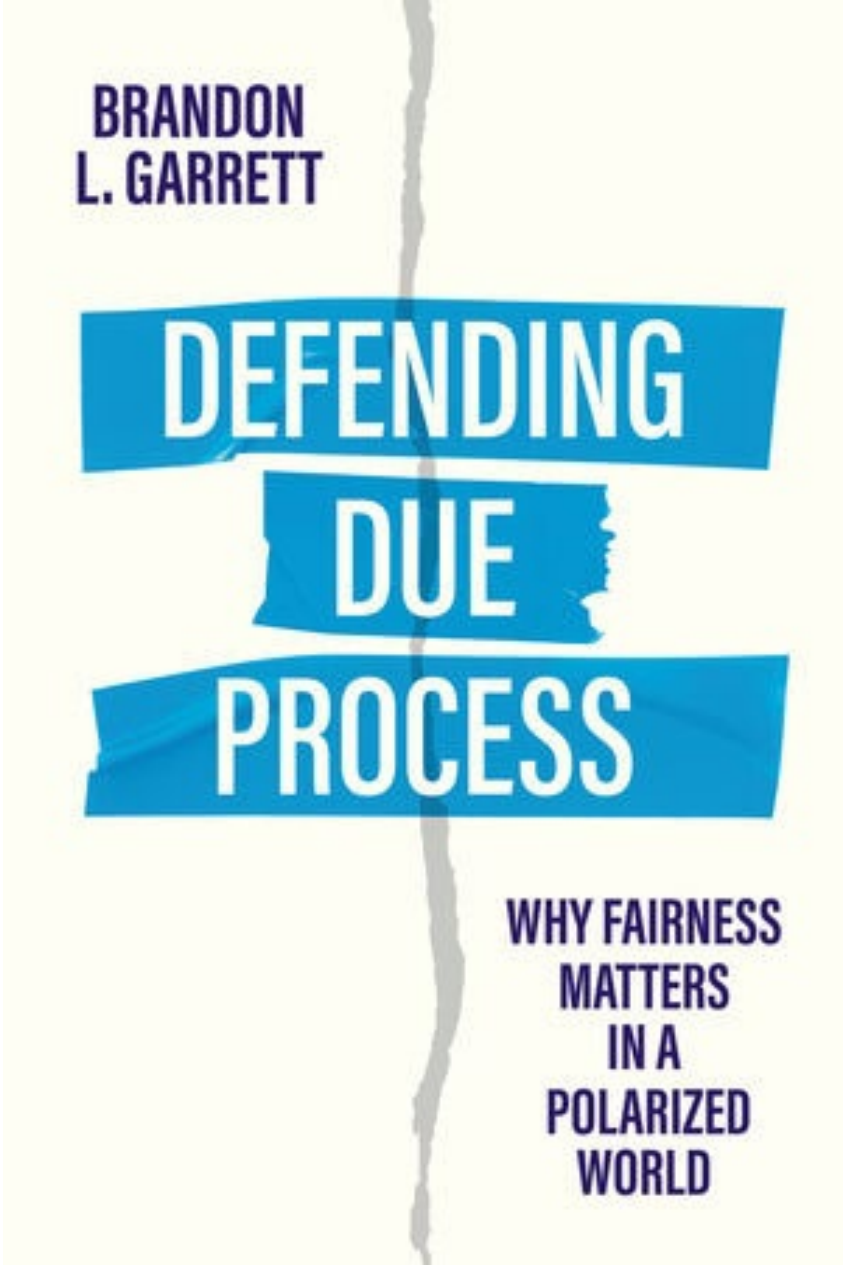




# AI, Due Process, and Scientific Evidence

Prof. Brandon L. Garrett, Duke University School of Law

2025



# Autopsy of a Crime Lab

Exposing the  
Flaws  
in Forensics



Brandon L. Garrett



## Was there Due Process?

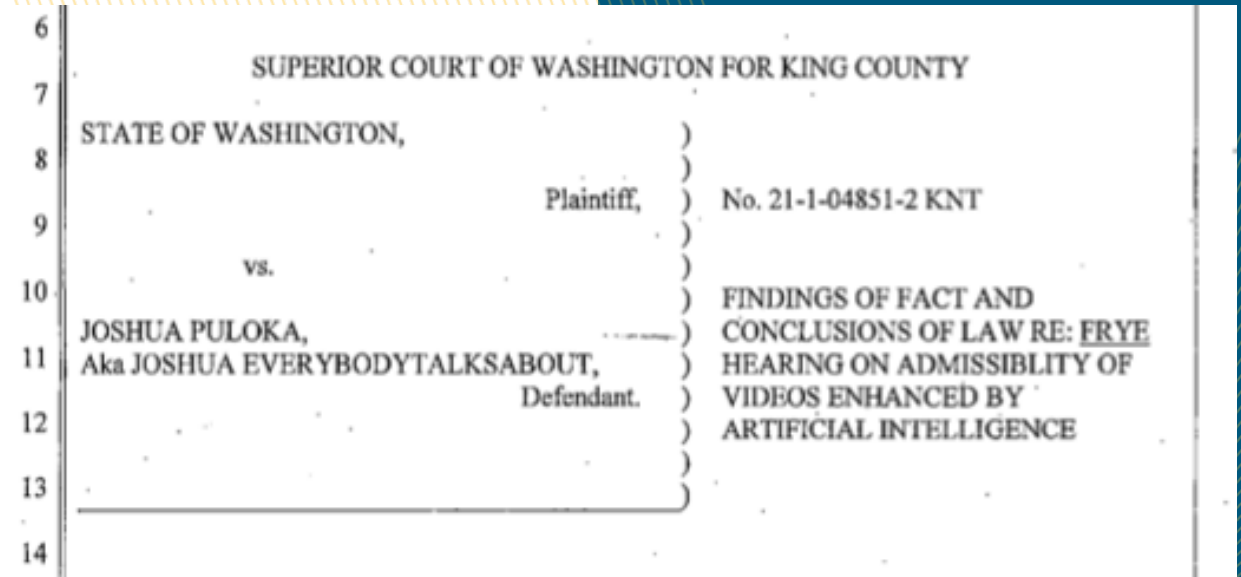
There can be no doubt that, at a minimum, the Due Process Clause requires notice and the opportunity to be heard incident to the deprivation of life, liberty or property at the hands of the government.

*Mullane v. Central Hanover Bank & Trust Co.*, 339 U.S. 306, 313 (1950).



“This Court finds that admission of this AI-enhanced evidence would lead to a confusion of the issues and a muddling of eyewitness testimony, and could lead to a time-consuming trial within a trial about the non-peer-reviewable-process used by the AI model”

## *Washington v. Puloka* March 29, 2024



# Key Terms



## Interpretable algorithmic forensics

Brandon L. Garrett<sup>a,b,1</sup> and Cynthia Rudin<sup>c,d,e,f,g</sup>

Edited by Thomas Albright, Salk Institute for Biological Studies, La Jolla, CA; received March 1, 2023; accepted May 22, 2023

One of the most troubling trends in criminal investigations is the growing use of “black box” technology, in which law enforcement rely on artificial intelligence (AI) models or algorithms that are either too complex for people to understand or they simply conceal how it functions. In criminal cases, black box systems have proliferated in forensic

In one telling example, a federal judge took the unusual step of ordering that the Office of the Chief Medical Examiner in New York City disclose the source code for its probabilistic genotyping software, used to analyze mixtures of DNA (7). As a result, a series of concerns regarding accuracy came to light, and the software was eventually discontinued (7).

**Artificial Intelligence.** Machines that perform tasks typically performed by humans and that normally require human intelligence.

**Interpretable.** Predictive models whose calculations are inherently capable of being understood by people. It provides information regarding the model, the factors used to provide a result, and how those factors were in fact combined to provide a result.

