



Forensic Science in the Courts

March 3, 2016

What is the role of the court in an age of developing science?

To make determinations in a manner that will promote public trust and confidence in the judicial system.

Today we are going to discuss both the current problems with science in the courts and how to make decisions on issues of science in a manner that promotes public trust and confidence..

How will we do that?

Presentation

Questions and Answers

PRESENTER

- David J. Waxse
- U.S. Magistrate Judge
 - District of Kansas
- Past Chair of the Judicial Division of the ABA

The National Academy of Sciences Report on Forensic Sciences: What it Means for the Bench and Bar

How and why was the NAS committee formed?

The National Academy of Sciences is a private, nonprofit, self-perpetuating society of distinguished scholars for the general welfare.

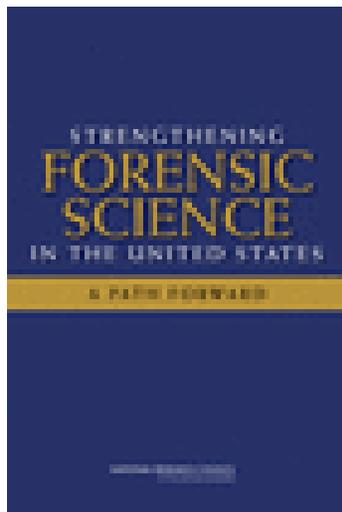
engaged in scientific and
engineering research,
dedicated to the
furtherance of science
and technology

and to their use for the
general welfare.

The National Academy of Sciences created a committee to conduct this study.

The Committee was
Chaired by Judge Harry T.
Edwards of the D. C.
Circuit and Constantine
Gatsonis of Brown
University.

“Strengthening Forensic Science in the United States: A Path Forward” (2009)



Judge Edwards has
stated:

The point here is simple:
When scientific
methodologies once
considered sacrosanct are
modified or discredited,
the judicial system must
accommodate the
changed scientific
landscape.

REPORT'S AUTHORS?

- ***Committee of National Academy of Sciences.***
 - interdisciplinary panel of distinguished scholars, scientists, and practitioners,
 - Including forensic scientists
 - days of testimony from leading forensic science professionals, researchers, and others knowledgeable in the field.

How did the committee
function?

How long did the process take?

The Committee on
February 18, 2009,
after more than two
years of work, issued
its report which is
available at:

[http://www.nap.edu/
catalog/12589/strengthening-forensic-
science-in-the-united-
states-a-path-forward](http://www.nap.edu/catalog/12589/strengthening-forensic-science-in-the-united-states-a-path-forward)

STRENGTHENING
**FORENSIC
SCIENCE**
IN THE UNITED STATES

A PATH FORWARD

NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES

What did the committee determine about the reliability of forensic science?

The report's
conclusion is
shocking and has not
been meaningfully
refuted. The
conclusion is:

“with the exception of nuclear DNA analysis, . . . no forensic method has been rigorously shown to have the capacity to consistently, and with a high degree of certainty, demonstrate a connection between evidence and a specific individual or source

What did the committee determine were the reasons for the unreliability of most forensic science?

Reasons for the unreliability of forensic science.

The paucity of scientific research to confirm the validity and reliability of forensic disciplines.

Reasons for the unreliability of forensic science.

The paucity of research programs on human observer bias and sources of human error in forensic examinations;

Reasons for the unreliability of forensic science.

The absence of scientific and applied research focused on new technology and innovation;

Reasons for the unreliability of forensic science.

The lack of autonomy of crime laboratories;

Reasons for the unreliability of forensic science.

The absence of rigorous, mandatory certification requirements for practitioners;

Reasons for the unreliability of forensic science.

The absence of uniform, mandatory accreditation programs for laboratories;

Reasons for the unreliability of forensic science.

The failure to adhere to robust performance standards;

Reasons for the unreliability of forensic science.

The failure of forensic experts to use standard terminology in reporting on and testifying about the results of forensic science investigations;

Reasons for the unreliability of forensic science.

The lack of effective oversight; and

Reasons for the unreliability of forensic science.

A gross shortage of adequate training and continuing education of practitioners.

What are the highlights of the report?

Highlights of the report.

1. Science.

Highlights of the report.

2. Subjective Interpretations,
Exaggerated Testimony,
and a Paucity of
Research.

Highlights of the report.

3. Inconsistent Practices in Crime Laboratories.

What has happened since the
release of the report?

