

FORENSIC EVIDENCE: THOUGHTS OF AN ACCIDENTAL TOURIST

PROFESSOR JULES EPSTEIN

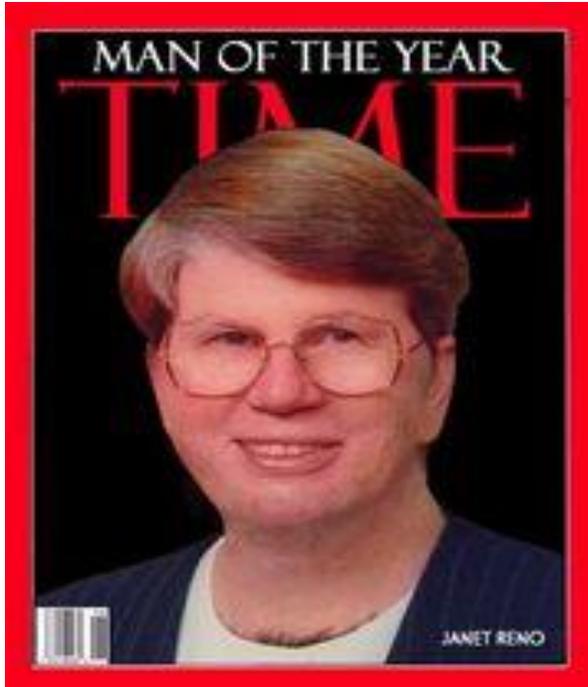
NIST, NOVEMBER 2016

DISCLAIMER



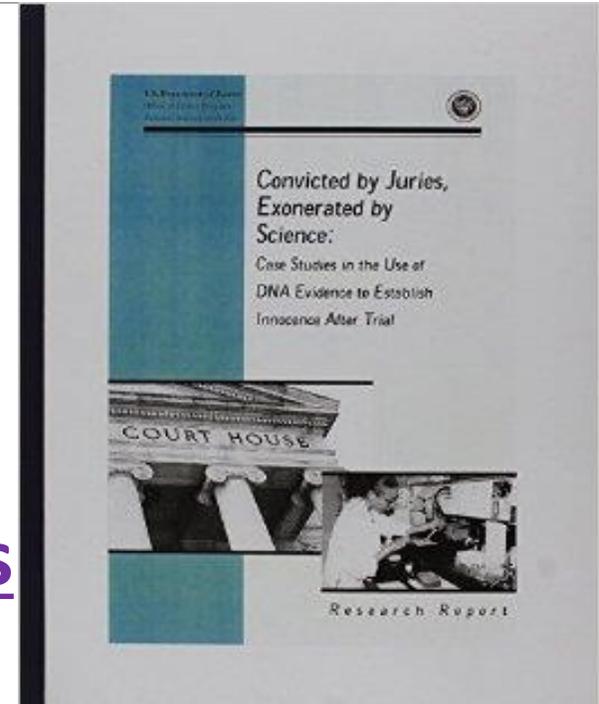
The image shows the top portion of a website for the National Commission on Forensic Science. At the top left is the Department of Justice seal. To its right, the text reads "THE UNITED STATES DEPARTMENT OF JUSTICE". Further right, there is a link for "en ESPAÑOL" and social media icons for Twitter, Facebook, YouTube, RSS, and Email. A search bar labeled "Search this site" is positioned to the right of the social media icons. Below these elements is a dark navigation bar with white text links: HOME, ABOUT, AGENCIES, BUSINESS, RESOURCES, NEWS, CAREERS, and CONTACT. The main content area has a light beige background. On the left side, there is a vertical menu with the following items: Home, National Commission on Forensic Science Home, Members, Meetings (with a right-pointing triangle), Work Products, Subcommittees, Press Room, and Contact the Commission. To the right of this menu is a dark horizontal banner with the text "NATIONAL COMMISSION ON FORENSIC SCIENCE" in white. Below the banner is a large graphic featuring the Department of Justice seal on the left and the NIST logo on the right. The NIST logo consists of the letters "NIST" in a large, bold, white font, with "National Institute of Standards and Technology" and "U.S. Department of Commerce" in smaller white text below it.

“20 YEARS AGO TODAY...”



We hope that these commentaries and the NIJ report spur a broader debate about the value of DNA technology and the role of science in the criminal justice system's search for truth.

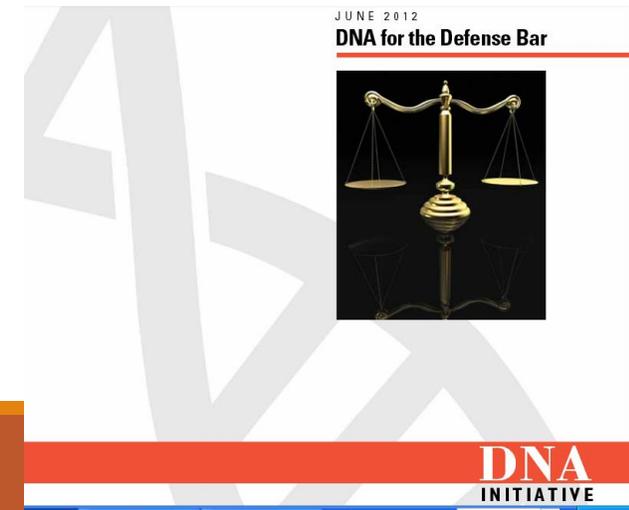
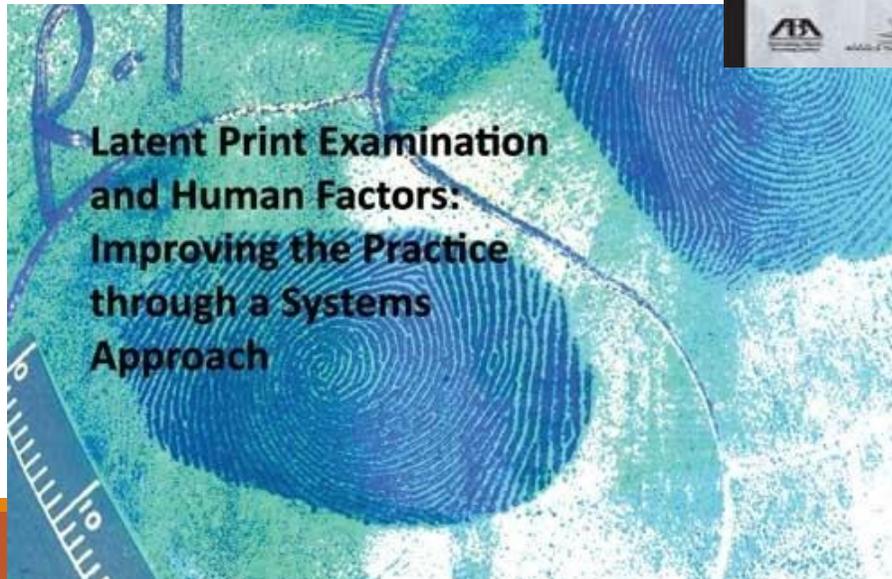
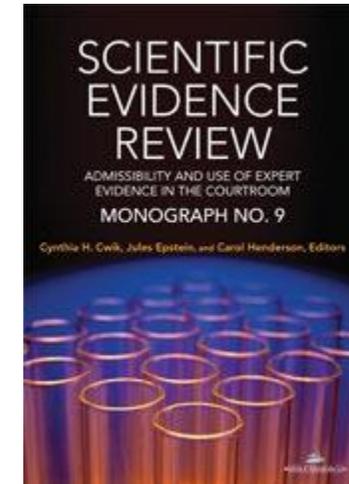
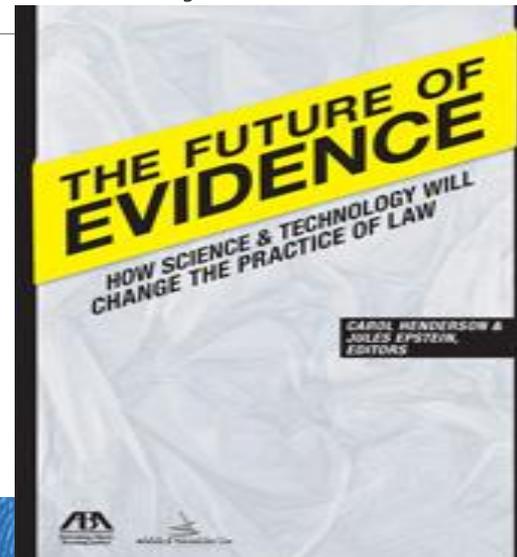
Janet Reno



What Am I Doing Here?



A Personal History in Forensics

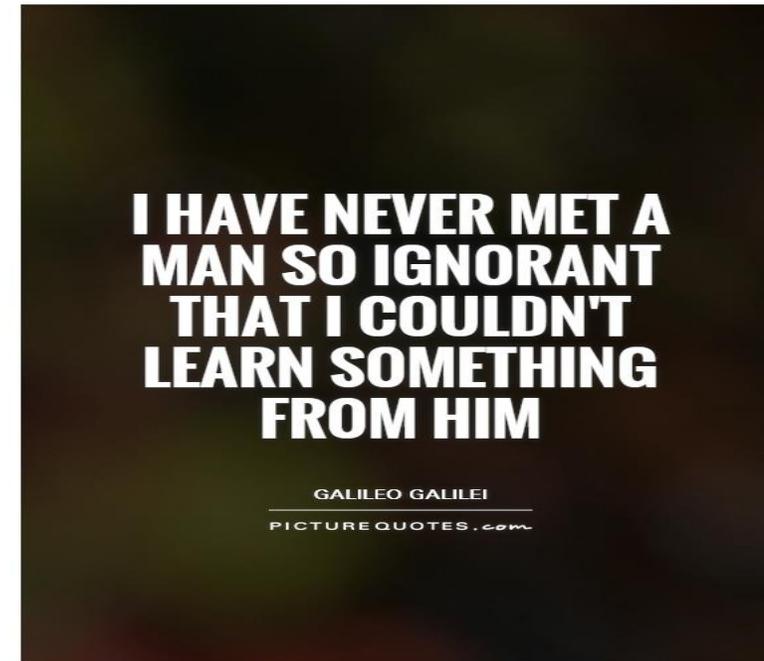


WHAT CAN I OFFER TO SCIENTISTS?