**Explainable.** Efforts to provide post hoc explanations for models.

**Transparent.** Providing training data and code to permit testing.



# Solving AI's Black Box Problem

Prof. Cynthia Rudin, Duke U.

*Interpretable Machine Learning  
Lab*

(The world's top lab in  
interpretable AI)

<https://users.cs.duke.edu/~cynthia/lab.html>



# Complex AI Can be Reduced to Simple and Interpretable Models

This model was just as predictable as the COMPAS algorithm, which is proprietary and relies on up to 137 inputs. It consisted in this simple statement:

**If the person has either >3 prior crimes, or is 18 to 20 y old and male, or is 21 to 23 y old and has two or three prior crimes, they are predicted to be rear-rested within 2 y from their evaluation, and otherwise not.**

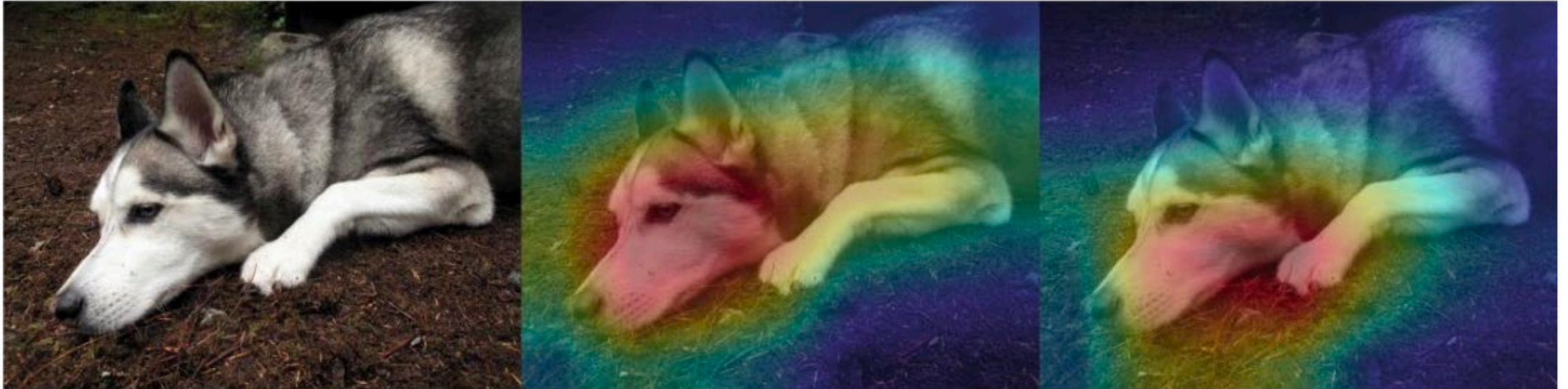
E. Angelino, N. Larus-Stone, D. Alabi, M. Seltzer, C. Rudin, Learning certifiably optimal rule lists for categorical data. *J. Mach. Learn. Res.* 18, 1–78 (2018).

Northpointe Suite  
Risk Needs Assessment

Industry leading Risk Needs Assessments,  
Your Tools, Your Way.



# A Husky or a ... Flute?



- Left: A photo of a Husky.
- Middle: Same photo with a heat map used by an AI system identifying it as a Husky.
- Right: A heat map by an AI system identifying the photo as a flute.
- Illustration from Cynthia Rudin, “Stop explaining black box machine learning models for high stakes decisions and use interpretable models instead.” May 2019. *Nature Machine Intelligence*, Vol. I, 206 at 209. Photo credit Chaofen Chen, Duke University.

# Errors in Administrative Data

- Typographical errors are extremely common.
- In the criminal justice setting: “Errors are evidently pervasive, systematic, frequently related to behaviors and policies of interest, and unlikely to conform to convenient textbook assumptions.” J. Pepper, C. Petrie, S. Sullivan, *Measurement Error in Criminal Justice Data in Handbook of Quantitative Criminology*, A. R. Piquero, D. Weisburd, Eds. (Springer, NY, 2010).
- “Our analysis also suggests that COMPAS scores may often be miscomputed. These kinds of errors can lead to years of extra prison time, or the other extreme, dangerous individuals being released into society.” C. Rudin C. Wang, B. Coker, *The Age of Secrecy and Unfairness in Recidivism Prediction*, HDSR, March 31, 2020.