The Role of the Courts in an Age of [Re]developing Science and Technology

The role of Daubert in Criminal Cases

How bad is the situation?

How did we get into such a mess?

What can we do to improve?

How Bad Is the Situation?
Exonerations provide some
understanding.

Post-mortems of DNA Exonerations



Invalid Forensic Science

On the Theory and Practice of Voice Identification

Commission on Forensic Science
 National Academy of Sciences

1979

Voiceprints
 (1979)

**REPORT
 IN BRIEF**

**FORENSIC ANALYSIS: WEIGHING
 BULLET LEAD EVIDENCE**

Since the 1970s, the law enforcement community has used evidence derived from Compositonal Analysis of Bullet Lead (CABL) to trace criminal cases involving gunfire. Different from ballistics techniques that compare striations on the barrel of a gun to those on a recovered bullet, CABL is used to trace a recovered bullet, or bullets, to one or more sources. CABL compares the elemental composition of bullets recovered from a crime scene to bullets found in a suspect's possession.

CABL has 3 distinct steps: 1) chemical analysis of trace elements in the bullets; 2) statistical comparison of the lead compositions; and 3) the legal interpretation of data from steps 1 and 2. Experts in forensic science have testified that bullets found to be analytically indistinguishable probably come from the same "box" or "source." However, some of this testimony has been contradicted.

Because it is important that criminal justice and legal professionals, as well as jurors, understand both the capabilities and the limitations of CABL, the National Academies of Sciences, Engineering, and Medicine (NASEM) convened a panel of experts to examine the scientific validity of the chemical and statistical analysis used in CABL, and what evidence can be used to support or contradict CABL evidence.

Analytical Technique Is Sound

The report finds that the technique the FBI uses for chemical analysis, called inductively coupled plasma-optical emission spectroscopy (ICP-OES), is accurate and reliable, and that the two elements currently analyzed (lead and antimony) are the most important for CABL. However, the report also finds that the FBI's current practice of analyzing only one sample from another is not appropriate.



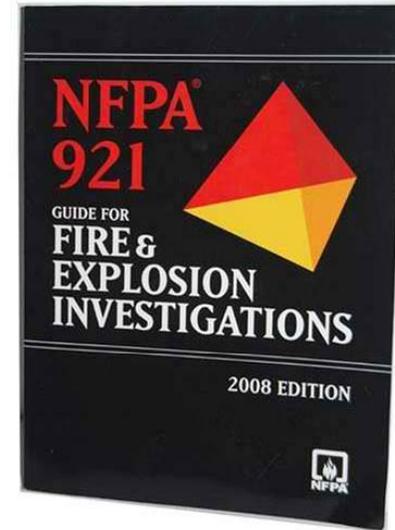
The report concludes that ICP-OES is currently the best available technology for the job, it also recommends that the FBI evaluate a new variant called "high-performance" ICP-OES, which might allow for better differentiation among samples.

The report recommends, however, that the FBI take several steps to ensure the validity of CABL results:

- **Improve Documentation.** FBI should collect all details of its analytical protocol in a single, authoritative document, and this protocol should be followed rigorously in every case.
- **Publish Details.** To allow others to fully understand the FBI's CABL results and techniques, the FBI should publish methodological details in a peer-reviewed journal or other public forum.
- **Improve Training and Oversight.** FBI should provide regular training and improve proficiency testing for CABL examiners.

THE NATIONAL ACADEMIES
 Advisers to the Nation on Science, Engineering, and Medicine

Bullet Lead
 (2004)



Arson Indicators
 (Recent Decades)

Indicators of Arson?

- **Wide V' s versus narrow V' s**
- **Spalling of concrete**
- **Crazing of window glass**
- **Char blisters**
- **Speed of fire' s spread**
- **Window sooting/staining**
- **Color of smoke and flame**



Bitemarks: Ray Krone

According to the Innocence Project, Bite mark analysis is particularly troubling because of the almost complete absence of validated rules, regulations, or processes for accreditation that establish standards for experts or the testimony they provide.

Last year, the American Academy of Forensic Sciences conducted a study of forensic odontologists and concluded that the analysis could not even accurately determine which marks were bite marks

Microscopic Hair Comparison





Washington, D.C.
April 20, 2015

FBI Testimony on
Microscopic Hair Analysis
Contained Errors in at Least
90 Percent of Cases in
Ongoing Review

26 of 28 FBI Analysts
Provided Testimony or
Reports with Errors



The United States Department of Justice (DOJ), the Federal Bureau of Investigation (FBI), the Innocence Project, and the National Association of Criminal Defense Lawyers (NACDL) reported today that the FBI has concluded that the examiners' testimony in at least 90 percent of trial transcripts the Bureau analyzed as part of its Microscopic Hair Comparison Analysis Review contained erroneous statements.

