

An Overview of the Current Use of Uncertainty
Statements in Court and the ASA Efforts to Help
Reform Forensic Science

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Outline

- Examples of bad or missing uncertainty statements in court or high profile investigations
- 2004-2011 germane NRC quotes
- ASA related science policy activities
- Closing comments

Collaborators

- ASA Working Group on Forensic Science including Steve Pierson
- The Innocence Project (Sarah Chu +)
- Bill Tobin
- Bob Rodriguez
- Various Hill staffers

Examples of Uncertainty Statements

- A forensic odontologist testified that there was "reasonable medical certainty" that Brewer's top two teeth caused bite marks found on the victim. When explaining what "medical certainty" means, analyst testified, "yes, he did" leave the marks.
- The analyst also assigned a percentage to a reddish hue observed on the sample, testifying, "I have seen it in less than 5% of the hairs that I examined. These particular hairs were especially light. I have not found any pubic hairs as light as these before."
- Incorrect DNA Analysis. An analyst gave faulty testimony by failing to provide relevant statistics for the population included by DQ Alpha type DNA testing.
- These 3 cases from Garrett/Neufeld, March 2009--all exonerations

Firearm/Toolmark Testimony from Mr. Murdock: Matching Bullets to a Gun Bucknell Case in Contra-Costa County, Ca.

- Q. Okay. And can you express, then, a percentage --
- the probability that another firearm could make that same
- toolmark?
- A. No. As a part of my answer, if you'll recall, I
- said that it's not based on mathematical probability
- estimates.
- Q. But yet you feel that you can state with
- certainty that there's virtually no chance that any other
- tool could make that same mark?
- A. Yes.
- Q. And that, in your view, does not imply an error
- rate of zero?
- A. Those seem to me to be mutually exclusive. An
- error rate of zero, how does that equate to absolute
- identification?

Mr. Murdock testimony continued

- Q. That you're-- essentially by saying there's
- virtually no chance that any other tool could make that
- same mark --
- A. Yes?
- Q. -- you're saying there's no other tool out there
- that can make that same mark.
- A. So that's an absolute statement. I said I didn't
- make that.
- Q. So --
- A. The idea is made to the practical exclusion, not
- the absolute exclusion.
- Q. So in your view "virtually no chance" doesn't
- mean no chance?
- A. That's correct. It's a practical exclusion.



U.S. Department of Justice

Federal Bureau of Investigation

In Reply, Please refer to
File No.

May 27, 2008

Bill Turner
Brazos County District Attorney's Office
300 E. 26th Street, Suite 310
Brazos County Courthouse
Bryan, TX 77803

Re: Case Name: James Otto Earhart
FBI File Number: 95-278406

Dear Sir or Madam:

This letter follows up on our previous communication regarding bullet lead analysis conducted by the FBI Laboratory. Thank you for providing the information requested from the above-referenced case.

After reviewing the testimony of the FBI's examiner, it is the opinion of the Federal Bureau of Investigation Laboratory that the examiner stated or implied that the evidentiary specimen(s) could be associated to a single box of ammunition. This type of testimony exceeds the limits of the science and cannot be supported by the FBI.

Your office is encouraged to consult appellate specialists in your jurisdiction to determine whether you have any discovery obligations with respect to the finding stated above. As directed by the Department of Justice, we are notifying the Chief Judge of the court in which this case was tried of the results of our review by copying him or her on this letter.

OFFICE OF THE DISTRICT ATTORNEY

BILL TURNER
District Attorney

MELISSA CARTER
Victim Assistance Coordinator



BRAZOS COUNTY, TEXAS

300 E. 26TH STREET
SUITE 310
BRAZOS COUNTY
COURTHOUSE
BRYAN, TEXAS 77803

OFF: 979 / 361-4320
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January 7, 2008

Valerie E. Caproni
U.S. Dept. of Justice
Federal Bureau of Investigation
O-GC ILU Rm. 7326
935 Pennsylvania Ave., NW
Washington, DC 20535-0001

Entered Into Database
Date: 1/25/08
Initials: *mm*

95-2781

Re: Defendant/Subject- James Earhart

~~95-97~~

Dear Ms. Caproni,

James Otto Earhart was charged with and convicted of Capital Murder regarding the kidnapping and murder of a local 10 year old school girl. The death sentence was imposed. It has been carried out.

A copy of the bullet lead testimony is attached.