# Using AI to Study Criminal Justice

## Evaluating Pre-trial Programs Using Interpretable Machine Learning Matching Algorithms for Causal Inference

**Travis Seale-Carlisle**

University of Aberdeen

**Saksham Jain**

University of Washington

**Courtney Lee**

Duke University

**Caroline Levenson**

Duke University

**Swathi Ramprasad**

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**Sudeepa Roy**

Duke University

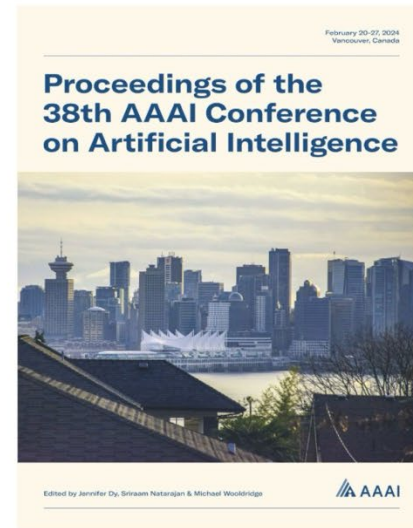
**Cynthia Rudin**

Duke University

**Alexander Volfovsky**

Duke University

DOI: <https://doi.org/10.1609/aaai.v38i20.30239>



PDF

Video/Poster

Published

