FW: HJC Prep Tuesday

From: "Hankey, Mary Blanche (OLA)" <(b) (6) >
To: "Raman, Sujit (ODAG)" <(b) (6) >
Date: Mon, 06 Nov 2017 14:57:03 -0500
Attachments: Asset Forfeiture Oversight - press release 10.17.2017.docx (26.45 kB); Civil Asset Forfeiture--USE THIS ONE.docx (25.53 kB); Human Trafficking 10 -12 -17.docx (21.88 kB); Backpage.com Investigation - JCT 10-12-17.docx (19.15 kB); Charging Memo.docx (20.75 kB); ECTR TPs for AG -- 10-6-2017_FINAL.docx (24.95 kB); Going Dark TPs for AG -- 10-6-2017_FINAL.docx (21.36 kB); US-UK Agreement + Foreign Stored Data TPs for AG-- 10-6-2017_FINAL.docx (27 kB); Lois Lerner briefing paper - 10.5.17.docx (18.38 kB); Forensics_09262017.docx (19.86 kB)

Sujit,

These prep sessions are more of an informal moot, than a subject matter briefing. So, please come prepared to ask the AG questions on the topics below. We are looking to your expertise in the cyber arena. Attached are the briefing papers. Please let me know if you need additional information.

This session is currently scheduled for Tuesday at 3:30 pm. You should be receiving a calendar invite

- Asset Forfeiture
- Human Trafficking
- Backpage.com
- Charging Memo
- ECTR/ECPA
- Going Dark
- Microsoft Fix/US-UK
- Lois Lerner Letter
- Forensics
- Human Fetal Tissue Referrals (will be coming later today)

Mary Blanche Hankey
Chief of Staff and Counsel
Office of Legislative Affairs
Office: (b) (6)
Cell: (b) (6)

ISSUE: CRITICISM OF FORENSIC SCIENCE

BACKGROUND

- (b) (5)
  - (b) (5)
- (b) (5)
- (b) (5)

EXPECTED QUESTIONS

- (b) (5)
- (b) (5)
- (b) (5)

RECOMMENDED RESPONSE

- (b) (5)
- (b) (5)

- (b) (5) [redacted]
- (b) (5) [redacted]
    - **IF PRESSED:**
        - (b) (5) [redacted]

PREPARED BY

COMPONENT: OLP

POC & DIRECT LINE: Kira Antell (b) (6)

RE: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

From: "Antell, Kira M. (OLP)" <(b) (6)>
To: "Shapiro, Elizabeth (CIV)" <(b) (6)>
Cc: "Hunt, Ted (ODAG)" <(b) (6)>, "Goldsmith, Andrew (ODAG)" <(b) (6)>
Date: Sat, 30 Sep 2017 16:28:11 -0400
Attachments: Evett et al, Finding the Way Forward, FS International (2017).pdf (418.04 kB); Budowle Response to PCAST Report 06-17-2017 (002).pdf (521.58 kB)

Thanks Betsy.

(b)(5) per CIV

Thanks,
Kira

From: Shapiro, Elizabeth (CIV)
Sent: Friday, September 29, 2017 1:44 PM
To: Antell, Kira M. (OLP) (b) (6)>
Cc: Hunt, Ted (ODAG) <(b) (6) oldsmith, Andrew (ODAG) <(b) (6)>
Subject: RE: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

Yes. I will definitely ask for that. I can bring copies myself, too.

From: Antell, Kira M. (OLP)
Sent: Friday, September 29, 2017 12:22 PM
To: Shapiro, Elizabeth (CIV) <(b) (6)>
Cc: Hunt, Ted (ODAG) <(b) (6)>; Goldsmith, Andrew (ODAG) <(b) (6)>
Subject: Re: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

Betsy,

(b)(5) per CIV

Sent from my iPhone

On Sep 29, 2017, at 11:58 AM, Goldsmith, Andrew (ODAG) (b) (6) wrote:

> Thanks; note that the entire 170+ page PCAST report is included with the materials for the Symposium.
>
> **From:** Hur, Robert (ODAG)
> **Sent:** Friday, September 29, 2017 11:49 AM
> **To:** Goldsmith, Andrew (ODAG) <(b) (6)>; Hunt, Ted (ODAG) <(b) (6)>
> **Cc:** Crowell, James (ODAG) <(b) (6)>; Shapiro, Elizabeth (CIV) <(b) (6)>
> **Subject:** FW: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting
>
> Andrew and Ted,
>
> FYI.
>
> Thanks,
> Rob
>
> **From:** (b)(6) Bridget Healy [(b)(6) Bridget Healy]
> **Sent:** Fr day, September 29, 2017 9:27 AM
> **To:** (b)(6) Debra Livingston; (b)(6) Daniel Capra; (b)(6) James Bassett;

(b)(6) Daniel Collins; Hur, Robert (ODAG) <(b) (6)>; (b)(6) AJ Kramer; (b)(6) Traci Lovitt; (b)(6) J Thomas Marten; (b)(6) Shelly Dick; (b)(6) Thomas Schroeder; (b)(6) Liesa Richter; (b)(6) William Sessions

Cc: (b)(6) James Dever; (b)(6) Lyndsay Hayes; (b)(6) Sara Lioi; Shapiro, Elizabeth (CIV) <(b) (6)>; (b)(6) David Campbell; (b)(6) Nancy Outley; (b)(6) Daniel Coquillette; (b)(6) Daniel Coquillette; (b)(6) Irene Dalbec; (b)(6) Barbara Alcon; (b)(6) Kathy Stephenson; (b)(6) Jeanette Santos; (b)(6) Krystle Dalke; (b)(6) Timothy Lau; Brown, Angela M. (ODAG) <(b) (6)>; (b)(6) Rebecca Womeldorf; (b)(6) Patrick Tighe

Subject: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

Dear Committee members and invited guests,

The agenda materials are now available on uscourts.gov at the following link: http://www.uscourts.gov/rules-policies/archives/agenda-books/advisory-committee-rules-evidence-october-2017. Please let our office know if you have any issues accessing or downloading the materials. We look forward to seeing you in Boston!

Sincerely,

Bridget Healy
Attorney Advisor
Office of General Counsel, Rules Committee Staff
(b) (6)
(b) (6)

Re: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

From: "Shapiro, Elizabeth (CIV)" <(b) (6) >
To: "Antell, Kira M. (OLP)" <(b) (6) >
Cc: "Hunt, Ted (ODAG)" <(b) (6) >, "Goldsmith, Andrew (ODAG)" <(b) (6) >
Date: Sat, 30 Sep 2017 18:09:19 -0400

Agreed

Sent from my Verizon, Samsung Galaxy smartphone

-------- Original message --------
From: "Antell, Kira M. (OLP)" <(b) (6) >
Date: 9/30/17 4:28 PM (GMT-05:00)
To: "Shapiro, Elizabeth (CIV)" <(b) (6) >
Cc: "Hunt, Ted (ODAG)" <(b) (6) n, Andrew (ODAG)" <(b) (6) >
Subject: RE: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

RE: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

From: "Shapiro, Elizabeth (CIV)" <(b) (6)>
To: "Antell, Kira M. (OLP)" <(b) (6)>
Cc: "Hunt, Ted (ODAG)" <(b) (6)>, "Goldsmith, Andrew (ODAG)" <(b) (6)>
Date: Sun, 01 Oct 2017 22:33:15 -0400

I sent the articles to Dan, and requested that they be circulated to the group – (b)(5) per CIV

From: Antell, Kira M. (OLP)
Sent: Friday, September 29, 2017 12:22 PM
To: Shapiro, Elizabeth (CIV) <(b) (6)>
Cc: Hunt, Ted (ODAG) <(b) (6)>; Goldsmith, Andrew (ODAG) <(b) (6)>
Subject: Re: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

Duplicative Information - See Document ID 20220314-04452

RE: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

From: "Antell, Kira M. (OLP)" <(b) (6) >
To: "Shapiro, Elizabeth (CIV)" <(b) (6) >
Cc: "Hunt, Ted (ODAG)" <(b) (6) >, "Goldsmith, Andrew (ODAG)" <(b) (6) >
Date: Mon, 02 Oct 2017 09:38:11 -0400

(b)(5) per CIV

(b)(5) per CIV

(b)(5) per CIV

From: Shapiro, Elizabeth (CIV)
Sent: Sunday, October 1, 2017 10:33 PM
To: Antell, Kira M. (OLP) <(b) (6) >
Cc: Hunt, Ted (ODAG) <(b) (6) >; Goldsmith, Andrew (ODAG) <(b) (6) >
Subject: RE: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

Duplicative Information - See Document ID 20220314-04456

RE: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

From: "Shapiro, Elizabeth (CIV)" <(b) (6)>
To: "Antell, Kira M. (OLP)" <(b) (6)>
Cc: "Hunt, Ted (ODAG)" <(b) (6)>, "Goldsmith, Andrew (ODAG)" <(b) (6)>
Date: Mon, 02 Oct 2017 12:53:27 -0400

Done. I suspect (b)(5) per CIV, but we'll see what he says. On the articles, the AO is going to send them out and append them to the written agenda materials.

From: Antell, Kira M. (OLP)
Sent: Monday, October 02, 2017 9:38 AM
To: Shapiro, Elizabeth (CIV) <(b) (6)>
Cc: Hunt, Ted (ODAG) <(b) (6)>; Goldsmith, Andrew (ODAG) <(b) (6)>
Subject: RE: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

Duplicative Information - See Document ID 20220314-04452

RE: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

From: "Antell, Kira M. (OLP)" <(b) (6)>
To: "Shapiro, Elizabeth (CIV)" <(b) (6)>
Cc: "Hunt, Ted (ODAG)" <(b) (6)>, "Goldsmith, Andrew (ODAG)" <(b) (6)>
Date: Mon, 02 Oct 2017 13:06:42 -0400

Thanks

From: Shapiro, Elizabeth (CIV)
Sent: Monday, October 2, 2017 12:53 PM
To: Antell, Kira M. (OLP) <(b) (6)>
Cc: Hunt, Ted (ODAG) <(b) (6)>; Goldsmith, Andrew (ODAG) <(b) (6)>
Subject: RE: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

FW: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

From: "Shapiro, Elizabeth (CIV)" <(b) (6)>
To: "Antell, Kira M. (OLP)" <(b) (6)>
Cc: "Hunt, Ted (ODAG)" <(b) (6)>, "Goldsmith, Andrew (ODAG)" <(b) (6)>
Date: Tue, 03 Oct 2017 11:06:28 -0400
Attachments: Evett et al, Finding the Way Forward, FS International (2017).pdf (418.04 kB); UNT Center for Human Identification, Response to PCAST Report June 2017.pdf (521.58 kB)

Kira, Ted, Andrew: Below is a message from Dan Capra, reacting to the articles we've added to the materials:

"Reading the two articles you sent it seems as if you are preparing for some battle. The pcast report is just background. The conference is not about the pcast report. I am going to be really upset if all my work and preparation leads to a day long line by line fight over the pcast report."

I wanted to respond to him as follows:

(b) (5)

From: (b)(6) Bridget Healy
Sent: Tuesday, October 03, 2017 10:40 AM
(b)(6) Debra Livingston; (b)(6) Dan Capra; (b)(6) James Bassett; (b)(6) Daniel Collins; Hur, Robert (ODAG) <(b) (6)>; (b)(6) AJ Kramer; (b)(6) Traci Lovitt; (b)(6) J Thomas Marten; (b)(6) Shelly Dick; (b)(6) Thomas Schroeder; (b)(6) Liesa Richter; (b)(6) William Sessions
Cc: (b)(6) James Dever; (b)(6) Lyndsay Hayes; (b)(6) Sara Lioi; Shapiro, Elizabeth (CIV) <(b) (6)>; (b)(6) David Campbell; (b)(6) Nancy Outley; (b)(6) Daniel Coquillette; (b)(6) Daniel Coquillette; (b)(6) Irene Dalbec; (b)(6) Barbara Alcon; (b)(6) Kathy Stephenson; (b)(6) Jeanette Santos; (b)(6) Krystle Dalke; (b)(6) Timothy Lau; Brown, Angela M. (ODAG) <(b) (6)>; (b)(6) Rebecca Womeldorf; (b)(6) Patrick Tighe
Subject: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

Hi everyone,

Please find attached two additional articles that relate to the report included at Tab 9C of the agenda book. They have been added to the online version of the agenda materials as well.

Sincerely,
Bridget

Bridget Healy
Attorney Advisor
Office of General Counsel, Rules Committee Staff
(b) (6)
(b) (6)

Forwarded by Bridget Healy/DCA/AO/USCOURTS on 10/03/2017 09 31 AM

From Bridget Healy/DCA/AO/USCOURTS

RE: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

From: "Antell, Kira M. (OLP)" <(b) (6)>
To: "Shapiro, Elizabeth (CIV)" <(b) (6)>
Cc: "Hunt, Ted (ODAG)" <(b) (6)>, "Goldsmith, Andrew (ODAG)" <(b) (6)>
Date: Tue, 03 Oct 2017 11:11:13 -0400

That looks very good. My suggestion in RED.

From: Shapiro, Elizabeth (CIV)
Sent: Tuesday, October 3, 2017 11:06 AM
To: Antell, Kira M. (OLP) <(b) (6)>
Cc: Hunt, Ted (ODAG) <(b) (6)>; Goldsmith, Andrew (ODAG) <(b) (6)>
Subject: FW: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

Kira, Ted, Andrew: Below is a message from Dan Capra, reacting to the articles we've added to the materials:

"Reading the two articles you sent it seems as if you are preparing for some battle. The pcast report is just background. The conference is not about the pcast report. I am going to be really upset if all my work and preparation leads to a day long line by line fight over the pcast report."

I wanted to respond to him as follows:

(b) (5)

Duplicative Information - See Document ID 20220314-04464

RE: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

From: "Shapiro, Elizabeth (CIV)" <(b) (6)>
To: "Antell, Kira M. (OLP)" <(b) (6)>
Cc: "Hunt, Ted (ODAG)" <(b) (6)>, "Goldsmith, Andrew (ODAG)" <(b) (6)>
Date: Tue, 03 Oct 2017 11:12:50 -0400

Perfect. Thanks Kira.

From: Antell, Kira M. (OLP)
Sent: Tuesday, October 03, 2017 11:11 AM
To: Shapiro, Elizabeth (CIV) <(b) (6)>
Cc: Hunt, Ted (ODAG) <(b) (6)>; Goldsmith, Andrew (ODAG) <(b) (6)>
Subject: RE: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

Duplicative Information - See Document ID 20220314-04466

RE: FRE Conference on Forensics Moot

From: "Antell, Kira M. (OLP)" <(b) (6)>
To: "Goldsmith, Andrew (ODAG)" <(b) (6)>, "Hunt, Ted (ODAG)" <(b) (6)>, "Hafer, Zachary (USAMA)" <(b) (6)>, "Young, Cynthia (USAMA)" <(b) (6)>, "Ibrahim, Anitha (CRM)" <(b) (6)>, "Wroblewski, Jonathan (CRM)" <(b) (6)>, "Smith, David L. (USAEO)" <(b) (6)>
Cc: "Shapiro, Elizabeth (CIV)" <(b) (6)>, "Morrissey, Brian (OAG)" <(b) (6)>, "Crytzer, Katherine (OLP)" <(b) (6)>, "Newman, Ryan (OLP)" <(b) (6)>, "Thiemann, Robyn (OLP)" <(b) (6)>, "Isenberg, Alice R. (LD) (FBI)" <(b)(6), (b)(7)(C), (b)(7)(E) per FBI>, (b)(6), (b)(7)(C), (b)(7)(E) per FBI (OGC) (FBI)" <(b)(6), (b)(7)(C), (b)(7)(E) per FBI>
Date: Tue, 10 Oct 2017 09:11:06 -0400
Attachments: FRE Symposium Forensics E Binder 10102017_DISTRIBUTED.pdf (4.26 MB)

Good morning,

(b)(5) per CIV, I have attached an e-binder than contains bios and summaries of symposium participants and additional information on PCAST and FRE 702 proposals.

Thanks,
Kira

-----Original Appointment-----
From: Antell, Kira M. (OLP)
Sent: Thursday, October 5, 2017 8:19 AM
To: Antell, Kira M. (OLP); Goldsmith, Andrew (ODAG); Hunt, Ted (ODAG); Hafer, Zachary (USAMA); Young, Cynthia (USAMA); Ibrahim, Anitha (CRM); Wroblewski, Jonathan (CRM); Smith, David L. (USAEO)
Cc: Shapiro, Elizabeth (CIV); Morris G); Crytzer, Katherine (OLP); Newman, Ryan (OLP); Thiemann, Robyn (OLP); Isenberg, Alice R. (LD) (FBI); (b)(6), (b)(7)(C) per FBI (OGC) (FBI)
Subject: FRE Conference on Forensics Moot
When: Wednesday, October 11, 2017 3:00 PM-4:00 PM (UTC-05:00) Eastern Time (US & Canada).
Where: OLP Conference Room 4525 and Conference Line: (b) (6) /Passcode: (b) (6)

From: Antell, Kira M. (OLP)
Sent: Tuesday, October 3, 2017 11:53 AM
To: Goldsmith, Andrew (ODAG) <(b) (6)>; Hunt, Ted (ODAG) <(b) (6)>; Hafer, Zachary (USAMA) <(b) (6)>; Young, Cynthia U MA) <(b) (6)>; Ibra , Anitha (CRM) <(b) (6)>; Wroblew Jonathan (CRM) <(b) (6)>; Smith, Dav d L. (USAEO) <(b) (6)>
Cc: Shapiro, Elizabeth (CIV) <(b) (6)>
Subject: FRE Conference on Forensics Moot

Good morning,

As you know, the Advisory Committee on Evidence is holding a mini-conference on forensics on 10/27 in Boston at which they will discuss potential changes to FRE 702. I have attached the conference memo here. Also, in the event you're not dialed into late night TV, enjoy this John Oliver piece on forensics.
http://theweek.com/speedreads/728186/john-oliver-takes-law-into-hands-fight-junk-forensic-science-since-trump-wont

Ted Hunt and Andrew Goldsmith are on the forensics panel and Zach Hafer is on a more general Daubert panel. Betsy Shapiro and Rob Hur will be attending as members of the committee. Cynthia Young and I will also be at the conference.

(b)(5) per CIV. I have suggested some times below. Please let me know if you're able to attend any of these. Also, let me know if you feel there are others I should include moving forward.

Friday, 10/6: 11:00 or 2:00
Wednesday, 10/11: 11:00 or 3:00
Thursday, 10/12: 2:30 or 3:30

Kira Antell
Senior Counsel
Office of Legal Policy
U.S. Department of Justice

950 Pennsylvania Avenue, NW
Washington, DC 20530
(b) (6)
(b) (6)

ADVISORY COMMITTEE ON EVIDENCE RULES

Symposium on
Forensic Evidence and Rule 702

Boston College School of Law
October 27, 2017

ADVISORY COMMITTEE ON EVIDENCE RULES
SYMPOSIUM ON FORENSIC EVIDENCE AND RULE 702

TAB 1:
ADVISORY COMMITTEE MATERIALS

FORDHAM

University School of Law

Lincoln Center, 150 West 62nd Street, New York, NY 10023-7485

Daniel J. Capra
Philip Reed Professor of Law

Phone: (b) (6)
e-mail: (b) (6)

Memorandum To: Advisory Committee on Evidence Rules
From: Daniel J. Capra, Reporter
Re: Symposium on Forensic Expert Testimony, *Daubert* and Rule 702
Date: October 1, 2017

This memorandum provides some background on the symposium that is going to be held the day after the Committee's Fall 2017 meeting. The symposium is about two topics: 1. Recent challenges to forensic expert testimony; and 2. Problems in applying *Daubert* more generally. The fundamental objective as to both topics is to provide the Committee with input on what the problems are, and whether rulemaking is a good option for trying to solve them. The panel consists of distinguished scientists, judges, academics and practitioners.

The format of the Symposium is to allow each participant to make a presentation of around 10 minutes in length. There will at various points be an opportunity for questions and comments from Committee members and general discussion among the participants. The estimate is that the first panel, on forensic evidence, will run from 8:30-11:15. The second panel, on *Daubert,* is estimated to run from 11:30-1:00.

We are very thankful to Boston College Law School and Dean Rougeau for hosting this conference and Committee meeting. And we must give an extra special thanks to Dan Coquillette for all his wonderful work in making this Symposium happen.

This memorandum first sets forth the Symposium agenda --- a list of speakers and topics. Next, it provides some background about the genesis of the Symposium. Third, it discusses briefly the possible role of rulemaking in regulating forensic expert testimony.

Attached to this memorandum is the report of the President's Council of Advisors on Science and Technology (PCAST) on forensic expert testimony. That report establishes the foundation for discussion on the forensic panel. Also attached to this memo is a bio for each Symposium participant.

Symposium Participants and Presentations

Here is a list of Symposium participants, in order of speaking, and their chosen topics:[1]

Panel One: Forensic Evidence

Scientists

Dr. Eric Lander, President and founding director of the Broad Institute of MIT and Harvard; co-chair of the President's Council of Advisors on Science and Technology (PCAST).

Topic: The PCAST Report

Dr. Karen Kafadar, Commonwealth Professor & Chair of Statistics at University of Virginia.

Topic: Distinguishing Opinion and Relevance From Demonstrably Sufficient Science

Rule 702 allows a witness to testify "in the form of an opinion or otherwise" if "the testimony is based on sufficient facts or data" and "is the product of reliable principles and methods" that have been "reliably applied". The determination of "sufficient" (facts or data), and whether the "reliable principles and methods" relate to the scientific question at hand, involve more discrimination than the current Rule 702 may suggest. Using examples from latent fingerprint matching and trace evidence (bullet lead and glass), Dr. Kafadar will offer some criteria that scientists often consider in assessing the "trustworthiness" of evidence, to enable courts to better distinguish between "trustworthy" and "questionable" evidence. The codification of such criteria may ultimately strengthen the current Rule 702 so courts can better distinguish between demonstrably scientific sufficiency and "opinion" based on inadequate (or inappurtenant) methods.

Dr. Bruce Budowle, Director of the Center for Human Identification, University of North Texas Science Center.

Topic: TBD

Dr. Itiel Dror, University College London (UCL) and Cognitive Consultants International.

Topic: "Reliability and Biasability of Expert Evidence"

[1] It is possible that speaker order, topics, and even speakers will change between the time this memo is distributed and the time of the Symposium.

Expert evidence is often based on human perception, judgement, interpretation and decision making. These often include subjective elements. Subjectivity is not necessarily a bad thing, but it can introduce two major concerns. First, reliability (in the scientific sense of consistency and reproducibility), that is, will different experts reach the same conclusions (the inter- between-expert reliability); and more basic, will the same expert, examining the same data, reach the same conclusions (the intra- within-expert reliability). The second concern is biasability, the biasing influence of irrelevant contextual information, as well as target driven bias (whereby the experts work 'backward' from the 'target' suspect to the evidence, rather than the evidence itself driving the forensic work). The Hierarchy of Expert Performance (HEP) demonstrates that expert evidence suffers from both issues of reliability and biasability, even in forensic fingerprint and mixture DNA evidence.

The problem is that forensic evidence is often misrepresented in court and is incorrectly regarded by most jurors (as well as judges, and the forensic experts themselves) as objective and impartial evidence. It is therefore important to make sure that there are minimal misconceptions about the true nature and weaknesses of forensic evidence. Furthermore, that the courts make sure that steps are taken by experts to deal with those weaknesses, such as LSU - Linear Sequential Unmasking (which stipulates that experts should only be exposed to relevant information and methods for ensuring experts work from the evidence to the suspect, not backwards). When expert evidence fails to meet these standards, it is biased and unreliable, and then it should be excluded. The fear of evidence being excluded will make a much needed positive impact on the way forensic work is carried out, resulting in evidence that is more impartial and reliable.

Dr. Thomas Albright, Professor and Conrad T. Prebys Chair, Salk Institute for Biological Studies.

Topic: Why Eyewitnesses Fail

Eyewitness identifications play an important role in the investigation and prosecution of crimes, but it is well known that eyewitnesses make mistakes, often with serious consequences. In light of these concerns, the National Academy of Sciences recently convened a panel of experts to undertake a comprehensive study of current practice and use of eyewitness testimony, with an eye towards understanding why identification errors occur and what can be done to prevent them. The work of this committee led to key findings and recommendations for reform, detailed in a consensus report entitled Identifying the Culprit: Assessing Eyewitness Identification. In this presentation, Dr. Albright will focus on the scientific issues that emerged from this study, along with brief discussions of how these issues led to specific recommendations for additional research, best practices for law enforcement, and use of eyewitness evidence by the courts.

Susan Ballou, Program Manager for the Forensic Sciences Research Program, National Institute of Standards and Technology (NIST).

Topic: Getting The Science Right – Not The Focus of Rule of Evidence 702

- Measurement science provides basis for testimony – data driven results required to justify position.
- Science is presented with increased specificity and certainty – supporting the selected principles and methods

Judiciary

Hon. Alex Kozinski, Circuit Judge, Ninth Circuit Court of Appeals

Topic: TBD

Hon. Jed S. Rakoff, District Judge, Southern District of New York

Topic: The Problem of Experts Overstating a "Match"

Hon. K. Michael Moore, Chief Judge, Southern District of Florida

Topic: The Need for a Flexible Rule

Chief Judge Moore will be discussing the need for a flexible rule to enable trial court judges to assess the admissibility of expert opinions, especially as the legal landscape evolves. Specifically, Chief Judge Moore will address recent developments in drug prosecutions pertaining to synthetic drugs and assessing the reliability of experts in this area.

Academics

Professor Ronald J. Allen, John Henry Wigmore Professor of Law, Northwestern Pritzker School of Law

Topic: Fiddling While Rome Burns: the Story of the Federal Rules and Experts.

Worrying about the "reliability" of some discipline with little assurance that it is has been applied correctly, and less assurance that the fact finder understands it, is to fiddle while Rome burns. This point derives from Professor Allen's papers that explored the distinction between educational and deferential models of decision making.

Professor David H. Kaye, Distinguished Professor and Weiss Family Scholar, Penn State Law School

Topic: Why Has Rule 702 Failed Forensic Science?

Eight years ago, a committee of the National Academy of Sciences concluded that "[i]n a number of forensic science 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." The committee also observed that "[f]ederal appellate courts have not with any consistency or clarity imposed standards ensuring the application of scientifically valid reasoning and reliable methodology in criminal cases involving *Daubert* questions." This situation, it added, was "not surprising" given that *Daubert* is so "flexible."

This presentation will elaborate on these conclusory remarks in four ways (time permitting). First, it will describe how ambiguities and flaws in the terminology adopted in *Daubert* combined with the opaqueness of forensic-science publications and standards have been exploited to shield some test methods from critical judicial analysis. Second, to promote an improved understanding of the necessary foundations for scientific and other expert testimony, it will sketch various meanings of the terms "validity" and "reliability" in science and statistics on the one hand, and in the rules and opinions on the admissibility of expert evidence, on the other. In this regard, it will skeptically consider the two-part definition of "validity" in a 2016 report of the President's Council of Advisors on Science and Technology and will question the report's effort to draw a bright line for the "validity" of pattern-matching testimony. Third, it will ask if the Federal Rules of Evidence should be revised to conform more closely to the usual scientific terminology. Finally, it will identify four ways to indicate uncertainty in forensic findings and will propose requiring statements about uncertainty when reporting outcomes of scientific tests.

Professor Jonathan J. Koehler, Beatrice Kuhn Professor of Law at Northwestern Pritzker School of Law

Topic: Rule 702(b) – "sufficient facts or data" In the Context of Source Opinion Testimony by Forensic Experts.

Professor Jane Campbell Moriarty, Carol Los Mansmann Chair in Faculty Scholarship, Duquesne University School of Law

Topic: Judicial Gatekeeping of Forensic Science Feature-comparison Evidence.

Courts generally admit such evidence, despite little proof of scientific reliability. Why are courts generally unreceptive to challenges about the reliability of such evidence? It may be that judges (like most people) perceive feature-comparison evidence as fairly straightforward and intuitively accurate. This perception may cause courts to employ heuristic approaches to the evidence—that is, cognitive shortcuts that manage complexity—which can be influenced by common cognitive biases, such as belief perseverance and confirmation bias. By understanding that feature-comparison "matching" is a complex, multifaceted process, courts might engage in a deeper, science-based review to better analyze the shortcomings and limitations of such evidence.

Professor Erin Murphy, N.Y.U. Law School

Topic: Machine-Generated Forensic Evidence

Technology has dramatically changed the shape of evidence in criminal courts. Forensic comparisons increasingly rely on machine-generated information, such as the DNA match statistics produced by a probabilistic genotyping software program or the location data reported by a cell phone tracker. This talk probes whether rules designed for viva voce confrontation of isolated pieces of evidence require tweaking when applied to machine-generated evidence.

Special Commentary by Professor Charles Fried, Beneficial Professor of Law, Harvard Law School.

Practitioners

Ted Hunt, Senior Advisor on Forensics, United States Department of Justice

Topic: The PCAST Report

Mr. Hunt will speak directly to the PCAST report and offer the Department's official position on the report.

Andrew Goldsmith, Associate Deputy Attorney General and National Criminal Discovery Coordinator, United States Department of Justice

Topic: The Reliability of the Adversarial System to Inform Factfinders About Any Genuine Issues as to the Reliability or Accuracy of Forensic Testimony.

Chris Fabricant, Joseph Flom Special Counsel and Director of Strategic Ligation, The Innocence Project

Topic: The 702 Requirement of Reliable Application

Mr. Fabricant will discuss 702/*Daubert* as it relates to forensic sciences, with a particular focus on FRE 702(c)'s requirement that the testimony at issue be the product of reliable principles and methods, and how this requirement has been interpreted by courts in criminal cases.

Anne Goldbach, Forensic Services Director, Committee for Public Counsel Services, Public Defender Agency of Massachusetts.
Topic: TBD

Panel Two: Rule 702 and Daubert

Judiciary

Hon. Patti B. Saris, Chief Judge, District of Massachusetts

Topic: Daubert Gatekeeping and Complex Scientific Concepts

Chief Judge Saris will address the challenges to courts in addressing *Daubert* motions where the scientific concepts are complex, like patent litigation or product liability. Her perspective is that *Daubert* does not have the liberalizing effect the Supreme Court anticipated but actually makes it harder to have expert evidence introduced. She will outline different approaches courts use to understand the science (like tutors).

Hon. Jed S. Rakoff, District Judge, Southern District of New York

Topic: How Daubert is Working in Non-Forensic Cases, and How Trial Judges seek to Avoid Daubert Rulings.

Hon. Paul W. Grimm, District Judge, District of Maryland

Topic: Structural Impediments for Judges Applying Rule 702 in Criminal Cases

Courts encounter special difficulties in making reasoned *Daubert* rulings in criminal cases. Structural impediments include: 1) the speed at which criminal cases proceed; 2) the significantly less helpful criminal expert disclosure rules as compared with the civil rules disclosures; 3) the overlay of the plea bargaining process and pressure on defendants not to file motions; and 4) resource limits on the ability of public defenders and CJA panel counsel on hiring forensic experts. These limitations make it very difficult for trial judges to get the information they need to perform a *Daubert*/Rule 702 analysis sufficiently far in advance of trial.

Practitioners

Zachary Hafer, Assistant U.S. Attorney, District of Massachusetts

Title: Daubert From the Perspective of a Prosecutor

Mr. Hafer will address Judge Grimm's remarks and speak further about the challenges of applying *Daubert* from the prosecutor's perspective.

Carrie Karis, Kirkland & Ellis, Chicago

Title: TBD

Lori Lightfoot, Mayer Brown, Chicago

Title: Making the Gatekeeping Function Meaningful

Experience shows *Daubert* motions have become perfunctory, i.e. it is assumed that such motions will be filed, and not attacking an expert through a *Daubert* motion is the exception, not the rule --- which obviously is not the intent. Experience also indicates judges are very reluctant to grant a *Daubert* motion if there is even a colorable argument in support of the expert's proffered testimony. So, the challenge is how to have the rule serve as an appropriate gatekeeper without barring legitimate testimony, given the significant role that experts can play in a trial. Another issue is whether, and to what extent, the rulings on the *Daubert* motions influence the settlement decision.

Lyle Warshauer, Warshauer Law Group, Atlanta

Topic: A Notice Requirement

Ms. Warshauer will speak on a proposal to require notice of intent to challenge an expert under Rule 702, and the ability to amend.

