent Orange and human behavior research); and 14 J.L. & POL'Y 1-209 (2006) (papers discussing risk assessment dealing with expert proof of causation in toxic tort cases and issues relevant to the availability of data). All papers are available in electronic form at <http://brooklaw.edu/centers/scienceforjudges/papers.php>.

² See David Eaton, *Scientific Judgment and Toxic Torts—A Primer In Toxicology For Judges and Lawyers*, 12 J.L. & POL'Y 5 (2003); Douglas Weed,

problem of proving causation—which is usually at the heart of toxic tort cases—is undoubtedly a direct cause of the Science for Judges programs. Training judges to understand complex scientific concepts took on a new urgency after the United States Supreme Court’s 1993 opinion in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*,³ required trial judges to make a preliminary finding that proffered scientific expert testimony was reliable and relevant before it could be admitted. *Daubert* was a toxic tort case in which the contested crucial issue was causation, as was *General Electric Co. v. Joiner*,⁴ the second case in which the Court explored criteria for the admissibility of expert proof. So from the first, the trial judge’s role as “gatekeeper” in admitting expert testimony was intertwined with rulings on expert testimony offered to prove that defendant’s product caused plaintiff’s alleged adverse health effect.

The emphasis on causation at these programs is not, however, due solely to the historical connection between *Daubert* and

Causation: An Epidemiologic Perspective (In Five Parts), 12 J.L. & POL’Y 43 (2003); John Concato, *Overview Of Research Design In Epidemiology*, 12 J.L. & POL’Y 489 (2004); John Ionnides & Joseph Lau, *Systematic Review of Medical Evidence*, 12 J.L. & POL’Y 509 (2004); James Robins, *Should Compensation Schemes Be Based On The Probability Of Causation Or Expected Years Of Life Lost?*, 12 J.L. & POL’Y 537 (2004); Jeanne Stellman & Steven Stellman, *Characterization of Exposure to Agent Orange in Vietnam Veterans as a Basis for Epidemiological Studies*, 13 J.L. & POL’Y 505 (2005); David Butler, *Connections: The Early History of Scientific and Medical Research on “Agent Orange,”* 13 J.L. & POL’Y 527 (2005); Irva Hertz-Picciotto, *How Scientists View Causality and Assess Evidence: A Study of the Institute of Medicine’s Evaluation of Health Effects in Vietnam Veterans and Agent Orange*, 13 J.L. & POL’Y 553 (2005); Joseph Rodricks, *Evaluating Disease Causation In Humans Exposed To Toxic Substances*, 14 J.L. POL’Y 39 (2005); Gary Marchant, *Genetic Data in Toxic Tort Litigation*, 14 J.L. & POL’Y 7 (2005); Lisa Heinzerling, *Doubling Daubert*, 14 J.L. & POL’Y 65 (2005).

³ 509 U.S. 579 (1998).

⁴ 522 U.S. 136 (1997). The third case in which the Supreme Court considered the admissibility of expert proof, *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999), turned on causation in a products liability action that did not involve a toxic tort. See Margaret A. Berger, *The Supreme Court’s Trilogy on the Admissibility of Expert Testimony*, in REFERENCE MANUAL ON SCIENTIFIC EVIDENCE (Federal Judicial Center, 2d ed. 2000).

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educational scientific programs for judges. Proving causation in toxic tort cases would have been a core part of any judicial curriculum on science even if the Supreme Court's new rule for admitting expert testimony had been handed down in a case having nothing to do with toxic torts. And that, of course, is because determining causation is such a difficult, complex issue. Any decision is beset by uncertainty because our comprehension of disease processes is far from complete. Determining whether a particular expert may testify about causation remains a highly demanding task for judges. As the reader of these essays will see, deciding issues about causation is equally challenging for scientists.

It is, therefore, gratifying to introduce articles by four eminent experts whose research is at the cutting edge of understanding and explaining causal claims. The principal message that emerges from their papers is that determining disease causality requires judgment; science at this point in time cannot often offer a definitive, clear-cut answer. In addition, all the authors, some more explicitly than others, are critical of some of the underlying assumptions that can be found in some judicial opinions as inconsistent with scientific reasoning.

The first paper, by Carl Cranor, a professor of philosophy, focuses first on what is known about chemicals and then on the structure of scientific arguments.⁵ Professor Cranor explains that drawing non-deductive inferences means that gaps in arguments will always be encountered, but that methods exist for drawing the best-supported conclusion. He stresses that scientists typically consider all relevant data in order to assess the strength of the available evidence, and gives examples of how pieces of data may fit together to produce a conclusion. The Supreme Court's *Joiner*⁶ opinion has been read by some courts as requiring judges to pass individually on the reliability of each study on which an expert seeks to rely rather than considering them as a whole. Professor Cranor's paper raises interesting issues about whether a separatist

⁵ Carl F. Cranor, *A Framework for Assessing Scientific Arguments: Gaps, Relevance and Integrated Evidence*, 15 J. L. & POL'Y 7 (2006).

⁶ *Supra*, note 4.

approach comports with scientific practice.