2024-03-24

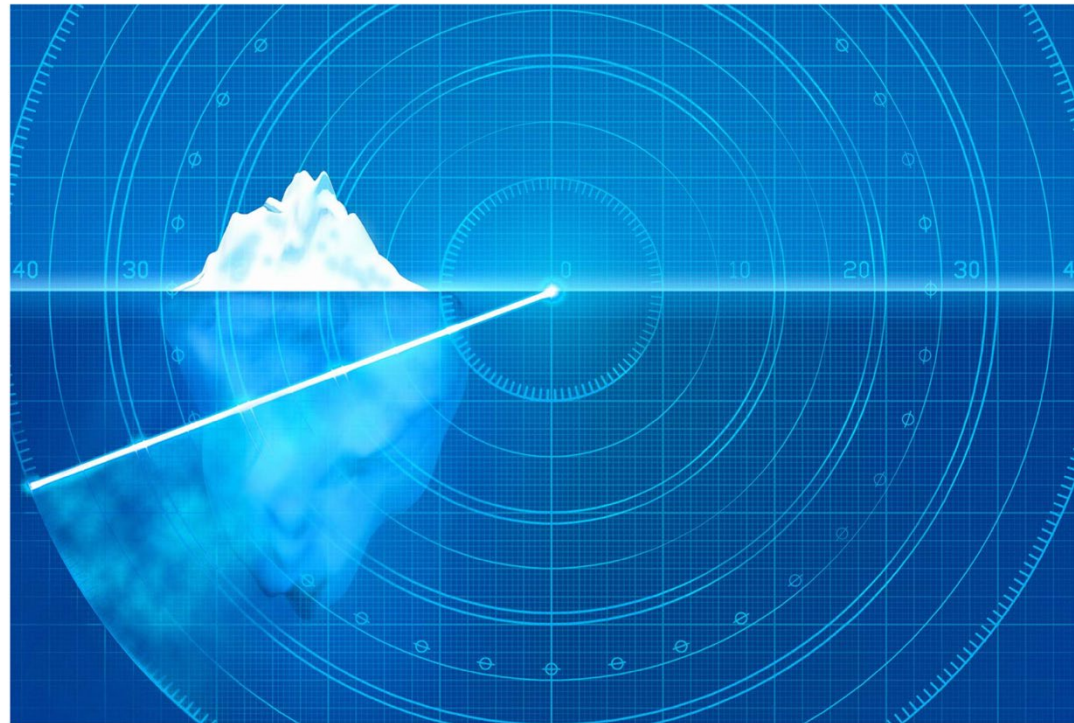


# How do legal decisionmakers use quantitative tools and information?

## Assessing Risk: The Use of Risk Assessment in Sentencing

by Brandon Garrett and John Monahan

Summer 2019 | Volume 103 Number 2



<https://judicature.duke.edu/articles/assessing-risk-the-use-of-risk-assessment-in-sentencing/>



# Studying Shotspotter Pilot in Durham, NC



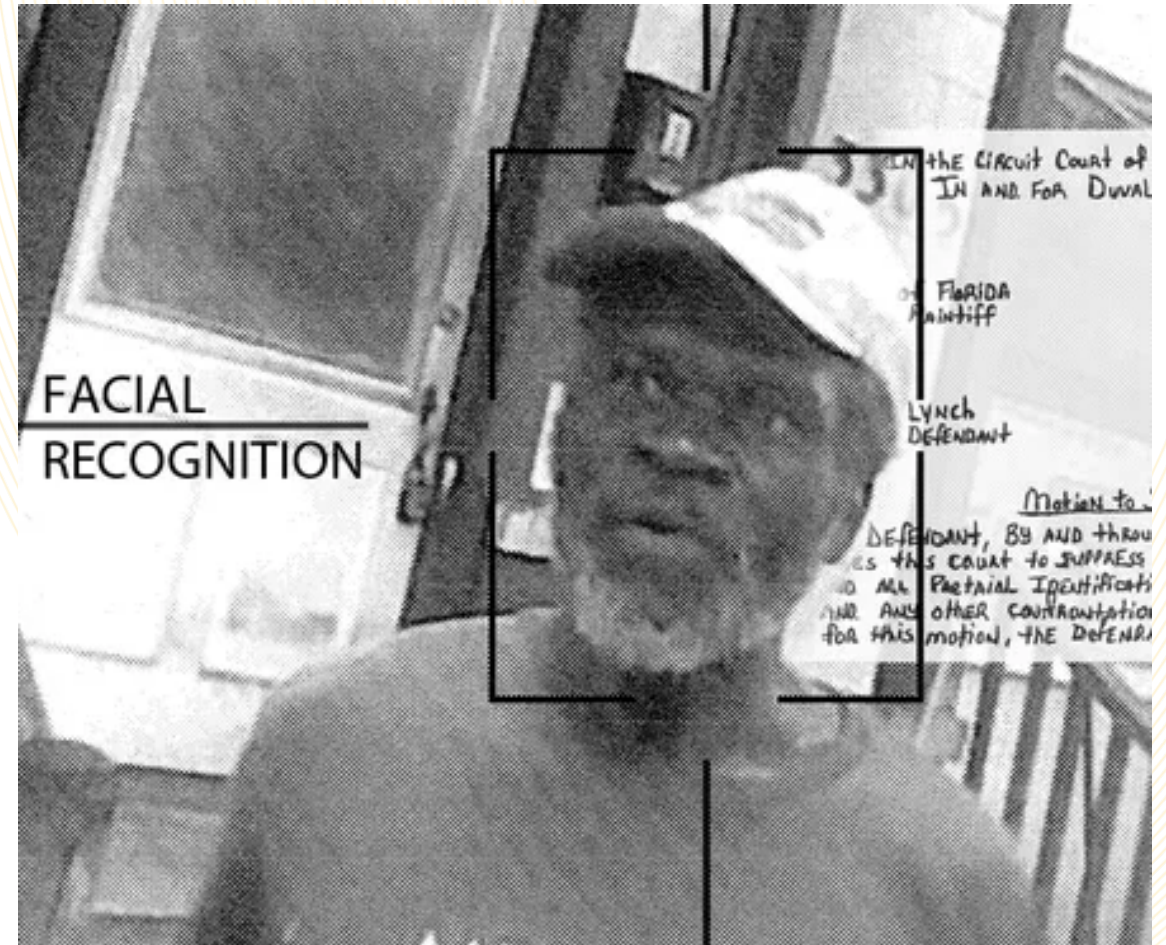
The ShotSpotter pilot was deployed from December 15, 2022 – December 14, 2023 in a three-square-mile area of Durham with historically comparatively high rates of gun violence.