Thomas M. Sobol, Hagens Berman, Boston

Title: TBD

Academic

Professor Stephen A. Saltzburg, Wallace and Beverley Woodbury University Professor, George Washington University Law School

Title: The Challenges Imposed by Daubert on Criminal Defense Counsel

Background Information on the Recent Challenges to the Reliability of Forensic Evidence

The idea for this Symposium originated in a contact between Professor Charles Fried and the Reporter --- a contact suggested by Dan Coquillette. The President's Council of Advisers on Science and Technology (PCAST) was working on a report on forensic evidence, and the question arose as to whether the Advisory Committee on Evidence Rules might have a role in implementing a set of "Best Practices" rules for certain kinds of forensic expert testimony. This Symposium is the first step in considering that question.

The best background for considering whether rulemaking has a role in addressing the challenges to forensic expert evidence is to get some idea of what those challenges are. The PCAST report --- *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods* --- provides an exhaustive analysis of why certain forensic comparison methods are questionable, and how at least some of them can be strengthened so that they have validity. Particular attention is given to the problem of experts overstating their results.

The PCAST report is attached to this memorandum. It is essentially the jumping-off point for the forensics panel at this conference. It is highly recommended reading.

As noted above, there are two separate panels for this Symposium. The second panel is on *Daubert* more generally. The genesis for this panel came from discussions with members of the Committee on Rules of Practice and Procedure, when Judge Sessions reported about the Advisory Committee's intention to hold a Symposium on forensic evidence. These members suggested that it would be fruitful to look at other problems that had arisen since the 2000 amendment to Rule 702. Moreover, the Committee had been receiving suggestions from some academics that Rule 702 was being applied incorrectly. Accordingly, the Symposium's agenda was expanded to encompass some preliminary discussions on other problems in applying Rule 702 and *Daubert.* This inquiry is a beginning and not an end --- there is no attempt to be comprehensive on all the issues that have arisen in applying *Daubert* and Rule 702; Panel Two is a sampling.

Amending the Evidence Rules to Regulate Forensic Expert Testimony Explicitly?

The PCAST report advocates a role for the Advisory Committee on Evidence Rules in regulating forensic expert testimony. Whether that role would mean proposing an amendment to the Federal Rules of Evidence is unclear, and will be a matter explored at the Conference.

While a rule amendment might not be the answer, it should at least be helpful to the discussion to set forth what a rule amendment might look like. So, for purposes of discussion, what follows below is two possibilities for amendment, both of which incorporate the suggested standards from the PCAST report. After that, consideration is given to the role of a Committee Note, and to the possibility of a freestanding Best Practices Manual.

1. Amending Rule 702:

One possibility is to add an extra section to Rule 702 to govern forensic expert testimony:

Rule 702. Testimony by Expert Witnesses

(a) In General. 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:

(1) ~~(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;

(2) ~~(b)~~ the testimony is based on sufficient facts or data;

(3) ~~(c)~~ the testimony is the product of reliable principles and methods; and

(4) ~~(d)~~ the expert has reliably applied the principles and methods to the facts of the case.

(b) Forensic Expert Witnesses. If a witness is testifying on the basis of a forensic examination [conducted to determine whether an evidentiary sample is similar or identical to a source sample] [or: "testifying to a forensic identification"], the proponent must prove the following in addition to satisfying the requirements of Rule 702(a):

(1) the witness's method is repeatable, reproducible, and accurate --- as shown by empirical studies conducted under conditions appropriate to its intended use;

(2) the witness is capable of applying the method reliably and actually did so; and

(3) the witness accurately states the probative value of [the meaning of] any similarity or match between the samples.

Reporter's Comments

1. Currently Rule 702 has four subdivisions, (a)-(d). Slapping on a new subdivision (e) to cover forensic evidence would be unworkable, because the standards set forth for forensic experts definitely overlap with the existing standards. (Which perhaps means that the existing standards are sufficient to treat any concern about forensic evidence, if the courts give them meaningful application.)

2. The current subdivisions would have to be changed from letters to numbers in order to have a separate subdivision covering forensic evidence. This is not ideal, because it will upset electronic searches on a Rule that is cited and applied hundreds of times a year. That concern points toward a separate rule for forensic expert testimony, assuming one is deemed necessary.

3. There will be some difficulty in defining the scope of the enterprise, i.e., what exactly is forensic expert testimony --- hence the bracketed alternatives. The PCAST report doesn't really have a working definition that could be capsulized in rule text. Defining it as "feature comparison" (from the title of the PCAST report) is probably too narrow. Breathalyzers would probably not fall

under that definition, for example, nor would autopsy reports. Perhaps it is best just to leave it alone and simply refer to "forensic expert testimony" and maybe try to expound upon that term in a Committee Note.

2. A Separate Rule on Forensic Expert Testimony

Rule 707. Testimony by Forensic Expert Witnesses. If a witness is testifying on the basis of a forensic examination [conducted to determine whether an evidentiary sample is similar or identical to a source sample], [or: "testifying to a forensic identification"] the proponent must prove the following in addition to satisfying the requirements of Rule 702:

(a) the witness's method is repeatable, reproducible, and accurate --- as shown by empirical studies conducted under conditions appropriate to its intended use;

(b) the witness is capable of applying the method reliably and actually did so; and

(c) the witness accurately states the probative value of [the meaning of] any similarity or match between the samples.

Reporter's Comments:

1. If it is separate, it needs to be Rule 707. It would not do to bump Rules 703-706 down a notch, as that would be unnecessarily disruptive to current understandings and settled expectations.

2. Even as a separate rule, there remains a problem with the interface of the general rule and a specific rule on forensic evidence. There is unquestionably an overlap, but a freestanding rule must nonetheless refer back to Rule 702, otherwise it could be read as dispensing with the requirements of qualification and helpfulness that Rule 702 sets forth.

3. A Committee Note

The PCAST report suggests that much of the benefit that rulemaking could provide for regulating forensic expert testimony lies in the Committee Note. A Committee Note might establish some "best practices" that could be much more detailed than anything that could be provided in rule text. But one possible, and disappointing, impediment to a Committee Note alternative is that there is an oft-spoken (but unwritten) rule that Committee Notes are not to go beyond the text of the Rule. No citations, no treatise-like comment. A helpful Committee Note in this area might look like the Committee Note to the 2000 amendment to Rule 702 --- the most cited Committee Note in the Evidence Rules. But that is the kind of Committee Note that has been frowned upon in recent years. Apparently the best Committee Note that can be written is four words long: "The rules speaks for itself." But the text of a rule cannot possibly set forth a detailed list of best practices for all the forms of forensic evidence.

Assuming that a Committee Note can provide instruction beyond the text of an amendment, a Committee Note on forensic expert testimony could usefully treat the following topics:

- Defining "forensic."
- Distinguishing objective and subjective processes --- and specifying that with subjective processes there must be "black box" testing and an established rate of accuracy.
- Possibly rejecting certain fields with no validity, such as bitemark comparison.
- Critiquing the requirement (or the testimony) of a "reasonable degree of [forensic] certainty."
- Specifying that the expert must articulate the rate of error.
- Providing guidance on how a court might regulate the expert's testimony so that it does not overstate the results --- exclusion, jury instruction, etc.

No attempt is made here to draft a Committee Note to a new rule on forensic expert testimony. As the PCAST report suggests, any guidance that the Advisory Committee can give should probably be supported by consultation with scientists.

4. A Freestanding "Best Practices" Report

One possibility suggested by the PCAST report is that the Advisory Committee issue a "best practices" report on forensic evidence, independent of a rule amendment. Just recently the Advisory Committee conducted a project on a best practices manual for authenticating electronic evidence. It was determined, however, that the manual should be issued without the imprimatur of the Advisory Committee. The concern was that the best practices manual might be given the status of a rule without going through the full rulemaking process. The manual was published, but only as the work of the individual authors. The introduction to the manual did state that the project began under the auspices of the Advisory Committee. It states that: "The Judicial Conference Advisory Committee on Evidence Rules, surveying the case law, determined that the Bench and Bar would be well-served by published guidelines that would set forth the factors that should be taken into account for authenticating each of the major new forms of digital evidence that are being offered in the courts." The Best Practices Manual on Authenticating Digital Evidence was distributed to every federal judge, and it has in its first year of issuance been cited and relied upon in a number of opinions.

That same process might be used with respect to a Best Practices Manual for forensic expert testimony. The good news is that 1) it could be widely distributed; 2) it could be influential in that it would have an Advisory Committee pedigree, if not an imprimatur; 3) it could be detailed and voluminous --- unlike a rule and Committee Note; and 4) it could be updated and revised easily--- again unlike a rule and Committee Note. The bad news is that it would not have the force of law that a rule would have --- or at least that a rule *should* have.

FORDHAM

University School of Law

Lincoln Center, 150 West 62nd Street, New York, NY 10023-7485

Daniel J. Capra Phone: (b) (6)
Philip Reed Professor of Law e-mail: (b) (6)

Memorandum

From: Daniel J. Capra, Reporter for the Advisory Committee on Evidence Rules

Re: Symposium on Forensic Evidence and Rule 702

Date: August 9, 2017

I am pleased to confirm logistical details surrounding the Advisory Committee on Evidence Rules Symposium on Forensic Evidence and Rule 702 during October 26-27, 2017 in Boston.

Schedule
Friday, October 27, from 8:30a to 4:00p – Symposium and Committee Meeting

The symposium will begin at 8:30am on Friday and will conclude around 1:00pm. Following lunch, the Advisory Committee will reconvene its meeting and should conclude by 4:00 pm. You are welcome to observe the meeting on committee business Friday afternoon if it suits your schedule. But that is by no means required.

The Committee also will meet on Thursday, October 26 from 1:00 to 5:00, to discuss other matters regarding the Federal Rules of Evidence. Again, you are welcome to attend that meeting, but it is not required.

Location
Boston College School of Law
885 Centre Street, Newton Centre, MA 02459

All proceedings will be held in East Wing 200 at the law school. Meeting day meals will be hosted in nearby Barat House. If you plan to attend the committee meeting on Thursday, please join for lunch at 12p. For the symposium on Friday, you are invited for breakfast at 8:00a and lunch at 1:00p.

Parking

Parking will be provided for those who need it. Please let me know in advance if you do.

Committee Dinner

Thursday, October 26 at 6:45p
The Country Club
191 Clyde Street, Chestnut Hill, MA

Boston College is hosting dinner for the committee and symposium participants at the historic club that was established in 1882. The dinner menu will offer a variety of choices. You may select from the menu that evening and advise your server of any dietary needs.

Please let me know your availability for both meeting day meals and the committee dinner by September 20.

Hotel

Hilton Back Bay
40 Dalton Street, Boston, MA 02115

Committee members are staying at the Hilton Back Bay and there are ten (10) rooms available under an existing block for symposium members at a rate of $296/night. You will be able to settle your hotel bill upon check out.

Please let Shelly Cox know if you would like a room by August 30. Her contact information is (b) (6) or (b) (6) . ***After August 30, the rooms will be released and you will need to make your own reservation.***

Ground Transportation

Shuttle service for the committee will be extended to symposium participants opting to stay at the Hilton Back Bay. The shuttle will operate for the dinner and meeting/symposium and the timing will be provided closer to the event date. Taxi service and Uber drivers are readily available in the area as needed.

FORDHAM

University School of Law

Lincoln Center, 150 West 62nd Street, New York, NY 10023-7485

Daniel J. Capra
Philip Reed Professor of Law

(b)(6) phone; email address

Memorandum To: Advisory Committee on Evidence Rules
From: Daniel J. Capra, Reporter
Re: Fall Conference on Rule 702
Date: April 1, 2017

As discussed at the last Committee meeting, the Advisory Committee on Evidence Rules is preparing a Conference on Rule 702 --- specifically on developments regarding expert testimony that might justify an amendment to Rule 702. The major development to be addressed is the challenges raised in the last few years to forensic expert evidence. In 2009, the National Academy of Sciences issued an important report, concluding that many forensic techniques were not scientific. This report has led to many new challenges to such forensic testimony as ballistics, bite mark identification, and handwriting identification. Then a few months ago the President's Council of Scientific and Technical Advisors (PCAST) issued a detailed report challenging the reliability of various forms of forensic testimony and providing suggestions for how these forensic inquiries can be validated. The Chair of PCAST contacted the Reporter of the Evidence Rules Committee to brainstorm on how the PCAST suggestions might be implemented as "best practices" under Rule 702. The Conference on Rule 702 is the first step in that process.

Besides the new challenges to forensic expert testimony, there are a number of other issues regarding expert testimony that judges and members of the public have asked the Committee to review. Among them are:

- Are courts accurately applying the admissibility factors established in the 2000 amendment to Rule 702 --- specifically that the expert must have a sufficient basis and the methodology must be reliably applied?

- How should a court assess the reliability of non-scientific or "soft science" experts?

- What special problems in evaluating challenges to expert testimony arise in criminal cases?

The Conference will be convened to discuss all of the above issues, though the major focus will be on forensic experts.

The Conference will take place before the Fall Committee meeting on Friday, October 27, 2017 at Boston College Law School. The Conference will begin at 8:30 a.m. and it is anticipated that it will run over into the afternoon.

So far we have commitments from the following people to make presentations at the Conference:

- Judge Alex Kozninski, Ninth Circuit Court of Appeals
- Judge Jed Rakoff, Southern District of New York
- Judge Amy St. Eve, Northern District of Illinois
- Judge Paul Grimm, District of Maryland
- Dr. Eric Lander, Harvard University, Broad Institute, Chair of PCAST
- Professor Charles Fried, Harvard Law School
- Professor Jonathan Koehler, Northwestern University Law School

We invite and seek the Committee's recommendations on other participants who should be invited. We also seek input on other issues and problems regarding Rule 702 that might be the subject of discussion at the Conference.

FORDHAM

University School of Law

Lincoln Center, 150 West 62nd Street, New York, NY 10023-7485

Daniel J. Capra
Philip Reed Professor of Law

(b)(6) phone; email address

Memorandum To: Advisory Committee on Evidence Rules
From: Daniel J. Capra, Reporter
Re: Public comment suggesting an amendment to Rule 702
Date: October 1, 2016

Two members of the public --- Professor David Bernstein and Eric Lasker, Esq.--- have submitted a proposal to amend Evidence Rule 702. It is the Committee's responsibility to consider suggestions from the public for change to the Evidence Rules. This memo is designed to assist the committee in exercising that responsibility.

The proposal to amend Rule 702 is set forth in an article in 57 William and Mary Law Review 1 (2015). This memo summarizes the suggestions for change and the stated reasons for change, and analyzes whether an amendment may be necessary. The memo is divided into three parts. Part One discusses the 2000 amendment to Rule 702, which is the focus of the article. Part Two discusses the author's complaints about case law that ignores or misapplies Rule 702 as it has been amended, and sets forth the authors' proposed amendment to Rule 702, which is intended to bring wayward courts back into line. And Part Three provides the Reporter's observations on the authors' proposed amendments.

I. The 2000 Amendment to Rule 702

The authors focus on the section of Rule 702 that was amended in 2000, in response to *Daubert v. Merrell Dow Pharm.,* 509 U.S. 579 (1993), and its progeny. That part of Rule 702 sets forth the following reliability-based requirements for expert testimony to be admissible:

> (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 the principles and methods to the facts of the case.

The 2000 amendment was designed to distill and codify the many strands of doctrine that started in *Daubert* and that were developed in later case law in both the Supreme Court (*General Electronic v. Joiner* and *Kumho Tire v. Carmichael*) and in the lower courts. The goal was to provide some structure for courts and litigants, so that they would not have to trudge through all the case law to determine what standards needed to be met before the trial judge could admit expert testimony.[1]

Admissibility Requirements Added by the 2000 Amendment:

The 2000 amendment added three admissibility requirements to Rule 702. As restyled, these are subdivisions (b), (c) and (d). Strictly speaking, only subdivision (c), requiring reliable principles and methods, can be found explicitly in *Daubert.* But when the Advisory Committee looked over the vast post-*Daubert* case law, as well as the underlying principles in *Daubert, Joiner and Kumho,* it saw that the other two requirements had been established as well. The other two requirements --- sufficient basis and proper application --- are obviously required if the goal is to assure that expert testimony must be reliable to be admissible. They are really inseparable from the requirement of reliable principles and methods. A short discussion of these factors will explain the point.

Subdivision (b) --- Sufficient facts or data: The requirement of sufficient facts or data means that an expert's opinion must be grounded in sufficient investigation or research. Some have called it the "homework" requirement ---- the expert must have done her homework before testifying. To take a simple example, an expert should not be permitted to testify to causation in a toxic tort case on the basis of studies that have been conducted, if she has only looked at a small percentage of those studies. Reviewing studies might well be a reliable method for coming to a conclusion, but if you don't read enough of them --- or if you cherry-pick them --- the opinion that is drawn will be unreliable. Similarly, assume that a hydrologist is called to testify that contaminated water from an industrial plant flowed into the plaintiff's well four miles away. The reliable method for that conclusion is to take samples at various points to track the underground water flow. But if the expert has taken only one sample, she would be relying on insufficient facts or data. Finally, assume that an accidentologist would testify to the cause of an accident, but never bothered to view the accident scene. No matter how reliable the methodology, the claim can be made that the opinion is speculative because it is insufficiently grounded in the facts or data. *See, e.g., Pelletier v. Main Street Textiles, LP,* 470 F.3d 48 (1st Cir. 2006) (expert on safety practices was properly excluded because he never inspected the facilities and equipment at issue, and so he lacked sufficient facts or data on which to base an opinion).

[1] Another goal, frankly, was to issue a Committee Note that would provide substantial and detailed guidance into the meaning of *Daubert* and its progeny; that would instruct on how to use the *Daubert* factors; and that would assist courts and litigants in determining which questions about experts would go to weight and which to admissibility. Because a Committee Note cannot be freestanding, an amendment was necessary; the amendment was intended to codify, not to depart from *Daubert.* The Rule 702 Committee Note, by the way, has been cited by courts more times than any other Committee Note in the Evidence Rules.

Subdivision (d) --- Reliable application: The Court in *Daubert* declared that the "focus, of course, must be solely on principles and methodology, not on the conclusions they generate." 509 U.S. at 595. Yet as the Court later recognized, "conclusions and methodology are not entirely distinct from one another." *General Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997). Under the amendment, as under *Joiner*, when an expert purports to apply principles and methods in accordance with professional standards, and yet reaches a conclusion that other experts in the field would never reach, the trial court may fairly suspect that the principles and methods have not been faithfully applied. As the Advisory Committee Note states, the amendment "specifically provides that the trial court must scrutinize not only the principles and methods used by the expert, but also whether those principles and methods have been properly applied to the facts of the case." This insight --- about the need for court review of how the method was applied --- came from Judge Becker, in *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 745 (3d Cir. 1994), where he stated that "any step that renders the analysis unreliable . . . renders the expert's testimony inadmissible. This is true whether the step completely changes a reliable methodology or merely misapplies that methodology."

In sum, the 2000 amendment specifies that sufficient basis and application of method are admissibility requirements --- the judge must be satisfied by a preponderance of the evidence that the expert has relied on sufficient facts or data, and that the expert has reliably applied the methods. It is not the case that the judge can say, "I see the problems, but they go to the weight of the evidence." After a *preponderance* is found, then any slight defect in either of these factors becomes a question of weight. But not before.

II. The Case for an Amendment to Rule 702

Bernstein and Lasker's primary complaint is that some lower courts have essentially ignored Rule 702 subdivisions (b) and (d). The authors state that despite the Rules Committee's clear instruction that sufficient facts or data and reliable application are both admissibility requirements (to be established to the court by a preponderance of the evidence), some courts have treated them as questions of weight --- so any doubt about foundation or application go to the jury. The authors conclude that while the 2000 amendment "appeared sufficient at the time to rein in recalcitrant judges who had tried to evade the *Daubert* trilogy's exacting admissibility standards, with the benefit of hindsight, it is now clear that the Judicial Conference failed to account for the tenacity of those who prefer the pre-*Daubert* approach to expert testimony."

The authors conclude, rather insultingly, that "the partial failure of the 2000 amendments can be attributed to faulty draftsmanship, because the amendments' language is insufficiently blunt to restrain judges who are inclined to resist a strong gatekeeper rule."[2]

[2] It's nice, though, that they say that the Advisory Committee, in promulgating the 2000 amendment, "had no discernable agenda beyond improving the quality of expert testimony admitted in American courts." Nice, but not quite accurate. The correct statement is that the Committee "had no discernable agenda other than implementing the standards of *Daubert* and its progeny and providing a uniform structure for assessing expert testimony in light of all the case law." There is a difference in the two descriptions. Any attempt to "improve the quality of expert testimony" came from the courts, not the Advisory Committee. Many public comments argued that the 2000 amendments favored defendants in civil cases because of its strict standards. The response from the Committee was

A. Examples of Wayward Case Law

The authors cite a number of instances in which lower courts have appeared to disregard either Rule 702(b) or Rule 702(d), ending up with rulings that are "far more lenient about admitting expert testimony than any reasonable reading of the Rule would allow." Here are some examples provided:

1. Rule 702(b) (Sufficient Basis) Examples:

Milward v. Acuity Specialty Products Group, Inc., 639 F.3d 11 (1st Cir. 2011): Here the court states that "when the factual underpinning of an expert's opinion is weak it is a matter affecting the weight and credibility of the testimony --- a question to be resolved by the jury."

Kuhn v. Wyeth, Inc., 686 F.3d 618, 633 (8th Cir. 2012): An expert who ignored studies was excluded by the district court, but the court of appeals found an abuse of discretion, holding that the sufficiency of an expert's basis is a question of weight and not admissibility. *See also United States v. Finch,* 630 F.3d 1057 (8th Cir. 2011) (the sufficiency of the factual basis for an expert's testimony goes to credibility rather than admissibility, and only where the testimony "is so fundamentally unsupported that it can offer no assistance to the jury must such testimony be excluded").

In re Chantix Prods. Liab. Litig., 889 F.Supp.2d 1272, 1288 (N.D. Ala. 2012) (finding that an expert's decision to ignore data from clinical trials "is a matter for cross-examination, not exclusion under *Daubert"*).

In re Urethane Antitrust Litig., 2012 WL 6681783, at *3 (D.Kan.) ("The extent to which [an expert] considered the entirety of the evidence in the case is a matter for cross-examination.").

Bouchard v. Am. Home Prods. Corp., 2002 WL 32597992, at *7 (N.D. Ohio) ("If the plaintiff believes that the expert ignored evidence that would have required him to substantially change his opinion, that is a fit subject for cross-examination.").

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that any complaint about rigorous standards should be addressed to the Court --- as they came from the Court in the *Daubert* trilogy.

2. Rule 702(d) (Reliable Application) Examples:

City of Pomona v. SQM N.Am. Corp. 750 F.3d 1036, 1047 (9th Cir. 2014): The case involved contamination of water, and the City's expert conducted a test to determine the source of the contaminant. There are protocols for conducting such testing and the expert deviated from the protocols. The court found that "expert evidence is inadmissible where the analysis is the result of a faulty methodology or theory as opposed to imperfect execution of laboratory techniques whose theoretical foundation is sufficiently accepted in the scientific community to pass muster under *Daubert*." For this proposition the court relied on pre-2000 9th Circuit case law. The court reversed a lower court decision to exclude the expert.

Walker v. Gordon, 46 F. App'x 691, 696 (3rd Cir. 2002)("because [plaintiff] objected to the application rather than the legitimacy of [the expert's] methodology, such objections were more appropriately addressed on cross-examination and no *Daubert* hearing was required").

United States v. Gipson, 383 F.3d 689, 696 (8th Cir. 2004): The court drew a distinction between "on the one hand, challenges to a scientific methodology, and, on the other hand, challenges to the application of that methodology." It stated that "when the application of a scientific methodology is challenged as unreliable under *Daubert* and the methodology itself is otherwise sufficiently reliable, outright exclusion of the evidence in question is warranted only if the methodology was so altered by a deficient application as to skew the methodology itself." The court relied on pre-2000 authority for this proposition.

Quiet Tech. DC-8, Inc. v. Hurel-Dubois UK Ltd., 326 F.3d 1333, 1343 (11th Cir. 2003): The court found it "important to be mindful" of a distinction between the reliability of a methodology and of the application of the methodology in the case, and rejected a *Daubert* challenge based on unreliable application, relying on case law that preceded *Daubert*.

United States v. McCluskey, 954 F.Supp.2d 1227, 1247-48 (D.N.M. 2013) ("the trial judge decides the scientific validity of underlying principles and methodology" and "once that validity is demonstrated, other reliability issues go to the weight --- not the admissibility --- of the evidence").

Proctor & Gamble Co. v. Haugen, 2007 WL 709298, at *2 (D.Utah) ("Where the court has determined that plaintiffs have met their burden of showing that the methodology is reliable, the expert's application of the methodology and his or her conclusions are issues of credibility for the jury.").

Oshana v. Coca-Cola Co., 2005 WL 1661999, at *4 (N.D.Ill.) ("Challenges addressing flaws in an expert's application of reliable methodology may be raised on cross-examination.").

United States v. Adam Bros. Farming, 2005 WL 5957827, at *5 (C.D.Cal.) ("Defendants' objections are to the accuracy of the expert's application of the methodology, not the methodology itself, and as such are properly reserved for cross-examination.").

See also Faigman, Slobogin and Monahan, *Gatekeeping Science: Using the Structure of Scientific Research to Distinguish Between Admissibility and Weight in Expert Testimony,* 11 Nw. U.L.Rev. 860, 863 (2016):

> Only a minority of courts have required that the judge preliminarily determine that the expert's conclusion was reliably reached using a reliable methodology. Most courts hold that the judge's sole concern is whether the expert followed an acceptable methodology, and other decisions have even punted some types of methodological issues to the jury.

3. Other Complaints of Judicial Non-compliance

The authors have a few other complaints about some of the post-2000 cases:

a. ***Erroneous standard of review****:*

Some appellate courts have allegedly failed to apply the abuse of discretion standard to trial court determinations excluding expert testimony. The example that the authors give is *Johnson v. Mead Johnson & Co.,* 745 F.3d 557, 562 (8th Cir. 2014), where the court stated that the "liberal admission of expert testimony" called for by *Daubert* "creates an intriguing juxtaposition with our oft-repeated abuse-of-discretion standard of review." The authors accuse the court of "paying lip service" to the abuse of discretion standard but actually applying de novo review to the trial court's exclusion of expert testimony. If courts in fact are abandoning the abuse of discretion standard, that would be clear error, because the central holding of *General Electric Co. v. Joiner,* 522 U.S. 136 (1997) is that appellate courts must apply the abuse of discretion standard of review to the trial court's decision to admit or exclude expert testimony.

b. ***Failure to regulate the reliability of the expert's basis:***

Some courts have allegedly failed to assess the reliability of the information on which an expert relies. This would be a misapplication not of Rule 702, but rather of Rule 703, which requires experts to limit consideration of facts or data to that which is reasonably relied upon by other experts in the field. As *Daubert* noted, Rule 702 must be read together with Rule 703. The Committee Note to the 2000 amendment to Rule 702 clarifies the relationship between these two rules in regulating the facts or data on which an expert relies:

> When an expert relies on inadmissible information, Rule 703 requires the trial court to determine whether that information is of a type reasonably relied on by other experts in the field. If so, the expert can rely on the information in reaching an opinion. However, the question whether the expert is relying on a *sufficient* basis of information --- whether admissible information or not --- is governed by the requirements of Rule 702.

In other words, with regard to the expert's basis of information, Rule 702 imposes a *quantitative* requirement, while Rule 703 imposes a *qualitative* requirement. The authors, however, argue that this nuance is lost on some courts, and that "despite the direction in *Daubert* that Rule 702 be read in tandem with Rule 703, Rule 703 is frequently ignored in *Daubert* analyses." The authors cite as an example the Seventh Circuit case of *Manpower, Inc., v. Ins. Co. of Pa.,* 732 F.3d 796, 808 (7th Cir. 2013), where the court stated that "the reliability of data and assumption used in applying a methodology is tested by the adversarial process and determined by the jury; the court's role is generally limited to assessing the reliability of the methodology."

c. Failure to require testing:

As the 2000 Committee Note emphasizes, an important factor set forth in *Daubert* (and thus in the Rule) is that the expert's methodology must be subject to testing. They note correctly that the Advisory Committee chose not "to delineate specific standards that courts must employ in regulating expert testimony, and it did not add any specific language about the scientific method or testability to amended Rule 702." Rather, testability is found in *Daubert* itself and in the Committee Note.

The Committee has always avoided setting forth lists of relevant factors in the text Evidence Rules, on the ground that a Rule is not a treatise, and any list is bound to be underinclusive. Also, adding something specific about scientific expert testimony would have been odd because one of the major points of the amendment was to make clear that the *Daubert* gatekeeping standards apply to *all* expert testimony, scientific and nonscientific.

In any case, the authors contend that the Committee's decision not to explicit add testability to a list of relevant factors "arguably opened the door for a renewed assault on the scientific methodology requirement for the admission of scientific testimony." The example given for this "assault" is the First Circuit's decision in *Milward v. Acuity Specialty Products Group, Inc.* 639 F.3d 11 (1st Cir. 2011), in which the court allowed an expert to opine about the cause of leukemia by using a "weight of the evidence" methodology. According to the authors, the weight of the evidence methodology is not scientific because it is only a hypothesis and it is not subject to testing.

B. The Authors' Proposed Solution

The authors propose the following amendments to Rule 702, designed to prevent the judicial waywardness that they criticize:

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 or an opinion or otherwise if the testimony satisfies each of the following requirements:

(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 that reliably support the expert's opinion;

(c) the testimony is the product of reliable and objectively reasonable principles and methods; and

(d) the expert has reliably applied the principles and methods to the facts of the case and reached a[3] conclusion without resort to unsupported speculation.

Appeals of district court decisions under this Rule are considered under the abuse-of-discretion standard. Such decisions are evaluated with the same level of rigor regardless of whether the district court admitted or excluded the testimony in question.

This Rule supersedes any preexisting precedent that conflicts with any[4] section of this Rule. [5]

Reading from the top, the explanation for the changes is as follows:

Amendment 1 (to the introduction) is to correct any possible misimpression that it is enough for admissibility to satisfy any one of the requirements, i.e., to emphasize that each of the requirements must be met.

[3] The authors use the word "his" but the Federal Rules are gender-neutral.

[4] The authors had "any or all" but I am pretty sure that Joe Kimball would say that any means all.

[5] These hanging, unnumbered and unlettered paragraphs are a stylistic no-no. They would have to be reconfigured if they were going to be added to the rule.

Amendment 2 (to subdivision (b)) is to require courts to assure that experts are basing their information on reliable facts or data --- a qualitative assessment.

Amendment 3 (to subdivision (c)) purports to add a specific requirement that the expert's methodology be subject to testing.

Amendment 4 (to subdivision (d)) is apparently intended to reinforce the point that the trial court must evaluate application as well as methodology.

Amendment 5 (first hanging paragraph) would codify the *Joiner* abuse of discretion standard of review.

Amendment 6 (second hanging paragraph) would prohibit courts from relying on pre-amendment case law that conflicts with the Rule's requirements.

III. Reporter's Comments

The authors are absolutely right that there are a number of lower court decisions that do not comply with Rule 702(b) or (d). As seen above, courts have defied the Rule's requirements --- which stem from *Daubert*--- that the sufficiency of an expert's basis and the application of methodology are both admissibility questions requiring a showing to the court by a preponderance of the evidence.

One question is whether the underlying premises should be reconsidered in light of the wayward case law --- should the questions of sufficient basis and reliable application continue to be considered questions of admissibility rather than weight? There is a strong argument that the Committee's substantive decisions were correct then and remain correct now. The requirements stem from *Daubert's* conclusion that it is the trial judge who is the gatekeeper of reliability. It is hard to see how expert testimony is reliable if the expert has not done sufficient investigation, or has cherry-picked the data, or has misapplied the methodology. The same "white lab coat" problem --- that the jury will not be able to figure out the expert's missteps --- would seem to apply equally to basis, methodology and application. So the question seems to be not whether the Rule should be changed substantively, but whether the Rule can be usefully changed to make sure that courts apply it in the way it was intended to be applied.

A look at the case law indicates that wayward courts are not confused by what Rule 702(b) and (d) say. It does not appear to be a matter of vague language. The wayward courts simply don't follow the rule. They have a different, less stringent view of the gatekeeper function. So it would seem that any language change would not be one of clarification of text, but rather one which ends up to be something like:

"We weren't kidding. We really mean it. Follow this rule or else."

No amendment to the Evidence Rules comes to mind that is tasked with that mission. As will be seen in the discussion of the specific amendments proposed, nothing in those proposals does anything to clarify vague language. It is all in the nature of telling courts what they should already know.

So let's discuss the specific suggestions for amending Rule 702:

Amendment 1 --- Specifying that each of the subdivisions must be met is what the stylists call a "redundant intensifier." The Rule as it exists makes it perfectly clear that each of the subdivisions must be satisfied before an expert's testimony can be admitted. The connector is "and"; it is not "or."