IF I AM CORRECT



IF I AM MISTAKEN



First, Accolades



Forensics – Some Data: Cleveland Homicides 2008-2011

214 CASES WITH PROBATIVE FORENSICS

Disposition:

- **214 cases**
- **199 arrests**
- **187 convictions/pleas**

Sentence Length:

- **13.6 years average**

71 CASES WITH NO PROBATIVE FORENSICS

Disposition:

- **71 cases**
- **49 arrests**
- **39 convictions/pleas**

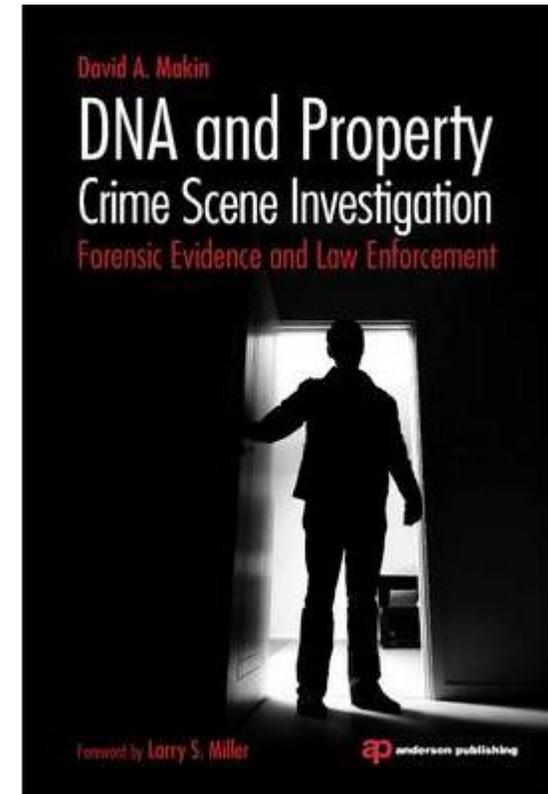
Sentence Length:

- **9.4 years average**

Forensics and 'Ordinary' Crime

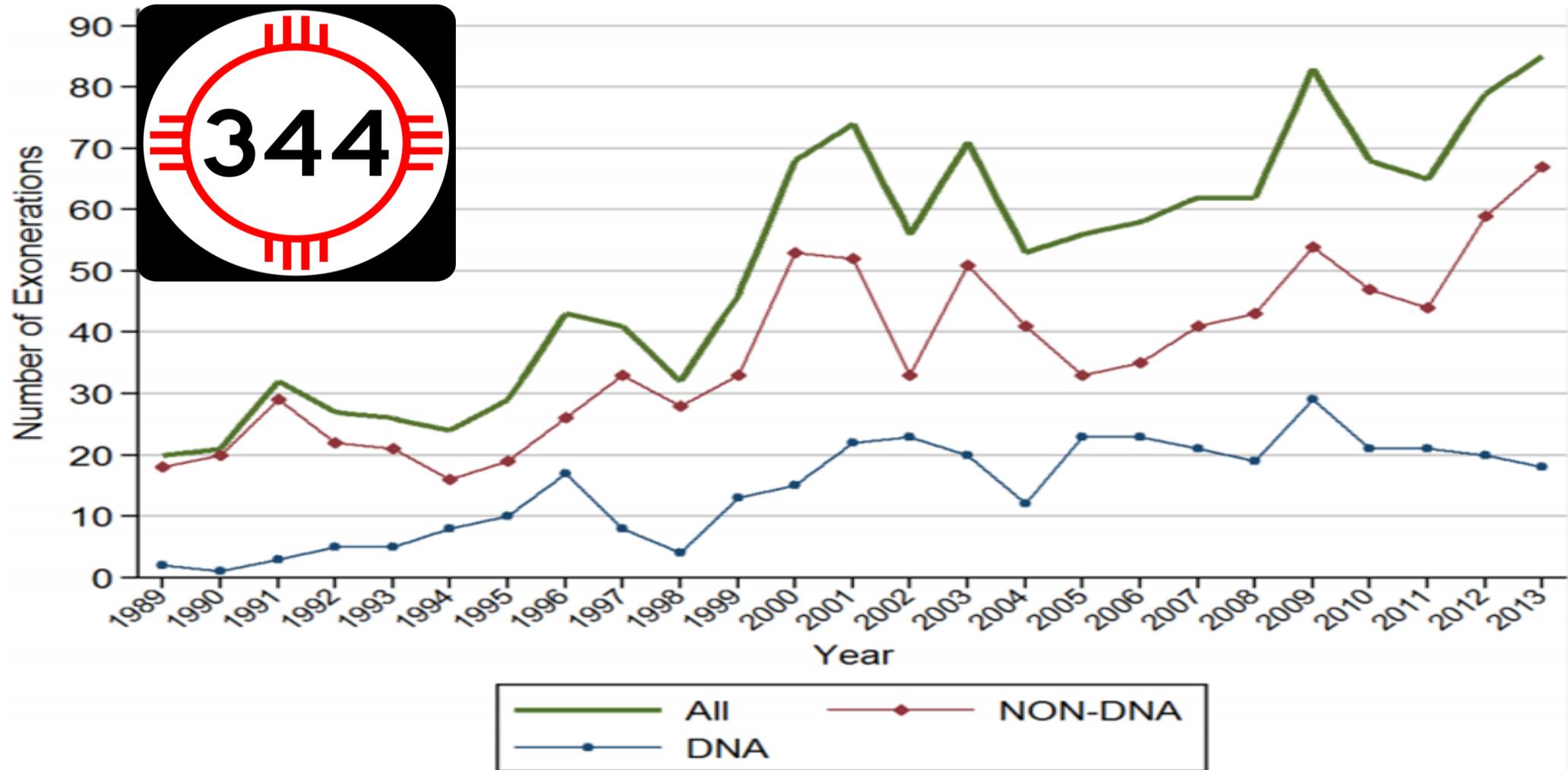
when DNA evidence was collected at property crime scenes:

- Suspect identifications and arrests doubled.
- Cases accepted for prosecutions doubled.
- DNA was twice as effective in identifying suspects as fingerprints.



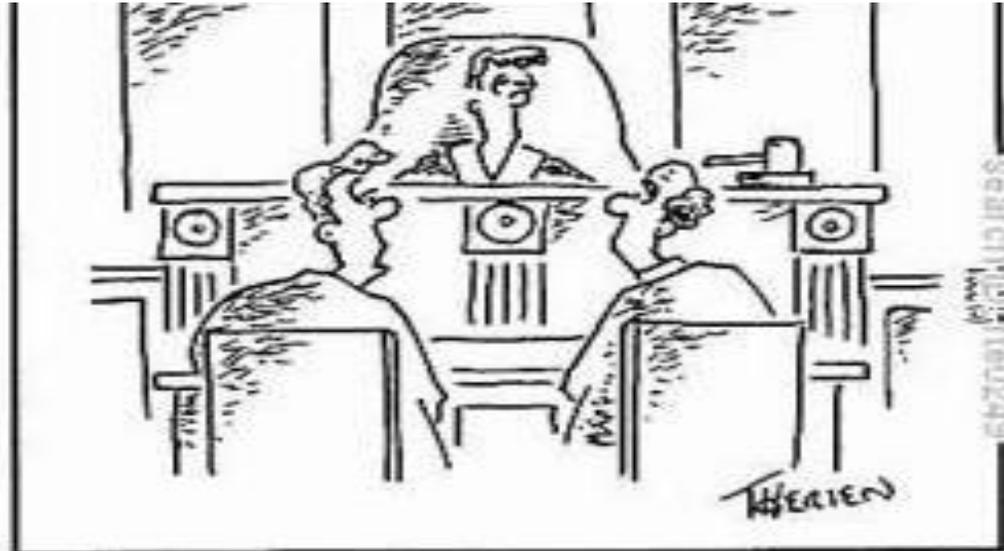
Forensics and “Error Correction”

Figure 2: Number of Exonerations by Basis, Over Time



A "NEEDS ASSESSMENT"

POLICING THE LAWYERS



"Not to worry, I've handled hundreds of cases like this and the way I see it, I'm bound to win one sooner or later."

POLICING THE DISCIPLINES

FORENSIC SCIENCE
ERROR MANAGEMENT

INTERNATIONAL
FORENSICS SYMPOSIUM

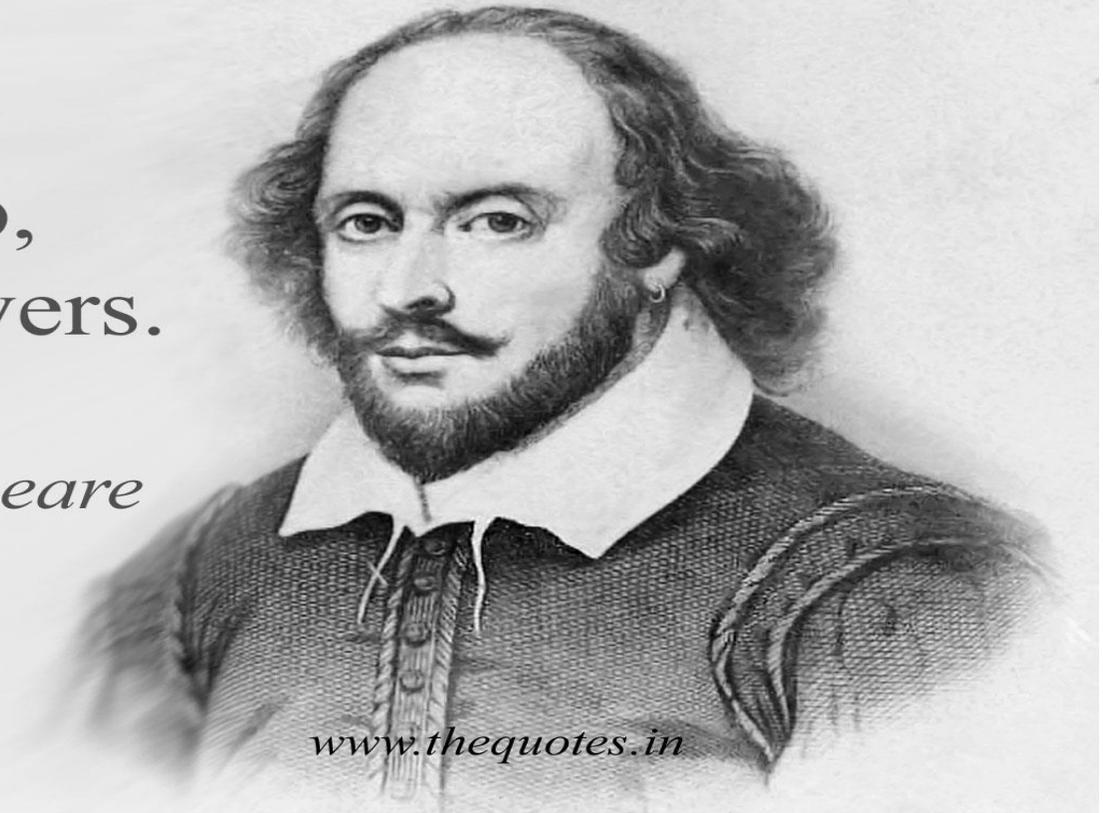
JULY 20-24, 2015 • WASHINGTON, DC



Let's Start With Lawyers

First thing we do,
let's kill all the lawyers.