The report, [\*Evaluation of Durham's ShotSpotter Installation: Results of a 12-month Pilot Project\*](#), examines the performance of ShotSpotter in the pilot area and is authored by Philip Cook, Professor Emeritus of Public Policy and Economics, Duke University, and Adam Soliman, Assistant Professor of Economics, Clemson University.



# Discovery and Black Box AI

- The Advisory Committee to the Federal Rules of Criminal Procedure notes Rule 16 intended to require disclosure of scientific results and tests: “the requirement that the government disclose documents and tangible objects ‘material to the preparation of his defense’ underscores the importance of disclosure of evidence favorable to the defendant.”
- *Brady v. Maryland* obliges prosecutors to disclose to the defense favorable evidence, even in the absence of a request, including evidence in the possession of other government actors.
- *Lynch v. State* (2019) – denied discovery and affirmed on appeal.
- *But: Arteaga v. New Jersey* (2023) – granting discovery re. facial recognition technology



# Rule 702, Daubert, and AI

## Federal Rule 702 Amendment, eff. Dec. 1, 2023

- Rule 702. Testimony by Expert Witnesses
- A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if the proponent demonstrates to the court that it is more likely than not that:
  - (a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;
  - (b) the testimony is based on sufficient facts or data;
  - (c) the testimony is the product of reliable principles and methods; and
  - (d) ~~the expert has reliably applied~~ expert's opinion reflects a reliable application of the principles and methods to the facts of the case.



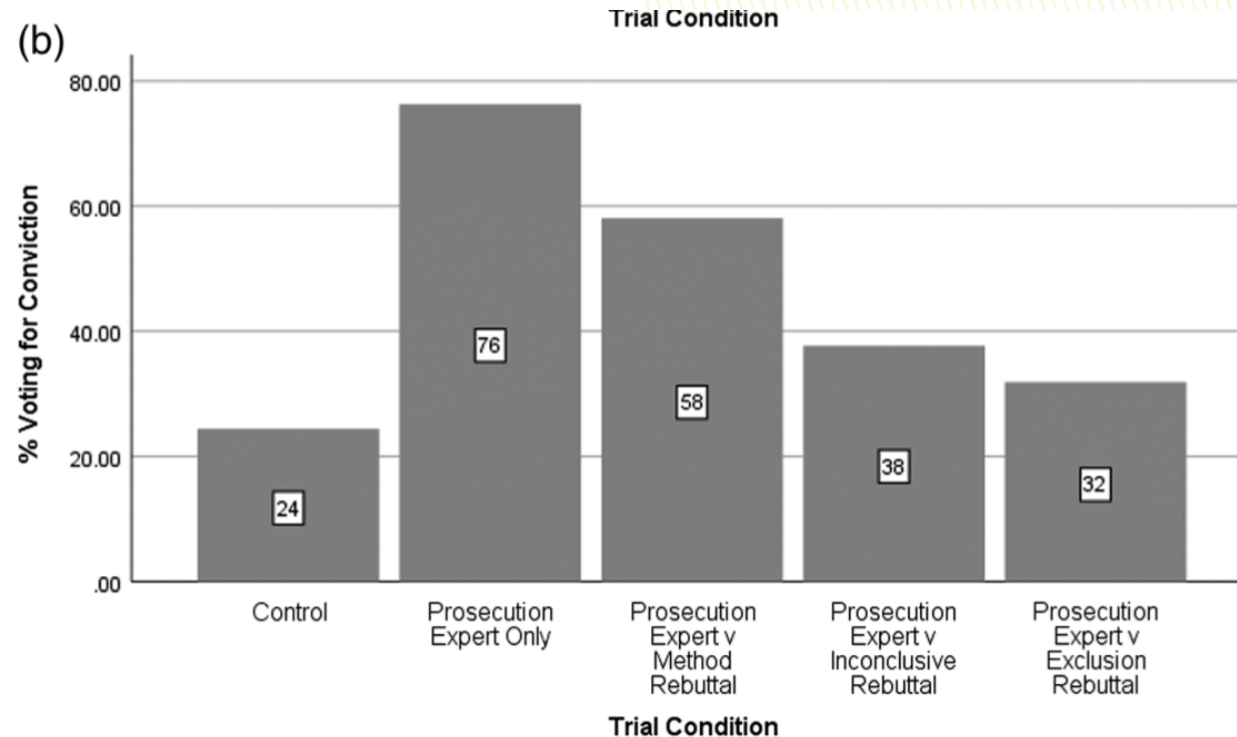
# Committee Notes on Rules—2023 Amendment