It can be argued that adding the intensifier couldn't hurt. But actually it could. There could be a collateral effect, across the rules --- no other Rule has such a provision saying that all factors apply when they are connected by "and". See, e.g., Rules 701, 804(b)(1), 804(b)(3) ---

each of which have several admissibility requirements in subdivisions, with an "and" connector. A lawyer reading those rules, which do not contain an intensifier, could after this amendment to Rule 702 make the argument that he only had to satisfy one, or a few, of the requirements in these other rules. In other words, if superfluous language is going to be added to Rule 702, why not to all the other rules that are similarly structured?

Amendment 2 --- The amendment would add a reliability component to the basis requirement. The problem with that is that Rule 703 *already* contains a reliability component that regulates an expert's basis. It should be noted that an earlier draft of the Rule 702 amendment *did* set forth a reliability component to the basis requirement. Public commentary indicated that this would create difficulty for courts and litigants in trying to unpack two separate rules that would each deal with the reliability of information relied upon by an expert. After extensive discussion and review, the Committee determined that the best course would be to place the quantitative requirement in Rule 702, while retaining the qualitative requirement in Rule 703. And the Committee Note, as set forth above, explained the different emphasis of each Rule. There doesn't seem to be any need to revisit that decision. Moreover, the courts that refuse to consider the reliability of an expert's basis do not seem to be confused by the text of the Rules. They simply are disregarding the Rules. So it would seem to be futile to try to fix that recalcitrance with a textual change.

Finally, the proposed amendment is quizzical because it eliminates the word "sufficient" from Rule 702(b) --- thus taking the quantitative regulator out of the rule. There seems to be no reason to do that.

Amendment 3 --- Adding "and objectively reasonable" to the methodology requirement is an attempt to emphasize the *Daubert* requirement of testing. One possible problem with this change, however, is that it is targeted mainly to scientific expert testimony. But Rule 702 applies to all expert testimony, and while testing is important across the board, it can be less important for modes of analysis that are based on experience and judgment (such as expertise that operates mainly on experience). So adding "objectively reasonable" is unlikely to do much good --- because everyone knows that for scientific experts, testing is important, and those courts that backslide are not doing so with lack of knowledge but rather from a more liberal and flexible view of *Daubert* that is unlikely to change simply because of an amendment. And the change may do some harm in application to non-scientific methodologies.

It could be argued that adding a reference to "objective reasonableness" might have been a good idea in 2000. But whether adding it now --- at most a mild improvement --- is worth the cost of amending the Rule is another thing.

Amendment 4 --- Adding a prohibition on speculative opinions to subdivision (d) is somewhat confounding. An expert's opinion might also be speculative because he relies on insufficient information (e.g., he never investigated the accident scene), or because his methodology is unreliable. Speculativeness is not unique to misapplication. So it is unclear why

a reference to speculativeness should be located in subdivision (d). Put another way, all three requirements are essentially designed to prevent the expert from providing speculative testimony.

Second, the authors' complaint about subdivision (d) is that courts are just not following it --- they are treating challenges to application as going to the weight and not the admissibility of the expert's opinion. Adding a prohibition on speculative testimony does not address that problem at all. What would directly address the problem is "we really mean it" language. That language would address the problem of recalcitrance --- but would it solve the problem?

Amendment 5 --- Codifying Supreme Court case law on abuse of discretion review can be criticized on four grounds. First, the Advisory Committee has never found it necessary to codify a single, clear case decided by the Supreme Court. What would be the point? It is true that Rule 702 is a codification of *Daubert and its progeny.* But that is a different enterprise --- trying to provide a structure to understand three Supreme Court cases and dozens of lower court cases is unlike codifying a single Supreme Court case with a clear holding. Moreover, if the courts are not following a directly applicable Supreme Court precedent, what would make them follow the text of a rule?

Second, the Federal Rules of Evidence generally govern trial courts. They do not cover appellate courts. There are exceptions, such as Rule 201, which covers judicial notice by appellate courts, and Rule 103, which to some extent governs appellate courts by setting standards for preserving claims of trial error. But there is nothing in the Rules of Evidence about standards of review. There would seemingly have to be a stronger reason to go down that road than the fact that a few courts are allegedly paying "lip service" to the abuse of discretion standard.

Third, there is a risk of collateral consequences if an abuse of discretion standard is added to Rule 702. Why not add the same requirement to Rule 403, or the hearsay rule? By negative inference, confusion will be raised if the abuse of discretion standard is added to Rule 702 and nowhere else.

Fourth, the case has not really been made that the courts are ignoring *Joiner* or the abuse-of-discretion standard, at least in any way that can be regulated. In the allegedly offending *Johnson* case, discussed above, the court specifically states that it *is* applying the abuse of discretion standard. The court provides a little thought piece of how that standard might be affected by liberal standards of admissibility of expert testimony, but in the end it says it is applying the abuse of discretion standard. Even if that is "lip service" how does adding an abuse of discretion standard to the rule prevent the court from coming to the same exact result, and writing the same exact opinion? What the authors are really asking for is a rule that says: "Don't say you are applying the abuse of discretion standard when you are not really doing that." That kind of instruction does not sound like a proper subject for an evidence rule.

Amendment 6 --- A provision that the rule supersedes pre-amendment conflicting case law is very problematic, because it goes to the fundamental nature of codification. When a rule is

enacted, *by definition* it supersedes prior case law that conflicts with the new rule. Otherwise, why write the rule? Adding a supersession clause to Rule 702 again raises a negative inference as to other rules --- in this case, not only as to Evidence Rules, but as to all other national rules.

IV. Conclusion

It is certainly a problem when Evidence Rules are disregarded by courts. And while the authors in some instances might be overstating the degree of judicial waywardness, the fact remains that some courts are ignoring the requirements of Rule 702(b) and (d). That is frustrating. It is what Rick Marcus refers to as "the Rulemaker's Lament." As Rick states, "[t]he rulemakers may endorse one view and disapprove another; for a judge who embraced the disapproved view, there may be a tendency to resist the rule, or at least not to embrace its full impact."[6] But it is hard to conclude that the problem of courts straying from the text will be solved by more text.

This is not to say that it would be a mistake for the Committee to revisit Rule 702 and to propose possible amendments. While reaffirming the Rule 702 amendments might not be reason enough, that project might be coupled with other possible changes. If the Committee does want to look at Rule 702, a stronger reason for doing so would be to determine whether changes are necessary in light of recent public reports challenging the reliability of various forms of forensic evidence. The National Academy of Science and, more recently, the President's Council of Advisors on Science and Technology (PCAST) has examined the scientific validity of forensic-evidence techniques— fingerprint, bitemark, firearm, footwear and hair analysis --- and has concluded that virtually all of these methods are unscientific and insufficiently standardized. Perhaps it would be fruitful to consider whether these recent findings might support amending Rule 702 to provide textual restrictions on such techniques. If that project would be useful, then adding some emphatic text to Rules 702(b) and (d) might be made part of the package.

[6] Richard Marcus, *The Rulemakers' Laments,* 81 Fordham L. Rev. 1639, 1643 (2013). Rick provides a number of examples of judicial reluctance to implement rule amendments, including amendments to Civil Rule 26, and the addition of Evidence Rule 502, as to which some courts have taken "too stingy a view of the rule's protections."

TAB 2:
PARTICIPANT BIOS AND SUMMARIES

Eric S. Lander, Professor, MIT and Harvard Medical School; President and Founding Director of the Broad Institute of Harvard and MIT

Previous: Co-Chair, President's Council of Advisors on Science and Technology (President Obama)

Education: Oxford, Ph.D. (Mathematics)
Princeton University, B.A. (Mathematics)

Biography

(b) (5) [redacted]

Relevant Publications

(b) (5) [redacted]

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Karen Kafadar, Commonwealth Professor & Chair of Statistics, The University of Virginia

Previous: Professor of Statistics, Indiana University
Professor of Mathematics, University of Colorado-Denver

Education: Princeton, Ph.D. (Statistics)
Stanford, M.S. (Statistics)
Stanford, B.S. (Mathematics)

Biography

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Relevant Publications

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Bruce Budowle, Director of the Center for Human Identification, University of North Texas Health Science Center

Previous:	Professor, Forensic Science Research and Training Center, FBI Kinship and Data Analysis Panel, NIJ Chair, Working Group on Microbial Genetics and Forensics, FBI
Education:	Virginia Tech, Ph.D. (Genetics) King College, B.A. (Biology)

Biography

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Relevant Publications

(b) (5) [redacted]

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Itiel Dror, University College London and Cognitive Consultants International

Previous: Chair, Human Factors Committee, DOJ & NIST Advisory Committee on Forensic Science Assessment, American Association for the Advancement of Science

Education: Harvard, Ph.D. (Psychology)

Biography

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Relevant Publications

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Thomas Albright, Professor and Conrad T. Prebys Chair, Salk Institute for Biological Studies

Education: Princeton, Ph.D. (Psychology and Neuroscience)
University of Maryland, B.S. (Psychology)

Biography

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Susan Ballou, Program Manager for the Forensic Sciences Research Program, NIST

Previous:	American Academy of Forensic Sciences Scientific Working Group on Digital Evidence
Education:	Johns Hopkins University, M.S. (Biotechnology) University of New Haven, B.S. (Criminal Justice)

Biography

(b) (5) [redacted]

Relevant Publications

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Judge Alex Kozinski, United States Circuit Judge for the Ninth Circuit

Previous: Special Counsel, U.S. Merit Systems Protection Board
Assistant Counsel, Office of Counsel to the President

Education: UCLA School of Law, J.D.
UCLA, B.A. (Economics)

Biography

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Relevant Publications

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Judge Jed S. Rakoff, United States District Judge for the Southern District of New York
Adjunct Professor, Columbia Law School

Previous: Partner, Fried Frank
AUSA, Southern District of New York

Education: Harvard Law School, J.D.
Oxford University, MPhil
Swarthmore College, B.A. (English)

Biography

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Relevant Publications

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Ronald J. Allen, John Henry Wigmore Professor of Law, Northwestern University

Previous: Professor of Law, Duke University
Professor of Law, University of Iowa
Assistant Professor of Law, State University of New York at Buffalo

Education: University of Michigan, J.D.
Marshall University, B.S. (Mathematics)

Biography

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Relevant Publications

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David H. Kaye, Distinguished Professor and Weiss Family Scholar, Penn State Law

Previous: Professor, Arizona State University School of Life Sciences and School of Law
Visiting Professor at numerous law schools including Cornell, Duke, and UVA

Education: Yale Law School, J.D.
Harvard University, M.A. (Astronomy)
MIT, B.S. (Physics)

Biography

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Relevant Publications

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Jonathan "Jay" Koehler, Beatrice Kuhn Professor of Law, Northwestern School of Law

Previous: Professor, Arizona State University (business and law schools;
University Distinguished Teaching
Professor at University of Texas at Austin (business)

Education: University of Chicago, Ph.D. (Behavioral Sciences)
University of Chicago, M.A. (Behavioral Sciences)
Pomona College, B.A. (Philosophy)

Biography

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Relevant Publications:

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Jane Campbell Moriarty, Professor of Law, Duquesne University School of Law

Previous: Professor of Law, University of Akron School of Law

Education: Boston College Law School, J.D.
Boston College, B.A. (Philosophy)

Biography

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Relevant Publications

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Erin E. Murphy, Professor of Law, NYU School of Law

Previous: Assistant Professor, UC Berkeley School of Law
Visiting Assistant Professor, Harvard Law School

Education: Harvard Law School, JD
Dartmouth College, BA (Comparative Literature)

Biography

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Relevant Publications

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Chris Fabricant, Director of Strategic Litigation, Innocence Project

Previous: Clinical Law Professor, Pace University School of Law
Public Defender, The Bronx Defenders

Education: George Washington University, J.D.

Biography

(b) (5) [redacted]

Relevant Publications

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Anne Goldbach, Forensic Services Director for the Committee for Public Counsel Services

Education: Boston College Law School, J.D.
Wellesley College, B.A.

Biography

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TAB 3:
FEDERAL RULES OF EVIDENCE MATERIALS

Rule 401 – Test for Relevant Evidence

Evidence is relevant if:

(a) it has any tendency to make a fact more or less probable than it would be without the evidence; and

(b) the fact is of consequence in determining the action.

Rule 402 – General Admissibility of Relevant Evidence

Relevant evidence is admissible unless any of the following provides otherwise:

- the United States Constitution;
- a federal statute;
- these rules; or
- other rules prescribed by the Supreme Court.

Irrelevant evidence is not admissible.

Rule 403 – Excluding Relevant Evidence for Prejudice, Confusion, Waste of Time, or Other Reasons

The court may exclude relevant evidence if its probative value is substantially outweighed by a danger of one or more of the following: unfair prejudice, confusing the issues, misleading the jury, undue delay, wasting time, or needlessly presenting cumulative evidence.

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:

(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 the principles and methods to the facts of the case.

Rule 703 – Bases of an Expert

An expert may base an opinion on facts or data in the case that the expert has been made aware of or personally observed. If experts in the particular field would reasonably rely on those kinds of facts or data in forming an opinion on the subject, they need not be admissible for the opinion to be admitted. But if the facts or data would otherwise be inadmissible, the proponent of the

opinion may disclose them to the jury only if their probative value in helping the jury evaluate the opinion substantially outweighs their prejudicial effect.

Rule 705 – Disclosing the Facts or Data Underlying an Expert

Unless the court orders otherwise, an expert may state an opinion — and give the reasons for it — without first testifying to the underlying facts or data. But the expert may be required to disclose those facts or data on cross-examination.

Chart Listing Exceptions to FRE Relevant in Criminal Cases

FRE	Basic Rule	Sec.	Special Criminal Rule/Exceptions	Year Adopted	Committee Notes/Reasoning
(b)	(5)				

FRE	Basic Rule	Sec.	Special Criminal Rule/Exceptions	Year Adopted	Committee Notes/Reasoning
(b) (5)					

FRE	Basic Rule	Sec.	Special Criminal Rule/Exceptions	Year Adopted	Committee Notes/Reasoning
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FRE	Basic Rule	Sec.	Special Criminal Rule/Exceptions	Year Adopted	Committee Notes/Reasoning
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FRE	Basic Rule	Sec.	Special Criminal Rule/Exceptions	Year Adopted	Committee Notes/Reasoning
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FRE	Basic Rule	Sec.	Special Criminal Rule/Exceptions	Year Adopted	Committee Notes/Reasoning
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TAB 4: PROPOSALS TO CHANGE FRE 702

RULEMAKING POSSIBILITIES: EFFORTS OF THE U.S. JUDICIAL CONFERENCE ADVISORY COMMITTEE ON EVIDENCE RULES TO ADDRESS THE RECENT CHALLENGES TO FORENSIC EXPERT TESTIMONY

Daniel J. Capra
Reed Professor of Law
Fordham Law School
Reporter to the Advisory Committee on Evidence Rules

EVIDENCE RULEMAKING IN THE U.S.

- Congress delegated rulemaking power to the Supreme Court --- Judicial Conference Committees, including the Rules Committee.
- Five Advisory Committees, Including Evidence.
- Rule proposal proceeds from Advisory Committee, to Rules Committee, public comment, Judicial Conference, and Supreme Court.
- Inaction by Congress means enactment of a rule.
- It takes a long time.

RULEMAKING CONSTITUENCIES

- Courts --- rules should be easy to apply, with heaps of discretion.
- Justice Department --- rules should work in their favor.
- Litigants --- rules should work in their favor.
- Academics --- rules should be theoretically sound and easy to teach, and written by "me".
- Rulemakers --- rules should be easy to understand and should stand the test of time.

CHALLENGES OF RULEMAKING

- Level of detail:

- Lists of Factors?
- Commonly recurring specific applications of a general rule?
  - Detailed Committee Notes
- The story of the 2000 Amendment to Rule 702.
- Rules Committee Change in Policy on Committee Notes.
- PCAST suggestion --- Committee Note without a rule change.

WRITING A RULE ON FORENSIC EXPERT TESTIMONY

- Is it necessary to add anything? See PCAST Report.
- 1. Foundational Validity --- Federal Rule 702(c) provides that the testimony must be the product of "reliable principles and methods."
- 2000 Committee Note looks at "[w]hether the field of expertise claimed by the expert is known to reach reliable results for the type of opinion the expert would give."
- 2. Validity as Applied --- Federal Rule 702(d) requires that the expert has "reliably applied the principles and methods to the facts of the case."

WRITING A RULE ON FORENSIC EXPERT TESTIMONY

- Arguments in favor of going beyond the existing rule and Committee Note:

- Courts not taking the existing (intervening) regime seriously, perhaps because it is too generalized.
- Reports from PCAST, etc. are not controlling.
- Existing rule and comment do not specifically address the problem of expert overstatement of results.

DRAFTING CHALLENGES

- Definition of "forensic"?
- Overlap with the existing rule:

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:

(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 the principles and methods to the facts of the case.

DRAFTING CHALLENGES

- Adding a new subdivision (e) results in specific add-on requirements to a general statement of law.

- Recalibrating Rule 702 would upset electronic searches.

EXAMPLE --- AN AMENDED RULE 702

- **Rule 702. Testimony by Expert Witnesses**
- **(a) In General. 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:**
  - **(1) 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;**
  - **(2) the testimony is based on sufficient facts or data;**
  - **(3) the testimony is the product of reliable principles and methods; and**
  - **(4) the expert has reliably applied the principles and methods to the facts of the case.**
- **(b) Forensic Expert Witnesses. If a witness is testifying on the basis of a forensic examination [conducted to determine whether an evidentiary sample is similar or identical to a source sample] [or: "testifying to a forensic identification"], the proponent must prove the following in addition to satisfying the requirements of Rule 702(a):**
  - **(1) the witness's method is repeatable, reproducible, and accurate --- as shown by empirical studies conducted under conditions appropriate to its intended use;**
  - **(2) the witness is capable of applying the method reliably and actually did so; and**
  - **(3) the witness accurately states the probative value of [the meaning of] any similarity or match between the samples.**

A POSSIBLE RULE 702(b)

- (b) Forensic Expert Witnesses. If a witness is testifying on the basis of a forensic examination [conducted to determine whether an evidentiary sample is similar or identical to a source sample], [or: "testifying to a forensic identification"], the proponent must prove the following in addition to satisfying the requirements of Rule 702(a):
- (1) the witness's method is repeatable, reproducible, and accurate –- as shown by empirical studies conducted under conditions appropriate to its intended use;
- (2) the witness is capable of applying the method reliably and actually did so; and
- (3) the witness accurately states the probative value of [the meaning of] any similarity or match between the samples.

A FREESTANDING RULE ON FORENSIC EXPERT TESTIMONY

- **Rule 707. Testimony by Forensic Expert Witnesses. If a witness is testifying on the basis of a forensic examination [conducted to determine whether an evidentiary sample is similar or identical to a source sample], [or: "testifying to a forensic identification"] the proponent must prove the following in addition to satisfying the requirements of Rule 702:**
  - **(a) the witness's method is repeatable, reproducible, and accurate --- as shown by empirical studies conducted under conditions appropriate to its intended use;**
  - **(b) the witness is capable of applying the method reliably and actually did so; and**
  - **(c) the witness accurately states the probative value of [the meaning of] any similarity or match between the samples.**

COMMITTEE NOTE ISSUES

- Defining "Forensic" --- not intended to cover lay identification.
- Discussion of objective and subjective processes --- and that with subjective processes there must be "black box" testing and an established rate of accuracy.
- Rejecting forensic methods such as bitemarks?
- Comment (or text) on reasonable degree of certainty.
- Expert must provide information on rate of error.

DOJ PROBLEMS

- DOJ is likely to be opposed to any rule that contemplates treating all forensic testimony under the rigors of science.

- Recent statement by Assistant A.G. --- "We should not exclude reliable forensic analysis — or any reliable expert testimony — simply because it is based on human judgment."

BEST PRACTICES MANUAL ALTERNATIVE

- PCAST suggestion --- essentially could track the PCAST report but distill it and have a step-by-step for admissibility.
- Advisory Committee will not issue a Best Practices Manual.
- Could reach an influential target audience and would have an Advisory Committee origin.
- But probably most effective in accompaniment with rulemaking, not in substitution.

David E. Bernstein & Eric G. Lasker, *Defending* Daubert: *It's Time to Amend Federal Rule of Evidence 702*, 57 Wm. & Mary L. Rev. 4 (2015).

The 2000 Advisory Committee on the Federal Rules of Evidence has not accomplished its goal of requiring courts to adopt a more rigorous and structured approach to scrutiny of expert testimony. The 2000 Advisory Committee amended FRE 702. It now states that trial courts must examine the factual foundation of expert testimony, the reliability of the expert's methodology, and the expert's application of her methodology to the facts at issue. Although courts always apply FRE 702, there are divisions in how it is applied, and the divisions are the same divisions that existed before the 2000 amendments. Bernstein and Lasker propose a new amendment to Rule 702.

Part I of Bernstein and Lasker's article surveys the history of the 2000 amendments to Rule 702. Part II describes the resistance of some courts to adopting the requirements of Amended Rule 702. Part III suveys case law subsequent to Rule 702's amendments. Part IV proposes specific revisions to Rule 702 to remedy lingering problems.

Bernstein and Lasker recommend the following amendments to Rule 702:

> "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 testimony satisfies each of the following requirements***:
>
> > (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 ***that reliably support the expert's opinion***;
> >
> > (c) the testimony is the product of reliable ***and objectively reasonable*** principles and methods; and
> >
> > (d) the expert has reliably applied the principles and methods to the facts of the case ***and reached his conclusions without resort to unsupported speculation.***
>
> ***Appeals of district court decisions under this Rule are considered under the abuse-of-discretion standard. Such decisions are evaluated with the same level of rigor regardless of whether the district court admitted or excluded the testimony in question.***
>
> ***This Rule supersedes any preexisting precedent that conflicts with any or all sections of this Rule***."

*added text is bolded and italicized. Removed text has been struck through.

On Amending Rule 702 of the Federal Rules of Evidence

No serious observer or scholar of the law of evidence can deny that the lower federal courts have applied *Daubert* and its progeny, and the revised Federal Rule of Evidence 702, inconstantly and inconsistently, in their decisions to admit or exclude proffered expert witness opinion testimony. Opponents of trial court "gatekeeping" of expert witnesses applaud the lapses in hopes that the gates have been unhinged and that there will be "open admissions" for expert witness testimony. These opponents latch on to the suggestion that the Rules favor "liberal" admissibility with a libertine; they lose sight of the meaning of "liberal" that conveys enlightened, with an openness to progress and salutary change, and the claims of knowledge over blind faith. Supporters of gatekeeping lament the courts' inability or unwillingness to apply a clear statutory mandate that is designed to improve and ensure the correctness of fact finding in the federal courts. A few have decried the lawlessness of the courts' evasions and refusals to apply Rule 702's requirements.

Given the clear body of Supreme Court precedent, and the statutory revision to Rule 702, which was clearly designed to embrace, embody, enhance, and clarify the high Court precedent, I did not think that an amendment to Rule 702 was needed to improve the sorry state of lower court decisions. Professor David Bernstein and lawyer Eric Lasker, however, have made a powerful case for amendment as a way of awakening and galvanizing federal judges to their responsibilities under the law. David E. Bernstein & Eric G. Lasker,"Defending *Daubert*: It's Time to Amend Federal Rule of Evidence 702," 57 *William & Mary L. Rev*. 1 (2015) [cited below as Bernstein & Lasker].

Bernstein and Lasker remind us that Rule 702 is a statute[1] that superseded inconsistent prior judicial pronouncements. The authors review many of the more egregious cases that ignore the actual text of Rule 702, while adverting to judicial gloss on the superseded rule, and even to judicial precedent and dicta pre-dating the *Daubert* case itself. Like the Papa Bear in the Berenstain Bear family, the authors show us how not to interpret a statute properly, through examples from federal court decisions.

The Dodgers' Dodges

Questions about whether expert witnesses properly applied a methodology to the facts of a case are for the jury, and not the proper subject of gatekeeping.

As Bernstein and Lasker document, this thought- and Rule-avoidance dodge is particularly shocking given that the Supreme Court clearly directed close and careful analysis of the specific application of general principles to the facts of a case.[2] Shortly after the Supreme Court decided *Daubert*, the Third Circuit decided a highly influential decision in which it articulated the need for courts to review every step in expert witnesses' reasoning for reliability. *In re Paoli RR Yard PCB Litig*., 35 F.3d 717, 745 (3d Cir. 1994). The Paoli case thus represents the antithesis of a judicial approach that asks only the 10,000 foot level question whether the right methodology was used; Paoli calls for a close, careful analysis of the application of a proper methodology to every step in the case. *Id*. ("any step that renders the analysis unreliable … renders the expert's testimony inadmissible … whether the step completely changes a reliable methodology or merely misapplies that methodology").

While the *Paoli* approach is unpopular with some judges who might prefer not to work so hard, the Advisory Committee heartily endorsed *Paoli*'s "any step" approach in its Note to the 2000 amendment. Bernstein & Lasker at 32. Bernstein and Lasker further point out that the Committee's Report, Professor Dan Capra, acknowledged, shortly after the amendment went into effect, that the *Paoli* "any step" approach had a "profound impact" on the drafting of amended Rule 702. Bernstein & Lasker at 28.[3]

Having demonstrated the reasons, the process, and the substance of the judicial and legislative history of the revised Rule 702, Bernstein and Lasker are understandably incensed at the lawlessness of circuit and trial courts that have eschewed the statute, have ignored Supreme Court precedent, and have retreated to vague judicial pronouncements that trace back to before some or any of the important changes occurred in Rule 702.[4]

Let's Cherry Pick and Weigh of the Evidence; Forget the Scale

Along with some courts' insistence that trial judges may not examine the application of methods to the facts of a case, other courts, perhaps mindful of their citation practices, have endorsed "cherry picking" as a satisfactory methodology for partial expert witnesses to support their opinions. *Id*. at 35-36. Our law review authors also trace the influence of plaintiffs' counsel, through their "walking around money" from the breast implant litigation, in sponsoring anti-*Daubert*, anti-gatekeeping conferences, at which prominent plaintiffs' advocates and expert witnesses, such as Carl Cranor presented in favor of a vague "weight of the evidence" (WOE) approach to decision making. *Id.* at 39. Following these conferences, some courts have managed to embrace WOE, which is usually packaged as an abandonment of scientific standards of validity and sufficiency, in favor of selective review and subjective decisions. To do this, however, courts have had to ignore both Supreme Court precedent and the clear language of Rule 702. In *Joiner*, the high Court rejected WOE, over the dissent of a single justice,[5] but some of the inferior federal courts have embraced the dissent to the exclusion of the majority's clear holding, as well as the incorporation of that holding into the revised Rule 702.[6] An interesting case of judicial disregard.

Other Dodges

The law review authors did not purport to provide an exhaustive catalogue of avoidance and evasion techniques. Here is one that is not discussed: shifting the burden of proof on admissibility to the opponent of the expert witness's opinion:

> "Testimony from an expert is presumed to be helpful unless it concerns matters within the everyday knowledge and experience of a lay juror."

Earp v. Novartis Pharms., No. 5:11–CV–680–D, 2013 WL 4854488, at *3 (Sept. 11, 2013). See also *Kopf v. Skyrm,* 993 F.2d 374, 377 (4th Cir.1993); *accord Koger v. Norfolk S. Ry. Co.,* No. 1:08–0909, 2010 WL 692842, at *1 (S.D.W.Va. Feb. 23, 2010) (unpublished).

Whence comes this presumption? Perhaps it is no more than a requirement for the opponent to object and articulate the flaws before the trial court will act. But the "presumption" sure looks like a covert shifting of the burden of proof for the requisite reliability of an expert witness's opinion, which burden clearly falls on the proponent of the testimony.

The Proposed Amended Rule 702

There are several possible responses to the problem of the judiciary's infidelity to basic principles, precedent, and legislative directive. Bernstein and Lasker advance amendments to the current Rule 702, as a blunt reminder that the times and the law have changed, really. Here is their proposed revision, with new language italicized, and deleted language shown to be struck:

> "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 testimony satisfies each of the following requirements*:
>
> (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 *that reliably support the expert's opinion*;
>
> (c) the testimony is the product of reliable *and objectively reasonable* principles and methods; and
>
> (d) the expert has reliably applied the principles and methods to the facts of the case *and reached his conclusions without resort to unsupported speculation*.
>
> *Appeals of district court decisions under this Rule are considered under the abuse-of-discretion standard. Such decisions are evaluated with the same level of rigor regardless of whether the district court admitted or excluded the testimony in question. This Rule supersedes any preexisting precedent that conflicts with any or all sections of this Rule.*"

Bernstein & Lasker at 44-45.

Before discussing and debating the changes, we should ask, "why change a fairly good statute just because lower courts evade its terms?" The corrupt efforts of SKAPP[7] to influence public and judicial policy, as well as the wildly one-sided *Milward* symposium,[8] which the authors discuss, should serve as a potent reminder that there would be many voices in the review and revision process, both from within plaintiffs' bar, and from those sympathetic to the litigation industry's goals and desires. Opening up the language of Rule 702 to revision could result in reactionary change, driven by the tort bar's and allies' lobbying. The result could be the evisceration of Rule 702, as it now stands. This danger requires a further exploration of alternatives to the proposed amendment.

Rule 702 has had the benefit of evolutionary change and development, which have made it better and also possibly burdened with vestigial language. To be sure, the rule is a difficult statute to draft, and while the authors give us a helpful start, there is many problems to be subdued before a truly workable working draft can be put be forward.

The first sentence's new language, "*the testimony satisfies each of the following requirements*," is probably already satisfied the use of "and" between the following numbered paragraphs. Given the judicial resistance to Rule 702, the additional verbiage could be helpful; it should be unnecessary. The conditionality of "if," however, leaves the meaning of the Rule unclear when that condition is not satisfied. The Rule clearly signifies that "if" in the introductory sentence means "only if," and the law and litigants would be better off if the Rule said what it means.

Proposed Subsection (b)

(b) the testimony is based on ~~sufficient~~ facts or data *that reliably support the expert's opinion*;

The authors do not make much of a case for striking "sufficient." There will be times when there are perfectly good facts and data supporting an expert witness's opinion, in a completely reliable opinion, but the supporting facts and data do not support an epistemic claim of "knowledge," because the support is indeterminate between the claim and many other competing hypotheses that might explain the outcome at issue. The reliably supporting facts and data may amount to little more than a scientific peppercorn, and really be too much of too little to support the claim. Deleting "sufficient" from subsection b could be a serious retrograde move, which will confuse the judiciary more than instruct it.

The revised subsection also fails to address the integrity of the facts and data, and the validity of how the data were generated. To be sure, Rule 703 could pick up some of the slack, but Rule 703 is often ignored, and even when invoked, that rule has its own drafting and interpretation problems. *See* "Giving Rule 703 the Cold Shoulder" (May 12, 2012); "RULE OF EVIDENCE 703 — Problem Child of Article VII" (Sept. 19, 2011). Also missing is an acknowledgment that the facts or data must often be analyzed in some way, whether by statistical tests or some other means. And finally, there is the problem in that reliable does not necessarily connote valid or accurate. Subsection (b) thus seems to cry out for additional qualification, such as:

> "the testimony is based on sufficient facts or data, reliably, accurately, and validly ascertained, and analyzed, which facts or data reliably and validly support the expert's opinion"

Proposed Subsection (c)

Bernstein and Lasker propose modifying this subsection to inject "and objectively reasonable" before "principles and methods." The authors do not explain what objectively reasonable principles and methods encompass, and they qualification does seem self-explanatory. Perhaps they are calling for principles and methods that are "generally accepted," and otherwise justified as warranted to produce accurate, true results? Is so, that might be a helpful addition.

Proposed Subsection (d)

Here the authors bolster the language of the subsection with a prohibition against using unsupported speculation. OK; but would supported or inspired or ingenious speculation be any better? Subsection

(a) speaks of knowledge, and it should be obvious that the expert witness's opinion has an epistemic warrant to be something more than a mere subjective opinion.

Whether Bernstein and Lasker have opened a can or a Concordat of Worms remains to be seen.