Drs. Melnick and Bucher are toxicologists at the National Toxicology Program at the National Institute of Environmental Health Sciences.⁷ Their paper provides a valuable overview of how toxicological studies have been used in making public health decisions, how they are designed, and how they are combined with other data, such as epidemiological studies. For judges handling toxic tort cases, perhaps the most useful discussion appears in Section III on Evaluation Issues. It suggests that courts may be out of touch with current research when they ignore animal studies as irrelevant because they do not relate to humans and expose animals to higher doses than those administered to persons. Toxicological studies have been gathering mechanistic data comparing the metabolizing of particular chemicals in humans and animals. These studies show that extrapolation to humans may be appropriate in certain cases, explain why adverse reactions to a particular substance may sometimes be observable in species, like mice, but not in others like rats, and reveal that the sites of tumors in animals may not always correspond to those in humans. Section IV of the Melnick-Bucher article explains how dose-response data from animal studies are converted to human equivalent doses. This is a paper which presents toxicology as an evolving experimental science that will undoubtedly play an increasingly important role in determining disease causality.

The next two papers focus on epidemiology. Dr. Steven N. Goodman's thesis is that the determination of causal claims in toxic tort cases is often "left to a formulaic misapplication of what are regarded as scientific criteria for proof."⁸ He first takes on traditional, frequentist statistics which he criticizes for producing results that on average may be correct but terribly wrong in a particular case. Next he explores Bayesian statistics and the difficulty of calculating the prior probability needed for a Bayesian analysis, and then turns to instances in which insisting on a relative risk greater than 2 to prove specific causation leads to invalid

⁷ Ronald L. Melnick & John R. Bucher, *Determining Disease Causality from Experimental Toxicology Studies*, 15 J. L. & POL'Y 111 (2006).

⁸ Steven N. Goodman, *Judgment for Judges: What Traditional Statistics Don't Tell You About Causal Claims*, 15 J. L. & POL'Y 92, 92 (2006).

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results. He concludes that “the truth of causal claims is not calculable from the data alone,”⁹ and instead proposes principles that judges should use in determining general and specific causation in toxic tort cases. His recommendations require judgment, a close look at prior studies and the strength of their design and implementation, and careful attention to biologic principles.

Dr. Douglas Weed’s article explores the nature of scientific judgment in depth.¹⁰ He explains why it is needed and examines the various essential functions expert judgment performs, although he concedes that the exact nature of judgment is complex and elusive. Dr. Weed provides a brief philosophical tour of a variety of values and criteria that have been proposed as attributes of scientific inquiry, and concludes by setting out a taxonomy of different types of judgment. He stresses the importance of not only assessing the outcome of a judgment but also of appraising the process by which judgments about causal claims are reached.

Exercising judgment, is of course, what judges do. Although it may be disturbing that there is no magic formula for determining the validity of a causal claim, it may also be reassuring to be reminded that legal and scientific reasoning share some of the same attributes: careful attention to relevant facts and how they are derived, understanding what is sought to be proved, assessing probative value, and being mindful of biases.

The fifth article that appears in this volume of the Journal of Law and Policy deals with a very different, but equally significant topic at the intersection of science and the law: the operation of forensic laboratories.¹¹ Here, too, *Daubert* has played a significant

⁹ *Id.* at 104.

¹⁰ Douglas L. Weed, *The Nature and Necessity of Scientific Judgment*, 15 J. L. & POL’Y 132 (2006).

¹¹ Paul C. Giannelli, *Regulating Crime Laboratories: The Impact of DNA Evidence*, 15 J. L. & POL’Y 58 (2006). Presentations by Peter Neufeld, Esq., a co-director of the Innocence Project, William A. Gardner, Executive Director of the American Registry of Pathology, and Timothy P. McMahon, Ph.D., Supervisor of Validation and Quality Control Armed Forces DNA Identification Laboratory, three of the other speakers at the session on Forensic Laboratories: Current Issues and Standards at the Science for Judges VII conference may be

role. The article by Professor Paul Giannelli of Case Western Reserve University Law School, who has long sought to alert the legal community about the deplorable state of many forensic laboratories,¹² concludes that significant reforms are finally in the offing. After a brief survey of the early history of American crime laboratories, he turns to developments in the 70's and 80's. He then discusses in greater detail DNA evidence's revolutionary impact on forensic science, and comments on the effect the Supreme Court's decision in *Daubert* is beginning to have on rethinking the admissibility of traditional forensic evidence that had never previously been challenged. In addition, Professor Giannelli examines pending initiatives of the American Bar Association that bear on reforms pertaining to crime labs. It appears that we are on the verge of important changes in the handling of scientific evidence in criminal cases.

I hope these highly abbreviated summaries whet your interest in reading the sophisticated, cutting-edge articles that follow. Understanding scientific principles and process is of the utmost importance to judges and lawyers: life and death outcomes and vast amounts of money not infrequently turn on issues relating to scientific proof.

viewed at <http://www.brooklaw.edu/centers/scienceforjudges/events.php> (click on video under the Science for Judges VII listing).

¹² See, e.g., *The Admissibility of Laboratory Reports in Criminal Trials: The Reliability of Scientific Proof*, 49 OHIO ST.L.J. 671 (1988).