William Shakespeare



www.thequotes.in

The Dimension of the Problem



Forensics and the Courts



JUDGES ARE NOT SCIENTISTS (2001)

Judges had the most difficulty operationalizing falsifiability and error rate,

with only 5% of the respondents demonstrating a clear understanding of falsifiability and

only 4% demonstrating a clear understanding of error rate.



Forensics and The Courts (2009)

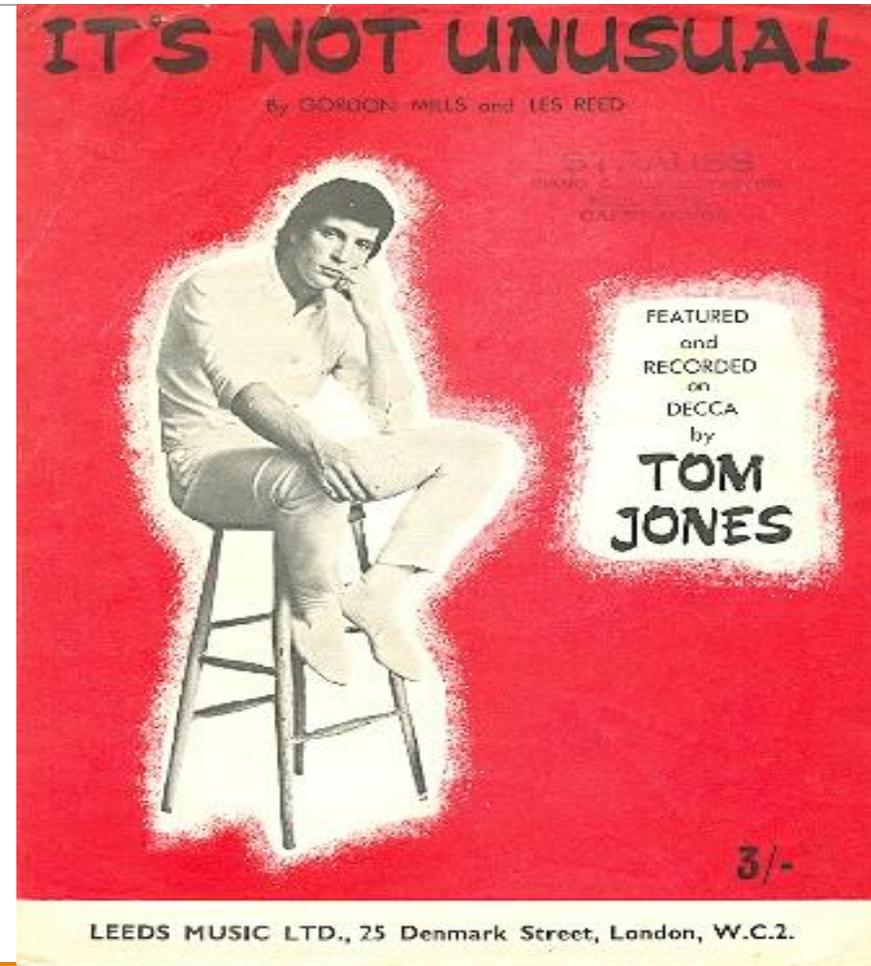
Courts continue to rely on forensic evidence without fully understanding and addressing the limitations

Forensics and the Courts (2009)

In a number of...disciplines, forensic science professionals have yet to establish either the validity of their approach or the accuracy of their conclusions, and the courts have been utterly ineffective in addressing this problem.

It's Not Unusual

Since 2009,
fewer than 140
cases even
mention the NAS
Report



Attorneys and Forensics

Misreading lab reports

The trial closing:

“Since his DNA was the major contributor, he wore it more recently.”

WRONG

Mistaken DNA interpretation sends death-row case to retrial



Kareem Johnson was sentenced to death in 2007.



By Claudia Vargas, Inquirer Staff Writer

POSTED: August 25, 2015

When Kareem Johnson killed Walter Smith outside a North Philadelphia nightclub, prosecutors said, he shot him at such close range that Smith's blood splashed onto Johnson's red Air Jordan baseball cap.

Attorneys and Forensics 2 – An Exemplar

In his opinion, the marks at the wig shop were made by the pry bar in question. Bergeron did not use phrasing overemphasizing his certainty.



ATTORNEYS and WAIVER

I believe there are serious questions about whether [TOOLMARK MATCHING] evidence has an adequate scientific foundation to allow its admission under MRE 702.



ATTORNEYS and WAIVER - AWOL

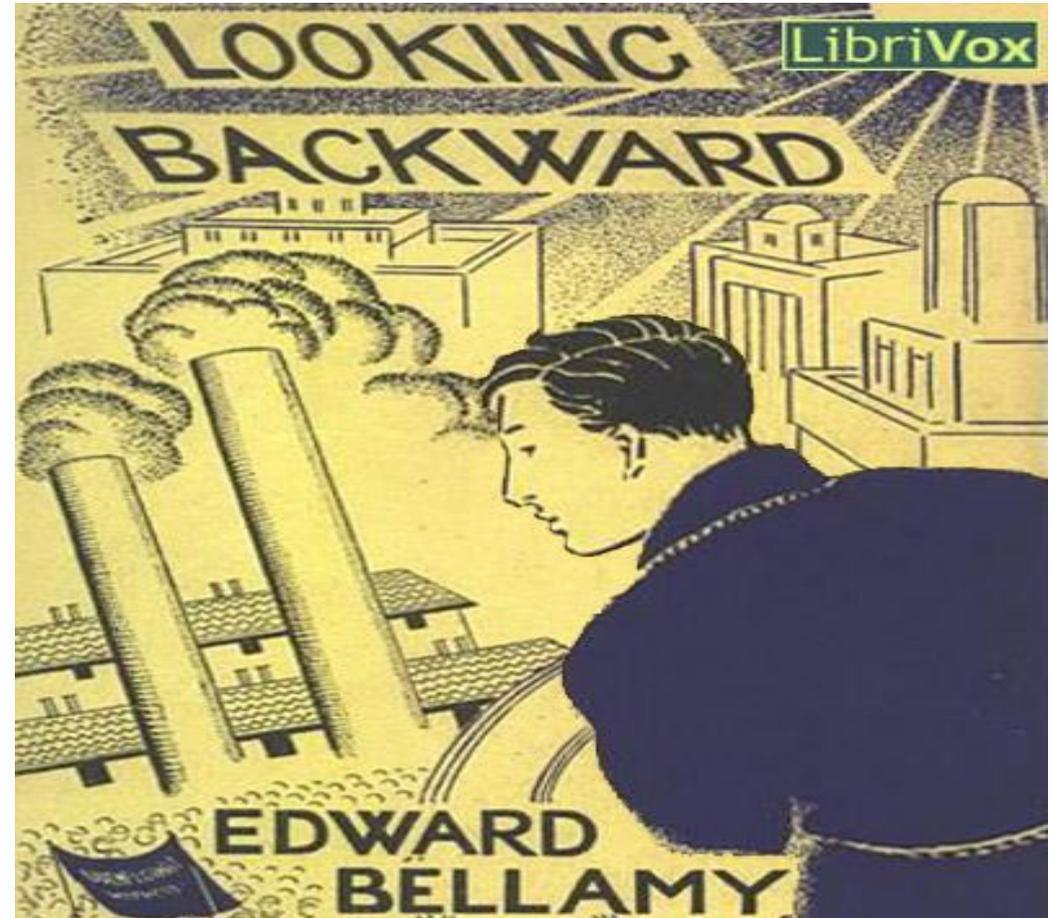
I concur in this Court's order denying leave to appeal, however, because this issue is unpreserved

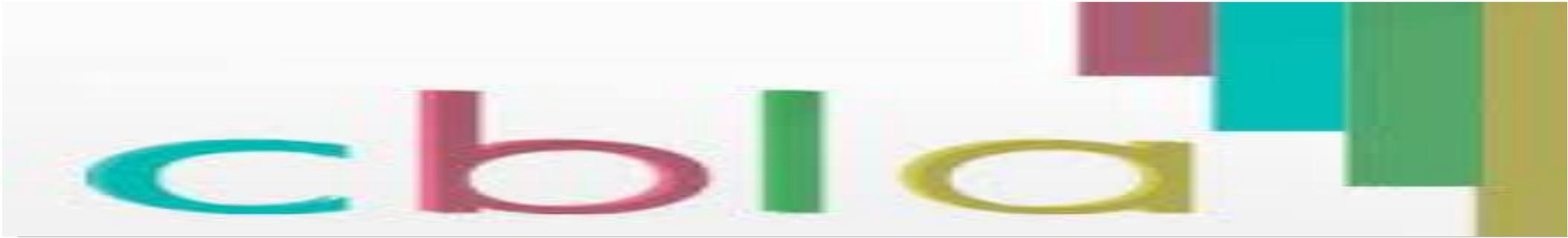
People v. McAdoo, (Mich. Mar. 6, 2015)



Science and Law in the Rear View Mirror

What happens when science admits its limits years after a conviction?