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[1] The authors provide a great resource on the legislative history of attempts to revise 702, up to and including the 2000 revision. The 2000 revision began with a proposed amendment from the Advisory Committee in April 1999. The Standing Committee on Rules of Practice and Procedure approved the proposal, and forwarded the proposed amendment to the Judicial Conference, which approved the amendment without change in September 1999. The Supreme Court ordered the amendment in April 2000, and submitted the revised rule to Congress. Order Amending the Federal Rules of Evidence, 529 U.S. 1189, 1195 (2000). The revised Rule 702 became effective on December 1, 2000. *See also* Bernstein & Lasker at 19 n. 99 (citing Edward J. Imwinkelried, "Response, Whether the Federal Rules of Evidence Should Be Conceived as a Perpetual Index Code: Blindness Is Worse than Myopia," 40 *Wm. & Mary L. Rev*. 1595, 1595-98 (1999) (noting and supporting the Supreme Court's interpretation and application of the Federal Rules of Evidence as a statute, and subject to the judicial constraints on statutory construction). For a strident student's pro-plaintiff view of the same legislative history, *see* Nancy S. Farrell, "*Congressional Action to Amend Federal Rule of Evidence 702: A Mischievous Attempt to Codify Daubert v. Merrell Dow Pharmaceuticals, Inc*.", 13 *J. Contemp. Health L. & Pol'y* 523 (1997).

[2] *General Electric Co. v. Joiner*, 522 U.S. 136 (1997) (reviewing and analyzing individual studies' internal and external validity, and rejecting plaintiffs' argument that only the appropriateness of the methodology in the abstract was subject of gatekeeping); *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 156-57 (1999) ("stressing that district courts must scrutinize whether the principles and methods employed by an expert have been properly applied to the facts of the case") (quoting what was then the proposed advisory committee's note to Rule 702, Preliminary Draft of Proposed Amendments to the Federal Rules of Civil Procedure and Evidence: Request for Comment, 181 F.R.D. 18, 148 (1998)).

[3] citing Stephen A. Saltzburg, Edwin J. Imwinkelried, & Daniel J. Capra, "Keeping the Reformist Spirit Alive in Evidence Law," 149 *U. Pa. L. Rev*. 1277, 1289-90 (2001). The authors note that other circuits have embraced the Paoli "any steps" approach. Bernstein & Lasker at 28 at n. 152 (citing *Paz v. Brush Engineered Materials, Inc.,* 555 F.3d 383, 387-91 (5th Cir. 2009); *McClain v. Metabolife Int'l, Inc.*, 401 F.3d 1233, 1245 (11th Cir. 2005); *Dodge v. Cotter Corp*., 328 F.3d 1212, 1222 (10th Cir. 2003); *Amorgianos v. Nat'l R.R. Passenger Corp.*, 303 F.3d 256, 267 (2d Cir. 2002) (quoting *In re Paoli*, 35 F.3d at 746).

[4] *See, e.g., City of Pomona v. SQM N. Am. Corp*., 750 F.3d 1036, 1047 (9th Cir. 2014) (rejecting the *Paoli* any step approach without careful analysis of the statute, the advisory committee note, or Supreme Court decisions); *Manpower, Inc. v. Ins. Co. of Pa*., 732 F.3d 796, 808 (7th Cir. 2013) ("[t]he reliability of data and assumptions used in applying a methodology is tested by the adversarial process and determined by the jury; the court's role is generally limited to assessing the reliability of the methodology – the framework – of the expert's analysis"); *Bonner v. ISP Techs., Inc.,* 259 F.3d 924, 929 (8th Cir. 2001) ("the factual basis of an expert opinion goes to the credibility of the testimony, not the admissibility, and it is up to the opposing party to examine the factual basis for the opinion in cross-examination").

[5] *General Electric Co. v. Joiner*, 522 U.S. 136, 146-47 (1997) (holding that district court had the "discretion to conclude that the studies upon which the experts relied were not sufficient, whether individually or in combination, to support their conclusions that Joiner's exposure to PCB's contributed to his cancer"). Other federal and state courts have followed *Joiner*. *See Allen v. Pa. Eng'g Corp.*, 102 F.3d 194, 198 (5th Cir. 1996) ("We are also unpersuaded that the 'weight of the evidence' methodology these experts use is scientifically acceptable for demonstrating a medical link between Allen's EtO exposure and brain cancer."). For similar rejections of vague claims that weak evidence add up to more than the sum of its parts, *see Hollander v. Sandoz Pharm. Corp.*, 289 F.3d 1193, 1216 n.21 (10th Cir. 2002); *Magistrini v. One Hour Martinizing Dry Cleaning*, 180 F. Supp. 2d 584, 608 (D.N.J. 2002); *Caraker v. Sandoz Pharm. Corp.*, 188 F. Supp. 2d 1026, 1040 (S.D. Ill. 2001); *Siharath v. Sandoz Pharm. Corp.*, 131 F. Supp. 2d 1347, 1371 (N.D. Ga. 2001), *aff'd sub nom. Rider v. Sandoz Pharm. Corp.*, 295 F.3d 1194 (11th Cir. 2002); *Merck & Co. v. Garza*, 347 S.W.3d 256, 268 (Tex. 2011); *Estate of George v. Vt. League of Cities & Towns*, 993 A.2d 367, 379-80 (Vt. 2010).

[6] *Milward v. Acuity Specialty Products Group, Inc.*, 639 F.3d 11, 17-18 (1st Cir. 2011) (reversing the exclusion of expert witnesses who embraced WOE). *Milward* has garnered some limited support in a few courts, as noted by Bernstein and Lasker; *see In re Fosamax (Alendronate Sodium) Prods. Liab. Litig.*, Nos. 11-5304, 08-08, 2013 WL 1558690, at *4 (D.N.J. Apr. 10, 2013); *Harris v. CSX Transp., Inc.*, 753 S.E.2d 275, 287-89, 301-02 (W. Va. 2013).

[7] "SKAPP A LOT" (April 30, 2010).

[8] "*Milward* Symposium Organized by Plaintiffs' Counsel and Witnesses" (Feb. 13, 2013); [http://perma.cc/PW2V-X7TK].

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325 E. 79th Street, Ste. 16-D
New York, NY 10075
(b) (6)

Geoffrey Stewart Morrison & William C. Thompson, *Assessing the Admissibility of a New Generation of Forensic Science Voice Comparison Testimony*, 18 Colum. Sci. & Tech. L. Rev. 326 (2017).

Sometimes, disputes arise in criminal cases over the identity of a speaker on an audio recording. To resolve the dispute, a forensic voice comparison may be performed. Forensic voice comparison evidence was last used in court in 2003, and thrown out by the judge. Since then there have been no reported instances where this type of evidence has overcome a *Daubert* challenge. However, there have been significant advances in forensic voice comparison technology in the last 15-20 years. This article offers a framework for assessing the strength of forensic voice comparison testimony.

First, Morrison and Thompson provide a "primer" on voice comparison technology. Second, they describe the frameworks that practitioners use when and reporting the strength of the evidence. They describe seven different frameworks. The leading framework is the "Likelihood-Ratio Framework," which requires the practitioner to consider: 1) the probability of obtaining the observed properties of the voice on the questioned-speaker recording if it were produced by the known speaker; and 2) the probability of obtaining the observed properties of the voice on the questioned-speaker recording if it were produced not by the known speaker, but by some other speaker from the relevant population.

Next, Morrison and Thompson discuss how to test for and control validity and reliability. They also discuss contextual bias, and recommend minimizing contextual bias by avoiding exposure of practitioners to "task-irrelevant" information (information that is not necessary for assessing the strength of forensic evidence). They also mention several ways to shield practitioners from task-irrelevant information: context management procedures, having a case manager as a middleman between analysts and clients, and sequential unmasking.

Morrison and Thompson also discuss admissibility and apply Daubert to forensic voice comparison testimony. They also review and critique the use of forensic voice technology in the recent case *U.S. v. Ahmed*. In conclusion, Morrison and Thompson outline how they believe a forensic voice comparison would have to be conducted to produce testimony that is admissible under *Daubert* (I have attached a copy of their proposal).

• The practitioner conducted one automatic analysis (Comparison 1), got a result, then modified the system (by adding an imposter set), reran the analysis, and got a result more favorable to the prosecution than the first result. A forensic practitioner should avoid acting in a way that could give the impression that they are cherry picking results, *i.e.*, that they tested multiple systems and then selected the one which was most favorable to the party instructing them. [214]

C. Conclusion with Respect to the *Ahmed* Testimony

The forensic practitioner in *Ahmed* used a mixture of approaches: auditory, acoustic-phonetic, and automatic. The results of all of the analyses were subjective judgments. Even for the automatic subsystem, which calculated likelihood ratios using quantitative measurements and statistical models, the practitioner did not directly report the calculated values, but instead used them as inputs to making a subjective decision. The way the results from ***413** each analysis were combined was also a subjective judgment. In general the procedures were not transparent, and were not described in sufficient detail that they could be replicated by another suitably qualified practitioner.

With respect to the *Daubert* factors, the practitioner did not empirically test the validity and reliability of his system under conditions reflecting those of the case under investigation. There is no evidence that he followed any standards which we would consider indicators of trustworthiness. Although there were some peer-reviewed publications supporting some aspects of his approach, their relevance for assessing the trustworthiness of his overall conclusions was limited. Whether his approach could be considered generally accepted in the relevant scientific community is unclear. Indeed, whether *any* particular approach is generally accepted at this time is unclear. While his approach may be in line with common practice among practitioners, it is not in line with current practice in the scientific research community. Clearly, we believe that the testimony did not satisfy the *Daubert* criteria and should not have been admitted.

Shortly after the hearing, the prosecution offered what the defense viewed as a favorable plea bargain and the case was resolved with a negotiated plea, rendering the admissibility issue moot. Although some might interpret this development as evidence that the prosecution feared losing the *Daubert* hearing and the case, there is no way to know how the court would have ruled. It remains to be seen how courts will view forensic voice comparison evidence when it is offered in future cases.

VIII. MEETING THE *DAUBERT* STANDARD: WHAT WOULD A POTENTIALLY ADMISSIBLE FORENSIC VOICE COMPARISON ANALYSIS LOOK LIKE?

Our critique of the testimony presented in *Ahmed* has been overwhelmingly negative. This does not, however, mean that we believe that forensic voice comparison testimony could never be found admissible under *Daubert*. We think that, in practice, only approaches based on relevant data, quantitative measurement, and statistical models would be able to satisfy the *Daubert* criteria. Below we outline how we believe a forensic voice comparison ***414** would have to be conducted in order to produce testimony which could potentially be found admissible under *Daubert*. [215]

1. To facilitate transparency and replicability, the forensic practitioner should document in their report or in bench notes all decisions they make and all actions they take. All parties should be made aware of the existence of these notes, and they should be provided to all parties upon request. All substantial decisions and actions should also be documented in the forensic report. On the basis of the report, bench notes, and a copy of the practitioner's standard operating procedures and other appendices, another suitably qualified forensic practitioner (or researcher) should be able to critique the first practitioner's decisions and actions

and potentially replicate what the first forensic practitioner did. If anything is unclear in the report and appendices, the second practitioner should be able to find the answer in the first practitioner's notes. The second forensic practitioner should not have to guess what the first forensic practitioner actually did.

2. To reduce the potential for contextual bias, the practitioner should take steps to avoid being exposed to task-irrelevant information, *i.e.*, information about the case which is not necessary for them to perform their forensic voice comparison analysis. In large laboratories, a case manager may be ***415** assigned to handle communication with the client and other parties, and only pass on to the practitioner task relevant information. In smaller laboratories the practitioner should ask the client up front to not provide task-irrelevant information.

3. Based on an examination of the questioned-speaker recording, and relevant information provided by the client and other parties as may be appropriate given the circumstances of the case, the practitioner should formulate the details of the same-speaker hypothesis and the different-speaker hypotheses that they plan to assess. The different-speaker hypothesis must include the definition of the relevant population. Before proceeding, the suitability of these hypotheses should be confirmed with the client and other parties as may be appropriate given the circumstances of the case. The hypotheses, including the relevant population, should be clearly described in the report.

4. Based on an examination of the known- and questioned-speaker recordings, and relevant information provided by the client and other parties as may be appropriate given the circumstances of the case, the practitioner should describe what they understand to be the speaking styles and recording conditions of the known-speaker recording and the questioned-speaker recording. All reasonable enquiries should be made to obtain technical details about recording systems, *etc*. These conditions should be clearly described in the report.

5. If the practitioner believes that *a priori* the conditions of the recordings are so poor that the performance of their forensic voice comparison system will be so poor that it is unlikely to be of value to the court, they should inform the client of this before proceeding. The client may still request that the practitioner proceed, but this will be an informed decision. If the client decides not to have the practitioner proceed with a ***416** particular comparison, this should be documented in the report, and no further analyses should be conducted on the relevant recordings.

6. The known- and questioned-speaker recordings should be prepared by selecting only portions of the recordings which actually contain speech of the speaker of interest. Interlocutor speech, transient noises, and stretches of silence or background noise should be excluded from the analysis. (This will reveal one aspect of the recording conditions, the net durations of the known-speaker and the questioned-speaker speech.)

7. The practitioner should obtain a sample of voice recordings representative of the relevant population and reflecting the speaking styles and recording conditions of the known-speaker recording and the questioned-speaker recording. The sample may come from an existing database, or new data may need to be collected.

The practitioner must be satisfied that the sample recordings are sufficiently representative and reflective of the relevant population, speaking styles, and recording conditions. The report must explain how the forensic practitioner sampled the speakers, and how they replicated or simulated the conditions. Sufficient detail must be provided so that the judge at an admissibility hearing has a basis on which to consider whether the recordings are sufficiently representative and reflective. We would expect the opposing parties to seek expert advice in this topic, and debate the merits before the judge during an admissibility hearing (if the testimony is admitted, this topic may also be argued before the trier-of-fact in relation to weight).

8. The relevant population sample recordings should be prepared in the same manner as the known- and questioned-speaker recordings.

9. The practitioner should split their data into at least two ***417** separate parts: a training set and a test set. Statistical models should not be trained and tested on the same data. [216]

10. To reduce the potential for contextual bias, the practitioner should use a system based on relevant data, quantitative measurements (*e.g.*, measurements of acoustic properties of the voice recordings), and statistical models. The output of the statistical model should be directly reported, it should not be used as input to a subsequent subjective judgment process.

11. The system should be trained and optimized using the training data, which reflect the relevant population, speaking styles, and recording conditions of the case. Ideally, a second forensic practitioner should check the first forensic practitioner's work at this stage in search of any potential mistakes. Once the forensic practitioner is satisfied with the training and optimization of the system, the system should be frozen, *i.e.*, no subsequent changes to the system will be allowed. [217]

12. The practitioner should then use the test data to empirically assess the performance of their system. The system as a whole should be tested, including any components depending on the particular human operator. The system which is tested should be the same system which will actually be used to compare the known- and questioned-speaker recordings. The results of the tests should be documented in the report, and an explanation of how to interpret any numeric or graphical results should be provided in the report or in an appendix. Sufficient detail ***418** should be provided to assist the judge at an admissibility hearing to decide if system performance is sufficient to warrant admission of the testimony (if the testimony is admitted, this question may also be argued before the trier-of-fact in relation to weight). Ideally, a second forensic practitioner should check the first forensic practitioner's work at this stage in search of any potential mistakes. Once the tests have been conducted, they should not be repeated in search of better results. The system should not be altered and then retested on the same data set. [218]

13. The last step in the analysis should be to actually compare the known- and questioned-speaker recordings. The numeric likelihood ratio generated by the system should be reported as the strength of evidence statement. The report, or an appendix, should include an explanation of the likelihood ratio

> framework so that the judge at an admissibility hearing and the trier-of-fact at trial can understand how to appropriately interpret the result. Once the likelihood ratio for the comparison of the known- and questioned-speaker recordings has been obtained, the system should not be altered or retested, and the likelihood ratio should not be recalculated in search of a better answer. [219]

Such procedures would, we believe, be potentially admissible under *Daubert* because they are logically correct, robust to cognitive bias, transparent and replicable, and include demonstration of degree of validity and reliability under conditions reflecting those of the case under investigation. If the judge at an admissibility hearing is satisfied (1) that the test data are sufficiently representative of the relevant population and sufficiently reflective ***419** of the speaking styles and recording conditions of the known-speaker recording and the questioned-speaker recording, and (2) that the empirically demonstrated degree of validity and reliability of the system under these conditions is adequate, then the system will have passed what we consider to be the most important *Daubert* criterion, *i.e.*, "whether the reasoning or methodology underlying the testimony is scientifically valid and ... whether that reasoning or methodology properly can be applied to the facts in issue," including "whether it can be (and has been) [empirically] tested," and "in the case of a particular scientific technique ... consider[ation of] the known ... rate of error." [220]

IX. CONCLUSION

We have argued that the most important *Daubert* criterion for deciding the admissibility of an implementation of any approach to forensic voice comparison (be it auditory, acoustic-phonetic non-statistical, acoustic-phonetic statistical, or automatic) is whether it has been empirically tested under conditions reflecting those of the particular case under investigation, and found to be sufficiently valid and reliable. We see this as the direct primary indicator of scientific validity, and the other *Daubert* criteria as secondary proxy indicators. If the judge accepts that the test data are sufficiently representative of the relevant population and sufficiently reflective of the conditions of the case under investigation, they can then consider whether the empirically demonstrated performance of the system under those conditions is sufficient to warrant admission. We have also argued that, because of the substantial case-to-case variability in relevant population, speaking styles, and recording conditions, system performance will need to be empirically assessed on a case by case basis, and admissibility will need to be considered on a case by case basis.

Although we have concentrated on admissibility under FRE 702 and *Daubert*, and to a lesser extent *Frye*, our arguments are founded on what we consider to be good scientific practice, and, from a scientific perspective, these should be relevant irrespective of the legal standard for admissibility.

Although our focus has been on the admissibility of forensic voice comparison testimony, we believe that it would be logically consistent to apply the same criteria in considering the admissibility ***420** of testimony based on comparison of other items of forensic interest.

X. ACKNOWLEDGMENTS

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TAB 5:
PCAST MATERIALS

SUMMARY OF PRESIDENT'S COUNCIL OF ADVISORS ON SCIENCE AND TECHNOLOGY REPORT ON FORENSIC SCIENCE

The President's Council of Advisors on Science and Technology (PCAST) is a federal advisory committee created to make recommendations to the President and the Executive Office of the President in areas of science policy. PCAST was established by President George W. Bush in 2001 and reestablished in 2009 by President Barack Obama but similar scientific advisory bodies existed under previous presidents. PCAST is supported by the Office of Science and Technology Policy (OSTP), co-chaired by the Director of OSTP, and its members are scientists appointed by the President. Unless renewed, PCAST's current charter is set to expire on February 12, 2018. It is unclear whether PCAST is currently active. PCAST has issued reports on a variety of topics such as the safety of drinking water, hearing aids, and climate change.

On September 30, 2016, PCAST released a report titled *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods*. (b) (5) [redacted]

While there is much in the PCAST report with which the Department agrees, in particular the (b) (5) [redacted], the Department believes that the report (b) (5) [redacted] Attorney General Lynch issued a statement (b) (5) [redacted] (see below). The Department also takes issue with (b) (5) [redacted] (b) (5) The report purports to (b) (5) [redacted] The report has naturally led to (b) (5) [redacted]

ATTORNEY GENERAL LYNCH STATEMENT ON PCAST PROVIDED TO WALL STREET JOURNAL (09/20/2016)

(b) (5) [redacted] *We remain confident that, when used properly, forensic science evidence helps juries identify the guilty and clear the innocent, and the Department believes that the current legal standards regarding the admissibility of forensic evidence are based on sound science and sound legal reasoning. We understand that PCAST also considered the issue of certain legal standards, alongside its scientific review. While we appreciate their contributions to the field of scientific inquiry, the Department will not be adopting the recommendations related to the admissibility of forensic science evidence.*

UNT HEALTH SCIENCE CENTER

UNT Center for Human Identification

June 17, 2017

To whom it may concern:

When the President's Council of Advisors on Science and Technology (PCAST) Report first was published in 2016, it was obvious that the report was not particularly helpful from a scientific perspective as it was myopic, full of error, and did not provide data to support its contentions. A more significant concern regarding the failings of the PCAST Report was that it claimed its focus was on science, but obviously was dedicated substantially to policy. Initially I considered writing a critique about the failings of the PCAST Report to assist the community. But the problems with this report were so obvious that I did not think it would be necessary to devote time to such an effort. Indeed my prediction was correct in that the report would be (and has been) rejected by the scientific community as well as overwhelmingly by the courts. However, the PCAST Report is being relied on by the Public Defender Service in U.S. v. Benito Valdez (Motion to Exclude the Testimony of the Government's proposed expert witness in Firearms Examination and Memorandum of Points and Authorities in Support, dated June 2, 2017) as a scientifically sound review of the state of the forensic sciences. Therefore, it has become necessary to address the serious limitations of the PCAST Report and convey that it is an unsound, unsubstantiated, non-peer-reviewed document that should not be relied upon for supporting or refuting the state of the forensic sciences.

My credentials to be able to opine on the failings of the PCAST Report are based on my work of more than 30 years in research, development, validation, and implementation of DNA typing methodologies for forensic applications (my CV is attached). I received a Ph.D. in Genetics in 1979 from Virginia Polytechnic Institute and State University. From 1979-1982, I was a postdoctoral fellow at the University of Alabama at Birmingham and carried out research predominately on genetic risk factors for such diseases as insulin dependent diabetes mellitus, melanoma, and acute lymphocytic leukemia. In 1983, I joined the research unit at the FBI Laboratory Division to carry out research, development, and validation of methods for forensic biological analyses. The positions I held at the FBI include: research chemist, program manager for DNA research, Chief of the Forensic Science Research Unit, and the Senior Scientist for the Laboratory Division of the FBI. I have contributed to the fundamental sciences as they apply to forensics in analytical development, population genetics, statistical interpretation of evidence, and in quality assurance. Some of my technical efforts have been: 1) development of analytical assays for typing myriad protein genetic marker systems, 2) designing electrophoretic instrumentation, 3) developing molecular biology analytical systems to include RFLP typing of VNTR loci and PCR-based SNP, VNTR and STR assays, and direct sequencing methods for mitochondrial DNA, 4) new technologies such as use of massively parallel sequencing; and 5) designing image analysis systems. I worked on laying some of the foundations for the current

statistical analyses in forensic biology and defining the parameters of relevant population groups. I have published approximately 600 articles (more than any other scientist in the area of forensic genetics), made more than 730 presentations (many of which were as an invited speaker at national and international meetings), and testified in well over 250 criminal cases in the areas of molecular biology, population genetics, statistics, quality assurance, validation, and forensic biology. In addition, I have authored or co-authored books on molecular biology techniques, electrophoresis, protein detection, forensic genetics, and microbial forensics. I was directly involved in developing the quality assurance standards for the forensic DNA field in the United States. I have been a chair and member of the Scientific Working Group on DNA Methods, Chair of the DNA Commission of the International Society of Forensic Genetics, and a member of the DNA Advisory Board. I was one of the original architects of the CODIS National DNA database, which maintains DNA profiles from convicted felons, from evidence in unsolved cases, and from missing persons.

Some of my efforts over the last 16 years also are in counter terrorism, including identification of victims from mass disasters, microbial forensics and bioterrorism. I was an advisor to New York State in the effort to identify the victims from the WTC attack. In the area of microbial forensics, I was the chair of the Scientific Working Group on Microbial Genetics and Forensics, whose mission was to set QA guidelines, develop criteria for biologic and user databases, set criteria for a National Repository, and develop forensic genomic applications. I also have served on the Steering Committee for the Colloquium on Microbial Forensics sponsored by American Society of Microbiology, was an organizer of four Microbial Forensics Meetings held at The Banbury Center in the Cold Spring Harbor Laboratory, and participated on several steering committees for NAS sponsored meetings.

In 2009 I became Executive Director of the Institute of Applied Genetics and Professor at the University of North Texas Health Science Center at Fort Worth, Texas. I currently direct the Center for Human Identification. I also direct an active research program in the areas of human forensic identification, microbial forensics, emerging infectious disease, human microbiome, molecular biology technologies, and pharmacogenetics (or molecular autopsy). I also currently am an appointed member of the Texas Forensic Science Commission.

Of note, the PCAST Committee relied on my work and as a noted expert which is supported by the report's citation of my work several times all in a favorable manner. Indeed, I am the scientist at the FBI that is mentioned as Dr. Lander's co-author to bolster his credentials in the forensic sciences (see footnotes 17 and 20). My work is cited in footnotes 33, 149, 183, 185, 187, and 209.

The report lacks scientific substance. It is cloaked with a veneer of science but in actuality is an attempt to set policy. The report discusses and advocates validation (a topic all should agree is important). Yet the topic is only addressed superficially providing definitions that already are well known with generalizations and terms it calls criteria. Nothing novel was provided by the report (see examples in references 1-7 that already have discussed the same criteria but to a greater degree than in the report). Moreover, the report does not provide any substantial guidance on how to perform validation studies for any of the disciplines it addresses. There are basic validation criteria such as sample size, power analyses, types of samples, sensitivity, specificity, dynamic range, purity of analyte, etc. that the report does not address per se or only touches upon (and instead uses black box studies for its only endeavor into sampling uncertainty and for a

misguided attempt at addressing the potential for error). The PCAST Committee could have done a service to the community if it had selected some validation studies that it claims to have reviewed (although such claims are suspect as there is no documentation supporting the claims) and described specifically those studies that the PCAST Committee deemed inappropriate and/or inadequate. Then, the PCAST Committee could have laid out how those studies should have been performed with the real substantive criteria and examples that are necessary to perform a validation study. Leading by example would have been helpful; instead the report just dismisses most of the work performed in 2000 plus articles that it claims (sic) to have reviewed. The report criticizes the forensic community for a lack of validation studies but does not describe what is lacking in any substantive way.

The Report does not describe data from each of the disciplines that could be relied upon. It is difficult to believe that in 2000 papers, the PCAST Committee claims to have relied upon, that there are no data of value. There are no indications that the PCAST Committee actually assessed the data in the literature. There is little if any documentation in this regard which should be extremely troubling to all given the PCAST Committee's strong positions of the importance of validation, documentation, and peer-reviewed publication for the forensic science community. The PCAST Committee clearly takes a "do as I say, not as I do" position. The report contains no discussion on the criteria that were used to assess the literature, the criteria that were used to dismiss the literature as inadequate, and no documentation that any data (if existing) are readily available to support that the PCAST committee performed a sound, full and complete review. Again, these issues are most disconcerting because it is apparent that the PCAST Committee in its undertaking did not hold itself up to the same standards of validation, documentation, and peer-review that it espouses the forensic community should embrace (compounded as a number of the criticisms in the report are unfounded). The report provides some guidance on basic statistics, such as estimating false positive rates (which are not novel). However, this lecturing on proper statistics is troubling to say the least as the report misuses statistics in its own cursory efforts.

The following are examples from the report to support my above claims. They are not comprehensive as it is unnecessary to go page-by-page to indicate the serious problems with the PCAST Report. A few examples should suffice to demonstrate why this report has been so underwhelming and been ignored by most scientists and the courts. In pointing out the failings of the report I will focus on topics that transcend the disciplines and specifically on my area of expertise, i.e., DNA; I could not adequately address the other disciplines and what data do or do not exist in those forensic science areas. I leave specifics of other disciplines to those with requisite expertise. However, I stress that since the report misinforms on forensic DNA applications, which is considered the "gold standard" and well-documented in the scientific literature (even the report acknowledges that), then there is a strong indication that perhaps the report missed the mark on the other disciplines as well.

I take the position that improvements in forensic sciences are needed. Indeed, all science continues to improve. It is never static. In my field of DNA typing, I and others have been and currently are working on developing better/improved methods, such as the use of next generation sequencing and new software tools. It would be improper to say that any method is perfect and cannot be made better. That position, though, is not a wholesale condemnation of the forensic sciences. Each discipline, or better yet each application, should be assessed in context as a holistic system (not solely based on validation as the report seemingly myopically espouses) and

the types/quality of samples encountered in specific cases. The report's generalization of issues avoids addressing an extremely important question – was the analysis/interpretation in this case performed correctly?

The first two examples presented below are particularly egregious and point to the dearth of substance in the report. The report states on page 2

> "In the course of its study, PCAST compiled and reviewed a set of more than 2,000 papers from various sources—including bibliographies prepared by the Subcommittee on Forensic Science of the National Science and Technology Council and the relevant Working Groups organized by the National Institute of Standards and Technology (NIST); submissions in response to PCAST's request for information from the forensic-science stakeholder community; and PCAST's own literature searches."

On page 67 of the report it is stated

> "PCAST compiled a list of 2019 papers from various sources—including bibliographies prepared by the National Science and Technology Council's Subcommittee on Forensic Science, the relevant Scientific Working Groups (predecessors to the current OSAC), and the relevant OSAC committees; submissions in response to PCAST's request for information from the forensic-science stakeholder community; and our own literature searches."

There were two citations to support the review of the 2000 or so papers that the PCAST relied upon:

> www.nist.gov/forensics/workgroups.cfm.
>
> www.whitehouse.gov/sites/default/files/microsites/ostp/PCAST/pcast_forensics_references.pdf.

Neither of these sites appear to show (or allow for ready identification) what those articles were that the PCAST Committee reviewed and then relied upon. More so, there are no criteria and no data in the report or at these sites on what the PCAST Committee actually read, noted, reviewed, quantified, calculated, accepted, rejected, and/or debated. The report advocates emphatically and repeatedly the virtues of validation, documentation, and peer-review. Yet the report does not contain such information and thus does not meet as a minimum the requirements that it lambasted the forensic science community for lacking. This inconsistency between recommended requirements and lack of performance by the PCAST Committee is most noted as there is substantial documentation in the forensic science community (in many disciplines) but not in this report.

This lack of documentation should be considered in light of the report's statements on pages 1 and 22

> "PCAST concluded that there are two important gaps: (1) the need for clarity about the scientific standards for the validity and reliability of forensic methods and (2) the need to

> evaluate specific forensic methods to determine whether they have been scientifically established to be valid and reliable."

The report also states on pages 4 and 21

> "It is the proper province of the scientific community to provide guidance concerning scientific standards for scientific validity, and it is on those *scientific* standards that PCAST focuses here."
> Yet the PCAST Committee did not provide its data to support the validity of its own work. There simply is no accounting of the PCAST Committee's work to demonstrate it assessed the 2000 papers and how it came to the conclusions it rendered.

This evident failing is exacerbated by the reports statement on page 6

> "The forensic examiner must have been shown to be *capable* of reliably applying the method and must *actually* have done so. Demonstrating that an expert is *capable* of reliably applying the method is crucial—especially for subjective methods, in which human judgment plays a central role. From a scientific standpoint, the ability to apply a method reliably can be demonstrated only through empirical testing that measures how often the expert reaches the correct answer. Determining whether an examiner has *actually* reliably applied the method requires that the procedures actually used in the case, the results obtained, and the laboratory notes be made available for scientific review by others."

No one knows what method(s) the PCAST Committee used; but it is clear that it did not hold itself to the same standard either by *capability* or *actually* performing. This report cannot be held up for scientific review (as indicated on page 6 of the report – see immediately above). There are no notes or results available.

As the report says repeatedly (see pages 6 and 32)

> "We note, finally, that neither experience, nor judgment, nor good professional practices (such as certification programs and accreditation programs, standardized protocols, proficiency testing, and codes of ethics) can substitute for actual evidence of foundational validity and reliability."

The academic and professional standings of the PCAST Committee members are not a substitute for good practices (none of which are documented). No one should take seriously this report because it has little substance to support its contentions.

The second most egregious example is the misuse and disregard for statistics. It may appear to the casual observer that the PCAST Committee is steeped in statistics and thus all statistics presented must be meaningful. For example, the report dedicates Appendix A for some discussion on statistics. But this guidance is rather basic and not particularly helpful to guide the community for any specific discipline or application. Yet when it comes to substance the PCAST Committee fails again which is evident in its own use of statistics. Consider the statements in the report on page 3

> "Reviews by the National Institute of Justice and others have found that DNA testing during the course of investigations has cleared tens of thousands of suspects and that DNA-based re-examination of past cases has led so far to the exonerations of 342 defendants. Independent reviews of these cases have revealed that many relied in part on faulty expert testimony from forensic scientists who had told juries incorrectly that similar features in a pair of samples taken from a suspect and from a crime scene (hair, bullets, bitemarks, tire or shoe treads, or other items) implicated defendants in a crime with a high degree of certainty."

Then on page 26

> "DNA-based re-examination of past cases, moreover, has led so far to the exonerations of 342 defendants, including 20 who had been sentenced to death, and to the identification of 147 real perpetrators."

A similar statement is found on page 44 (footnote 94). These findings appear to support the assertion on page 44 of the report

> "It is *important* because it has become apparent, over the past decade, that faulty forensic feature comparison has led to numerous miscarriages of justice."