Identification by Hair

| Microscopic Comparison | Mitochondrial DNA | |
|------------------------|-------------------|----------|
| | Match | No-match |
| Match | 100 | 35 |
| No-match | 0 | 65 |



Fingerprints: Brandon Mayfield

Itiel Dror et al.

| Time 1: In Court | Time 2: In Study |
|-------------------------|-------------------------|
| Positive Ident | ? |

Itiel Dror et al.

| Time 1: In Court | Time 2: In Study |
|-------------------------|-------------------------|
| Positive Ident | Not a Match |
| Positive Ident | ? |

Itiel Dror et al.

| Time 1: In Court | Time 2: In Study |
|-------------------------|-------------------------|
| Positive Ident | Not a Match |
| Positive Ident | Not a Match |
| Positive Ident | ? |
| Positive Ident | ? |
| Positive Ident | ? |

Itiel Dror et al.

| Time 1: In Court | Time 2: In Study |
|-------------------------|-------------------------|
| Positive Ident | Not a Match |
| Positive Ident | Not a Match |
| Positive Ident | Not a Match |
| Positive Ident | ? |
| Positive Ident | ? |

Itiel Dror et al.

| Time 1: In Court | Time 2: In Study |
|-------------------------|-------------------------|
| Positive Ident | Not a Match |
| Positive Ident | Not a Match |
| Positive Ident | Not a Match |
| Positive Ident | Undecided |
| Positive Ident | ? |

Itiel Dror et al.

| Time 1: In Court | Time 2: In Study |
|-------------------------|-------------------------|
| Positive Ident | Not a Match |
| Positive Ident | Not a Match |
| Positive Ident | Not a Match |
| Positive Ident | Undecided |
| Positive Ident | Positive Ident |



Commonwealth v. Melendez-Diaz

557 U.S. 305

June 25, 2009

- “Serious deficiencies have been found in the forensic evidence used in criminal trials.”
- “Forensic evidence is not uniquely immune from the risk of manipulation.”

The Court added: “The forensic science system, encompassing both research and practice, has serious problems that can only be addressed by a national commitment to overhaul the current structure that supports the forensic science community in this country.”

Harvard Professor Nancy Gertner , formerly a Federal Judge in Boston, discussed the report in her Procedural Order: Trace Evidence entered in 08-cr-10104-NG on March 8, 2010. She stated:

While the [NAS] report does not speak to admissibility or inadmissibility in a given case, it raised profound questions that need to be carefully examined in every case prior to trial:

Question“(1) the extent to which a particular forensic discipline is founded on a reliable scientific methodology that gives it the capacity to accurately analyze evidence and report findings and

Question (2) the extent to which practitioners in a particular forensic discipline rely on human interpretation that could be tainted by error, the threat of bias, or the absence of sound operational procedures and robust performance standards.”

Judge Gertner continued by saying:
The Report noted that these fundamental questions have not been “satisfactorily dealt with in judicial decisions pertaining to the admissibility” of evidence.

. . .

“In the past, the admissibility of this kind of evidence was effectively presumed, largely because of its pedigree – the fact that it had been admitted for decades.”

She further stated:
“As such, counsel rarely challenged it, and if it were challenged, it was rarely excluded or limited.”

She concluded: "The NAS report suggests a different calculus – that admissibility of such evidence ought not to be presumed; that it has to be carefully examined in each case, and tested in the light of the NAS concerns, the concerns of Daubert/Kumho case law, and Rule 702 of the Federal Rules of Evidence."

How Did We Get Into Such a Mess?

- Popular culture: scientific detectives
- Evaluating empirical/scientific claims is not a strength of lawyers and judges
- Most forensic science fields were admitted in the absence of any legal test
- Pseudo-precedential habits of mind
 - We've let it in for so long it *must* be valid
 - Presumption of validity
- Deferential standard of review

What Can We Do to Improve?