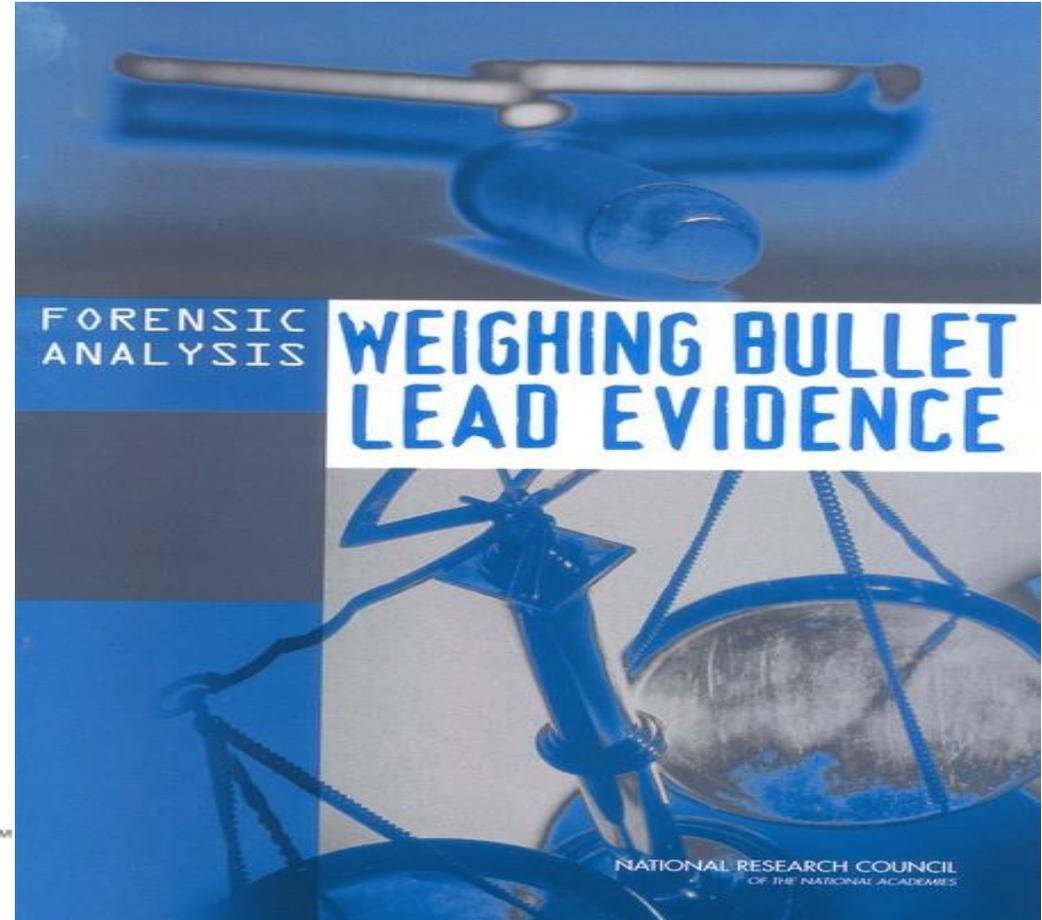




Trial in 1995:

Peele testified that the composition of elements in the molten lead of a bullet fragment found in Kulbicki's truck matched the composition of lead in a bullet fragment removed from the victim's brain;

that's
GOOD
science!™



The Conclusions

a similarity of the sort one would “expect” if “examining two pieces of the same bullet.’

a bullet taken from Kulbicki’s gun was not an “exac[t]” match to the bullet fragments, but

was similar enough that the **two bullets likely came from the same package.**



The Legal Problem

11 years after his conviction, CBLA had fallen out of favor.

Translated: The NRC expressed concerns, however, relating to the interpretation of the results of bullet lead examinations.



Back to 1995 – The Clue

a report coauthored by [**this expert**] in 1991

- the composition of lead in some bullets was
- the same as
- lead in other bullets packaged many months later in a separate box

The Lawyer's Duty: 2 Views

the failure to properly investigate forensic methodology and adequately cross-examine a forensic expert may be a basis for deficient performance.

Kulbicki v. State, 440 Md. 33, 47, 99 A.3d 730, 738 (2014)

Counsel did not perform deficiently by dedicating their time and focus to elements of the defense that did not involve poking methodological holes in a then-uncontroversial mode of ballistics analysis.

Maryland v. Kulbicki, 2015 U.S. LEXIS 4693, *5 (U.S. Oct. 5, 2015)



The Unmentioned Issues

Was there a *curriculum vitae*?

No mention of a duty of a lawyer to read up on the discipline (at least as long as it's currently accepted)

Here's what Maryland wrote:

"[f]ailure to investigate the forensic evidence is not what a competent lawyer would do."

ARE *FRYE* AND *DAUBERT* FIXES?



Do *Frye* and *Daubert* Hearings Make for More Accurate Science?

United States v. Llera-Plaza I: expert witnesses will not be permitted to present...testimony...that a particular latent print is in fact the print of a particular person.

United States v. Llera-Plaza II: Let it in.

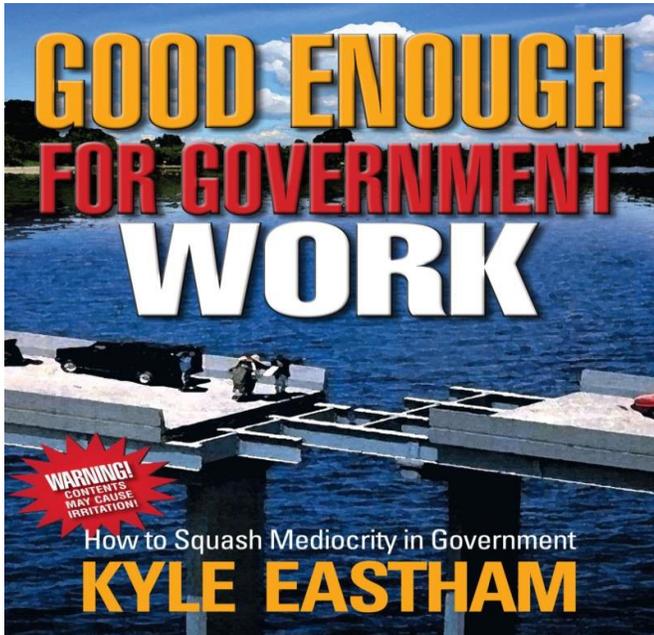
I am now persuaded that the standards which control the opening of a competent fingerprint examiner satisfy *Daubert*.



Why Are *Daubert* and *Frye* Inadequate?

Daubert's “evidentiary” reliability test does not mean necessarily mean “accurate”

Frye's “general acceptance” test varies with the community



Why Are *Daubert* and *Frye* Inadequate?

Daubert is applied far more stringently in civil cases than in criminal ones, and

even in criminal ones, Daubert serves a more effective screening role for filtering out flawed defense expert testimony than weak prosecution and police-generated forensic science.



Level Playing Field Institute
The Tilted Playing Field:
Hidden Bias in Information

Why Are Daubert and Frye Inadequate?

The cost of litigation

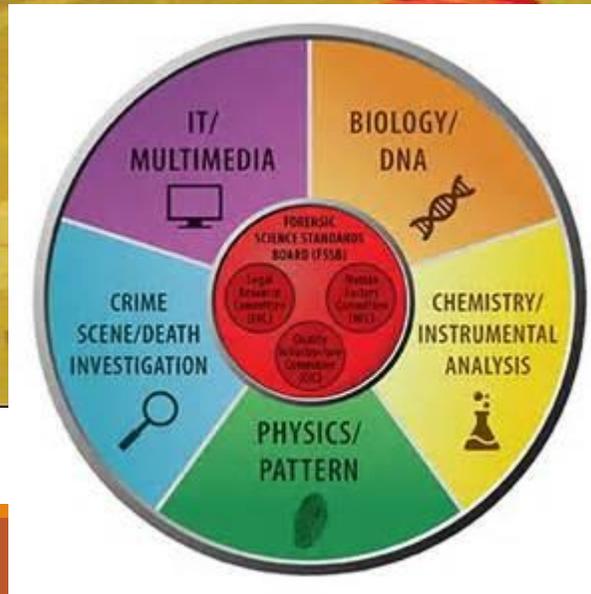
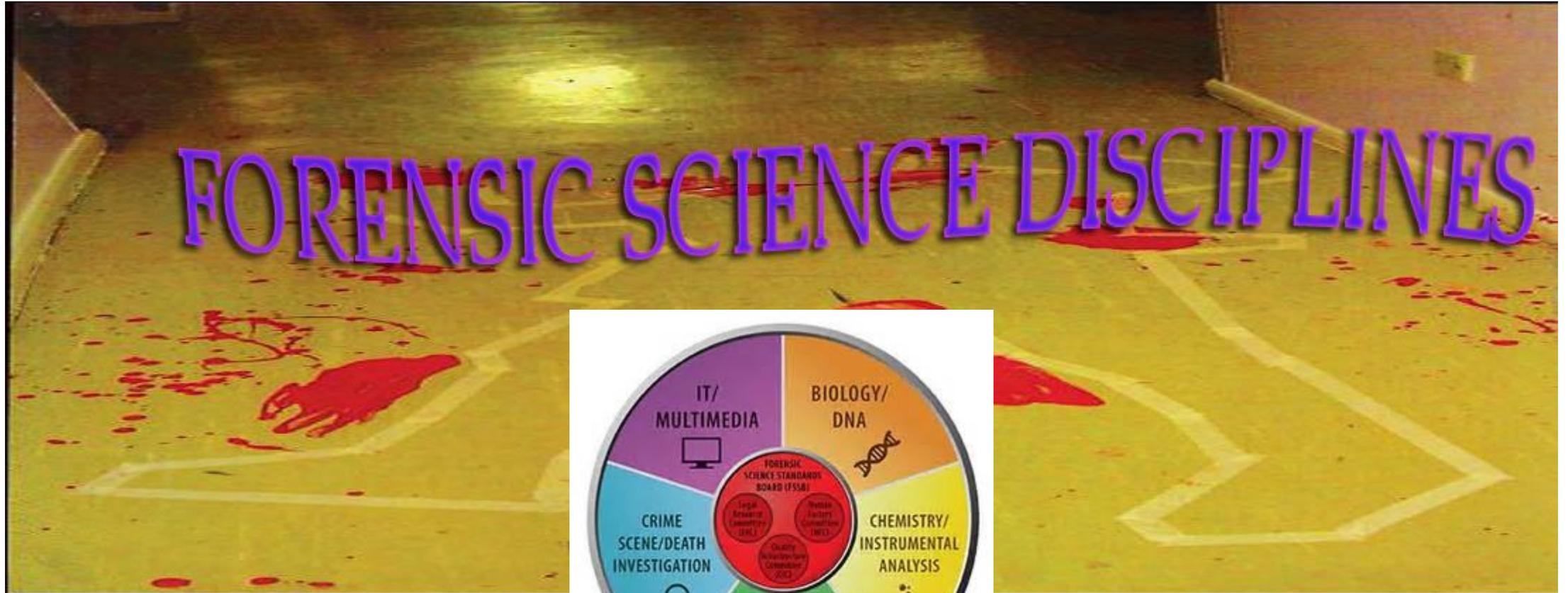
The overworked indigent defense counsel