I do not dispute that there have been 342 post-conviction exonerations. I am not sure what the number of exonerations is when the report says "many relied in part on faulty expert testimony" – because the report does not quantify what is meant by many. However, one wrongful analysis or testimony is one too many, and every effort should be made to minimize forensic science errors. The exoneration of 342 convicted felons is serious and topic in its own right (and again way too many). But this number is statistically meaningless and out of context. The PCAST Committee should have recognized this obvious aspect of the use of numbers. The PCAST Committee did not perform any statistical analyses or even appear to collect the data necessary to put these numbers in proper perspective. The PCAST Committee should have identified how many cases in total that have been reviewed to date (especially given that the report discusses the proper way to calculate a false positive rate, the Committee does not follow through with the same verve). This number of 342 may be and is likely a very small percentage of the total number of cases reviewed, especially since the innocence project has been around for 25 years (see https://25years.innocenceproject.org/). Moreover, the PCAST Committee did not convey how many post-conviction analyses that have been performed over the past 25 years in which there was no evidence of improper scientific performance, findings or faulty testimony. It would seem that such obvious basic information eluded the PCAST Committee. Those cases that were reviewed over the past 25 years in which no misuse of forensic science analyses were detected would indicate that perhaps the forensic science field is not so scientifically corrupt as the report implies. More so it would indicate that proper results can be obtained (at least most of the time).

The report discusses error rates substantially using statements such as on page 6

> "Similarly, an expert's expression of *confidence* based on personal professional experience or expressions of *consensus* among practitioners about the accuracy of their field is no substitute for error rates estimated from relevant studies."

The PCAST Report also recommends

> "For subjective feature-comparison methods, because the individual steps are not objectively specified, the method must be evaluated as if it were a "black box."

Smrz et al (8) (a paper of which I am a co-author) recommended the black box approach after the review of the FBI Laboratory's latent print misidentification related to the Madrid bombing incident, and the PCAST Report advocates the use of such black box studies. I concur that a black box approach has some value but strongly caution that one must consider the proper utility of such studies. The authors of the PCAST Report calculated upper bound error rates based on the results of the very few black box studies they discuss; the PCAST Committee seemingly implies that these upper bound error rates are somehow meaningful to report in every case analysis. A black box study can demonstrate generally whether or not a method can yield reliable results where a human is substantially involved in the interpretation of results. But it does not necessarily help address error that may or may not have occurred during a specific case analysis.

There are several problems with such a simplistic generalization that the authors of the PCAST Report have taken regarding use of black box studies. A black box study only tests those individuals involved in the study. Therefore, the performance of the rest of the analysts of the forensic science community is not covered by the study, and the results of the study may not apply to those analysts. Some individuals perform better than others in black box studies. The average rate inflates the performance of the poorer analysts and deflates the performance of the better analysts tested in the study. Therefore, the error rate values calculated by the PCAST authors likely do not apply to most analysts. Moreover, the information content and quality of results from a forensic science analysis vary from sample to sample. Treating all sample results equally and applying a single error rate does not convey the chance for error in a particular analysis. As the PCAST Report states (see below) DNA mixture interpretation is more challenging than interpretation of single source DNA profiles. If the PCAST Committee recognizes that differences in the quality of DNA evidence affect difficulty of interpretation, then the PCAST Committee should have been able to realize that the same holds for black box study results and different quality evidence (another obvious inconsistency in the report).

A known error rate or proficiency test mistake is at best some indirect measure of the verity of the proposed results in any given sample analysis, but can never be a direct measure of the reliability of the specific result(s) in question (9). Consider a hypothetical crossing of a street where there is a 1% error (arbitrary for sake of discussion) of being hit by a car. At the beginning of the journey crossing the road there is a 1% error of being hit. While crossing the road the chance can increase or decrease depending on circumstances (possibly being greater at the center of the road and less within lanes). If the individual successfully crosses the road, then the error drops to zero. Of course, different roads (such as a busy interstate vs a rural back road) have different *a priori* chances of error (i.e., similar to the quality of evidence affects the degree of difficulty). Ultimately the issue of crossing the road is did the individual successfully cross the road or get hit. The same holds for casework, i.e., is there an error or is there not an error in the performance or analysis. Given that the black box studies mentioned in the report did have a good degree of success, there is support that a process can generate a reliable result. Thus it still comes back to determining if an error of consequence was committed in a specific case. Oddly not mentioned in the PCAST Report is that most of the forensic disciplines addressed carry out non-consumptive forms of examination. Therefore, the most direct way to measure the truth of

the purported results is to have another expert conduct his/her own review, as is advocated by the National Research Council Report II for DNA analyses (10). Re-analysis would be more meaningful instead of espousing hypothetical error rates, which may not apply to the actual results and/or analysts involved. Indeed, the above mentioned black box studies and the missing data on total number of cases from innocence project case reviews do support that tests can yield reliable results but that most of the problems (as discussed below for DNA mixtures) have been due to misapplication. Therefore, case peer-review can be an effective approach to identify misapplications. However, the PCAST Report seems to ignore the value of this practice which demonstrates the reports myopic assessment of the forensic sciences and lack of consideration of a holistic systems approach.

The PCAST Report singles out validation as essentially the sole basis for reliability. Instead under a systems approach there are several components that impact an outcome, and the reliance on these several features increases validity and reliability in any one case. Quality performance is an essential component for obtaining reliable results and for reducing the chance of error. Quality assurance provides an infrastructure to promote high performance, address errors that arise, and improve processes. In addition to validation studies, there are other mechanisms such as technical review of a case that reduce error. This technical review is performed within the laboratory before issuing a report and also outside the laboratory when an expert witness is acquired by the opposing side to assess results and interpretations. The PCAST Report seems to ignore the value of these additional quality measures and the strength of the adversary system.
Error rates are difficult to calculate; they are fluid. When an error of consequence (i.e., a false "match") occurs, under a sound quality assurance program corrective action is taken (to include review of cases analyzed by the examiner prior to and post the discovery of the error). When the corrective action is such that the individual will no longer commit that error, it no longer impacts negatively on the individual's future performance. In fact, he/she is better educated and less likely to err. The calculation of a current error rate then should not include past error(s). Having said that, past error should not be ignored; if desired, it could be raised in court or other deliberations. The defense (or prosecution), if it believes it useful, should make use of such information during a cross-examination of an expert. But the PCAST Report does not address the shortcomings of the calculated error rate as it uses it; it treats the upper bound error rate calculation from black box studies as if they are robust and specific (which they are not).

Notably the PCAST Report tends to dismiss experience and judgment, implying it has little value. I agree that experience and judgment standing alone should be considered with caution. However, the vast majority of forensic science disciplines work in a systems approach, i.e., many facets to the process; experience is but one factor among several to effect a quality result. Even though the PCAST Report dismisses experience it again shows its inconsistencies about the province of experience. Consider the following statements on page 55 of the report

> "In some settings, an expert may be scientifically capable of rendering judgments based primarily on his or her "experience" and "judgment." Based on experience, a surgeon might be scientifically qualified to offer a judgment about whether another doctor acted appropriately in the operating theater or a psychiatrist might be scientifically qualified to offer a judgment about whether a defendant is mentally competent to assist in his or her defense."

> "By contrast, "experience" or "judgment" cannot be used to establish the scientific validity and reliability of a metrological method, such as a forensic feature-comparison method. The frequency with which a particular pattern or set of features will be observed in different samples, which is an essential element in drawing conclusions, is not a matter of "judgment." It is an empirical matter for which only empirical evidence is relevant. Moreover, a forensic examiner's "experience" from extensive casework is not informative—because the "right answers" are not typically known in casework and thus examiners cannot accurately know how often they erroneously declare matches and cannot readily hone their accuracy by learning from their mistakes in the course of casework."

Even to a lay person these statements should be obviously inconsistent, troubling and point to the inadequacy of the PCAST Committee addressing the topic of forensic science reliability. I fail to see why the medical and psychology fields can have another expert review another's work (on what may be life and death decisions) and opine on the analyses/interpretations; yet a qualified forensic science analyst cannot perform a technical review of forensic work to assess analyses/interpretations (especially since the report has ignored data that support that at some level forensic testing is reliable). The logic of the PCAST Committee escapes me.

The PCAST Report discusses DNA typing and the limitations that have been encountered with mixture interpretation. For example on page 75 the report states

> "DNA analysis of complex mixtures—defined as mixtures with more than two contributors—is inherently difficult and even more for small amounts of DNA."

I concur that it is more challenging to interpret DNA mixtures compared with single-source DNA profiles. But the report fails to add that difficult does not necessarily translate into impossible or that proper interpretations can be made. The difficulties with mixture interpretation were not due to a lack of good, valid approaches to employ as there were valid approaches and also not due to the fact that there is some subjective judgment with interpretations. The issue, and it is a serious one, was that many of the practitioners in the forensic DNA community were inadequately trained, did not seek out solutions, or instead chose to wait for guidance (see pages 77-78 of the PCAST report and discussion on Texas and mixture interpretation). These issues were similar to the mixture interpretation problems at the Department of Forensic Sciences in Washington, DC (in which I was the scientist who identified the problems).

The PCAST Report assails the use of the Combined Probability of Inclusion (CPI) which is one of the methods used by the community and endorsed by the DNA Advisory Board (11) 17 years ago. However, the discussion of the Texas Forensic Science Commission (TFSC) (of which I was deeply involved in the review of mixture interpretation for the State) and how it pursued and addressed inappropriate interpretation of mixtures actually implies that valid methods do exist; otherwise how could a group of international experts (of which I was one of the experts) assess the situation, determine that there are problems in the application of interpretation guidelines, and provide guidance to the community to implement sound procedures?

The PCAST Committee on page 78 of the report states

> "The TFSC also convened an international panel of scientific experts—from the Harvard Medical School, the University of North Texas Health Science Center, New Zealand's

> forensic research unit, and NIST—to clarify the proper use of CPI. These scientists presented observations at a public meeting, where many attorneys learned for the first time the extent to which DNA-mixture analysis involved subjective interpretation. Many of the problems with the CPI statistic arose because existing guidelines did not clearly, adequately, or correctly specify the proper use or limitations of the approach."

The report properly focuses on lack of detailed guidelines on interpretation and does not suggest that the principles of how to calculate the CPI are erroneous. Indeed, nowhere in the report are there any data to indicate that the CPI is foundationally erroneous.

Yet, the report then states on page 78

> "In summary, the interpretation of complex DNA mixtures with the CPI statistic has been an inadequately specified—and thus inappropriately subjective—method. As such, the method is clearly not foundationally valid."

The allegation that the CPI is not foundationally valid demonstrates the lack of understanding (and again the lack of documentation of review) by the PCAST Committee. In fact, these statements also demonstrate another report inconsistency – this time about the principles of statistical calculations related to DNA profiles. On page 72 the report states

> "The process for calculating the random match probability (that is, the probability of a match occurring by chance) is based on well-established principles of population genetics and statistics."

The random match probability is one approach to calculating a statistic for single-source samples and appears to be endorsed by the PCAST Committee as well-established and thus valid. Yet, the PCAST Committee takes the opposite position for the CPI stating it is not foundationally valid. If one reads my colleagues and my most recent paper on the CPI (12), cited in the PCAST Report, it is clear that the principles of the foundational validity of the CPI are the same as those for the random match probability. Consider a similar situation which is the chance of drawing four aces in a row from a standard deck of cards is estimated to be 1 in 270,275. This value is based on probability theory and does not require an empirical testing to be published in the peer reviewed literature to support it validity. The CPI and random match probability use the same population frequency data and the same well-established principles of population genetics and statistics. While this is another example of myopia by the PCAST Committee, it borders on the bizarre that the PCAST Committee failed to understand the foundations of DNA statistics.

All know the PCAST Committee had access to the most recent paper on the use of the CPI (and the references within that paper) as it is stated on page 78 of the report

> "Because the paper appeared just as this report was being finalized, PCAST has not had adequate time to assess whether the rules are also *sufficient* to define an objective and scientifically valid method for the application of CPI."

I note that the CPI is a rather simple concept and its foundations are basic. It is surprising that the PCAST Committee, which touts its vast expertise, could not readily assess the paper. Given the importance of their report and this topic it also is surprising that they would not have done so before finalizing their report.

The PCAST Report recognizes that probabilistic genotyping is an advancement to improve or reduce subjectivity in DNA mixtures (see page 79). I concur. But the report states on page 79

> "Appropriate evaluation of the proposed methods should consist of studies by multiple groups, *not associated with the software developers*, that investigate the performance and define the limitations of programs by testing them on a wide range of mixtures with different properties."

Also the report states on page 81

> "Because empirical evidence is essential for establishing the foundational validity of a method, PCAST urges forensic scientists to submit and leading scientific journals to publish high-quality validation studies that properly establish the range of reliability of methods for the analysis of complex DNA mixtures."

Publication is part of the peer-review process and I support publication by the developers and others who adopt the method. But the PCAST Committee has placed a requirement that is unrealistic to meet which is publication by the user laboratories. It is likely that a few at most laboratories will be able to publish their validation testing of the software. Anyone who serves on editorial boards of scientific journals should know that journals are unlikely to publish additional studies because they are not considered novel. Yet, the PCAST Committee failed to recognize this fact.

It is important to stress that the report contains no criticisms of probabilistic genotyping and still there are no data contained in the report that demonstrate that the PCAST Committee actually reviewed (or better yet tested) the current probabilistic genotyping software programs (even though it claims to have done extensive review, such as the undocumented 2000 papers).

Forensic laboratories are required to perform validation studies, and there are substantial data on mixtures that support the validity of mixture interpretation and use of probabilistic genotyping. Mixture studies are required to be performed by every laboratory engaged in analyzing such evidence as part of their validation studies. Many of these studies lack novelty and thus will never be published in peer-review journals. However, the PCAST Committee could have contacted a number of forensic DNA laboratories who have implemented one of the probabilistic genotyping software programs (as there were laboratories operating or near implementation of the tools at the time of the report's publication) to gain access to the validation data to determine whether there are sufficient data to support the already peer-reviewed published work. There is no indication that the PCAST Committee made any effort to become informed to opine on the reliability and validity of probabilistic genotyping.

The PCAST Committee simply ignored a wealth of validation data residing in crime laboratories. If the PCAST Committee had taken a holistic approach, they would have considered the totality of data in determining whether there is support for the validity and reliability of probabilistic genotyping. Peer-review publications by the developers and validation data by the users combined clearly support the software and its applications. Indeed, this failure of the PCAST Committee of not considering all available data is reminiscent of a similar situation that occurred 25 years ago with another report – the National Research Council I Report (NRC I) (13). The NRCI Report proposed a non-scientific, *ad hoc* way to calculate statistics called the ceiling principle. The ceiling principle had no genetics foundation or validity and was roundly rejected. One of the bases for the proposed ceiling principle approach (espoused by the NRC I Committee) was a lack of population data. There were substantial population data in crime

laboratories world-wide at the time the NRC I Report was published; but the NRC I Committee did not seek out the data. As soon as the NRC I Report was published, I reached out to my colleagues around the world and gathered the existing data which were then compiled into a five volume compendium (14). If the NRC I Committee had chosen to consider extant population data, they might have prepared a more informed Report. The outcome was that the National Academy of Sciences convened a second committee and produced the sound NRC II Report (10), which was steeped in fundamental population genetics and statistical applications. The findings of the NRC II Report in part were based on the data I complied in the five volume compendium which were available prior to the publication of the rejected NRC I Report. The PCAST Report has taken the same blinded approach and ignored extant data with a similar outcome as 25 years ago – a report that provides little value for assessing the state-of-the-art and even less value for providing guidance to improve the forensic sciences.

In conclusion, the few examples above demonstrate that the PCAST Report 1) is **not** scientifically sound, 2) is **not** based on data, 3) is **not** well-documented, 4) misapplies statistics, 5) is full of inconsistencies, and 6) does **not** provide helpful guidance to obtain valid results in forensic analyses.

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I declare under penalty of perjury that the forgoing is true and correct to the best of my knowledge.

Bruce Budowle, Ph.D.
Director
Center for Human Identification
University of North Texas Health Science Center
Fort Worth, Texas 76107
Email: (b) (6)
Tel: (b) (6)

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Review Article

Finding the way forward for forensic science in the US—A commentary on the PCAST report

I.W. Evett*[,a], C.E.H. Berger[b], J.S. Buckleton[c,d], C. Champod[e], G. Jackson[f]

[a] Principal Forensic Services Ltd., 34 Southborough Road, Bickley, Bromley, Kent, BR1 2EB, United Kingdom
[b] Institute for Criminal Law and Criminology, Faculty of Law, Leiden University, PO Box 9520, 2300 RA Leiden, The Netherlands
[c] Environmental Science & Research Ltd, Private Bag 92021, Auckland 1142, New Zealand
[d] Department of Statistical Genetics, University of Washington, Box 357232 Seattle, WA 98195-7232, United States
[e] Ecole des Sciences Criminelles, Faculty of Law, Criminal Justice and Public Administration, Université de Lausanne, Batochime — quartier Sorge, CH-1015 Lausanne-Dorigny, Switzerland
[f] Abertay University, Dundee, DD1 1HG, United Kingdom

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ABSTRACT

A recent report by the US President's Council of Advisors on Science and Technology (PCAST), (2016) has made a number of recommendations for the future development of forensic science. Whereas we all agree that there is much need for change, we find that the PCAST report recommendations are founded on serious misunderstandings. We explain the traditional forensic paradigms of *match* and *identification* and the more recent foundation of the logical approach to evidence evaluation. This forms the groundwork for exposing many sources of confusion in the PCAST report. We explain how the notion of treating the scientist as a black box and the assignment of evidential weight through error rates is overly restrictive and misconceived. Our own view sees inferential logic, the development of calibrated knowledge and understanding of scientists as the core of the advance of the profession.

Contents

* Corresponding author.
E-mail address: ianevett@btinternet.com (I.W. Evett).

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In Memoriam

This paper is dedicated to the memory of Bryan Found who did so much to advance the profession of forensic scientist through his work on calibrating and enhancing the performance of experts under controlled conditions. He will be sorely missed.

1. Introduction

This paper is written in response to a recent report on forensic science of the US President's Council of Advisors on Science and Technology (PCAST) [1]. There have already been several responses to the report from the forensic community [2–7] which have resulted in an addendum to the report [8]. Our main concern is that the report (and its addendum) fails to recognise the advances in the logic of forensic inference that have taken place over the last 50 years or so. This is a serious omission which has led PCAST to a narrowly-focussed and unhelpful view of the future of forensic science.

The structure of our paper is as follows. In Section 2 we briefly outline our view of the requirements imposed by logic on the assessment of the probative value of evidence. This allows us to set up a framework against which we can contrast some of the suggestions of the report. In Sections 3 and 4 we briefly explain the notions of "match" and "identification" paradigms that have underpinned much of forensic inference over the last century or so. Section 5 will point out misconceptions, fallacies, sources of confusion and improper terminology in the PCAST report. Our contrasting view of the future path for forensic science follows in Section 6.

2. The logical approach

Much has been written over the past 40 years on inference in forensic science. The frequency of appearance of articles, papers and books on the topic has increased markedly in recent years. Practically all of this material is founded on a logical, probabilistic approach to the assessment of the probative value of scientific observations [9,10]. The PCAST report mentions this body of work only briefly and pays scant attention to its principles [11], which we list and explain briefly as follows.

2.1. Framework of circumstances

It is necessary to consider the evidence within a framework of circumstances.

A simple example will illustrate this. Imagine that a sample[1] has been obtained from a crime scene which yielded a DNA profile from which the genotype of the originator of the sample has been inferred. A suspect for the crime is known to have the same genotype. Because the alleles revealed by a DNA profile will be found in different proportions in different ethnic groups, it is relevant to the assessment of the probative value of this correspondence of genotypes that a credible eyewitness of the crime said that the offender was of a particular ethnic appearance.

It follows that, when presenting an evaluation, the scientist should clearly state the framework of circumstances that are relevant to their assessment of the probative value of the observations, with a caveat that, if details of the circumstances change, the evaluation must be revisited.

2.2. Propositions

The probative value of the observations cannot be assessed unless two propositions are addressed.

In a criminal trial, these will represent what the scientist believes the prosecution may allege and a sensible alternative that represents the defence position.[2] In taking account of both sides of the argument, the scientist is able to assess the evidence in a balanced, justifiable way and display to the court an unbiased approach, irrespective of which side calls the witness.

Propositions may be formed at any of at least four levels in a hierarchy of propositions [12–14]. These levels are termed offence, activity, source and sub-source. We do not discuss these in any depth here. Most of the PCAST report appears to address questions at the source or sub-source level. Examples of these would be:

1. Sub-source: The DNA came from the person of interest (POI),[3] or
2. Source: This fingermark was made by the POI.

2.3. Probability of the observations

It is necessary for the scientist to consider the probability[4] of the observations given the truth of each of the two propositions in turn.

The ratio of these two probabilities is widely known as the *likelihood ratio* (LR) and this is a measure of the weight of evidence that the observations provide in addressing the issue of which of the propositions is true. A likelihood ratio greater than one provides support for the truth of the prosecution proposition. A likelihood ratio less than one provides support for the truth of the defence proposition.

It cannot be sufficiently emphasized that it is the scientist's role to provide expert opinion on the probability of the *observations* given the proposition. The role of assigning a value to the probability of the *proposition* given the observations is that of the jury in a criminal trial. This probability will take account, not just of the scientific observations, but also of all of the other evidence presented at court.

[1] The term "sample" is used generically to describe what is available for forensic examination. The term is not used here to suggest any statistical sampling process.

[2] We recognise that the scientist, particularly at an early stage of proceedings, may not know the position that defence will take. It is common practice for the scientist to adopt what appears to be a reasonable proposition, given what is known of the circumstances—making it clear that this is provisional and subject to change at any time.

[3] A source level DNA proposition would specify the nature of the recovered material, e.g. "the semen came from the POI".

[4] This could be a probability density, depending on the nature of the observations. But the principle remains unchanged.

3. The match paradigm

In most forensic comparisons, one of the items will be from a known origin (such as: a reference sample for DNA profiling from a particular individual; a pair of shoes from a suspect; a set of control fragments of glass from a broken window). The other will be from an unknown, or disputed origin (such as: DNA recovered from a crime scene; a footwear mark from the point of entry at a burglary; or a few small fragments of glass recovered from the clothing of a suspect). It is convenient to refer to these as the *reference* and *questioned* samples, respectively. The matter of interest to the court relates to the origin of the questioned sample. This question will be addressed scientifically by carrying out observations on both samples. These observations may be purely qualitative: such as, for example, the shapes of the loops of letters such as "y" and "g" in a passage of handwriting. They may be quantitative and discrete, such as the alleles in a DNA STR profile. Or they may be quantitative and continuous, such as the refractive index of glass fragments. The match paradigm calls for a judgement, by the scientist, as to whether or not the two sets of observations agree within the range of what would be expected if the questioned sample had come from the same origin as the reference sample. The basis for that judgement may, in the case of quantitative observations, be based on a set of pre-determined criteria; but where the observations are qualitative such criteria may be vague or purely judgemental.

If the two sets of observations are considered to be outside the range of what may have been expected if the two samples had come from the same source then the result may be reported as a "non-match". Depending on the nature of the observations, this provides the basis for a strong implication that the questioned and reference samples came from different sources. In many instances this conclusion will be non-controversial in the sense that prosecution and defence will be content to accept it.

However, when the result of the comparison is a "match" it does not logically follow that the two samples do share the same source or even that they are likely to be from the same source. It is possible that the two samples came from two different sources that, by coincidence, have similar properties. Throughout the history of forensic science there has been the notion – often imperfectly expressed – that the smaller the probability of such a coincidence, the greater the evidential value to be associated with the observed match. In DNA profiling, for example, we encounter the notion of a "match probability". The implication of this approach is that the jury should assign an evidential weight that is related to the inverse of the match probability.

The logical approach has done much to clarify the rather woolly inference that historically has been associated with the match paradigm but it has also demonstrated the considerable advantages of the single stage approach implied by the assignment of weight through the calculation of the likelihood ratio, over the rather clumsy and inefficient two-stage approach implied by the match paradigm. This has already been pointed out by Morrison et al. [4].

4. The identification paradigm

Historically, fingerprint comparison was seen to be the gold standard by which the power of any other forensic technique could be judged. The paradigm here was the notion of "identification"[5] or "individualization" (the terms are used synonymously here). Provided that sufficient corresponding detail was observed, the outcome of a comparison between a fingermark of questioned origin and a print taken from a known person would be reported as a categorical opinion: the two were definitely made by the same person.

So, the match and identification paradigms are related with the difference that in the latter the scientist is allowed to state that the match probability is so infinitesimally small that it is reasonable to conclude that the two items came from the same source. Historically, many examiners would have claimed that the source was established with certainty to the exclusion of all others.

The identification paradigm went largely unchallenged for many years until later in the 20th century when its logical basis was questioned (see, for example, [16] or more recently [17,18]) and also when, in a number of high profile cases, misidentifications with serious consequences were exposed.

An example of the paradigm is given in box 6, p. 137 of the PCAST report (DOJ proposed uniform language) (emphasis added).

> The examiner may state that it is his/her opinion that the shoe/tire *is the source of the impression* because there is sufficient quality and quantity of corresponding features such that the examiner would not expect to find that same combination of features repeated in another source. This is the highest degree of association between a questioned impression and a known source.

The PCAST report rightly indicates that the conclusions conveying "100 percent certainty" or "zero or negligible error rates" are not scientifically defensible. Such conclusions tend to overestimate the weight to be assigned to the forensic observations.

5. Misconceptions, fallacies and confusions in the PCAST report

The most serious weakness in the PCAST report is their flawed paradigm for forensic evaluation. Unfortunately, the report contains more misconceptions, fallacies, confusions and improper wording. In this section we will discuss the main problems with the report.

5.1. Confusion between the match and identification paradigms

This is the first source of confusion in the report. For example, from p. 90 of the report (emphasis added):

> An FBI examiner concluded with "100 percent certainty" that the fingerprint *matched* Brandon Mayfield . . . even though Spanish authorities were unable to confirm the *identification.*

On p. 48 we find (emphasis added):

> To meet the scientific criteria of foundational validity, two key elements are required:
> (1) a reproducible and consistent procedure for (a) identifying features within evidence samples; (b) comparing the features in two samples; and (c) determining based on the similarity between the features in two samples, whether the samples should be declared to be a proposed *identification* ("*matching rule*").

We have seen that declaring a match and declaring an identification are not the same thing. Declaring a match implies nothing about evidential weight whereas declaring an identification implies evidential weight amounting to complete certainty.

The PCAST report proposes an approach that is fusion of the match and identification paradigms. See, from p. 45/46:

[5] Kirk [15] defined the term identification as only placing an object in a restricted class. The criminalist would, for example, identify a particular mark as a fingerprint. Individualization was defined by Kirk as establishing which finger left the mark. An opinion of the kind "this latent mark was made by the finger which made this reference print" is an individualization.

> Because the term "match" is likely to imply an inappropriately high probative value, a more neutral term should be used for an examiner's belief that two samples came from the same source. We suggest the term "proposed identification" to appropriately convey the examiner's conclusion, along with the possibility that it might be wrong. We will use this term throughout the report.

If a scientist says that the questioned and reference samples match, the immediate inference to be drawn from this (as we have explained) is that they might have come from the same source but it is also true that they might not have come from the same source. These two statements make no implication with regard to evidential weight. Weight only comes from the second stage of the paradigm which entails coming up with some impression of rarity. The identification paradigm, on the other hand, is different in that implies a statement of certainty: the two samples certainly came from the same source.

The PCAST paradigm requires that the scientist should make a categorical statement (an identification) that cannot be justified on logical grounds as we have already explained. Most scientists would be comfortable with the notion of observing that two samples *matched* but would, rightly, refuse to take the logically unsupportable step of inferring that this observation amounts to an *identification*.

5.2. Judgement

The report emphasises the value of empirical data (emphasis added):

> The frequency with which a particular pattern or set of features will be observed in different samples, which is an essential element in drawing conclusions, *is not a matter of 'judgment'*. It is an empirical matter *for which only empirical evidence is relevant.* ([1], p. 6)

This denial of the importance of judgement betrays a poor understanding of the nature of forensic science. We offer a simple example.

Mr POI is the suspect for a crime who was arrested at time *T* in location *Z*. Some questioned material has been found on the clothing of Mr POI which is to be compared with reference material taken from the crime scene. Denote the observations on the two samples by y and x respectively. Whichever paradigm we follow, we are interested in the probability of finding material with observations y on the clothing of Mr POI if he had nothing to do with the crime. Ideally, of course, we would like a survey carried out near to time T and in the general region of Z and of people of a socio-economic group *Q* that would include Mr POI. But this is, of course unrealistic. What we do have is a survey of materials on clothing carried out at some earlier time T' and at another location Z' and of a slightly different socio-economic group *Q*'. Who is to make a judgement on the relevance of this survey data to the case at hand? We would argue that this is where the knowledge and understanding of the forensic scientist is of crucial importance.

The reality is, of course, that the perfect database never exists. The council is wrong: it is most certainly *not* the case that "only empirical evidence" is relevant. Without downplaying the importance of data collections, they can only inform judgement—it is judgement that is paramount and informed judgement is founded in reliable knowledge.

5.3. Subjective versus Objective

PCAST give their definition of the distinction between "objectivity" and "subjectivity" p. 5—footnote 3.

> Feature-comparison methods may be classified as either objective or subjective. By objective feature-comparison methods, we mean methods consisting of procedures that are each defined with enough standardized and quantifiable detail that they can be performed by either an automated system or human examiners exercising little or no judgment. By subjective methods, we mean methods including key procedures that involve significant human judgment ...

What is suggested is that many of the decisions be moved from the examiner to the procedure and/or software. The procedure or software will have been written by one or more people and the decisions about what models are used or how decisions are made are now enshrined in paper or code. Hence all the subjective judgements are now made by this person or group of people via the paper or code. Whereas this approach could be viewed as repeatable and reproducible, the objectivity is illusory.

In the US environment, subjectivity has been associated with bias and sloppy thinking, and objectivity with an absence of bias and rigorous thinking. It is worthwhile examining whence the fear of subjectivity arises. There is considerable proof that humans are susceptible to quite a number of cognitive effects many of which can affect judgement. We suspect that the fear is that these effects bias the decisions in ways that are detrimental to justice. Hence, it is bias arising from cognitive effects that is the enemy, not subjectivity.

If we return to the concept of enforced precision, we could assume that trials could be conducted on such a system and that the outputs could be calibrated. Such a system could be of low susceptibility to bias arising from cognitive effects. We suspect that these are the goals sought by PCAST. We certainly could support calibrating subjective judgements but we see little value in pretending that writing them down or coding them makes them objective.

5.4. Transposed conditional

We are concerned by the report's poor use of the notion of probability. In particular we note in the report many instances where the fallacy of the transposed conditional either occurs explicitly or is implied. We have seen that the logic of forensic inference directs us to assign a value to the probability of the observations given the truth of a proposition. The probability of the truth of a proposition is for the jury *not* the scientist. Confusion between these two different probabilities has been called the "prosecutor's fallacy" [19]. We prefer the term *transposed conditional* because, in our experience, the fallacy is regularly committed by prosecutors, defence attorneys, the judiciary and the media alike.

The fallacy is widespread, even though it can be grounds for a retrial if given in testimony by an expert witness. The document [20] that attempts to explain DNA statistics to defence attorneys in the US describes – incorrectly – a likelihood ratio for a mixture profile as:

> 4.73 quadrillion times more likely[6] to have originated from [suspect] and [victim/complainant] than from an unknown individual in the U.S. Caucasian population and [victim/complainant]." ([20], p. 52)

[6] We are fully aware of the distinction made in statistical theory between "likelihood" and "probability". We believe that attempting to explain that distinction in this paper would cause more confusion than the worth of it. It is our experience that in courts of law the two terms are taken to be synonymous.

This is a classic example of the transposed conditional. It is a transposition of the likelihood ratio, which would be more correctly presented as follows:

> The DNA profile is 4.73 quadrillion times more likely to be obtained if the DNA had originated from the suspect and the victim/complainant rather than if it had originated from an unknown individual in the U.S. Caucasian population and the victim/complainant.

The contrast between these two statements, though apparently subtle, is profound. The first is an expression of the probability (or odds) that a particular proposition is true—this, we have seen, is the probability that the jury must address, not the scientist.[7] The second considers the probability of the *observations*, given the truth of one proposition then the other, which is the appropriate domain for the expertise of the scientist. It is important to realise that the first statement is not a simple rephrasing of the second statement. Whereas the second may be a valid representation of the scientist's evaluation in a given case, the first most definitely cannot be.

Consider the following quote from the first paragraph on footwear methodology in the PCAST report ([1], p. 114):

> Footwear analysis is a process that typically involves comparing a known object, such as a shoe, to a complete or partial impression found at a crime scene, to assess whether the object is likely to be the source of the impression.