Please be advised that the defendant, in his state writ, claimed that his trial counsel was ineffective for not hiring an expert to examine and provide testimony rebutting the State's expert testimony regarding the elemental composition of the bullets found in the victim's head, and in defendant's vehicle and house. The defendant's state writ attorney filed a motion for examination and testing of physical evidence, in which he requested that he be allowed to have his own expert re-examine the bullet evidence. On November 13, 1998, the trial court granted the motion and approved funds so that the defendant's writ attorney could hire his own expert. The writ attorney was also provided with the prior testimony of the bullet comparison expert, John Riley. Even after having been provided with expert funding and information concerning trial counsel's cross-examination of Mr. Riley, the defendant chose not to further litigate his bullet comparison claim.

I appreciate your concern over the bullet examiner's testimony. I feel compelled to advise you that Mr. Earhart admitted kidnapping the girl but claimed he did not kill her. He did not explain the blood spatter on his shirt sleeve nor the pubic hair found in the girl's underwear. D.N.A. analysis was not available at the time. Should you need confirmation by other evidence of the correctness of the verdict we will try to find all relevant evidence.

Sincerely,

A handwritten signature in cursive script, appearing to read "Bill Turner".

Bill Turner

Enc.

Sacco and Vanzetti

At the trial, the District Attorney did not ask me whether I had found any evidence that the so-called mortal bullet which I have referred to as number 3 passed through Sacco's pistol, nor was I asked that question on cross-examination. The District Attorney desired to ask me that question, but I had repeatedly told him that if he did I should be obliged to answer in the negative; consequently, he put to me this question: Q. Have you an opinion as to whether bullet number 3 was fired from the Colt automatic which is in evidence? To which I answered, "I have." He then proceeded. Q. And what is your opinion? A. My opinion is that it is consistent with being fired by that pistol.

Sacco and Vanzetti continued

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THE SACCO-VANZETTI CASE

That is still my opinion for the reason that bullet number 3, in my judgment, passed through some Colt automatic pistol, but I do not intend by that answer to imply that I had found any evidence that the so-called mortal bullet had passed through this particular Colt automatic pistol and the District Attorney well knew that I did not so intend and framed his question accordingly. Had I been asked the direct question: whether I had found any affirmative evidence whatever that this so-called mortal bullet had passed through this particular Sacco's pistol, I should have answered then, as I do now without hesitation, in the negative.¹⁰

Anthrax Attacks

- First focus on Steven Hatfill, who was eventually exonerated.
- Bruce Edwards Ivins was second suspect, and NRC report indicates his involvement was not as clear cut as FBI claimed.

From 2009 NRC report: Strengthening Forensic Science in the United States: A Path Forward

Standardized Terminology and Reporting

The terminology used in reporting and testifying about the results of forensic science investigations must be standardized. Many terms are used by forensic scientists in scientific reports and in court testimony that describe findings, conclusions, and degrees of association between evidentiary material (e.g., hairs, fingerprints, fibers) and particular people or objects. Such terms include, but are not limited to “match,” “consistent with,” “identical,” “similar in all respects tested,” and “cannot be excluded as the source of.” The use of such terms can and does have a profound effect on how the trier of fact in a criminal or civil matter perceives and evaluates scientific evidence. Although some forensic science disciplines have proposed reporting vocabulary and scales, the use of the recommended language is not standard practice among forensic science practitioners.

From the 2008 NRC report: Ballistic Imaging

- A third point is important in reading this report—stopping short of
- commenting on whether firearms toolmark evidence should be admissible:
- Conclusions drawn in firearms identification should not be made to imply
- the presence of a firm statistical basis when none has been demonstrated.
- Specifically, as described in Section 3–B.4, examiners tend to cast their
- assessments in bold absolutes, commonly asserting that a match can be
- made “to the exclusion of all other firearms in the world.” Such comments
- cloak an inherently subjective assessment of a match with an extreme prob-
- ability statement that has no firm grounding and unrealistically implies an
- error rate of zero. Thornton and Peterson (2002:24–25) note the basic flaw
- in this reasoning:

Continued

Since the basis of all forensic identification is probability theory, examiners can never really assert a conclusion of an “identification to the exclusion of all others in the world,” but at best can only assert a very small (objective or subjective) probability of a coincidental match. . . . It is ironic that those areas of forensic science that have real underlying data offer more modest statements of individualization, while those limited to subjective or impressionistic data make the strongest statements, sometimes of absolute certainty.