No resources/modeling

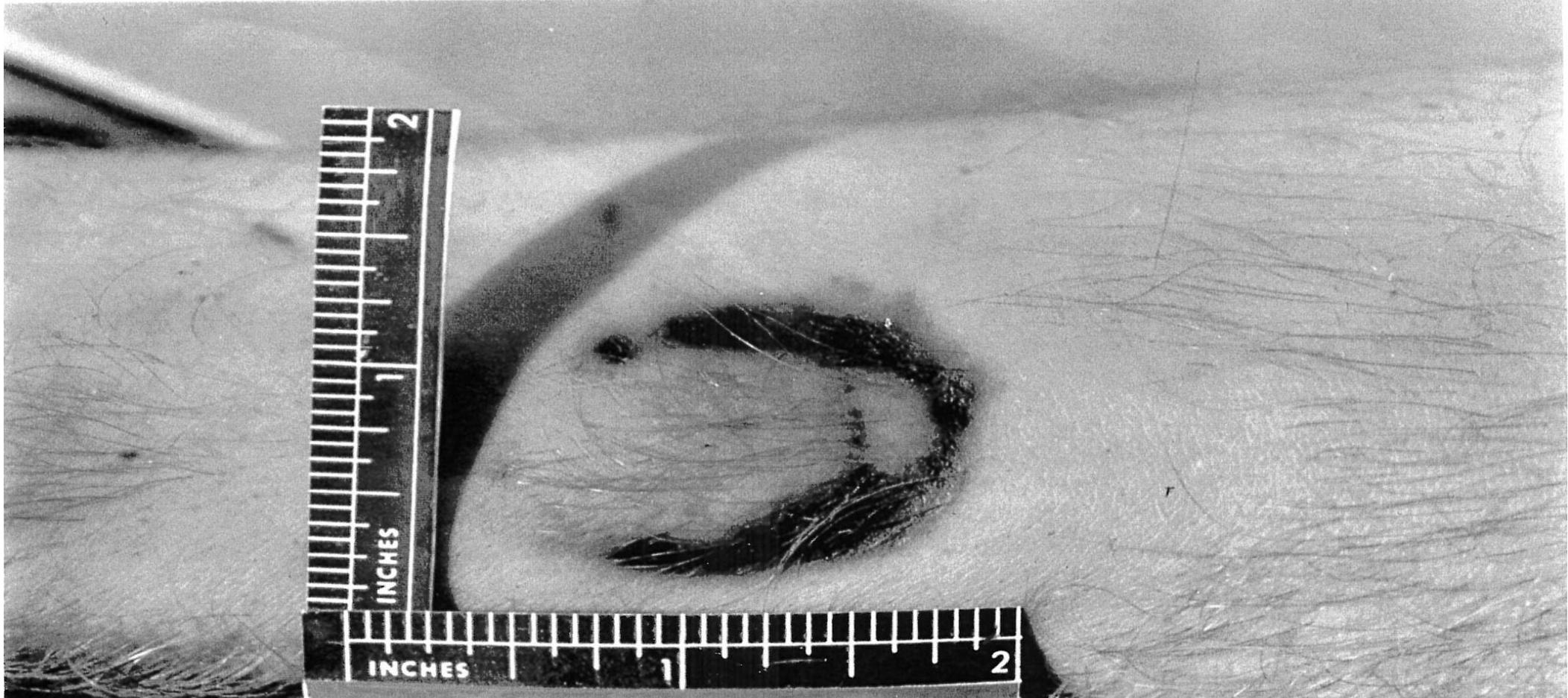
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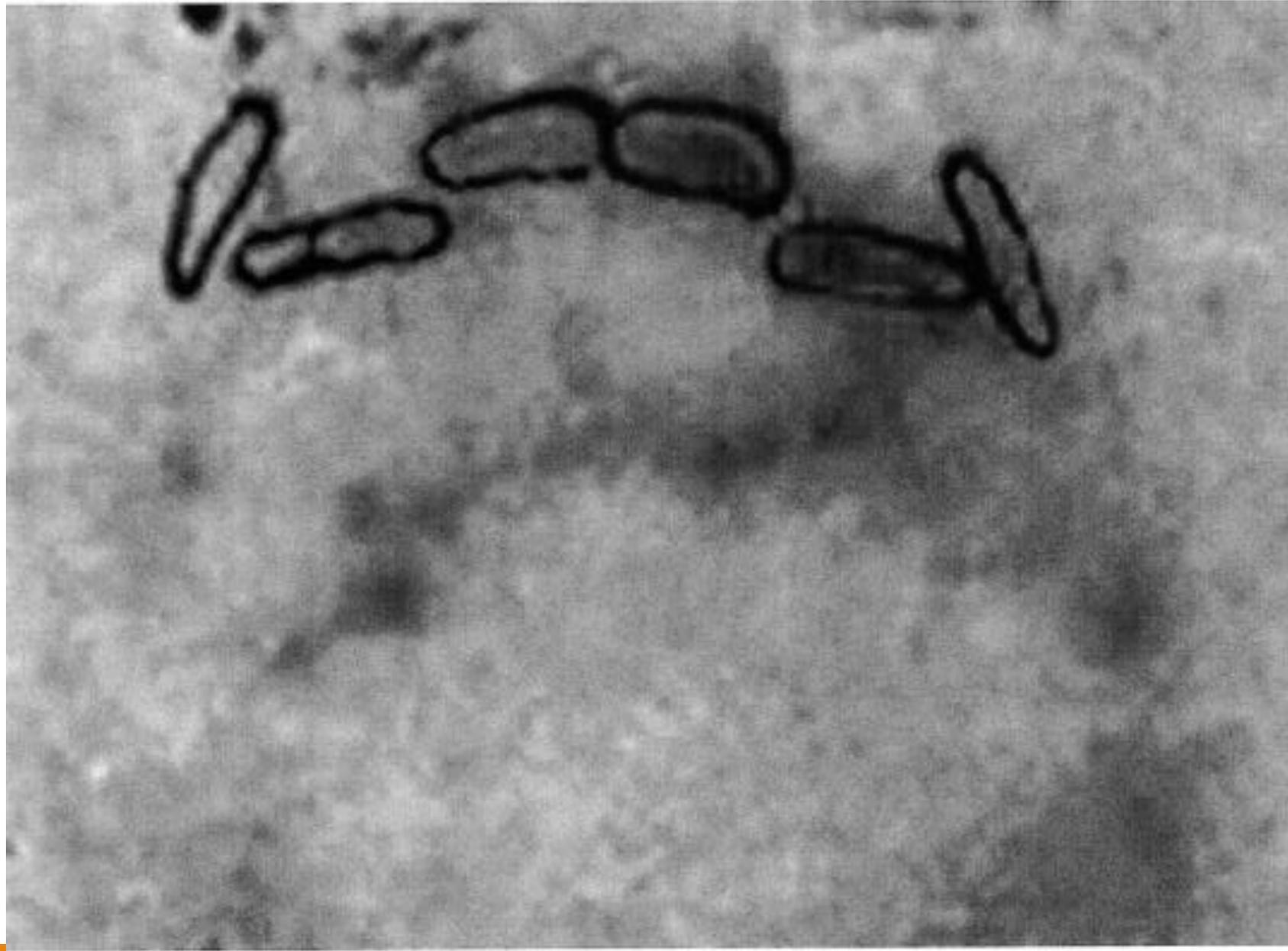
Perhaps adversary hearings are not the best model

WHAT ABOUT FORENSIC DISCIPLINES?



PROBLEM 1 – WE STILL PERMIT RISKY EVIDENCE





Bite Mark Matching

“Perfect match...”

“match up...”

“matching...”

“the biter...”

“reasonable dental certainty...”

“one in a million...”