This is wrong. We state again that it is not for the scientist to present a probability for the truth of the proposition that the object was the source of the impression. The scientist addresses the probability of the outcome of the comparison *if* the object were the source of the impression: this probability forms the numerator of the likelihood ratio. Just as important, of course, is the probability of the outcome of the comparison *if* some other object were the source of the impression. The latter forms the denominator of the likelihood ratio. It is the two probabilities, taken together, that determine the evidential weight in relation to the two propositions of interest to the court.

The PCAST report sentence clearly states that the objective of the footwear analysis is to present a probability for the proposition given the observations, and not for the observations given the proposition. This is clearly a transposition of the conditional.

Similarly, the scientist is not in a position to consider the probability addressed in the following ([1], p. 65 and repeated on p. 146):

> . . . determining, based on the similarity between the features in two sets of features, whether the samples should be declared to be likely to come from the same source . . .

We have seen that is not for the scientist to consider the probability that the samples came from the same source given the observation of a "match". It is another example of the fallacy of the transposed conditional.

This confusion is systematic in the original report and we note that it continues into the addendum ([8], p. 1) (emphasis added):

> These methods seek to determine whether a questioned sample *is likely to come* from a known source based on shared features in certain types of evidence.

We have seen that this is most certainly *not* what a feature-comparison should aspire to. It is not the role of the forensic scientist to offer a probability for the proposition that a questioned sample came from a given source since this would require the scientist to take account of all of the non-scientific information which properly lies within the domain of the jury.

The need for precision of language when presenting probabilities is exemplified by two quotations from the report. First, from p. 8 when talking about the interpretation of a DNA profile:

> Could a suspect's DNA profile be present within the mixture profile? And, what is the probability that such an observation might occur by chance?

As we read it, this second sentence can be taken to mean:

> What is the probability that such an observation would be made if the suspect's DNA were not present in the mixture?

Within the logical paradigm, this is a legitimate question to ask—it is the probability of the observations given that one of the propositions were true.

However, later in the report we find (p. 52):

> the random match probability—that is, the probability that the match occurred by chance".

There is an economy of phrasing here that obscures meaning and the reader could be forgiven for believing that the question implied by the second phrase is:

> What is the probability that the two samples had come from different sources and matched by chance?

This is a probability of a proposition (the two samples came from different sources) given the observation (a match) and would imply a transposed conditional. We are aware that the council may respond that this is not at all what they meant—to which we would respond that the council should have been far more careful in its phraseology.

5.5. "Probable match"

In giving their definition of the distinction between "objectivity" and "subjectivity" p. 5—see footnote 3 the report states:

> how *to determine whether the features are sufficiently similar to be called a probable match.*

The council do not say what they mean by a "probable match" but it seems to us that it is another example of confusion between the match and identification paradigms. Following the match paradigm there is no such thing as a probable match—the two samples either match or they do not.

5.6. Foundational validity and accuracy

The report distinguishes two types of scientific validity: "foundational validity" and "validity as applied". We confine ourselves to the first of these (p. 4):

> *Foundational validity* for a forensic-science method requires that it be shown based on empirical studies to be *repeatable, reproducible, and accurate*, at levels that have been measured and are appropriate to the intended application. Foundational validity, then, means that a method can, *in principle*, be reliable.

Repeatability refers to the ability of the same operator with the same equipment to obtain the same (or closely similar) results when repeating analysis of the same material. Reproducibility refers to the ability of the equipment to obtain the same (or closely similar) results with different operators. As such, both are

[7] In Bayesian terms, the first statement is one of posterior odds. This can be derived from the second statement either by assigning prior odds of one (which would be highly prejudicial in most criminal trials) or by making the mistake of transposing the conditional. Neither is acceptable behaviour for a scientist.

expressions of precision, which is how close each measurement or result is to the others.

Accuracy is a measure of how close one or a set of measurements is to the true answer. This has an obvious meaning when we know or could know the true answer. We could imagine some measurement such as the weight of an object where that object has been weighed by some very advanced technique and we can accept that as the "true" weight. We wish then to consider the accuracy of some other, perhaps cheaper, technique. We could assess the accuracy of this second technique by using it to weigh the object multiple times and observing the deviation of the results from the "true" weight of the object.

For some questions in forensic science, such as "How much heroin is in this seized sample?" or "How much ethanol is in this blood sample?", the notion of the accuracy of an applied analytical technique is relevant because it is possible to assess a technique's accuracy using trials with known quantities of heroin or ethanol. However, when it comes to answering a question such as "What is the probability that there would have been a match with a suspect's shoe if it did not make the mark at the scene of crime?", then there is no sense in which there is a "true answer". The values that experts assign for such probabilities will vary depending on the specific knowledge of the experts and the nature of any databases that experts may use to inform their probabilities.

We could use a weather forecaster as an illustration. If she says that there is a 0.8 probability of a sunny day tomorrow, there can be no sense in which this is a "true" statement. Equally, if tomorrow brings rain, she is not "wrong" in any sense. Nor is she "inaccurate". A probabilistic statement of this nature may be unhelpful or misleading, in the sense that it may lead us to make a poor decision, but it cannot be either true or false.

Once we abandon the idea of a true answer for probabilities, we are left with the difficult question of what we mean by accuracy. We suggest that the report does a disservice to the important task of calibrating probabilities by a simplistic allusion to accuracy.

The PCAST report says (p. 46):

> Without appropriate estimates of accuracy, an examiner's statement that two samples are similar – or even indistinguishable – is scientifically meaningless; it has no probative value, and considerable potential for prejudicial impact. Nothing – not training, personal experience nor professional practices – can substitute for adequate empirical demonstration of accuracy.

We have seen that the report is wrong here—it is not a matter of "accuracy" but of evidential weight.

5.7. The PCAST paradigm

The PCAST report proposes an approach that is fusion of the match and identification paradigms. See, from p. 45/46:

> Because the term "match" is likely to imply an inappropriately high probative value, a more neutral term should be used for an examiner's belief that two samples came from the same source. We suggest the term "proposed identification" to appropriately convey the examiner's conclusion, along with the possibility that it might be wrong. We will use this term throughout the report.

First, we have seen that the term "match", if used properly, makes no implication of probative value: it implies that the two samples might have come from the same source but also might have come from different sources. This is evidentially neutral. Second, we have seen that there is no place for the "examiner's belief that two samples came from the same source": it is not for the scientist to assign a probability to the proposition that the two samples came from the same source.

Next we must consider what the council understand the phrase "proposed identification" to mean. Do they mean that, because it is an identification, it is a categorical opinion? Note that the qualifier "proposed" does not make the identification less than categorical – if it were probabilistic it could not be "wrong".[8] If it is not probabilistic then the scientist is to provide a categorical opinion while telling the court that he/she might be wrong! It is difficult to believe that any professional forensic scientist would be happy to be put in this position.

5.8. The scientist as a "black box"

On page 49 we find:

> For subjective methods, procedures must still be carefully defined—but they involve substantial human judgment. For example, different examiners may recognize or focus on different features, may attach different importance to the same features, and may have different criteria for declaring proposed identifications. Because the procedures for feature identification, the matching rule, and frequency determinations about features are not objectively specified, the overall procedure must be treated as a kind of "black box" inside the examiner's head.

The report justifiably emphasises weaknesses of qualitative opinions. The intuitive "black box" view of the scientist will certainly have been true in many instances in the past and, indeed, in certain quarters in the present day. But for us the solution is emphatically not to continue to treat this as an acceptable state of affairs for the future. The PCAST view appears to be "it's a black box, so let's treat it like a black box". Our approach has been, and will continue, to break down intuitive mental barriers by expanding transparency, knowledge and understanding. We do not see the future forensic scientist as an *ipse dixit* machine—whatever the opinion, we expect the scientist to be able to explain it in whatever detail is necessary for the jury to comprehend the mental processes that led to it.

5.9. Black box studies

That the council intend the proposed identification to be categorical is clarified in the following from page 49 (emphasis added):

> In black-box studies, many examiners are presented with many independent comparison problems – typically, involving "questioned" samples and one or more "known" samples – and *asked to declare whether the questioned samples came from the same source as one of the known samples*.[9] The researchers then determine how often examiners reach erroneous conclusions.

PCAST proposes that the error rates from such experiments would be used to assign evidential value at court.

We are strongly against the notion that the scientist should be forced into the position of giving categorical opinions in this way. Whereas, we are strongly in favour of the notion of calibrating the

[8] Though, of course, it would be logically incorrect because it would imply a transposed conditional.

[9] In footnote 111 the report says: "Answers may be expressed in such terms as "match/no match/inconclusive" or "identification/exclusion/inconclusive". This strengthens our belief that the council see match and identification as interchangeable".

opinions of forensic scientists under controlled conditions we see those opinions expressed in terms of statements of evidential weight. We return to the subject of calibration later.

5.10. Governance

PCAST suggests that forensic science should be governed by those, such as metrologists, from outside the profession. This speaks to the view, reinforced by a very selective reference list, that the forensic science discipline is not to be trusted with developing procedures, testing them, and self-governance. We do not reject input from outside the profession: we welcome it. But our own observations are that those outside may be engaged to different extents, varying from a passing interest to years of study. They may be unduly influenced by headlines in newspapers highlighting or exaggerating deficiencies. On occasion, these same commentators from outside the profession may not recognise the limitations in their own knowledge base where it concerns specifically forensic aspects, may be reticent to consult subject matter experts from amongst practising scientists and may give well-intentioned, but erroneous, advice [1,21].

6. Our view of the future

6.1. Logical inference

The recommendations of the PCAST report are founded on a conflation of two classical forensic paradigms: match and identification. These paradigms are as old as forensic science but their inadequacies and illogicalities have been comprehensively exposed over the last 50 years or so. All of us maintain, and have done so in our writings, that the future of forensic science should be founded first on the notion of logical inference and second on the notion of calibrated knowledge. The former leads to a framework of principles (which have been adopted by ENFSI) and we are disappointed that PCAST has apparently chosen to ignore, or at most pay lip service to, this fundamental change. The second is a deeper and far richer concept than the profoundly limited notion of false-positive and false-negative error rates: this is the notion of *calibration.*

6.2. Calibration

We are most definitely in favour of the studying of expert opinion under controlled circumstances, see for example Evett [22] but proficiency testing is far more than the counting of errors. The PCAST black-box approach calls for a categorical opinion that is recorded as right or wrong but we have seen that forensic interpretation is far richer and more informative than simple yes/no answers. In a source level proficiency test we expect the participants to respond with a statement of evidential weight in relation to one of two clearly stated propositions. Support thus expressed for a proposition that is, in fact, false is undesirable because it is misleading—not "wrong". Obviously, the desirable outcome of the proficiency test is a small value for the expected weight of evidence in relation to a false proposition. But whatever the outcome, the study must be seen as a learning exercise for all participants: the pool of knowledge has grown. The notion of an error rate to be presented to courts is misconceived because it fails to recognise that the science moves on as a result of proficiency tests. The work led by Found and Rogers [23] has shown how the profession of handwriting comparison in Australia and New Zealand has grown in stature because of the culture of advancing knowledge through repeated study under controlled conditions. To repeat then, our vision is not of the black-box/error rate but of continuous development through calibration and feedback of opinions.

A striking example of forensic calibration is the evolution of fingerprints evidence from the identification paradigm to the logical paradigm via mathematical modelling [24,25]. Instead of the categorical identification, we have a mathematical approach that leads to a likelihood ratio. The validation of such approaches is founded on two desiderata: we require large likelihood ratios in cases in which the prosecution proposition is true; and small likelihood ratios in cases in which the defence proposition is true. Investigation of performance in relation to these two desiderata is undertaken by considering two sets of comparisons: one set in which it is known that the two samples came from the same source; and one set in which it is known that the two samples came from different sources. There have been major advances over recent years in how the likelihood ratio distributions from such experiments may be compared and evaluated (Ramos [26], Brümmer [27] see also Robertson et al. [28] for a layman's introduction to calibration). The elegance and performance of such methods far transcends the crude PCAST notion of "false-positive" and "false-negative" error rates.

6.3. Knowledge and data

The PCAST report focuses on "feature-comparison" methods and, as we have explained, this has meant that it is concerned with inference relating to source-level propositions. At this level, the report sees data as the sole means for assigning probabilities. An important part of the role of the forensic scientist is concerned with inference with regard to activity-level propositions. Consider, for example, a question of the form "what is the probability of finding this number of fragments of glass on Mr POI's jacket if he is the person who smashed the window at the crime scene?" The answer is heavily dependent on circumstantial information (how large is the window? where was the person who smashed the window standing? was any implement used? how much time elapsed between the breaking of the window and the seizure of the jacket from Mr POI? etc.) and the variation in this between cases is vast. There is no single database to inform such probabilities. The scientist will, it is hoped, be thoroughly familiar with all of the published literature on glass transfer in crime cases [29] and may, if resources permit, carry out experiments that reproduce the current case circumstances. The knowledge and judgement of other scientists who have encountered similar questions is also relevant. We agree with PCAST that length of experience is not a measure of reliability of scientific opinion: the foundation is reliable knowledge. Too little effort has been devoted within the forensic sphere thus far to the harnessing of knowledge through knowledge based systems but see [29] for examples of how such a system was created for glass evidence interpretation.

We do not deny the importance of data collections but the view that data may replace judgement is misconceived. A data collection should be used to inform reliable knowledge—not replace it.

We have explained that our view of the scientist is the antithesis of the PCAST "black box" automaton. Although there is a need for data, PCAST are mistaken in seeing it as the be-all and end-all: qualitative judgement will always be at the centre of forensic science evidence evaluation. We reject the PCAST vision of the scientist who gives a categorical opinion and a statement about the probability that the opinion is wrong. We see the model scientist as deeply knowledgeable about her domain of expertise and able to rationalise the opinion in terms that the jury will understand. The principles have been expressed elsewhere [11] as balance, logic, robustness and transparency. There is no place for the black box. We agree that the scientist should be able to provide the court with evidence of performance under controlled conditions. Found and Rogers [23] have provided a model for handwriting comparison

and we see such approaches as extending into other areas: the emphasis is on calibration of probabilistic assessments.

7. Conclusion

The 44th US president's request was "to consider whether there are additional steps that could usefully be taken on the scientific side to strengthen the forensic-science disciplines and ensure the validity of forensic evidence used in the Nation's legal system" ([1], p. 1). We suggest that the report has very little emphasis on positive steps and does much to reinforce poor thinking and terminology.

Our own view of the future of forensic science is based on the principle that forensic inference should be founded on a logical framework for reasoning in the face of uncertainty. That framework is provided by probability theory coupled with the recognition that probability is necessarily subjective and conditioned by knowledge and judgement. It follows that our view of the forensic scientist is a knowledgeable, logical and reasonable person. Whereas data collections are valuable they should be viewed within the context of reliable knowledge. The overarching paradigm of reliable knowledge should be founded on the notion of knowledge management, including comprehensive systems for the calibration of expert opinion.

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U.S. Department of Justice Deputy Attorney General News Update

From: U.S. Department of Justice <usdoj@public.govdelivery.com>
To: (b)(6) William Hughes
Date: Wed, 13 Jan 2021 15:02:01 -0500

You are subscribed to Deputy Attorney General News for U.S. Department of Justice. This information has recently been updated, and is now available.

Justice Department Publishes Statement on 2016 President's Council of Advisors on Science and Technology Report

01/13/2021 12:00 AM EST

Today, the Justice Department published a statement on the 2016 President's Council of Advisors on Science and Technology (PCAST) Report, Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods. The statement is a response to PCAST's claims regarding what it described as forensic "feature comparison methods."

RE: Deliverables

From: "Ferrato, Katherine M. (ODAG)" <(b) (6)>
To: "Bolitho, Zachary (ODAG)" <(b) (6)>, "Terwilliger, Zachary (ODAG)" <(b) (6)>
Cc: "Spolar, Ellen S. (ODAG)" <(b) (6)>
Date: Fri, 16 Feb 2018 12:02:59 -0500
Attachments: March Deliverables (2.16 at noon).docx (29.36 kB)

Zach, Zac,

The only additional input I received was from Ted Hunt re forensics. I am happy to continue adding to this document as more responses come in, but I wanted to send you the most recent version. Let me know if you have any questions.

Best,
Katie

From: Ferrato, Katherine M. (ODAG)
Sent: Friday, February 16, 201
To: Bolitho, Zachary (ODAG) <(b) (6)>; Terwilliger, Zachary (ODAG) <(b) (6)>
Cc: Spolar, Ellen S. (ODAG) <(b) (6)>
Subject: RE: Deliverables

Zach, Zac,

The attached document includes deliverables from Dan. I also attached the document that OTJ sent. Most of the deliverables listed occurred in February so aren't included in the document for next month, but wanted to send for your awareness.

We have still not received input from Steve, Tash, John, Ted, Iris, Mark, Sujit, Scott, Matt, and Dave. I will follow up with them this morning and see if we can get something for inclusion in the next hour or so.

Best,
Katie

From: Spolar, Ellen S. (ODAG)
Sent: Thursday, February 15, 2018 4:20 PM
To: Bolitho, Zachary (ODAG) <(b) (6)>; Terwilliger, Zachary (ODAG) <(b) (6)>
Cc: Ferrato, Katherine M. (ODAG) <(b) (6)>
Subject: RE: Deliverables

Hi Zach and Zac,

Please see the attached document. We have not yet received input from Steve, Tash, John, Ted, Iris, Dan, Mark, Sujit, Scott, Matt, and Dave.

Thank you,
Ellen

From: Bolitho, Zachary (ODAG)
Sent: Thursday, February 15, 2018 4:12 PM
To: Ferrato, Katherine M. (ODAG) <(b) (6)>; Spolar, Ellen S. (ODAG) <(b) (6)>
Cc: Terwilliger, Zachary (ODAG) <(b) (6)>
Subject: Deliverables

Katie/Ellen,

Can you please send me and Zach T. the information you have so far on the deliverables?

Thanks,
Zac

Re: Advisory Committee on Rules of Evidence, agenda materials for October 26-27, 2017 meeting

From: "Goldsmith, Andrew (ODAG)" <(b) (6)>
To: "Antell, Kira M. (OLP)" <(b) (6)>
Cc: "Shapiro, Elizabeth (CIV)" <(b) (6)>, "Hunt, Ted (ODAG)" <(b) (6)>
Date: Tue, 03 Oct 2017 11:16:52 -0400

I concur.

Sent from my iPhone - please excuse any typos.

On Oct 3, 2017, at 11:11 AM, Antell, Kira M. (OLP) <(b) (6)> wrote:

702/PCAST TPs

From: (b)(6) Andrew Goldsmith
To: "Hur, Robert (ODAG)" <(b) (6) >
Cc: "Antell, Kira M. (OLP)" <(b) (6) >, "Shapiro, Elizabeth (CIV)" <(b) (6) >, "Hunt, Ted (ODAG)" <(b) (6) >
Date: Thu, 21 Sep 2017 13:59:30 -0400
Attachments: Proposed Talkers for Call with Judge Livingston on 702_09202017.docx (25.2 kB); ATT00001.txt (2 bytes)

Rob - here are the talkers for R 702/PCAST. Betsy is preparing a similar set later today for 404(b) and the Committee. She has indicated that J Livingston is very familiar with where we stand on 404(b), and that you'll need a more detailed briefing on the topic prior to the meeting itself. - Andrew

Conference materials for October 27

From: Daniel Capra <(b) (6)>
To: Eric Lander <(b) (6)>, "Dror, Itiel" <(b) (6)>, Karen Kafadar <(b) (6)>, Tom Albright <(b) (6)>, "Isenberg, Alice R. (LD) (FBI)" <(b)(7)(E) per FBI>, "Ballou, Susan M (Fed)" <(b) (6)>, Jeff Salyards <(b) (6)>, (b)(6) Alex Kozinski, (b)(6) Jed Rakoff <(b)(6) Jed Rakoff>, (b)(6) K Michael Moore, Ronald J Allen <(b) (6)>, "Kaye, David" <(b) (6)>, Jonathan J Koehler <(b) (6)>, (b)(6) Jane Moriarty, "Murphy, Erin" <(b) (6)>, Stephen Saltzburg <(b) (6)>, "Hunt, Ted (ODAG)" <(b) (6)>, "Goldsmith, Andrew (ODAG)" <(b) (6)>, Chris Fabricant <(b) (6)>, Anne Goldbach <(b) (6)>, (b)(6) Patti Saris, (b)(6) Paul Grimm, "Hafer, Zachary (USAMA)" <(b) (6)>, "Lightfoot, Lori" <(b) (6)>, (b)(6) Laura Shamp, Thomas Sobol <(b) (6)>
Cc: (b)(6) Debra Livingston, (b)(6) David Campbell, (b)(6) Daniel Coquillette, (b)(6) Shelly Cox, "Shapiro, Elizabeth (CIV)" <(b) (6)>
Date: Wed, 11 Oct 2017 13:00:51 -0400
Attachments: Rule 702 conference BC Law School conference materials.docx (42.14 kB)

Attached is a file representing the conference materials for October 27 --- Agenda, Speaker bios, and relevant rules for discussion.

I would like to cover a couple of process issues:

1. We will be operating under significant time constraints given the number of participants. And while the individual presentations are obviously critical, I believe that it is equally important to save time for discussion among the participants, and for questions from and discussion with members of the Advisory Committee. Therefore, I implore each of the speakers to adhere to the time limits that were originally stated --- no more than 10 minutes for the initial presentation. You can save what you don't get to for the general discussion. I will be giving two minute warnings. Thanks to everyone in advance for bringing their talks within the time limits.

2. While the PCAST report was the reason that the forensics panel was conceived, the Conference is not about the merits of the PCAST report. It is about what the current problems are in forensic expert testimony and whether the problems that do exist can be usefully regulated by the courts and , specifically, by rulemaking. I am hoping that the conversation will be about those matters, rather than a line-by-line attack or support on the PCAST report.

3. If you wish to do a powerpoint presentation, please bring it on a USB stick. BC prefers to have it provided to them in that way. It would probably be a good idea to get everything loaded before we start at 8:30.

4. The Conference is scheduled to conclude at 1 and lunch will follow. We start at 8:30 sharp.

If you have any questions or anything you need help with in terms of logistics or otherwise, please let me know.

Thank you all so much. We are really excited about your participation in this important event. See you all soon.

Daniel J. Capra
Reed Professor of Law
Fordham Law School
New York, New York
(b) (6)

Judicial Conference Advisory Committee on Evidence Rules

Symposium on Forensic Expert Testimony, *Daubert,* and Rule 702

Boston College Law School

October 27, 2017

Conference Materials

I. Agenda

Introductory Remarks

Dean Vincent D. Rougeau, Boston College Law School

Hon. David Campbell, Chair of the Committee on Rules of Practice and Procedure

Hon. William K. Sessions, III, former Chair of the Advisory Committee on Evidence Rules

Panel One: Forensic Evidence

Scientists

Dr. Eric Lander, President and founding director of the Broad Institute of MIT and Harvard; co-chair of the President's Council of Advisors on Science and Technology (PCAST).

Topic: Rulemaking to Help Assure the Validity of Forensic Expert Testimony.

Dr. Itiel Dror, University College London (UCL) and Cognitive Consultants International.

Topic: "Reliability and Biasability of Expert Evidence"

Expert evidence is often based on human perception, judgment, interpretation and decision making. These often include subjective elements. Subjectivity is not necessarily a bad thing, but it can introduce two major concerns. First, reliability (in the scientific sense

of consistency and reproducibility), that is, will different experts reach the same conclusions (the inter- between-expert reliability); and more basic, will the same expert, examining the same data, reach the same conclusions (the intra- within-expert reliability). The second concern is biasability, the biasing influence of irrelevant contextual information, as well as target driven bias (whereby the experts work 'backward' from the 'target' suspect to the evidence, rather than the evidence itself driving the forensic work). The Hierarchy of Expert Performance (HEP) demonstrates that expert evidence suffers from both issues of reliability and biasability, even in forensic fingerprint and mixture DNA evidence.

The problem is that forensic evidence is often misrepresented in court and is incorrectly regarded by most jurors (as well as judges, and the forensic experts themselves) as objective and impartial evidence. It is therefore important to make sure that there are minimal misconceptions about the true nature and weaknesses of forensic evidence. Furthermore, that the courts make sure that steps are taken by experts to deal with those weaknesses, such as LSU - Linear Sequential Unmasking (which stipulates that experts should only be exposed to relevant information and methods for ensuring experts work from the evidence to the suspect, not backwards). When expert evidence fails to meet these standards, it is biased and unreliable, and then it should be excluded. The fear of evidence being excluded will make a much needed positive impact on the way forensic work is carried out, resulting in evidence that is more impartial and reliable.

Dr. Karen Kafadar, Commonwealth Professor & Chair of Statistics at University of Virginia.

Topic: Distinguishing Opinion and Relevance from Demonstrably Sufficient Science

Rule 702 allows a witness to testify "in the form of an opinion or otherwise" if "the testimony is based on sufficient facts or data" and "is the product of reliable principles and methods" that have been "reliably applied". The determination of "sufficient" (facts or data), and whether the "reliable principles and methods" relate to the scientific question at hand, involve more discrimination than the current Rule 702 may suggest. Using examples from latent fingerprint matching and trace evidence (bullet lead and glass), Dr. Kafadar will offer some criteria that scientists often consider in assessing the "trustworthiness" of evidence, to enable courts to better distinguish between "trustworthy" and "questionable" evidence. The codification of such criteria may ultimately strengthen the current Rule 702 so courts can better distinguish between demonstrably scientific sufficiency and "opinion" based on inadequate (or inappurtenant) methods.

Dr. Jeff Salyards, Director of the Defense Forensic Science Center, Department of Defense .

Topic: "Uncertainty, Error, and Mistake," and the Difference Between "validation and Validation."

Dr. Thomas Albright, Professor and Conrad T. Prebys Chair, Salk Institute for Biological Studies.

Topic: Why Eyewitnesses Fail

Eyewitness identifications play an important role in the investigation and prosecution of crimes, but it is well known that eyewitnesses make mistakes, often with serious consequences. In light of these concerns, the National Academy of Sciences recently convened a panel of experts to undertake a comprehensive study of current practice and use of eyewitness testimony, with an eye towards understanding why identification errors occur and what can be done to prevent them. The work of this committee led to key findings and recommendations for reform, detailed in a consensus report entitled *Identifying the Culprit: Assessing Eyewitness Identification*. In this presentation, Dr. Albright will focus on the scientific issues that emerged from this study, along with brief discussions of how these issues led to specific recommendations for additional research, best practices for law enforcement, and use of eyewitness evidence by the courts.

Dr. Alice R. Isenberg, Deputy Assistant Director of the FBI Laboratory

Topic: The Modern Practice of Forensic Science

As a forensic practitioner, Dr. Isenberg will speak about forensic methods and actions to strengthen use of forensic science in the laboratory and in the courtroom. She will also discuss validation research in a federal laboratory and address the role and importance of quality assurance systems including, accreditation, testimonial training, and competency and proficiency testing.

Susan Ballou, Program Manager for the Forensic Sciences Research Program, National Institute of Standards and Technology (NIST).

Topic: Getting The Science Right – Not The Focus of Rule of Evidence 702

- Measurement science provides basis for testimony – data driven results required to justify position.

- Science is presented with increased specificity and certainty – supporting the selected principles and methods

Judiciary

Hon. Alex Kozinski, Circuit Judge, Ninth Circuit Court of Appeals

Topic: A Comment on the Science Presentations and the Role of Rule 702.

Hon. Jed S. Rakoff, District Judge, Southern District of New York

Topic: The Problem of Experts Overstating a "Match"

Hon. K. Michael Moore, Chief Judge, Southern District of Florida

Topic: The Need for a Flexible Rule

Chief Judge Moore will be discussing the need for a flexible rule to enable trial court judges to assess the admissibility of expert opinions, especially as the legal landscape evolves. Specifically, Chief Judge Moore will address recent developments in drug prosecutions pertaining to synthetic drugs and assessing the reliability of experts in this area.

Academics

Professor Ronald J. Allen, John Henry Wigmore Professor of Law, Northwestern Pritzker School of Law

Topic: Fiddling While Rome Burns: the Story of the Federal Rules and Experts.

Worrying about the "reliability" of some discipline with little assurance that it is has been applied correctly, and less assurance that the fact finder understands it, is to fiddle while Rome burns. This point derives from Professor Allen's papers that explored the distinction between educational and deferential models of decision making.

Professor David H. Kaye, Distinguished Professor and Weiss Family Scholar, Penn State Law School

Topic: Why Has Rule 702 Failed Forensic Science?

Eight years ago, a committee of the National Academy of Sciences concluded that "[i]n a number of forensic science 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." The committee also observed that "[f]ederal appellate courts have not with any consistency or clarity imposed standards ensuring the application of scientifically valid reasoning and reliable methodology in criminal cases involving *Daubert* questions." This situation, it added, was "not surprising" given that *Daubert* is so "flexible."

This presentation will elaborate on these conclusory remarks in four ways (time permitting). First, it will describe how ambiguities and flaws in the terminology adopted in *Daubert* combined with the opaqueness of forensic-science publications and standards have been exploited to shield some test methods from critical judicial analysis. Second, to promote an improved understanding of the necessary foundations for scientific and other expert testimony, it will sketch various meanings of the terms "validity" and "reliability" in science and statistics on the one hand, and in the rules and opinions on the admissibility of expert evidence, on the other. In this regard, it will skeptically consider the two-part definition of "validity" in a 2016 report of the President's Council of Advisors on Science and Technology and will question the report's effort to draw a bright line for the "validity" of pattern-matching testimony. Third, it will ask if the Federal Rules of Evidence should be revised to conform more closely to the usual scientific terminology. Finally, it will identify four ways to indicate uncertainty in forensic findings and will propose requiring statements about uncertainty when reporting outcomes of scientific tests.

Professor Jonathan J. Koehler, Beatrice Kuhn Professor of Law at Northwestern Pritzker School of Law

Topic: Data and Forensic Science Opinions

FRE 702 permits expert opinion testimony if the opinion is based on sufficient facts or data, if those facts or data are derived from reliable principles and methods, were reliably applied in the instant case, and if the opinion is helpful to the trier of fact. I will suggest that, in many instances, opinion testimony that is routinely provided by forensic scientists fails this test. The failure arises largely because trial judges have not required testifying forensic scientists in any area (including DNA) to provide meaningful data to help judges and jurors assess the probative value of forensic opinion testimony. Empirical evidence from studies with mock jurors hints at substantial confusion around this issue. I will suggest amending FRE 702 to ensure that forensic science opinion testimony – and other expert testimony that relies heavily on subjective human judgment – receives a more rigorous vetting at trial.

Professor Jane Campbell Moriarty, Carol Los Mansmann Chair in Faculty Scholarship, Duquesne University School of Law

Topic: Judicial Gatekeeping of Forensic Science Feature-comparison Evidence.

Courts generally admit feature-comparison evidence, despite little proof of scientific reliability. Why are courts generally unreceptive to challenges about the reliability of such evidence? It may be that judges (like most people) perceive feature-comparison evidence as fairly straightforward and intuitively accurate. This perception may cause courts to employ heuristic approaches to the evidence—that is, cognitive shortcuts that manage complexity—which can be influenced by common cognitive biases, such as belief perseverance and confirmation bias. By understanding that feature-comparison "matching" is a complex, multifaceted process, courts might engage in a deeper, science-based review to better analyze the shortcomings and limitations of such evidence.

Professor Erin Murphy, N.Y.U. Law School

Topic: Machine-Generated Forensic Evidence

Technology has dramatically changed the shape of evidence in criminal courts. Forensic comparisons increasingly rely on machine-generated information, such as the DNA match statistics produced by a probabilistic genotyping software program or the location data reported by a cell phone tracker. This talk probes whether rules designed for viva voce confrontation of isolated pieces of evidence require tweaking when applied to machine-generated evidence.

Professor Stephen A. Saltzburg, Wallace and Beverley Woodbury University Professor, George Washington University Law School

Title: Requiring Appointment of a Defense Expert to Challenge the Government's Forensic Expert

Professor Saltzburg will explore the question whether a defense lawyer confronting expert testimony and/or scientific tests by the government can provide effective assistance of counsel without having access to a defense expert to examine the government's forensics. The solution to the problem may be an amendment to Rule 706, or an appointment provision added to a new rule on forensic evidence.

Practitioners

Ted R. Hunt, Senior Advisor on Forensics, United States Department of Justice

Topic: The PCAST Report

Mr. Hunt will speak directly to the PCAST report and offer the Department's official position on the report.

Andrew Goldsmith, Associate Deputy Attorney General and National Criminal Discovery Coordinator, United States Department of Justice

Topic: The Reliability of the Adversarial System to Inform Factfinders About Any Genuine Issues as to the Reliability or Accuracy of Forensic Testimony.