- The amendment is especially pertinent to the testimony of forensic experts in both criminal and civil cases. Forensic experts should avoid assertions of absolute or one hundred percent certainty—or to a reasonable degree of scientific certainty—if the methodology is subjective and thus potentially subject to error. In deciding whether to admit forensic expert testimony, the judge should (where possible) receive an estimate of the known or potential rate of error of the methodology employed, based (where appropriate) on studies that reflect how often the method produces accurate results. Expert opinion testimony regarding the weight of feature comparison evidence (i.e., evidence that a set of features corresponds between two examined items) must be limited to those inferences that can reasonably be drawn from a reliable application of the principles and methods. This amendment does not, however, bar testimony that comports with substantive law requiring opinions to a particular degree of certainty.



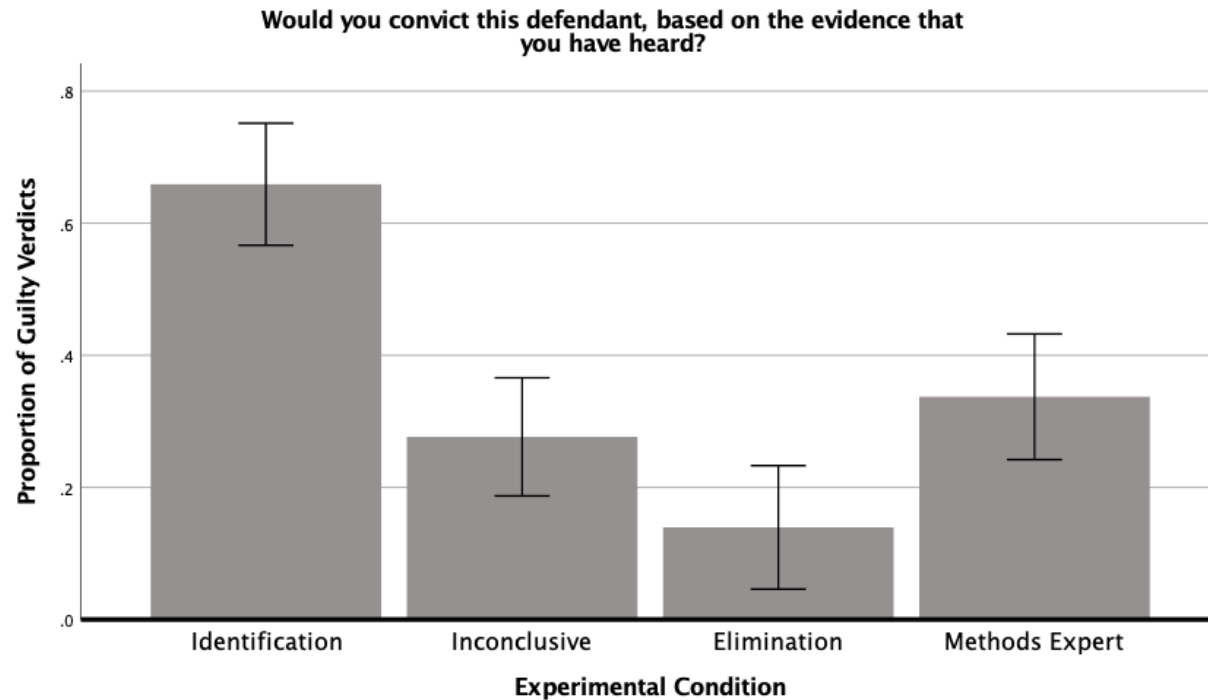
# Defense Experts

- Greg Mitchell and Brandon L. Garrett, *Battling to a Draw: Defense Expert Rebuttal Can Neutralize Prosecution Fingerprint Evidence*, APPLIED COGNITIVE PSYCHOLOGY 2 (2021)



# New Work: Dueling Firearms Experts

Figure 2. Guilty Verdicts as a Function of Experimental Condition.



# Mock Jury Studies and Surveys

- Gregory Mitchell and Brandon L. Garrett, *Battling to a Draw: Defense Expert Rebuttal Can Neutralize Prosecution Fingerprint Evidence*, APPLIED COGNITIVE PSYCHOLOGY 2 (2021)
- Brandon L. Garrett, Brett Gardner, Evan Murphy, and Patrick M. Grimes, *Judges and Forensic Science Education: A National Survey*, FORENSIC SCIENCE INTERNATIONAL (2021)
- Will Crozier, Jeff Kukucka, and Brandon L. Garrett, *Juror Appraisals of Forensic Evidence: Effects of Blind Proficiency and Cross-Examination*, 315 FORENSIC SCIENCE INTERNATIONAL (2020)