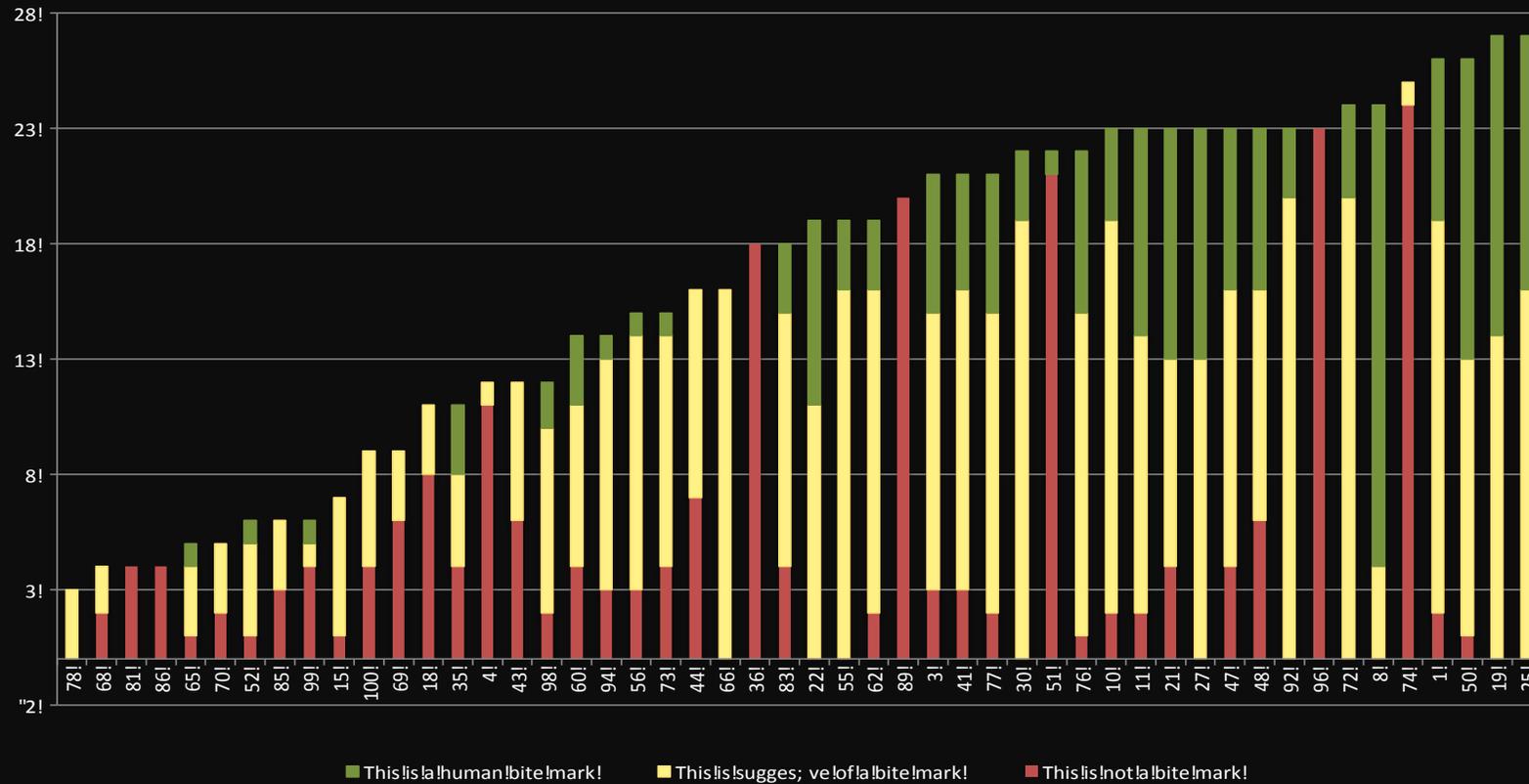
FORENSIC ODONTOLOGISTS' 2014 RESEARCH - OOPS

100 cases, each with 3 questions:

- Was there sufficient evidence to render an opinion on whether it was a human bitemark?
- Using newly proposed (draft) ABFO decision tree, was the injury a human bitemark?
- If a human bitemark, did it have distinct, identifiable arches and individual tooth marks?

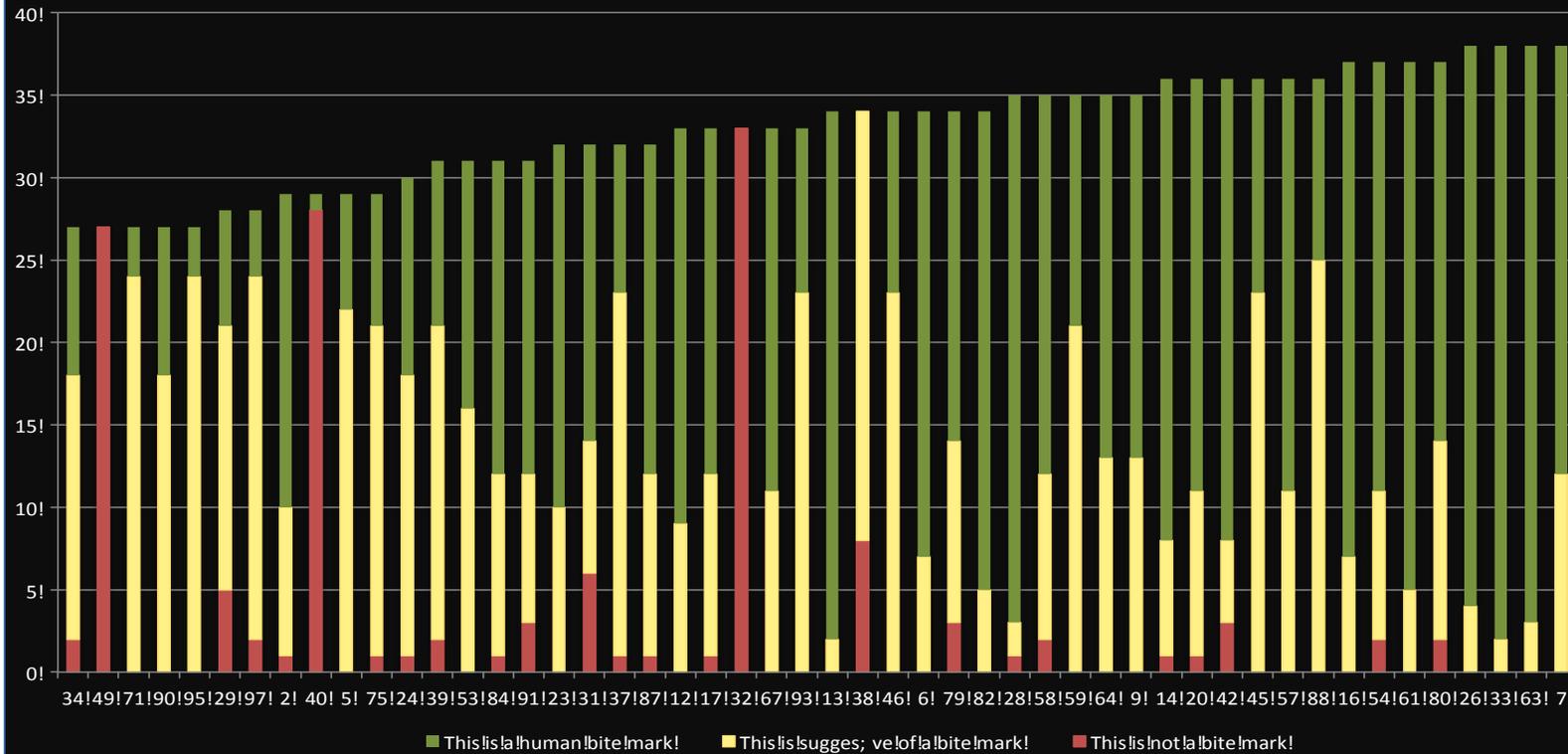
Results – decision spread!

Look at the spread of decisions for individual cases.

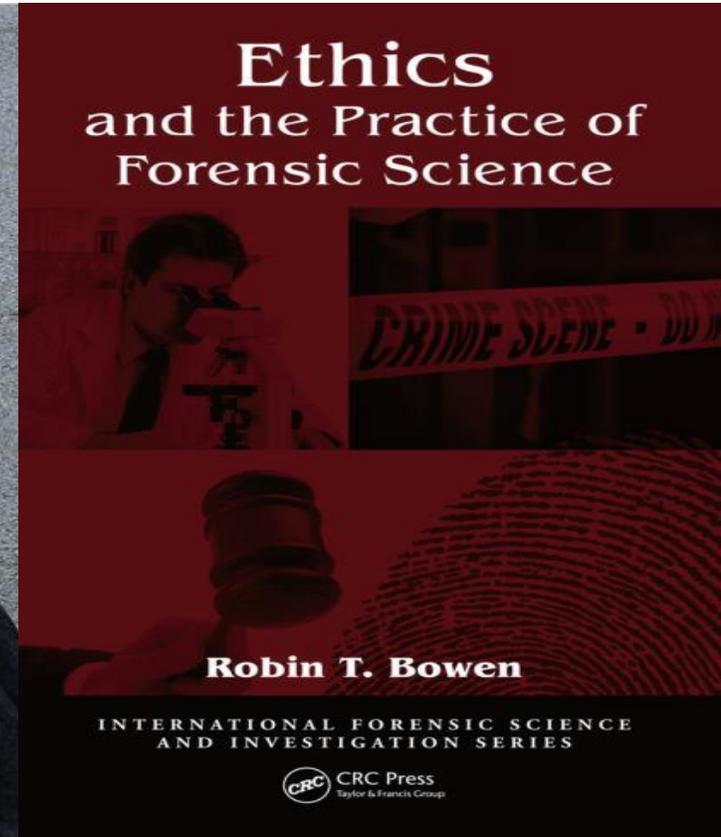
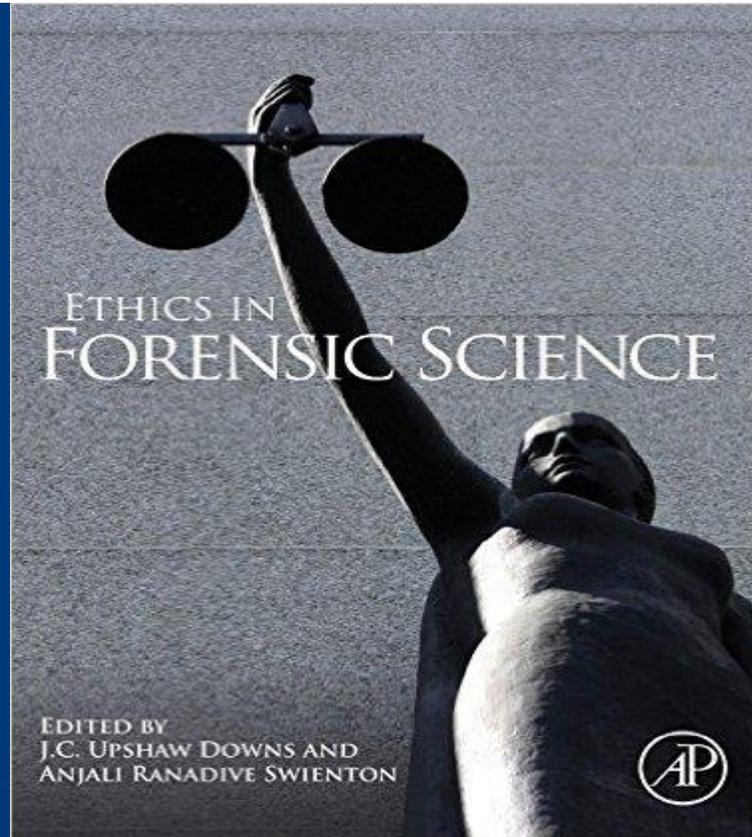
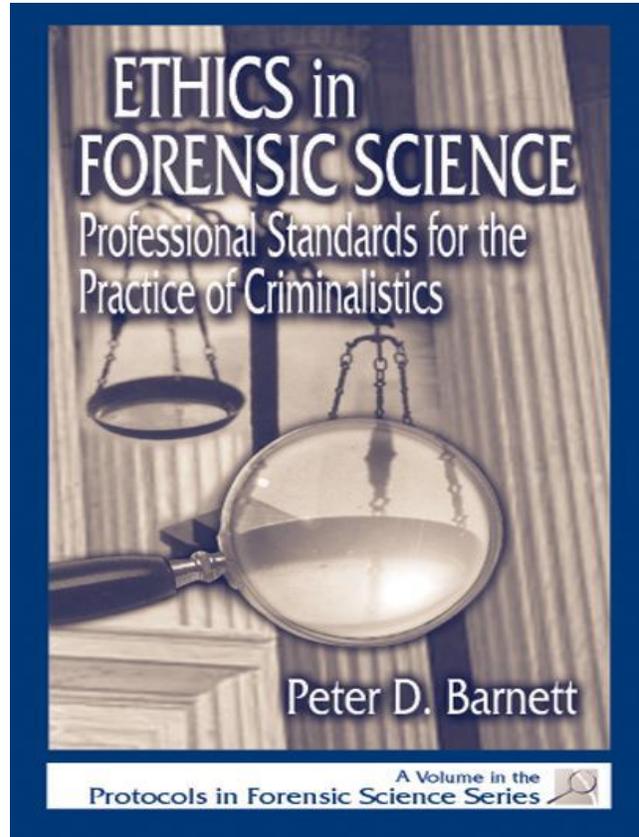