Chris Fabricant, Joseph Flom Special Counsel and Director of Strategic Ligation, The Innocence Project

Topic: The 702 Requirement of Reliable Application

Mr. Fabricant will discuss 702/*Daubert* as it relates to forensic sciences, with a particular focus on FRE 702(c)'s requirement that the testimony at issue be the product of reliable principles and methods, and how this requirement has been interpreted by courts in criminal cases.

Anne Goldbach, Forensic Services Director, Committee for Public Counsel Services, Public Defender Agency of Massachusetts.

Topic: Rule 702(d) and Forensic Experts

Ms. Goldbach will discuss Rule 702(d)'s requirement that expert testimony must demonstrate that the expert has reliably applied the principles and methods to the facts of the case, and how this requirement has been interpreted in criminal cases involving forensic experts in the First Circuit and Massachusetts courts.

Concluding Remarks: Special Commentary by Professor Charles Fried, Beneficial Professor of Law, Harvard Law School.

Panel Two: Rule 702 and Daubert

Judiciary

Hon. Patti B. Saris, Chief Judge, District of Massachusetts

Topic: Daubert Gatekeeping and Complex Scientific Concepts

Chief Judge Saris will address the challenges to courts in addressing *Daubert* motions where the scientific concepts are complex, like patent litigation or product liability. Her perspective is that *Daubert* does not have the liberalizing effect the Supreme Court anticipated but actually makes it harder to have expert evidence introduced. She will outline different approaches courts use to understand the science (like tutors).

Hon. Jed S. Rakoff, District Judge, Southern District of New York

Topic: How Daubert is Working in Non-Forensic Cases, and How Trial Judges Seek to Avoid Daubert Rulings.

Hon. Paul W. Grimm, District Judge, District of Maryland

Topic: Structural Impediments for Judges Applying Rule 702 in Criminal Cases

Courts encounter special difficulties in making reasoned *Daubert* rulings in criminal cases. Structural impediments include: 1) the speed at which criminal cases proceed; 2) the significantly less helpful criminal expert disclosure rules as compared with the civil rules disclosures; 3) the overlay of the plea bargaining process and pressure on defendants not to file motions; and 4) resource limits on the ability of public defenders and CJA panel counsel on hiring forensic experts. These limitations make it very difficult for trial judges to get the information they need to perform a *Daubert*/Rule 702 analysis sufficiently far in advance of trial.

Practitioners

Zachary Hafer, Assistant U.S. Attorney, District of Massachusetts

Title: Daubert from the Perspective of a Prosecutor

Mr. Hafer will address Judge Grimm's remarks and speak further about the challenges of applying *Daubert* from the prosecutor's perspective.

Lori Lightfoot, Mayer Brown, Chicago

Title: Making the Gatekeeping Function Meaningful

Experience shows *Daubert* motions have become perfunctory, i.e. it is assumed that such motions will be filed, and not attacking an expert through a *Daubert* motion is the exception, not the rule --- which obviously is not the intent. Experience also indicates judges are very reluctant to grant a *Daubert* motion if there is even a colorable argument in support of the expert's proffered testimony. So, the challenge is how to have the rule serve as an appropriate gatekeeper without barring legitimate testimony, given the significant role that experts can play in a trial. Another issue is whether, and to what extent, the rulings on the *Daubert* motions influence the settlement decision.

Laura M. Shamp, Shamp Jordan Woodward, Atlanta

Topic: Daubert from the Plaintiffs' Perspective

Ms. Shamp will speak about the challenges that are faced by plaintiffs under *Daubert* and on whether an amendment to Rule 702 would be helpful to address those challenges.

Thomas M. Sobol, Hagens Berman, Boston

Title: Problems in the Use of Expert Screening Tools

Mr. Sobol will address two opposing forces in the use of *Daubert* and related expert screening tools. On the one hand, the perceived or actual overuse of these tools occasionally leads to a lack of focus to cull out those portions of expert testimony that truly ARE contrary to law or the relevant professional standards. On the other hand, these tools too often provide a vehicle for judicial intervention into the jury's fact finding role. The solution is more selective attacks by counsel, as opposed to shotgun motions.

Concluding Remarks on the Conference

Hon. Debra Livingston, Chair of the Advisory Committee on Evidence Rules.

II. Speaker Bios

Dr. Thomas D. Albright

Dr. Thomas D. Albright is Professor and Conrad T. Prebys Chair at the Salk Institute for Biological Studies in La Jolla, California. His laboratory seeks to understand the brain bases of visual perception, memory and visually-guided behavior. Albright received a Ph.D. in psychology and neuroscience from Princeton University. He is a member of the US National Academy of Sciences, a fellow of the American Academy of Arts and Sciences, and a fellow of the American Association for the Advancement of Science.

Albright served as co-chair of the US National Academy of Sciences Committee on Scientific Approaches to Eyewitness Identification, which produced the 2014 report *Identifying the Culprit: Assessing Eyewitness Identification*. He is a member of the US National Academy of Sciences Committee on Science, Technology, and Law, and serves on the US National Commission on Forensic Science.

Professor Ronald J. Allen

Professor Allen is the John Henry Wigmore Professor of Law at Northwestern University, in Chicago, IL. He did his undergraduate work in mathematics at Marshall University and studied law at the University of Michigan. He is an internationally recognized expert in the fields of evidence, criminal procedure, and constitutional law. He has published seven books and over 100 articles in major law reviews. He has been quoted in national news outlets hundreds of times, and appears regularly on national broadcast media on matters ranging from constitutional law to criminal justice. He has worked with various groups in China to help formulate proposals for legal reform, and he was recently retained by the Tanzanian Government to assist in the reform of their evidence law. He is a member of the American Law Institute, has chaired the Evidence Section of the Association of American Law Schools, and was Vice-chair of the Rules of Procedure and Evidence Committee of the American Bar Association's Criminal Justice Section.

Susan Ballou

Susan Ballou has been involved in NIST research for the past 17 years. She is the Program Manager for the Forensic Sciences Research Program within the Special Programs Office at the National Institute of Standards and Technology (NIST), Gaithersburg, MD. She is also the Federal Officer for the NIST Forensic Science Center of Excellence based at Iowa State University and appropriately titled: the Center for Statistics and Applications in Forensic Evidence (CSAFE). Prior to NIST, she served as the lead serologist for the Montgomery County Police Department (MCPD) Crime Laboratory in Rockville, Maryland. Several of her cases have been on the highly

acclaimed TV series, *Forensic Files*. Before the MCPD she worked for the Commonwealth of Virginia Division of Consolidated Laboratory Services at their Merrifield location where she conducted analysis on evidence suspected of containing illicit drugs, body fluids and hairs and fibers. Her expertise with the Virginia system grew from her prior position as chemist in the Connecticut Office of the Chief Medical Examiner under the supervision of Chief Toxicologist, Dr. Randall Baselt. She holds a Master of Science degree in Biotechnology from The Johns Hopkins University and a Criminal Justice Undergraduate degree from the University of New Haven, West Haven, Connecticut. Qualified as an Expert in 180 court cases she has ventured beyond the crime laboratory to assist with crime scene investigations and has taught this information at The Judge Advocate General's Legal School and Center in Charlottesville, Virginia. She has served on the ASTM E30 Forensic Science committee and held the position of chair receiving the prestigious ASTM International Award of Merit with the honorary title of Fellow from Committee E30. She currently is the President-Elect of the American Academy of Forensic Sciences (AAFS) a 7000 member strong association. She holds fellow status in the AAFS and received the AAFS Criminalistics Section Mary E. Cowan Outstanding Service Award. She has authored book chapters, scientific papers and participated in documentary standards development during her membership in several forensic science related scientific working groups.

Dr. Itiel Dror

After finishing his Ph.D. in psychology at Harvard University, Itiel Dror pursued his interest in expert performance. Along with his theoretical laboratory based research he has conducted fieldwork with a variety of experts (such as with U.S. Air Force pilots, frontline police officers, forensic examiners, and medical professionals). Dr. Dror's research has demonstrated that specific components in the cognitive underpinning of expertise entail vulnerabilities. Building on these insights he developed unique ways to combat these weaknesses and improve expert performance. Dr. Dror has published over 100 articles and is on the editorial board of a variety of scientific journals (such as Science & Justice, Pragmatics & Cognition, and the Journal of Applied Research in Memory & Cognition). He has trained judges in a variety of countries (e.g., the United States, United Kingdom, and Taiwan), as well as many forensic experts in law enforcement agencies (e.g., the FBI, NYPD, San Francisco PD, Boston PD, & LAPD in the United States, and in other countries, such as the Netherlands, Finland, Canada, Brazil, Singapore, Taiwan, and Australia). Dr. Dror now divides his time between academic work at University College London (UCL) and applied work at Cognitive Consultants International (CCI-HQ). More information is available at: www.cci-hq.com

M. Chris Fabricant, Esq.

As the Joseph Flom Special Counsel and Director of Strategic Ligation, M. Chris Fabricant leads the Innocence Project's Strategic Litigation Department, whose attorneys develop and execute national litigation strategies to address the leading causes of wrongful conviction,

including eyewitness misidentification, the misapplication of forensic sciences and false confessions. Previously, he was a clinical law professor and the director of the Criminal Justice Clinic at the Pace Law School, where he was named a "Bellows Scholar" by the Association of American Law Schools, Clinical Legal Education Section. Mr. Fabricant has over a decade of criminal defense experience at the state and federal, trial and appellate levels with The Bronx Defenders and Appellate Advocates.

Anne Goldbach, Esq.

Anne Goldbach is the Forensic Services Director for the Committee for Public Counsel Services. After graduating from Boston College Law School, Ms. Goldbach joined the Massachusetts Defenders Committee as a public defender in 1978. After the creation of CPCS, she joined the staff of Roxbury Defenders in January, 1985, where she became a supervising attorney; she was selected as Attorney in Charge of the Boston office in November, 1987. After running the Boston Trials Unit for 10 years, she became CPCS' Director of Forensic Service in November of 1997. In that capacity, she acts as a resource on forensics issues and experts for public defenders and bar advocates across the state.

Throughout her career, Ms. Goldbach has been actively involved in continuing legal education and criminal defense training programs, and has lectured on numerous forensics topics. She has been a frequent lecturer, writer and moderator for Mass. Continuing Legal Education, CPCS conferences and training programs, as well as other CLE training programs. She has served on the Board of Directors of the Mass. Council for Public Justice. She serves on the board of the Thomas J. Drinan Memorial Fellowship Fund at Suffolk University Law School. She is a non-voting member of the state's Forensic Sciences Advisory Board. She is a past president and current board member of MACDL, Massachusetts Association of Criminal Defense Lawyers.

In May 2000, Ms. Goldbach received the Hon. David S. Nelson Public Interest Law Award from the Boston College Law School Alumni Association. In May 2013, Ms. Goldbach received the Edward J. Duggan Public Defender Award from CPCS for zealous advocacy and outstanding legal services. In April 2014, Boston College Law School's Women's Law Center gave her the annual "Woman of the Year" award and in June, 2016 she received the Clarence Gideon Award from the Massachusetts Association of Criminal Defense Lawyers.

Andrew D. Goldsmith, Esq.

Mr. Goldsmith was appointed in January 2010 as the Justice Department's first National Criminal Discovery Coordinator. In this role, he oversees a wide range of national initiatives designed to provide federal prosecutors and other law enforcement officials with training and resources relating to criminal discovery, including electronic discovery. As Associate Deputy

Attorney General, he is also responsible for topics concerning professional responsibility, recording of custodial statements, legal education, and environmental matters. Mr. Goldsmith previously served as the First Assistant Chief of DOJ's Environmental Crimes Section, and successfully prosecuted the *Atlantic States* case in New Jersey during 2005-06, an eight-month trial that is the longest environmental crimes-related prosecution in U.S. history. His articles on criminal e-discovery have appeared in the *United States Attorneys' Bulletin*. In 2016, Mr. Goldsmith earned his fourth Attorney General's Award when he received the Claudia J. Flynn Award for Professional Responsibility in recognition of his efforts to ensure that department attorneys carry out their duties in accordance with the rules of professional conduct.

He previously served as an Assistant U.S. Attorney for the District of New Jersey. Mr. Goldsmith started out his legal career as an Assistant District Attorney in the Manhattan D.A.'s Office during the high crime era of the 1980's. Mr. Goldsmith graduated *cum laude* in 1983 from Albany Law School, which presented to him in 2008 its Distinguished Alumni in Government Award. He received his B.S. degree in biology in 1979 from Cornell University, which selected him in 2014 for inclusion on its list of Distinguished Classmates.

Hon. Paul W. Grimm

Paul W. Grimm serves as a District Judge for the United States District Court for the District of Maryland. He sits at the Greenbelt, Maryland courthouse located near Washington D.C. He was appointed to the Court on December 10, 2012. Previously, he was appointed to the Court as a Magistrate Judge in February 1997 and served as Chief Magistrate Judge from 2006 through 2012. In September, 2009 the Chief Justice of the United States appointed Judge Grimm to serve as a member of the Advisory Committee for the Federal Rules of Civil Procedure where he served until September, 2015 as the chair of the Discovery Subcommittee. Judge Grimm is a member of the American Law Institute, and has been an adjunct professor of law at the University of Baltimore School of Law and the University of Maryland School of Law, where he taught courses on evidence and discovery, and he has written extensively on both topics. Judge Grimm received his BA from the University of California, Davis, his JD from the University of New Mexico, and his LLM from Duke University.

Zachary R. Hafer, Esq.

Zachary R. Hafer has extensive experience leading the investigation and prosecution of high-profile federal criminal cases, including capital murder, public corruption, RICO, mail and wire fraud, money laundering, and drug trafficking. Most recently, he was the lead prosecutor in the four-month capital retrial *United States v. Gary Lee Sampson*. During the five-week defense case in *Sampson*, the prosecution cross-examined nearly 50 witnesses, including 12 experts in the fields of neuroimaging, neuropsychology, neuropsychiatry, forensic pathology, and statistical analysis of life expectancy. Mr. Hafer has briefed and argued several appeals in the First Circuit and has twice received the Attorney General's Award: (1) in 2010 for leading a years-long

international drug trafficking and money laundering investigation in which U.S. and Colombian law enforcement arrested 78 drug traffickers and seized approximately $10 million in cash and thousands of kilograms of cocaine; and (2) in 2014 for his work as a trial AUSA in *United States v. James "Whitey" Bulger*. Mr. Hafer began his career as a law clerk for U.S. District Judge Shirley W. Kram in the Southern District of New York and was also in private practice at Debevoise & Plimpton in the firm's New York office prior to joining the Department of Justice in 2007. Mr. Hafer received a full-tuition, merit scholarship to the University of Virginia School of Law, from which he graduated in 2003. He graduated *cum laude* from Dartmouth College in 1999, with High Honors in English.

Ted R. Hunt, Esq.

Ted R. Hunt is Senior Advisor to the Department of Justice on Forensic Science. Prior to his appointment by the Attorney General, he was Chief Trial Attorney at the Jackson County Prosecutor's Office in Kansas City, Missouri, where he served for 25 years as a state level prosecutor and managed a large staff of trial attorneys. During that time, Mr. Hunt prosecuted more than 100 felony jury trials, the vast majority of which involved the presentation of forensic evidence.

Mr. Hunt is a former member of the National Commission on Forensic Science, the ASCLD/LAB Board of Directors, the Missouri Crime Lab Review Commission, the OSAC Legal Resource Committee, and the NDAA DNA Advisory Group. He also served as a member of the International Association of Chiefs of Police (IACP) Forensic Science Committee, and was an Invited Guest on the Scientific Working Group on DNA Analysis Methods (SWGDAM) Next Generation Sequencing Working Group.

Dr. Alice R. Isenberg

Dr. Isenberg is the Deputy Assistant Director of the FBI Laboratory. She entered duty at FBI in 1998 and has previously served as the Section Chief of the Biometrics Analysis Section, Unit Chief of the Mitochondrial DNA Unit, and as a forensic examiner in the DNA unit. While Chief of the Biometrics section, she managed the elimination of an offender DNA backlog of over 300,000 samples and the casework DNA backlog involving over 2700 criminal cases. She also facilitated the deployment of a new version of Combined DNA Index System (CODIS) software and implementation of numerous automated DNA techniques as well as the development of Rapid DNA capability. Dr. Isenberg earned her Master of Science and Ph.D. in Analytical Chemistry from the University of Virginia.

Dr. Karen Kafadar

Karen Kafadar is the Commonwealth Professor & Chair of Statistics at University of Virginia. She received her Ph.D. in Statistics from Princeton University, and previously held positions at NBS (now NIST), Hewlett Packard's RF/Microwave R&D Division, National Cancer Institute, University of Colorado-Denver, and Indiana University. Her research focuses on robust methods, exploratory data analysis, characterization of uncertainty in the physical, chemical, biological, and engineering sciences, and methodology for the analysis of screening trials. She served on the National Academy of Sciences' Committees that led to "Weighing Bullet Lead Evidence" (2004), "Strengthening the Forensic Science System in the United States: A Path Forward" (2009), "Review of the Scientific Approaches Used During the FBI's Investigation of the Anthrax Letters" (2011), "Evaluating Testing, Costs, and Benefits of Advanced Spectroscopic Portals" (2011), and "Identifying the Culprit: Assessing Eyewitness Reliability" (2014). She also served on the governing boards for ASA, IMS, ISI, and NISS, is a member of OSAC's FSSB, and chairs OSAC's Statistical Task Group and ASA's Advisory Committee on Statistics in Forensic Science. She is past Editor of JASA Reviews (1996-98) and Technometrics (1999-2001), is currently Health & Life Sciences Editor for The Annals of Applied Statistics, and is an Elected Fellow of the ASA, AAAS, and ISI.

Professor David H. Kaye

David H. Kaye is Distinguished Professor and Weiss Family Scholar at Penn State Law, a member of the graduate faculty of Penn State University's Program in Forensic Science, and Regents' Professor Emeritus of Law and of Life Sciences at Arizona State University. He has held research or teaching positions at Cornell University, Duke University, the University of Chicago, the University of Virginia, and universities in England and China.

Professor Kaye was an Assistant Watergate Special Prosecutor, an associate in a private law firm in Portland, Oregon, and a law clerk to Judge Alfred T. Goodwin, U.S. Court of Appeals for the Ninth Circuit. He holds degrees in law (Yale University), astronomy (Harvard University), and physics (MIT).

Professor Kaye's research and teaching focuses on the law of evidence, statistics, criminal procedure, forensic science, and forensic genetics. His publications include textbooks on statistics and on scientific evidence; treatises on evidence and scientific evidence; and over 170 articles and letters in journals of law, philosophy, psychology, medicine, genetics, forensic science, and statistics. He is the author or a coauthor of The Double Helix and the Law of Evidence (Harvard University Press), the Handbook of Forensic Statistics (forthcoming), McCormick on Evidence, The New Wigmore, Modern Scientific Evidence (first four editions), and the Federal Judicial Center's Reference Manual on Scientific Evidence.

Professor Kaye has served on committees of the American Statistical Association, the National Academy of Sciences, the National Commission on Forensic Science, the National Commission on the Future of DNA Evidence, the National Institutes of Health, the National

Institute of Standards and Technology, the Organization of Scientific Area Committees for Forensic Science (OSAC), and the International Conferences on Forensic Inference and Statistics. He is a recipient of the OSAC Distinguished Service Award.

Professor Jonathan J. Koehler

Jonathan "Jay" Koehler is the Beatrice Kuhn Professor of Law at Northwestern Pritzker School of Law. He has a B.A. from Pomona College (Philosophy), and an M.A. and PhD in Behavioral Sciences from the University of Chicago. His research focuses on issues in forensic science, decision theory, and juror decision making. He is an editor of *Law, Probability & Risk*, and a consulting editor of *Judgment and Decision Making.* Prior to joining Northwestern in 2010, he was a University Distinguished Teaching Professor at The University of Texas at Austin (business school), and a professor at Arizona State University (business and law schools).

Hon. Alex Kozinski

Judge Kozinski was appointed United States Circuit Judge for the Ninth Circuit on November 7, 1985, and served as Chief Judge from 2007 to 2014. He graduated from UCLA, receiving an A.B. degree in 1972, and from UCLA Law School, receiving a J.D. degree in 1975.

Prior to his appointment to the appellate bench, Judge Kozinski served as Chief Judge of the United States Claims Court, 1982-85; Special Counsel, Merit Systems Protection Board, 1981-82; Assistant Counsel, Office of Counsel to the President, 1981; Deputy Legal Counsel, Officer of President-Elect Reagan, 1980-81; Attorney, Covington & Burling, 1979-81; Attorney, Forry Golbert Singer & Gelles, 1977-79; Law Clerk to Chief Justice Warren E. Burger, 1976-77; and Law Clerk to Circuit Judge Anthony M. Kennedy, 1975-76.

Dr. Eric Lander

Eric Lander is president and founding director of the Broad Institute of MIT and Harvard. A geneticist, molecular biologist, and mathematician, he has played a pioneering role in the reading, understanding, and biomedical application of the human genome. He was a principal leader of the Human Genome Project.

With his colleagues, Lander has developed and applied powerful methods for discovering the molecular basis of rare genetic diseases, common diseases, and cancer. He has done pioneering work on human genetic variation; human population history; genome evolution; regulatory elements; long non-coding RNAs; three-dimensional folding of the human genome; and genome-wide screens to discover the genes essential for biological processes using CRISPR-based genome editing.

Lander is professor of biology at MIT and professor of systems biology at Harvard Medical School. From 2009 to 2017, he served as co-chair of the President's Council of Advisors on Science and Technology for President Barack Obama.

Lander's honors and awards include the MacArthur Fellowship, the Breakthrough Prize in Life Sciences, the Albany Prize in Medicine and Biological Research, the Gairdner Foundation International Award of Canada, the Dan David Prize of Israel, the Mendel Medal of the Genetics Society in the UK, the City of Medicine Award, the Abelson Prize from the AAAS, the Award for Public Understanding of Science and Technology from the AAAS, the Woodrow Wilson Prize for Public Service from Princeton University, and the James R. Killian Jr. Faculty Achievement Award from MIT.

Lori Lightfoot, Esq.

Lori Lightfoot is a partner at Mayer Brown in Chicago. She is a trial attorney, investigator and risk manager. Both as a civil litigator and as Assistant US Attorney in the Criminal Division of the US Attorney's Office, Northern District of Illinois (1996–2002), Lori has tried over 20 federal and state jury and bench trials. She has also argued cases in state and federal appellate courts, and she has successfully conducted numerous internal investigations. From 2002 to 2005, Lori worked with the City of Chicago as Interim First Deputy Procurement Officer, Department of Procurement Services (DPS); General Counsel and Chief of Staff, Office of Emergency Management and Communications (OEMC); and Chief Administrator, Office of Professional Standards (OPS) of the Chicago Police Department. At OPS, Lori managed a 100-person office of civilian investigators charged with investigating police-involved shootings, allegations of excessive force and other misconduct alleged against Chicago police officers. She also coordinated joint investigations with state and federal criminal authorities and facilitated the implementation of new compliance and risk-management systems that included redesign of the disciplinary processes for sworn and civilian members, creation of a management intervention program for problem employees, and targeted tracking of litigation costs associated with complaints against department members. Lori has been associated with Mayer Brown since 2005 and, previously, between 1990 and 1996. Earlier, she served as Law Clerk to The Honorable Charles Levin, Michigan Supreme Court (1989–1990). She is a graduate of the University of Michigan and the University of Chicago Law School.

Hon. K. Michael Moore

Chief Judge K. Michael Moore received his B.A. in Economics from Florida State University in 1972 and his J.D. from Fordham Law School in 1976. Judge Moore served as an Assistant United States Attorney for the Southern District of Florida from 1976 to 1981. From 1982 to 1986 he served as Assistant United States Attorney for the Northern District of Florida and held supervisory, Chief Assistant and Court-appointed United States Attorney positions.

In 1987, he received the first of three presidential appointments requiring United States Senate confirmation when President Ronald Reagan appointed Judge Moore to be United States Attorney for the Northern District of Florida. While United States Attorney, Judge Moore was also selected to serve on the Attorney General's Advisory Committee. As United States Attorney, Judge Moore was responsible for overseeing civil and criminal litigation on behalf of the United States for the northern third of the State of Florida.

In 1989, President George Bush appointed Judge Moore to be Director of the United States Marshals Service. In receiving this appointment, Judge Moore became the first presidentially appointed Director of our nation's oldest law enforcement agency. As Director, Judge Moore oversaw the Marshals Service's judicial security, witness security, fugitive apprehension, asset forfeiture, and prisoner transportation programs.

In 1992, President Bush appointed Judge Moore to the United States District Court for the Southern District of Florida. In July 2014, Judge Moore became the Chief Judge of the Southern District of Florida.

Professor Jane Campbell Moriarty

Jane Campbell Moriarty is the Carol Los Mansmann Chair in Faculty Scholarship and Professor at Duquesne University School of Law in Pittsburgh, PA. She teaches Evidence, Scientific and Expert Evidence, Neuroscience and Law, and Professional Responsibility—all areas of her scholarship. Among her publications are a treatise, Giannelli, Imwinkelried, Roth & Moriarty, Scientific Evidence (Fifth Edition 2013, supps. 2014-2017) and a casebook, Scientific and Expert Evidence (Aspen, 2nd ed. 2011)(with John M. Conley) and several articles in the areas of science and law, judicial decision making, and legal ethics. Relevant articles include *Seeing Voices: Potential Neuroscience Contributions to a Reconstruction of Legal Insanity,* 85 Fordham L. Rev. 101 (2016); *The Legal and Policy Implications of Using Brain Imaging for Lie Detection,* 19 Psych., Pub. Pol'y & Law 222 (2013)(co-authored); *"Will History Be Servitude?" The NAS Report on Forensic Science and the Role of the Judiciary*, 2010 Utah L. Review 299 (2010); "*Misconvictions" Science and The Ministers of Justice*, 86 Nebraska L. Rev. 1 (2007); and *Forensic Science: Grand Goals, Tragic Flaws & Judicial Gatekeeping*, 44 ABA Judges' Journal 16 (2005)(with Michael Saks). She is currently working on a book for NYU Press entitled, Are you Lying Now? Neurotechnology and Law (2018).

Professor Erin E. Murphy

Erin Murphy's research focuses on technology and forensic evidence in the criminal justice system. She is a nationally recognized expert in forensic DNA typing, and her work has been cited by multiple times by the Supreme Court. Her book, Inside the Cell: The Dark Side of Forensic DNA (Nation Books 2015), addresses the scientific, legal, and ethical challenges of forensic DNA typing. Murphy is also co-editor of the Modern Scientific Evidence treatise, presently serves as

the Associate Reporter for the American Law Institute's project to revise Article 213 of the Model Penal Code, and was elected to the ALI in 2013. She has shared her scholarly work with popular audiences through publications in Scientific American, The New York Times, USA Today, Slate, the San Francisco Chronicle, and the Huffington Post, and has offered commentary for numerous media outlets, including NPR, CNN, MSNBC, and NBC Nightly News.

A proud recipient of the Podell Distinguished Teaching Award in 2012, Murphy's course offerings include criminal law and procedure, evidence, forensic evidence, and professional responsibility in the criminal context. She joined the NYU faculty after five years at UC Berkeley School of Law. Prior to that, Murphy spent five years as an attorney with the Public Defender Service for the District of Columbia. She received her B.A. in comparative literature from Dartmouth College in 1995 and her J.D. from Harvard Law School in 1999, both magna cum laude. She clerked for Judge Merrick B. Garland on the U.S. Court of Appeals for the D.C. Circuit.

Hon. Jed S. Rakoff

Jed S. Rakoff has served since March 1996 as a U.S. District Judge for the Southern District of New York. He also frequently sits by designation on the 2nd and 9th Circuit Courts of Appeals. Judge Rakoff holds the position of Adjunct Professor at Columbia Law School -- where he teaches courses in white collar crime, science and the law, class actions, and the interplay of civil and criminal law –and Adjunct Lecturer at Berkeley Law School. He has written over 145 published articles, 635 speeches, 1500 judicial opinions, and co-authored 5 books. He is also a regular contributor to the New York Review of Books.

Judge Rakoff holds a B.A. degree from Swarthmore College (1964), an M.Phil. degree from Oxford University (Balliol, 1966), and a J.D. degree from Harvard Law School (1969). Following law school, he clerked for the late Hon. Abraham L. Freedman, US Court of Appeals, Third Circuit, and was then an associate at the Debevoise law firm. From 1973-80, he served as an Assistant United States Attorney Office in the Southern District of New York, the last two years as Chief of Business & Securities Fraud Prosecutions. Thereafter, before going on the bench, he was a partner at two large law firms in New York, specializing in white collar criminal defense and civil RICO.

Judge Rakoff served on the National Commission on Forensic Science and as co-chair of the National Academy of Science's Committee on Eyewitness Identification. He served on the New York City Bar Association's Executive Committee and was chair of the Association's Honors and Criminal Law Committees. He was Chair of the Second Circuit's Bankruptcy Committee, and Chair of the Southern District of New York's Grievance Committee and Criminal Justice Advisory Board. He served on Swarthmore College's Board of Managers, on the Governance Board of the MacArthur Foundation's Project on Law and Neuroscience, and on the Committee on the Development of the Third Edition of the Manual on Scientific Evidence. He has assisted the U.S. Government in the training of foreign judges in Azerbaijan, Bahrain, Bosnia, Dubai, Iraq, Kuwait, Morocco, Saudi Arabia, and Turkey. He is a Member of the American Academy of Arts and Sciences and of the American Law Institute. He is a Judicial Fellow of the American College of

Trial Lawyers and the American Board of Criminal Lawyers. He was a Director of the New York Council of Defense Lawyers.

Dr. Jeff Salyards

Dr. Jeff Salyards, PhD, MFS, is the Executive Director of the Defense Forensic Science Center, Forest Park, Georgia. Prior to his current position, he served as the Chief Scientist for the U.S. Army Criminal Investigation Laboratory. Before coming to USACIL, he was a Principal Analyst with Analytical Services and authored a study about the best methods to train military operators in material collection during the conduct of operations.

He holds a PhD in Chemistry from Montana State University, a Masters of Forensic Sciences from The George Washington University and has completed a Fellowship in Forensic Medicine from the Armed Forces Institute of Pathology.

A former Director of the Defense Computer Forensic Laboratory and AFOSI Special Agent, he has 26 years of combined experience in investigations, forensic consulting and teaching. He served as the Deputy for Operations and Assistant Professor at the Air Force Academy Chemistry Department and was honored with the Outstanding Academy Educator Award. Dr. Salyards has served on the Board of Directors for the American Society of Crime Laboratory Directors/Laboratory Accreditation Board, the Department of Justice National Steering Committee for Regional Computer Forensic Laboratories, the Council of Federal Forensic Laboratory Directors, the ASCLD Board of Directors, and as a Commissioner for the Forensic Education Programs Accreditation Commission; he is a current member of the National Commission on Forensic Science. Dr. Salyards is a Fellow of the American Academy of Forensic Sciences. He is also a retired commissioned officer in the United States Air Force.

Professor Stephen A. Saltzburg

Stephen A. Saltzburg has taught at The George Washington University Law School since 1990. In January 2004, he was named the Wallace and Beverley Woodbury University Professor. From 1990-2004, he was the Howrey Professor of Trial Advocacy, Litigation and Professional Responsibility. Professor Saltzburg founded and became the Director of the Masters Program in Litigation and Dispute Resolution in 1996. Before moving to George Washington, Professor Saltzburg taught at the University of Virginia School of Law from 1972 to 1990. He was named the first Chairholder of the Class of 1962 Endowed Chair. He co-founded the University of Virginia Law School Trial Advocacy Institute in 1981, which is now the National Trial Advocacy College at the University of Virginia Law School. He continues to be the Director of the College.

Professor Saltzburg served as Reporter for and then as a member of the Advisory Committee on the Federal Rules of Criminal Procedure and as a member of the Advisory Committee on the Federal Rules of Evidence. He was the Reporter for the Civil Justice Reform Act Committee for the District of Columbia District Court and then became Chair of that

Committee. From 1987 to 1988, Professor Saltzburg served as Associate Independent Counsel in the Iran-Contra investigation. In 1988 and 1989, Professor Saltzburg served as Deputy Assistant Attorney General in the Criminal Division of the Department of Justice, and in 1989 and 1990 was the Attorney General's ex officio representative on the United States Sentencing Commission. In June, 1994, the Secretary of the Treasury appointed Professor Saltzburg as the Director of the Tax Refund Fraud Task Force, a position he held until January, 1995. Professor Saltzburg is the author of numerous books and articles on criminal law and procedure, evidence, litigation and trial advocacy. He is a member of the ABA House of Delegates from the Criminal Justice Section (which he served as Chair) and the ABA Task Force on Cyber Security.