From the 2004 NRC report: Forensic Analysis: Weighing Bullet Lead Evidence

- The available data do not support any statement that a crime bullet came from a particular box of ammunition. In particular, references to “boxes” of ammunition in any form should be avoided as misleading under Federal Rule of Evidence 403.
- Compositional analysis of bullet lead data alone also does not permit any definitive statement concerning the date of bullet manufacture.

2011 NRC report:

S.3 The FBI created a repository of Ames strain B. anthracis samples and performed experiments to determine relationships among the letter materials and the repository samples. The scientific link between the letter material and flask number RMR-1029 is not as conclusive as stated in the DOJ Investigative Summary.

2011 report continued

TABLE S-1 FBI and DOJ Conclusions and Committee Comments

FBI conclusions	DOJ conclusions	Committee comment	Relevant report finding/section
	<p>“Spores of such high concentration and purity indicate that they were derived from high quality spore preparations. Spores of this quality are often used in biodefense research, including vaccine development. It is important to have highly concentrated spores to challenge most effectively the vaccine being tested. Similarly, highly purified spores are necessary to prevent obstruction of the machinery used in those experiments. These findings meant that the anthrax mailer must have possessed significant technical skill” (USDOJ, 2010, p. 14).</p>	<p>The committee finds no scientific basis on which to accurately estimate the amount of time or the specific skill set needed to prepare the spore material contained in the letters. The time might vary from as little as 2 to 3 days to as much as several months. Given uncertainty about the methods used for preparation of the spore material, the committee could reach no significant conclusions regarding the skill set of the perpetrator.</p>	<p>Finding 4.1</p>

ASA efforts largely organized by Steve Pierson

- Visits to Capital Hill:
 - Senate
 - Commerce, Science, and Transportation Committee
 - Judiciary Committee
 - House
 - Science and Technology Committee
 - Judiciary Committee
- Outcomes:
 - Hill staffers more aware of scientific considerations of forensic science reform and role of statistics
 - ASA's profile raised as only science association active on Hill in pushing forensic science reform
 - Rockefeller bill specifically says statisticians should be on forensic science advisory committee
 - Better awareness for importance of independent body overseeing forensic science reform

Hill Efforts continued

Outcomes:

- Hill staffers more aware of scientific considerations of forensic science reform and role of statistics
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ASA Visits to Other Agencies

NIJ

Outcomes:

Learned about NIJ priorities and budget constraints and their desire for greater statistical input, particularly for proposal reviews

NIST

Outcomes:

Learned about key role of Office of Law Enforcement Standards and connection to OSTP in the White House

ASA Inspired Sessions

- 2011 Miami JSM

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Mon, 8/1/2011, 10:30 AM - 12:20 PM

Current Issues in Forensic Science — Topic Contributed Panel

Section on Physical and Engineering Sciences, Committee of Representatives to AAAS

Organizer(s): Clifford Spiegelman, Texas A & M University

Chair(s): Karen Kafadar, Indiana University

Abstract: **Current Issues in Forensic Science**

Panelists: **Constantine Gatsonis, Brown University**
Sarah Chu, Innocence Project
Clifford Spiegelman, Texas A & M University

12:15 PM **Floor Discussion**

- 2012 San Diego JSM
 - Today's Program

ASA Inspired sessions continued: AAAS 2013 in Boston

A Decade After ‘Forensic Science: Oxymoron?’ Is There Hope? Will There Be Real Change?

Speaker (1) NRC (2009) report why, and what it was meant to do.

Anne-Marie Mazza, Ph.D. Director, Committee on Science, Technology, and Law, the National Academies.

Speaker (2) A vibrant forensic science program in the Office of Justice Programs is should be a national priority. John H. Laub, Ph.D. Director, National Institute of Justice

Speakers (3) Establishing a statistical foundation for forensic science techniques is a key to advancement. (Except for DNA, most forensic science techniques are lacking this foundation.) Dr. Karen Kafadar Rudy Professor of Statistics, Indiana University Bloomington

Final Comments

- There is a broad consensus on the need for forensic reform
- There is not consensus on the pace and details of reform, and particularly how much the stat community will be involved but there is reason to be optimistic
- Many other high profile forensic blunders left out of this talk. Either forensic science was not applied or applied badly
 - JFK, RFK, MLK, Pan Am 103