Results – decision spread!

Look at the spread of decisions for individual cases.



PROBLEM 2 - ETHICS



ETHICS – A MIXED MESSAGE?

FORENSIC SCIENCE COMMISSION

Once a report is issued and the adjudicative process has commenced,

Communicate fully with the parties

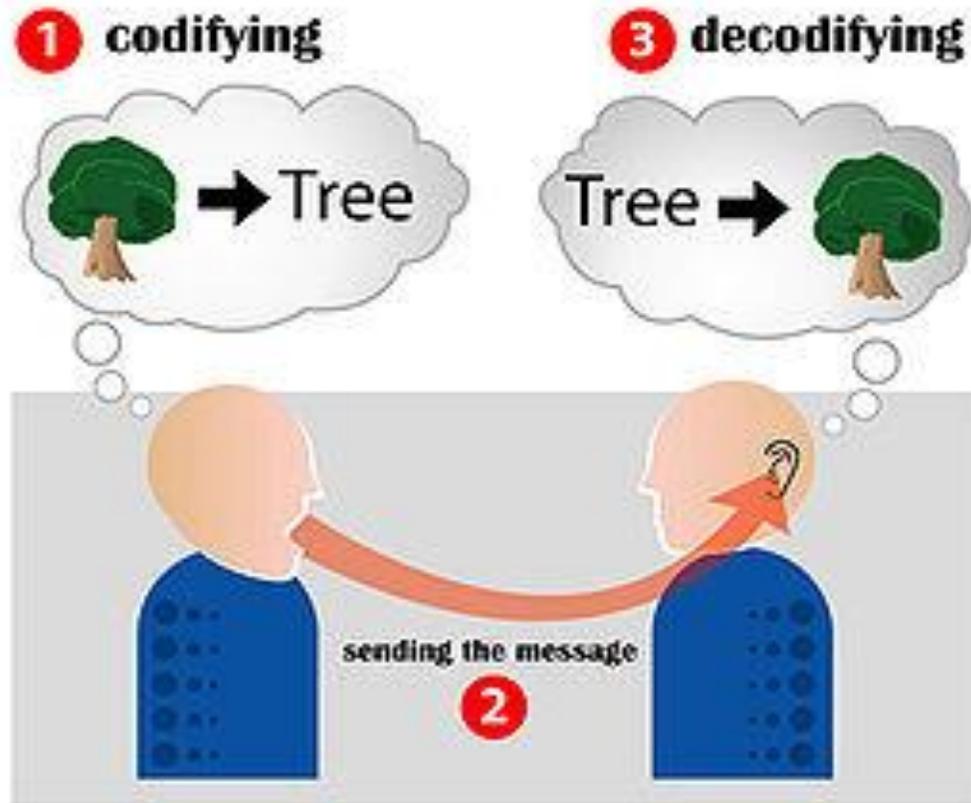
Unless a privilege, protective order or law prevents disclosure

ATTORNEY GENERAL RESPONSE

- Honestly communicate with all parties
- When communications are permitted by law *or agency practice*



PROBLEM 3 – COMMUNICATING RESULTS



“NOT EXPLAINING
SCIENCE SEEMS TO ME
PERVERSE.
WHEN YOU'RE IN
LOVE, YOU WANT TO
TELL THE WORLD.”

~ CARL SAGAN

Earprint Testimony

▶ Q: Do you have an opinion as to the probability that the defendant's left ear is the source of the latent impression which was left at the scene of the crime in this case?

A: I do have an opinion, yes.

Earprint Testimony

A: I think it's probable that it's the defendant's ear is the one that was found on the scene...I'm 100 percent confident with that opinion.



Certain that it is Probable

What does that
mean?

Is that science?



HAVE WE LEARNED?

SHOE/TIRE ***IS*** THE SOURCE OF THE IMPRESSION

IF EVIDENCE AND SAMPLE SHARE CLASS CHARACTERISTICS

AND ONE OR MORE RANDOMLY ACQUIRED CHARACTERISTICS

The screenshot shows the top navigation bar of the Department of Justice website. It includes the Department of Justice seal, the text "THE UNITED STATES DEPARTMENT OF JUSTICE", a search bar, and a navigation menu with links for HOME, ABOUT, AGENCIES, BUSINESS, RESOURCES, NEWS, CAREERS, and CONTACT. Below the navigation bar, the breadcrumb trail reads "Home » Office of the Deputy Attorney General". The main content area features a large black box with white text: "DEPARTMENT OF JUSTICE PROPOSED UNIFORM LANGUAGE DOCUMENTS FOR FIBER, FOOTWEAR AND TIRE TREADS, GENERAL CHEMISTRY, GLASS, LATENT PRINTS, SEROLOGY, AND TOXICOLOGY". To the left of this box is a sidebar menu with links for "Office of the Deputy Attorney General Home", "About the Office", "Meet the Deputy Attorney General", "Press Room", "Selected Publications", "Internship Opportunities", and "ODAG FOIA". Below the main content box, there is a paragraph of text: "Department of Justice Proposed Uniform Language documents for fiber, footwear and tire treads, general chemistry, glass, latent prints, serology, and toxicology". This is followed by a paragraph: "The comment period for these documents closed on July 8, 2016. Due to the substantive nature of the comments received and the recency of the closing of the comment period, the Department's adjudication process is ongoing." Below this is a line of text: "Public comments may be viewed through www.regulations.gov." At the bottom of the page, there is a small line of text: "Supporting Documentation for Department of Justice Proposed Uniform Language for Testimony and Reports for the Forensic Toxicology Discipline".

THE NON-SCIENTIST'S QUESTIONS





SHOE/TIRE IS THE
THE IMPRESSION

IF EVIDENCE AND
SHARE CLASS CH

AND ONE OR MORE
ACQUIRED CHAR



PROBABLY MADE
ON

CORRESPONDENCE
CHARACTERISTICS

ON WITH SPECIFIC
OR RANDOMLY
CHARACTERISTICS

PROBLEM 4 - RELIABILITY



**Reliable
Not Valid**



**Low Validity
Low Reliability**



**Not Reliable
Not Valid**



**Both Reliable
and Valid**

by Experiment-Resources.com

DO WE YET KNOW HOW RELIABLE EXPERTS ARE?



Contents lists available at [ScienceDirect](#)

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Review

A Hierarchy of Expert Performance[☆]

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University College London, United Kingdom

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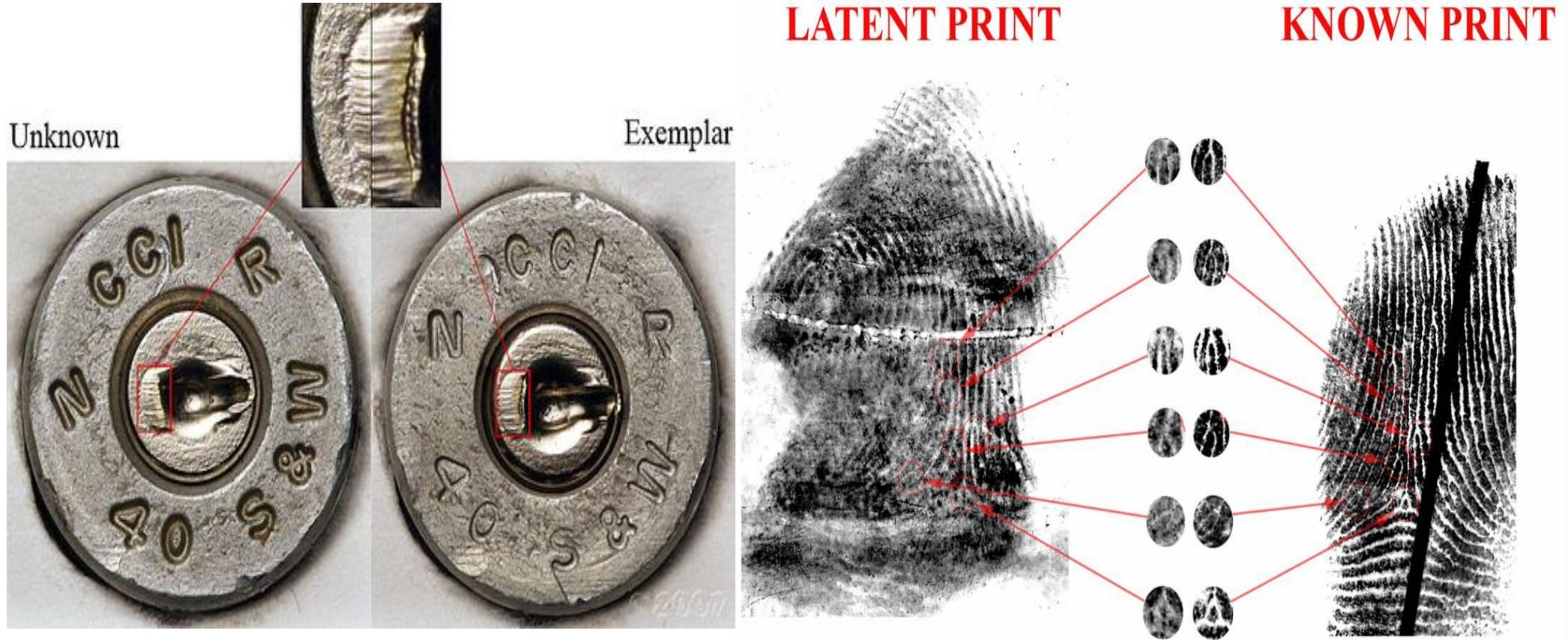
ABSTRACT

