

TRIAL WITH & WITHOUT MATHEMATICS



Friday, May 30, 9:30AM–5:45PM

2014 Stanford Symposium on Law & Rationality

Paul Brest Hall West, Munger Graduate Residences

Register: conferences.law.stanford.edu/trialmath

9:30	Welcome & opening
10:00-12:00	Session I
10:00-10:30	<i>A Tribe of Skeptics: Probability and the 19th Century Law of Evidence</i> Sandy L. Zabell Department of Statistics, Northwestern University
10:30-10:45	Commentator: Andrea Roth University of California, Berkeley, School of Law
10:45-11:00	Discussion
11:00-11:30	<i>Legal Probabilism: An Epistemological Dissent</i> Susan Haack Department of Philosophy/School of Law, University of Miami
11:30-11:45	Commentator: Charles H. Brenner University of California, Berkeley, Human Rights Center; DNA-View, Oakland
11:45-12:00	Discussion
12:00-13:00	Lunch
13:00-15:00	Session II
13:00-13:30	<i>How Should Forensic Scientists Explain Their Evidence to Juries: Match Probabilities, Likelihood Ratios, or “Verbal Equivalents”?</i> William C. Thompson Department of Criminology, Law and Society, University of California, Irvine
13:30-13:45	Commentator: Paul Brest Stanford Law School
13:45-14:00	Discussion

14:00-14:30	<i>Models of Legal Proof and Their Cognitive Plausibility</i> Henry Prakken Department of Information and Computing Sciences, Utrecht University; Faculty of Law, University of Groningen
14:30-14:45	Commentator: Sarah B. Lawsky School of Law, University of California, Irvine
14:45-15:00	Discussion
15:00-15:30	Break
15:30-17:30	Session III
15:30-16:00	<i>Computational Representation of Legal Reasoning at the Law-Fact Interface</i> Vern R. Walker Maurice A. Deane School of Law, Hofstra University
16:00-16:15	Commentator: Bart Verheij CodeX Center for Legal Informatics, Stanford University; Institute of Artificial Intelligence, University of Groningen
16:15-16:30	Discussion
16:30-17:00	<i>What Are We Doing? Reconsidering Juridical Proof Rules</i> Ronald J. Allen Northwestern University School of Law
17:00-17:15	Commentator: Marcello Di Bello Department of Philosophy, Stanford University
17:15-17:30	Discussion
17:30-17:45	Closing

A Tribe of Skeptics: Probability and the 19th Century Law of Evidence

[Sandy L. Zabell](#)

Department of Statistics, Northwestern University

After the appearance of Laplace's "Essai philosophique sur les probabilités" in 1814, a number of British jurists discussed the feasibility of using mathematical probability to quantify evidence in a legal setting. Many of the arguments raised foreshadowed some of those forwarded much later in the 20th century. I will review this debate, and then illustrate some of the issues in it by using the contrast between contemporary fingerprint and DNA identification evidence as an example.

Legal Probabilism: An Epistemological Dissent

[Susan Haack](#)

Department of Philosophy/School of Law, University of Miami

The mathematical calculus of probabilities is perfectly fine in its place; but that place is a limited one. In particular, this mathematical calculus sheds little or no light on the crucial concept Russell calls "rational credibility," and I call "warrant." One consequence, as I shall argue here, is that we can't look to probability theory for an understanding of degrees and standards of proof in the law, but must look, instead, to an older and less formal branch of inquiry: epistemology.

*How Should Forensic Scientists Explain Their Evidence to Juries:
Match Probabilities, Likelihood Ratios, or "Verbal Equivalents"?*

[William C. Thompson](#)