- Will Crozier, Rebecca Grady, and Brandon L. Garrett, *Likelihood Ratios, Error Rates, and Jury Evaluation of Forensic Evidence*, JOURNAL OF FORENSIC SCIENCES (2020)
- Gregory Mitchell and Brandon L. Garrett, *The Impact of Proficiency Testing Information and Error Aversions on the Weight Given to Fingerprint Evidence*, 37 BEHAVIORAL SCIENCES AND LAW 1 (2019)
- Brandon L. Garrett, Gregory Mitchell and Nicholas Scurich, *Comparing Categorical and Probabilistic Fingerprint Evidence*, JOURNAL OF FORENSIC SCIENCES (2018)
- Brandon L. Garrett and Gregory Mitchell, *Forensics and Fallibility: Comparing the Views of Lawyers and Jurors*, 119 WEST VIRGINIA LAW REVIEW 621 (2016)
- Brandon L. Garrett and Gregory Mitchell, *How Jurors Evaluate Fingerprint Evidence: The Relative Importance of Match Language, Method Information and Error Acknowledgement*, 10 JOURNAL OF EMPIRICAL LEGAL STUDIES 484 (2013)



# Confrontation Rights and AI

- The Supreme Court's Sixth Amendment Confrontation Clause rulings have emphasized the defense right to confront adverse witnesses regarding testimonial evidence, including forensic witnesses in court

For a longer discussion:

Brandon L. Garrett & Cynthia Rudin, *The Right to a Glass Box: Rethinking the Use of Artificial Intelligence in Criminal Justice*, Cornell L. Rev. (forthcoming 2024),  
[https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=4275661](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4275661)



# Settling with AI

- “I’m like, do I want to roll the dice knowing that I have children out there? As a father, I see my children hurting. I’m hurting, but I could hurt, right? I could deal with that. But when I see my hurting is affecting my children, I got to be a father. I got to go home to my kid,”
- “People be like, ‘Yo, you had a good thing with your case. Why didn’t you fight all the way?’” Arteaga said. “My question for them was, ‘What would you do if you was me?’”





Thank you!  
Questions?



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