- Admission depends upon satisfaction of 702 and the Daubert Trilogy (or state variants)
- Apply the law
 - “Everything old is new again”
 - “Though... the Daubert factors are not holy writ, in a particular case the failure to apply one or another of them may be unreasonable, and hence an abuse of discretion.” (Scalia concurrence)
- Forensic science fields will improve to the extent courts require them to

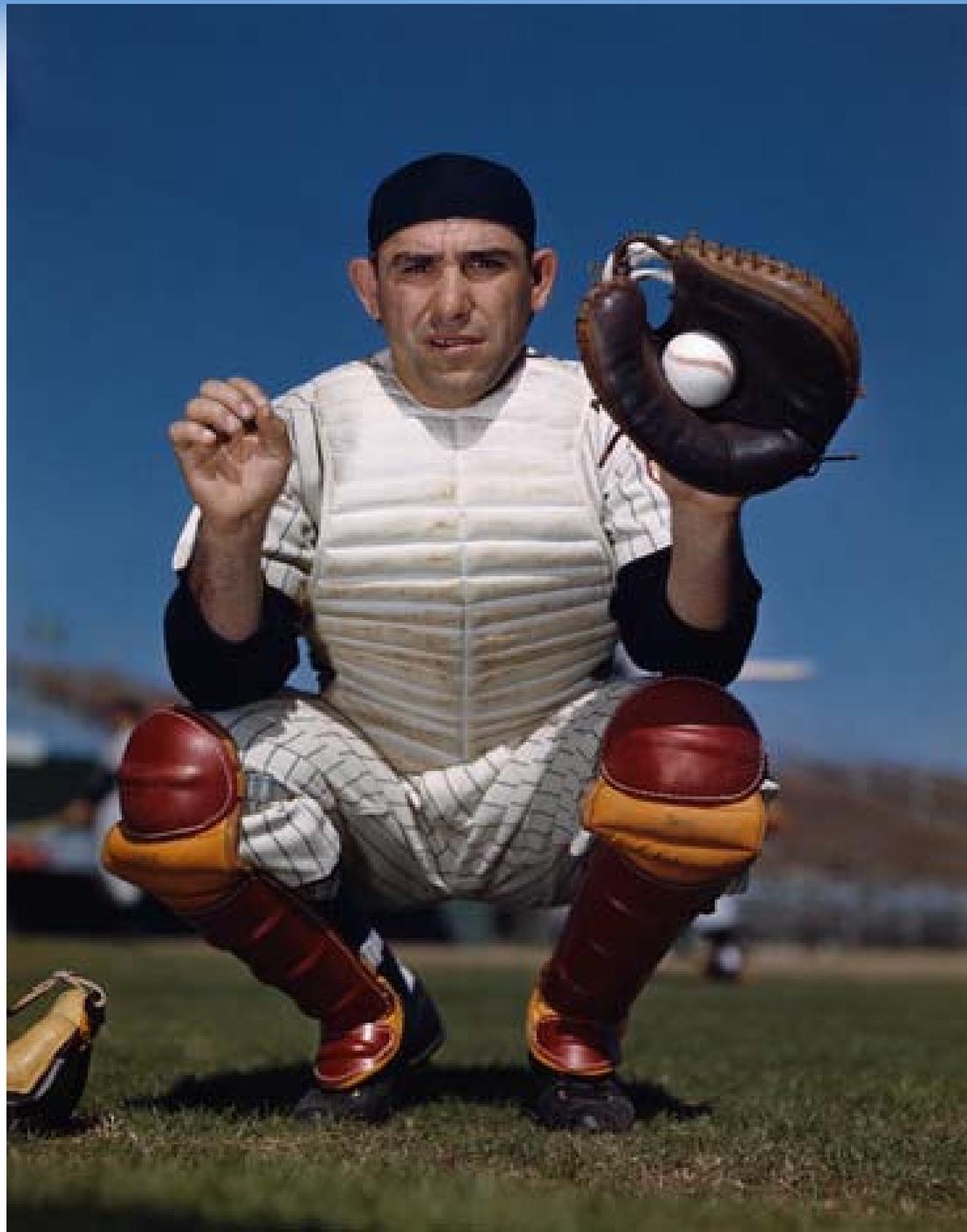


If it is too painful to follow the law to unfamiliar results, then place limits:

- Partial admission
 - Allow description but prohibit conclusions
- Require “masked” examination
- Prohibit overpowering and misleading terminology
- Confine expert witnesses within the bounds of validated knowledge



- Certified examiners
- Accredited labs
- Instruct jury on the limits of field's knowledge
- Recognize right to attack on weight and credibility at trial (FRE 104(e))



“Are you gonna get any better, or is this it?”