Department of Criminology, Law and Society, University of California, Irvine

Forensic scientists have come under increasing pressure to abandon their traditional practice of presenting findings in a categorical manner (e.g., "individualization;" "match;" "exclusion") in favor of a more empirically-based, probabilistic approach. We report a jury simulation experiment using recruits from Amazon's Mechanical Turk (N=551) that examines reactions to three proposed alternative methods for presenting the results of forensic comparisons: random match probabilities (RMP's), likelihood ratios (LRs) and non-quantitative verbal characterizations of likelihood ratios ("Verbal Equivalents"). When evaluating DNA evidence, people's verdicts were sensitive to variations in the strength of evidence regardless of presentation format; but when evaluating shoeprint evidence, verdicts were sensitive to the variation in strength only with the RMP format. The RMP format also led to greater sensitivity to the strength of the forensic evidence on some (but not all) measures of the probability of the defendant's guilt. People gave considerably more weight to a DNA match than a shoe print match regardless of how the strength of the evidence was characterized. People's estimates of the probability of guilt also depended on the way in which we asked them to express those estimates: estimates were more extreme, and more consistent with Bayesian norms, when expressed on a log scale of probabilities than when expressed as odds. Although most participants responded to the forensic evidence in the expected manner when judging the defendant's guilt, the majority responded incorrectly to questions about the meaning of the expert's statistics—endorsing statements consistent with the prosecutor's fallacy or defense attorney's fallacy. We also observed a "weak evidence effect" in which a minority of participants treated the forensic evidence as exculpatory; this was most common when weaker evidence was characterized with "verbal equivalents." By including two types of forensic evidence (DNA and shoe print) and multiple response measures, this experiment helps reconcile the seemingly conflicting findings of earlier research and offers important insights on the important question of how best to explain forensic evidence to lay juries.

Models of Legal Proof and Their Cognitive Plausibility

[Henry Prakken](#)

Department of Information and Computing Sciences, Utrecht University;
Faculty of Law, University of Groningen

In the academic literature three approaches to rational legal proof are investigated, broadly speaking based, respectively on Bayesian statistics, on scenario construction and on argumentation. In this paper these approaches are discussed in light of their cognitive plausibility, that is, can people involved in legal cases apply these styles of thinking in realistic legal settings? One issue that will be discussed is the distinction between 'shallow' and 'deep' models of evidential reasoning and how they relate.

Computational Representation of Legal Reasoning at the Law-Fact Interface

[Vern Walker](#)

Maurice A. Deane School of Law, Hofstra University

If systematic empirical work is to be the foundation for studying the logical structure of legal reasoning, then we must develop standards for adequately representing the operation of certain legal concepts that play fundamental roles for judges and attorneys. One such concept is the law-fact distinction, which is a key means by which presiding judges and appellate courts can organize and oversee the factfinding operations of the factfinder. By way of illustrating this law-fact distinction, legal presumptions provide a useful focal point for studying dynamics at the law-fact interface. This presentation discusses the computational and graphical representation of the legal presumptions found in civil trials, drawing upon judicial decisions concerning compensation for vaccine-related injuries in the United States. One problem for computation is adequately representing not only the semantics of sentences used to express presumptive legal reasoning, but also the pragmatics of presumptive statements in a litigation context. The presentation will discuss methodological problems as well as possibilities in devising representations that are both human-readable and machine-readable, including the limits of logic in analyzing the reasoning expressed in natural language legal decisions.

What Are We Doing? Reconsidering Juridical Proof Rules

[Ronald J. Allen](#)

Northwestern University School of Law

Beginning with Kaplan's seminal article (and perhaps earlier with Wigmore, *The Nature of Juridical Proof*) applying simple decision theoretic approaches to the law, scholars in various disciplines have examined the juridical proof rules from varying perspectives. Perhaps because the explicit burden of persuasion rules seem to encapsulate the essence of the juridical process by providing a decision rule, most of these efforts have focused on them. It might thus appear that the burden of proof rules have been subjected to a multidisciplinary onslaught focusing on the common objective of explaining them and in the process accommodating certain anomalies, in particular the conjunction paradox, and thus of explaining juridical proof. I have three points to make about this picture:

1. The picture of juridical proof rules laid out above is highly misleading.
2. From the perspective of the legal analyst, the examination of the proof rules as presently done in the literature is becoming less interesting over time, largely because the answers to the pertinent questions (for the legal analyst) are now quite clear.

3. From the legal analyst's perspective, analysis of the proof rules should be embedded in the objectives of a sensible legal system that will tend to focus on overall social welfare rather than discrete aspects of errors, and that has at best ambiguous implications for the proof rules.

I then present a conceptualization of the legal system as a complex adaptive system that learns bottom up rather than top down the characteristics of which may be identifiable and subject to verification or falsification.

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