Expert performance can be quantified by examining reliability and biasability between and within experts, and teasing apart their observations from their conclusions. I utilize these parameters to develop a Hierarchy of Expert Performance (HEP) that includes eight distinct levels. Using this hierarchy I evaluate and quantify the performance of forensic experts, a highly specialized domain that plays a critical role in the criminal justice system. Evaluating expert performance within HEP enables the identification of weaknesses in expert performance, and enables the comparison of experts across domains. HEP also provides theoretical and applied insights into expertise.

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PROBLEM 5

When is Enough Enough?



PROBLEM 5

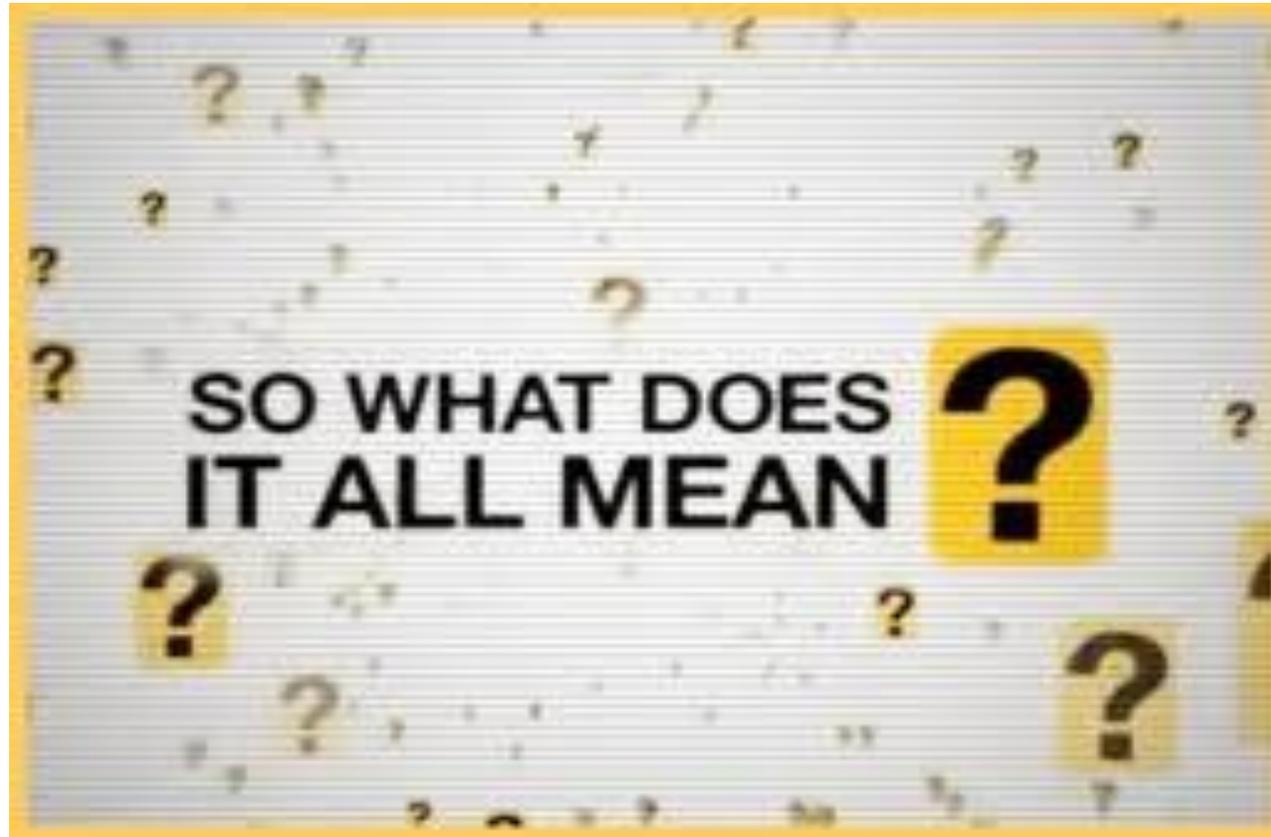
When is Enough Enough?

**an examiner may conclude that two items
have a common origin**

**if their marks are in “sufficient
agreement,”**



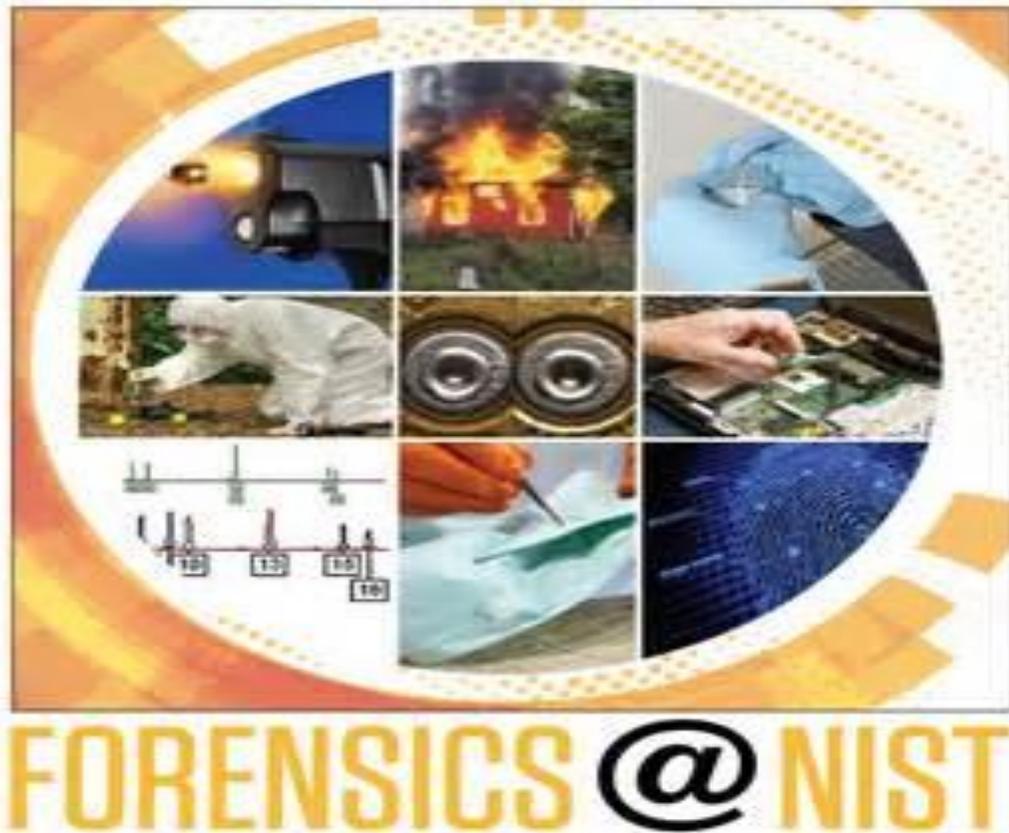
WHAT'S THE TAKE-AWAY?



IF I AM MIS-INFORMED?



AND IF I AM CORRECT?



NEWS

NIST Unveils Forensic Technique to Measure Mechanical Properties of Evidence

November 01, 2016

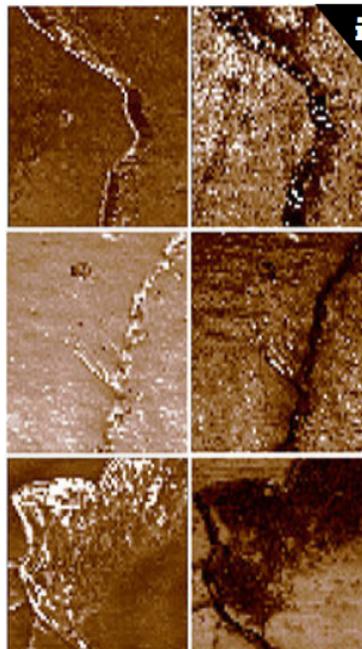
Share



You may have seen it on CSI: The star examines hair from a crime scene and concludes its color or texture looks like the defendant's hair, or maybe his dog's. Case closed.

But looks can be deceiving, as well as vague and subjective. In real life, the FBI is now reviewing thousands of cases involving hair comparisons going back to the 1980s because traditional identifications—often based on looks alone—have been called into question.

Instead, what if investigators could precisely measure a hair's mechanical properties—its stiffness and stickiness? In fact, they can, [according to recent experiments](#) at the National Institute of Standards and Technology (NIST), which is developing science-based methods to help ensure rigorous



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🏢 ORGANIZATIONS

Material Measurement Laboratory

Applied Chemicals and Materials Division

Nanoscale Reliability Group

MEASURE, MEASURE, MEASURE





**THANK
YOU
FOR
ALL YOU
DO**