IT CONCLUDED: *FINGERPRINT FIREARMS, HANDWRITING, TOOLMARK*

- *Conclusions not supported by methodology or training.*
- *No adequate basis for individualization, linking evidence to a defendant,*
- *No basis for exceptional degree of certainty: “to the exclusion of anyone else in the world,”*

IT CONCLUDED:

- *Dearth of peer-reviewed, published studies establishing the scientific bases and validity of many forensic methods.*
- *No research on proficiency, performance, role of bias and observer effects*

IT CONCLUDED:

NOT THAT THIS FIELD
COULD *NEVER* MEET
SCIENTIFIC STANDARDS

ONLY THE CURRENT
STATE WAS “SERIOUSLY
WANTING”



CRITICISM OF COURTS AS “UTTERLY INEFFECTIVE”

- NOT HOLDING A HEARING
- MISAPPLYING *Kumho Tire* – OVERLY FLEXIBLE
- REVERSING THE BURDEN OF PERSUASION ONTO THE CHALLENGER;
- CONFLATING GENERAL ACCEPTANCE *IN THE SCIENTIFIC COMMUNITY* – OFTEN PROBLEMATIC – WITH ACCEPTANCE *BY THE COURTS*
- RELEGATING FUNDAMENTAL QUESTIONS OF VALIDITY TO ISSUES OF WEIGHT, NOT ADMISSIBILITY



CONTRAST THE TREATMENT OF “THE CSI EFFECT”

- **Untested –no scientific basis –yet some courts have:**
 - **voir dire** - whether juror believes government must have scientific evidence to meet its burden
 - **instruct** the jury on it
 - Cwlth v. Perez, 460 Mass. 683, Stabb v. Md, 2011 MD LEXIS 678.
 - **Admit** inconclusive test to show prosecutor was exhaustive
 - DeL. v. Cooke, 914 A.2d 1078



RELATIONSHIP BETWEEN FORENSIC ERROR AND INNOCENCE FINDINGS

- MORE THAN 50% OF DNA EXONERATIONS
- BRANDON MAYFIELD CASE
- OBSERVER BIAS
 - Itiel E. Dror & David Charlton, *Why Experts Make Errors*, 56 J. FORENSIC IDENTIFICATION 600 (2006).)

VICIOUS CYCLE

- “Pedigree” of trace evidence discourages challenge –
- Even if challenged a busy trial judge can rely on the case law to deny a hearing
 - Abuse of Discretion Standard on Appeal.

“ABUSE OF DISCRETION” STANDARD - MISINTERPRETED

- While it means *only* that there is a range of discretionary decisions-- admitting or excluding
....
- It is *cited* to mean – an endorsement of admission, or no hearing.



ABUSE OF DISCRETION STANDARD IS OVERBROAD

- “To show an abuse of discretion, the defendant has the burden of showing that “no conscientious judge, acting intelligently, could honestly have taken the view expressed by [her].”
 - Cwlth. v. Cruz, 926 N.E.2d 142, 153.

WHAT TO DO

- THRESHOLD FOR HEARING ALREADY PROVIDED BY NAS REPORT
 - CAN NO LONGER PRESUME ADMISSIBILITY
 - ADMISSIBILITY MUST BE TESTED in the light of the NAS concerns, the concerns of *Daubert/Kumho* case law, and Rule 702 of the Federal Rules of Evidence.

MAKING A RECORD

- EXPERT AFFIDAVITS
- OFFER OF PROOF WITH RESPECT TO EXPERT TESTIMONY
- CITE TO INNOCENCE PROJECT REPORTS



CITING ACADEMIC COMMENTARY

- JENNIFER MNOOKIN
- MICHAEL SAKS
- MICHAEL RISINGER
- DAVID FAIGMAN
- ITIEL DROR

NEW LEGAL RESEARCH

- CIVIL STANDARDS
- DISTINGUISH THE CASE LAW AS PRE AND POST – NAS REPORT
- CLARIFY ABUSE OF DISCRETION PRECEDENTS



IS THE FAILURE TO CHALLENGE FORENSICS INEFFECTIVE ASSISTANCE OF COUNSEL?

- Required to be familiar with the NAS report raised.
- The best cross-examiner, may not be up to par when complex forensic evidence is involved.
 - But see *Harrington v. Richter*, 121 S. Ct. 770 (2011); *Cullen v. Pinholster*, 131 S. Ct. 1388 (2011).

WHETHER OR NOT IT IS CONSTITUTIONALLY INEFFECTIVE ASSISTANCE OF COUNSEL

- IT IS THE RIGHT THING
TO DO!