Hon. Patti B. Saris

United States District Judge Patti B. Saris became Chief Judge of the United States District Court for the District of Massachusetts on January 1, 2013. She was Chair of the United States Sentencing Commission in Washington, DC from January, 2011 to January, 2017. She is a graduate of Radcliffe College '73 (Magna Cum Laude, Phi Beta Kappa) and Harvard Law School '76 (Cum Laude). After graduating from law school, she clerked for the Supreme Judicial Court, and then went into private practice. When Senator Edward M. Kennedy became chairman of the Senate Judiciary Committee, she moved to Washington D.C. and worked as staff counsel. She later became an Assistant United States Attorney, and eventually chief of the Civil Division. In 1986, Judge Saris became a United States Magistrate Judge, and in 1989, she was appointed as an Associate Justice of the Massachusetts Superior Court. In 1994, she was appointed to the United States District Court.

Laura M. Shamp, Esq.

Laura is a plaintiff's trial lawyer practicing principally in the areas of medical negligence, product liability and catastrophic injury in both state and federal court. Laura graduated with honors from the Harvard Law School and thereafter clerked for the Honorable Robert H. Hall at the United States District Court for the Northern District of Georgia. In 1996 Laura formed her own firm where she focused on complex commercial litigation, medical negligence and product liability, almost exclusively on behalf of plaintiffs. In 2004, she returned to Harvard to study patient safety and medical errors under Don Berwick and Lucian Leape, leaders in the field of patient safety, and in 2005 obtained a Masters Degree in Public Health from the Harvard School of Public Health. Laura is dedicated to working to try and improve the quality of medical care in Georgia and serves on committees that review legislation to try and address issues of medical error and patient safety.

Laura is also a frequent appellate advocate. Her reported cases have helped shaped the law in Georgia regarding medical malpractice and the use of expert witness testimony in professional negligence cases. In February of 2015 Laura, along with her partners formed, a plaintiff's boutique firm --- Shamp Jordan Woodward --- focusing on complex civil trial work. Laura has received

seven and eight figure verdicts on behalf of her clients in difficult venues and with difficult cases in the past several years. Most recently she led a trial team in an *Engle* Progeny tobacco case in Florida, securing an $11million verdict for her client.

Thomas Sobol, Esq.

Thomas M. Sobol has been the Managing Partner of Hagens Berman Sobol Shapiro's Boston office for fifteen years. He has almost thirty-five years of experience in complex civil litigation. Mr. Sobol currently leads drug pricing litigation seeking to recover overcharges for individuals, health plans, state governments, and others that pay for brand name and generic drugs. Mr. Sobol has been a lead negotiator in court-approved settlements with pharmaceutical companies totaling well over one billion dollars. He currently is court-appointed lead or co-lead counsel in *In re Solodyn Antitrust Litigation, In re Celebrex Antitrust Litigation, In re Lipitor Antitrust Litigation, In re Effexor Antitrust Litigation*, and other matters. Mr. Sobol was appointed lead counsel in *In re New England Compounding Pharmacy Litigation Multidistrict Litigation* MDL, representing more than 700 victims who contracted fungal meningitis or suffered other serious health problems caused by contaminated products produced by NECC. To date, related settlements exceed $200 million. Mr. Sobol was also co-lead trial counsel in the Neurontin MDL, where the jury returned a $142 million racketeering (RICO) verdict against Pfizer.

In the 1990s, Mr. Sobol served as Special Assistant Attorney General for the Commonwealth of Massachusetts and the states of New Hampshire and Rhode Island, and served as one of the private counsel for Massachusetts and New Hampshire in ground-breaking litigation against the tobacco industry. These cases led to significant injunctive relief and to monetary recovery in excess of $10 billion to those states. Mr. Sobol practiced at the Boston firm of Brown Rudnick for about seventeen years, where he was a litigation partner for a decade.

Mr. Sobol served as judicial clerk for then-Chief Justice Allan M. Hale of the Massachusetts Appeals Court from 1983 to 1984. Mr. Sobol is a member of the bar of Massachusetts and has been appointed pro hac vice in numerous federal courts across the country. He graduated *summa cum laude* from Clark University in Worcester, Massachusetts in 1980 and was elected to Phi Beta Kappa in 1979. Mr. Sobol graduated *cum laude* from Boston University School of Law in 1983.

III. Evidence Rules for the Discussion:

A. Rule 702:

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: **(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 the principles and methods to the facts of the case.

B. A Rule 702 "tweak" that might allow for a Committee Note on forensic expert testimony.

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:

(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 empirical data; and

(d) the expert has reliably applied the principles and methods to the facts of the case.

C. A freestanding rule on forensic expert testimony:

Rule 707. Testimony by Forensic Expert Witnesses. If a witness is testifying on the basis of a forensic examination [conducted to determine whether an evidentiary sample is similar or identical to a source sample], [or: "testifying to a forensic identification"] the proponent must prove the following in addition to satisfying the requirements of Rule 702:

(a) the witness's method is repeatable, reproducible, and accurate for its intended use --- as shown by empirical studies conducted under conditions appropriate to that use;

(b) the witness is capable of applying the method reliably --- as shown by adequate empirical demonstration of proficiency --- and actually did so; and

(c) the witness accurately states, on the basis of adequate empirical evidence, the probative value of [the meaning of] any similarity or match between the evidentiary sample and the source sample.

[future subdivisions might be added to codify specific forms of comparison such as ballistics. Or they might be added in separately numbered rules.]

RE: Toolmark Forensic Issue

From: "Goldsticker, Michael (USAMD)" <(b) (6) >
To: "Hunt, Ted (ODAG)" <(b) (6) >
Cc: "Metcalf, David (ODAG)" <(b) (6) >
Date: Fri, 18 Oct 2019 14:36:45 -0400
Attachments: 35_Motion to Exclude Firearm Evidence.pdf (679.09 kB); Gov't Response to Bailey Motion to Exclude Expert Ballistics Testimony.docx (100.24 kB)

Yes, that'd be great. What number should I call?

In advance of our chat, attached is the motion that was filed by the public defender. It appears to be mostly copied from prior motions filed in this district. I've also attached a response recently filed by a colleague that was successful. I was planning to use that as a go-by.

Mike

From: Hunt, Ted (ODAG) <(b) (6) >
Sent: Friday, October 18, 2019 2:33
To: Goldsticker, Michael (USAMD) <(b) (6) >
Cc: Metcalf, David (ODAG) <(b) (6) >
Subject: RE: Toolmark Foren

Hi Michael,

You want to try for 3:30 today?

Ted

From: Goldsticker, Michael (USAMD) <(b) (6) >
Sent: Friday, October 18, 2019 1:50 PM
To: Hunt, Ted (ODAG) <(b) (6) >
Cc: Metcalf, David (ODAG) <(b) (6) >
Subject: RE: Toolmark Forensic Issue

Ted,

With apologies for the lengthy delay, do you have any availability to chat this afternoon or next week?

Thanks,
Mike

From: Hunt, Ted (ODAG) <(b) (6) >
Sent: Monday, September 23, 2019 9:49 PM
To: Goldsticker, Michael (USAMD) <(b) (6) >
Cc: Metcalf, David (ODAG) <(b) (6) >
Subject: Re: Toolmark Forensic Issue

Hi Mike,

When is your hearing/is one set?
I'm (b) (6) this week at a meeting with very limited availability tomorrow, but will try to call when I can get a second.

Ted

On Sep 23, 2019, at 6:00 PM, Goldsticker, Michael (USAMD) <(b) (6) > wrote:

> Thanks, David.
>
> Ted, I'm generally around tomorrow. Cell is probably best—(b) (6) . I look forward to chatting.
>
> Mike

From: Metcalf, David (ODAG) <(b) (6)>
Sent: Monday, September 23, 2019 8:18
To: Hunt, Ted (ODAG) <(b) (6)>
Cc: Goldsticker, Michael (USAMD) <(b) (6)>
Subject: Toolmark Forensic Issue

Ted,

An old friend, Michael Goldsticker (cc'ed here), is now confronting our favorite issue in the District of Maryland – the breadth of expert opinion eligible for toolmark examination / ballistics matching. He could certainly use all the ammunition you have to offer to wage this fight and make sure we do not get another adverse ruling. Could you reach out and give him a call when you get a moment?

David Metcalf
Counsel to the Deputy Attorney General
Office of the Deputy Attorney General
950 Pennsylvania Avenue, NW, Room 4226
Washin 30
Office: (b) (6)
Cell: (b) (6)
(b) (6)

IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF MARYLAND

UNITED STATES	:	
	:	
	:	
v.	:	**Case No. RDB-19-0205**
	:	
CORNELL SLATER	:	
	:	
Defendant	:	

MOTION *IN LIMINE* TO EXCLUDE FIREARM INDENTIFICATION EVIDENCE, OR IN THE ALTERNATIVE, TO LIMIT SUCH TESTIMONY

Cornell Slater, the Defendant, by and through his attorneys, James Wyda, Federal Public Defender for the District of Maryland, Christian Bryan Lassiter and Devin A. Prater, Assistant Federal Public Defenders, hereby moves to exclude the government's proposed expert testimony and firearm identification evidence, or in the alternative, to limit the scope of the expert's opinion to accurately reflect the discipline. The proposed expert testimony is inadmissible under Federal Rule of Evidence 702 because the proposed opinion is based on an unvalidated and unreliable methodology. *See Daubert v. Merrell Dow Pharmaceuticals*, 509 U.S. 579, 597 (1993); *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999); *see also* Fed. R. Evid. 702. Equally important, the examiners in this case failed to reliably apply the methodology and the government has not provided the bases and reasons for the examiners opinions. *See Id.*; *see also* Fed R. Crim. P. 16.

INTRODUCTION

The debate over whether firearms examiners can link fired ammunition components to a particular firearm has reached its zenith. Three recent reports issued in 2008, 2009, and 2016, two by the research arm of the National Academy of Sciences,[1] and one by the President's Council of

[1] The National Research Council (NRC) is a component of the National Academy of Sciences, which was created by congressional charter in 1863 to "investigate, examine, experiment, and report upon any subject of science." Act to Incorporate the National Academy of Sciences, sec. 3, 12 Stat. 806 (1863).

Advisors on Science and Technology, have rejected the claim that firearms identification is valid and reliable science. The most recent report, issued in 2016 following a review of more than 2,000 articles and presentations by members of the forensic community, states unequivocally: firearms identification "falls short of the scientific criteria for foundational validity." President's Council of Advisors on Science and Technology, *Forensic Science in Criminal Courts: Ensuring Validity of Feature-Comparison Methods*, at 11 (Sept. 20, 2016) [hereafter PCAST Report].

These three reports made several findings central to whether this Court should admit firearms identification testimony. The findings are:

- "The validity of the fundamental assumptions of uniqueness and reproducibility of firearms-related toolmarks has not yet been demonstrated." National Research Council, Committee to Assess the Feasibility, Accuracy, and Technical Capability of a National Ballistics Database, *Ballistics Imaging* (2008) at 3 [hereafter Ballistics Imaging Report]. *See* **Exhibit A**, Ballistic Imaging Report excerpts.

- The theory of firearms examination is "not a scientific theory," but rather a "claim that examiners applying a subjective approach can accurately individualize the origin of a toolmark." PCAST Report at 60. *See* **Exhibit B**, PCAST excerpts.

- The method is subjective, with examiners using their personal judgment to select which features to compare; and the reasoning employed to reach a conclusion is circular—a match can be declared when there is "sufficient agreement" and when there is "sufficient agreement" is based on the personal judgment of each examiner. *Id*. at 47, 60, 104, and 113.

- Because the method is "subjective," foundational validity and reliability "can *only* be established through multiple independent black-box studies"[2] and "at present there is only a single study that was appropriately designed." *Id*. at 106, 111 (emphasis in the

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http://www.nasonline.org/about-nas/leadership/governing-documents/act-of=incorporation.html (last visited March 19, 2018). The NRC was established in 1916 "to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and advising the federal government." National Research Council, Committee to Assess the Feasibility, Accuracy, and Technical Capability of a National Ballistics Database, Ballistic Imaging iii (2008).

[2] "Black-box" studies are studies "with many examiners making a series of independent comparison decisions between a questioned sample and one or more known samples that may or may not contain the source." PCAST Report at 110. Because these studies best replicate case work they are the "*only*" studies appropriate for assessing scientific validity and estimating reliability. *Id*. at 106. (emphasis in the original).

original); *See* **Exhibit C,** *An Addendum to the PCAST Report on Forensic Science in Criminal Courts*, (Jan. 6, 2017) at 7 [hereafter PCAST Addendum].

- As a result, "firearms analysis currently falls short of the criteria for foundational validity." PCAST Report at 111; *see also* **Exhibit D**, National Research Council, *Committee on Identifying the Needs of the Forensic Science Community, Strengthening Forensic Science in the United States: A Path Forward*, (2009) at 154 [hereafter NRC Forensics Report].

In sum, three interdisciplinary reports authored by three separate committees of nationally recognized scientists and professionals found that: the "fundamental assumptions" underlying firearms examination have not been demonstrated; the theory is "not a scientific theory"; the method is "subjective"; and there is "insufficient empirical evidence" establishing validity and estimating reliability.

Because the hallmark of legal admissibility is validity and reliability, this Court should exclude the proposed firearms identification testimony until firearms examiners produce appropriate independent empirical evidence that (1) firearms have unique or individual characteristics, (2) firearms consistently imprint those characteristics on bullets and shell casings, and (3) examiners can identify and evaluate those marks using a reliable and repeatable method, with a known and acceptable error rate.

Law enforcement and laboratory accrediting bodies have created standards to which examiners must adhere. Chief among these standards are the requirement of contemporaneous documentation. This requirement serves two core functions: First, documentation helps to protect against bias—the examiner deviating from his initial analysis in order to identify similarities with a comparison. Second, documentation seeks to ensure that an examiner's work and ultimately subjective conclusions that two items "match" can be reproduced and verified by a third party.

The government's experts Jennifer Ingbretson, Chirstopher Faber, and Victor Meinhardt have failed to meet these requirements and ignored the standards that govern the discipline. The

government's experts have proposed to testify that after examining cartridge cases recovered on November 14, 2018 and December 5, 2018 and comparing them to a firearm seized on December 18, 2018, they have determined that "*sufficient agreement exists." See* **Exhibit E**, Baltimore Police Department IBIS Hit Reports. (emphasis added).[3] The government's experts have provided neither contemporaneous documentation of their adherence to any methodology, nor any other documentation of the similarities or differences they purport to exist between the items they compared. These failures not only violate the accreditation and licensing standards governing the Baltimore Police Department's laboratory but also deprives the defense of any way to test whether the government's experts reliably applied any methodology in this case. *See* **Exhibit F**, Opinion Transcript, *United States v. Jovon Medley*, Case No. PWG-17-242 (D. Md. Apr. 24, 2018) at 21-23; 51.[4]

Exclusion is the appropriate remedy in this case, as cross-examination cannot cure the prejudice from the admission of evidence derived from a method that has not been proven valid and that lacks estimates of its reliability. The significance of expert testimony at trial cannot be overstated. Scientific expert testimony carries with it the "aura of special reliability and trustworthiness," creating a grave risk that jurors will receive it without a critical eye. *United States v. Dowling*, 753 F.2d 1224, 1236 (3d Cir. 1985); *see also United States v. Haines*, 803 F.3d 713, 730 (5th Cir. 2015) (recognizing the significance of expert testimony to juries). Cross-examination cannot solve this problem. The government has not provided any information with

[3] At the time of this filing, expert disclosures have not been disclosed. As a result, defense counsel is utilizing the aforementioned reports as guidance as to any summary of the facts and opinions to which the government's expert(s) are expected to testify. Without full expert disclosures, the defense is impaired in its ability to fully challenge the validity of this analysis. The defense requests the right to supplement this pleading once the government has filed its expert disclosures.

[4] The Honorable Paul W. Grimm conducted a Daubert hearing in *Medley*. Judge Grimm expressly intended the attached transcript to serve as "my opinion." *Medley* at 57.

which to question its expert(s) regarding their adherence to a methodology or the validity of their subjective conclusion that the firearm is the source of the marks on the recovered cartridge cases. The failure to state the bases and reasons renders the examiners opinion inadmissible under Rule 702 and violates Rule 16. If the testimony is admitted, the jury will be left to take the government's expert at his word: because he says so, it is true.

At a minimum, this Court should instruct that any firearm identification evidence expert the government seeks to offer as a witness cannot testify that he or she "identified" the firearm as the source of the casings. This type of source attribution testimony is scientifically indefensible in light of the well-documented limitations of firearm identification. The government's expert(s) should only be permitted to testify to the similarities and differences he or she observed when comparing the various items of evidence without any statements of certainty. *See Medley* at 54. Any expert's conclusions, if any, should be limited to including or excluding the firearm as a potential source of the recovered cartridge casings. Finally, any government expert should be prepared to testify to the error rates from the only appropriately designed validation study. Absent these limitations—even with the benefit of cross-examination—Mr. Slater will be unfairly prejudiced by misleading testimony that will unquestionably garner significant weight from the jury.

ARGUMENT

I. RULE 702 AND *DAUBERT* REQUIRE RIGOROUS EVALUATION AND REEVALUATION OF THE RELIABILITY OF PARTICULAR METHODOLOGIES AND HOW THEY ARE APPLIED.

Firearm identification evidence is inadmissible unless it is based on a method that is both "scientifically valid" and that "properly can be applied to the facts in issue" in a particular case. *See Daubert,* 509 U.S. at 589; *accord Kumho Tire*, 526 U.S. at 141 (same analysis applies to

matters of a technical, rather than a scientific expertise). Federal Rule of Evidence 702, which codified the Supreme Court's holding in *Daubert* and its progeny, governs the admission of expert testimony of a technical or scientific nature. The rule requires the proponent to show:

(1) 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;

(2) the testimony is based on sufficient facts or data;

(3) the testimony is the product of reliable principles and methods; and

(4) the expert has reliably applied the principles and methods to the facts of the case.

Fed. R. Evid. 702; *see also Daubert*, 509 U.S. at 592 n.10 (proponent bears the burden); *see also Cooper v. Smith & Nephew, Inc.*, 259 F.3d 194, 199 (4th Cir. 2001)(same). Thus, *Daubert* requires, as codified in the rules of evidence, *both* that an expert's testimony be the "product of reliable principles and methods," *and* that the expert "reliably *applied*" the principles and methods to the facts of the case. *Daubert*, 509 U.S. at 597. "Nothing in either *Daubert* or the Federal Rules of Evidence requires a district court to admit opinion evidence that is connected to existing data only by the *ipse dixit* of the expert." *Kumho Tire*, 526 U.S. at 158 (citing *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997).

Reliability is thus the touchstone of admissibility under *Daubert*. *Daubert*, 509 U.S. at 589. Indeed, because of the power of expert testimony to sway a jury, "it is crucial that the district court conduct a careful analysis into the reliability of the expert's proposed opinion." *United States v. Fultz*, 591 Fed. Appx. 226, 227 (4th Cir. 2015). To guide this inquiry, *Daubert* and its progeny established five factors for assessing the reliability of an expert's proffered opinions:

(1) whether the particular scientific theory "can be (and has been) tested";

(2) whether the theory "has been subjected to peer review and publication";

(3) the "known or potential rate of error";

(4) the "existence and maintenance of standards controlling the technique's operation"; and

(5) whether the technique has achieved "general acceptance" in the relevant scientific or expert community.

United States v. Hassan, 742 F.3d 104, 130 (4th Cir. 2014); *see also Daubert,* 509 U.S. at 593–94. The list is not exhaustive: the Court retains broad latitude to use other factors to measure reliability. *Kumho Tire.,* 526 U.S. at 152.

The reliability of a particular methodology requires constant reevaluation by each court asked to admit expert testimony in a particular case. *Daubert* explained that "scientific conclusions are subject to perpetual revision." *Daubert,* at 597. In practice, this means that "[w]hen scientific methodologies once considered sacrosanct are modified or discredited, the judicial system must accommodate the changed scientific landscape." *See* **Exhibit G**, Hon. Harry T. Edwards, *The National Academy of Sciences Report on Forensic Sciences: What it Means for the Bench and Bar,* 51 JURIMETRICS J. 1 (Summer 2010). For this reason, "past acceptance does not render expert testimony admissible"; rather, "expert testimony long assumed reliable before Rule 702 must nonetheless be subject to the careful examination that *Daubert* and *Kumho Tire* require." *See United States v. Willock,* 696 F. Supp.2d 536 (D. Md. 2010).

II. THE THEORY OF FIREARMS IDENTIFICATION

To conduct firearms identification, examiners look at toolmarks on spent ammunition. Bullets pick up markings from gun barrels. The barrels are rifled, to improve accuracy, with spiral grooves cut into the barrel's interior to impart spin on the bullet. Cartridge casings, which do not travel down the barrel, may pick up markings from other parts of the weapon, such as the firing pin or breechface. To conduct their analysis in an individual case, the examiner test-fires the suspected firearm and visually compares the pattern of marks on the test-fired ammunition with that on the ammunition recovered from the scene, using a comparison microscope. If the examiner

does not have a suspect weapon, he or she compares the marks on spent bullets or casings to determine if they were fired from the same weapon. *See* Foundational Overview of Firearm/Toolmark Identification tab available at afte.org/resources/swggun-ark (last accessed July 26, 2018).

Firearms examiners first examine bullets and/or casings for class characteristics. "Class characteristics" are distinctive features shared by many items of the same or similar type—such as the width of a groove cut into the barrel of a firearm, or the shape of a firing pin—and are determined before manufacturing. *See* NRC Forensics Report at 152. Class characteristics are used to narrow the pool of suspect firearms to one or more makes and models. If the class characteristics between test-fired and evidence ammunition, or between sets of ammunition, are the same, the examiner next evaluates "accidental" marks left on bullets and/or casings by features of a weapon that are accidentally imparted during manufacture. One group of accidental marks, "subclass characteristics," are defined as features left on multiple items fabricated by the same tool: imperfections on the tool's cutting surface are imparted on a series of weapons. Examiners may confuse subclass characteristics with individual characteristics, discussed below, in cases where there are limited microscopic marks of value.[5] Subclass characteristics are only "present on a group of guns within a certain make or model, such as those manufactured at a particular time and place." *United States v. Monteiro*, 407 F. Supp. 2d 351, 360 (D. Mass. 2006).

"Individual" characteristics are the other type of accidental marks sometimes found on guns.[6] Like subclass characteristics, firearms examiners believe that individual characteristics result from imperfections on tool cutting surfaces during the firearm manufacturing process, as

[5] http://projects.nfstc.org/firearms/module11/fir_m11_t04_01.htm (last visited September 18, 2019).

[6] Marks left on ammunition by imperfections in the barrel versus deliberate rifling are called "striae."

well as through wear and tear of the firearm.[7] Unlike subclass characteristics, firearms examiners presume that the imperfections that result in individual characteristics are imparted upon, and thus unique to, a particular gun. *See* NRC Forensics Report at 150-151; PCAST Report at 104.

Because of these individual characteristics, firearm examiners assume that each firearm has a unique set of patterns or marks on bullets or casings that are not shared by any other firearm. *See Williams v. United States*, 130 A.3d 343, 352 (D.C. 2016) (Easterly, J., concurring). While class characteristics are well-defined, firearms examiners lack standards for distinguishing between "subclass" characteristics, which are shared by firearms, and "individual" characteristics, which are not. Instead, the examiner relies on his or her training and experience.[8]

If the examiner finds "sufficient agreement" between the individual characteristics seen in the two sets of ammunition, he or she declares a "match" and concludes that the ammunition recovered from the crime scene was fired from the suspected firearm. No standard or protocol, however, dictates how many characteristics the examiner must find in agreement to declare a match. Instead, firearms examiners utilize a subjective pattern-matching methodology that allows each examiner to set his or her own criteria based on training and experience. *See* **Exhibit I**, AFTE Theory of Identification; *see United States v. Taylor*, 663 F.Supp.2d 1170, 1177 (D. N.M. 2009); *see also* PCAST Report at 104 (Examiners find "sufficient agreement" when they are "convinced that the items are extremely unlikely to have a different origin.")(citing AFTE Criteria).

III. THIS COURT SHOULD EXCLUDE THE FIREARMS IDENTIFICATION TESTIMONY BECAUSE THE GOVERNMENT

[7] The assumption that wear and tear creates unique marks on all bullets and shell casings shot by a particular gun is puzzling as this would require "wear and tear" to remain constant over the life/use of a gun. This is contrary to the idea of "wear and tear."

[8] Firearms examiners themselves concede that subclass marks "may be misinterpreted, especially in cases with very limited microscopic marks of value, or in instances in which no firearm is submitted." *See* **Exhibit H**, National Forensic Science Technology Center/AFTE Firearm examiner training module, Physical Characteristics, *available at* http://projects.nfstc.org/firearms/module11/fir_m11_t04_01.htm.

CANNOT DEMONSTRATE IT IS BASED ON A VALID AND RELIABLE METHODOLOGY

The field of firearms identification lacks the scientific validity that is the predicate for evidentiary admissibility. Indeed, the conclusions of the NRC and PCAST Reports are uniform: there is no scientific theory or technique that is generally accepted by the relevant scientific community, and there is no evidence that examiners regularly reach accurate conclusions. *See Daubert*, 509 U.S. at 593-95.

Each report found no empirical research proving the "theory of identification." Instead, this "theory" is nothing more than a series of unproven assumptions embraced by firearms examiners. First, the field assumes that every firearm has unique characteristics resulting from both the manufacturing process and wear and tear, which consistently produce unique marks on bullets and shell casings. It also assumes that examiners, based on experience and judgment, can identify and distinguish these "unique" accidental marks from subclass marks[9], which are also accidentally left during the manufacturing process but are not unique. Finally, the field assumes that examiners can accurately determine when two sets of "unique" marks are in "sufficient agreement" to declare a "match." There is no standard for what constitutes "sufficient agreement," nor is there empirical data supporting any particular threshold number of marks that must align. Rather, each examiner refers to his personal recollection of the amount of agreement he has observed in close non-matches encountered throughout his career; in other words, "sufficient agreement" is wholly subjective.

[9] The OSAC (Organization of Scientific Area Committees) was unable to find a single study "that assesses the overall firearm discipline's ability to correctly/consistently categorize evidence by class characteristics, identify subclass marks, and eliminate items using individual characteristics." PCAST Report at n. 160; *see* **Exhibit J**, OSAC Research Needs Assessment Form. The OSAC was established by the National Institute of Standards and Technology (NIST) to develop standards and guidelines to improve the quality and consistency in the forensic science community.

Assumptions and observations do not constitute a valid scientific theory tested through independent empirical research. To the contrary, a "valid theory" is a "comprehensive explanation of some aspect of nature that is supported by a vast body of evidence." PCAST Report at 60; NRC Forensics Report at 154-55 (reaching the same conclusion); Ballistics Imaging Report at 1, 3 ("[T]he validity of the fundamental assumptions of uniqueness and reproducibility of firearms-related toolmarks ha[s] not yet been demonstrated.").

The NRC and PCAST Reports also uniformly and emphatically conclude that the field of firearms identification has not proved it has a reliable or valid scientific technique for reaching conclusions about individualization, and is therefore not generally accepted in the scientific community. *See Daubert*, 509 U.S. at 593-95 (courts must consider "the extent to which the underlying scientific theory and technique are accepted as valid by the relevant scientific community.") As all three reports recognized, to be an accepted scientific method, the field must conduct empirical testing to prove that examiners can reliably and repeatedly reach accurate conclusions. The field lacks any repeatable and consistent procedures for examiners to follow when identifying features within evidence samples, comparing those samples, and then measuring the significances of similarities and differences. Rather, the field allows each examiner to draw his own subjective conclusions about what qualifies as "sufficient agreement" between test-fired samples and found ammunition. *See* PCAST Report at 111-12; *see also* NRC Forensics Report p. 155 (concluding that the field of toolmarks relies on the "subjective findings of examiners rather than on the rigorous quantification and analysis of the sources of variability."); *id*. at 153-54 ("the decision of the toolmark examiner [to declare a match] remains a subjective decision based on unarticulated standards and no statistical foundation for estimation of error rates.").

As these reports also make clear, the field lacks sufficient peer review. *Daubert*, 509 U.S. at 593-95 (requiring courts to evaluate whether peer-reviewed studies exist demonstrating the field's validity). Only one study, the Ames study, has replicated case-work situations to test the reliability of firearms examiners' case work. PCAST Report at 108-110. This does not prove scientific validity. *Id*. at 111.

To that end, the field lacks a known error rate, as only one appropriately designed study – the Ames study – has attempted to measure it. *Id*.; *Daubert*, 509 U.S. at 593-95 (emphasizing the importance of a known error rate in assessing a field's reliability). That study suggests that the field has grossly underestimated its rate of false-positives. *Id*. at 11, 111. Without a known error rate, "an examiner's statement that two samples are similar – or even indistinguishable – is scientifically meaningless: it has no probative value, and considerable potential for prejudicial impact." *Id*. at 6.

Here, the firearms examiners will merely rely on their training and experience to reach indefensible claims of individualization and certainty.[10] However, the collective experience of examiners in the field and in courts, no matter how extensive, is not a scientific basis to demonstrate validity and reliability. Claims to the contrary have been soundly rejected by the scientific community. "Nothing – not training, personal experience nor professional practices – can substitute for adequate empirical demonstration of accuracy." PCAST Report at 46.

Defense counsel have made requests to ascertain the scientific foundations and principles upon which the government's examiners will rely. *See* **Exhibit L**, Firearm & Toolmark Discovery

[10] The proposed testimony contravenes a 2016 memorandum from the Attorney General directing Department forensic labs to cease using even the lesser expressions "reasonable scientific certainty" or "reasonable [forensic discipline] certainty" in their reports or testimony and directing Department prosecutors to abstain from use of these expressions. *See* **Exhibit K**, DEPT. OF JUSTICE, Memorandum of Attorney General Loretta Lynch (Sept. 6, 2016)

Request (requesting validation studies conducted and/or relied on in connection with firearm analysis in this case). However, the firearms examiners in this case have failed to identify the validation studies that would support their claims and proposed testimony. The defense submits that the NRC and PCAST Reports critiques of the firearms identification disciple are the reason for this silence. The entirely subjective methodology employed here lacks sufficient empirical evidence to establish validity and reliability. The firearms identification evidence is not evidence that a jury can rely on. This Court should exclude it.

IV. THIS COURT SHOULD EXCLUDE THE EXPERT TESTIMONY BECAUSE THERE IS NO WAY TO DISCERN WHETHER THE METHODOLOGY HAS BEEN RELIABLY APPLIED

Even if the Court finds that the general methodology underlying the government's expert testimony is sufficiently reliable, it must query "whether those principles and methods have been properly applied to the facts of the case." *See* Fed. R. Evid. 702 advisory committee's note; Rule 702(a)(3).

The admissibility of an examiner's opinion as to the existence of an identification is a subjective determination predicated on the examiner's experience, and it is "essential that the examiner provide a sufficient explanation for the basis of the opinion." *See Willock*, 696 F. Supp.2d at 561. As noted by the Advisory Committee Note to Fed. R. Evid. 702:

> If the witness is relying solely or primarily on experience, then the witness must explain how that experience leads to the conclusion reached, why that experience is a sufficient basis for the opinion, and how that experience is reliably applied to the facts. The trial court's gatekeeping function requires more than simply "taking the expert's word for it."

In *Willock*, the Court emphasized that when applying a subjective methodology like firearm identification, evidence is relevant, reliable, and helpful only if the examiner followed and

documented his or her application of the accepted methodology. *See Willock*, 696 F. Supp.2d at 572 (discussing the importance of adherence to standards in firearms toolmark identification).

To this end, courts have required an expert presenting subjective identification testimony to properly document his analysis such that his conclusions and application of the methodology in question can be verified and reproduced. "The twin requirements of adequate documentation and peer review of the primary examiner's results are said to 'ensure the reliability of the expert's results and the testability of the opinion.'" *Willock*, F. Supp.2d at 561 (citation omitted); *In de Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 745 (3d Cir. 1994) (explaining that "any step that renders the analysis unreliable . . . renders the expert's testimony inadmissible. This is true whether the step completely changes a reliable methodology or merely misapplies that methodology"). Thus, in the context of expert testimony regarding subjective firearm identification, courts have explained that "[r]eproducibility is an essential component of scientific reliability." *United States v. Green*, 405 F. Supp. 2d 104, 108 (D. Mass. 2005); *see also Monteiro* 407 F. Supp. at 368.

For these reasons, courts have excluded subjective firearm expert testimony where the examiner failed to document their analysis in a way that was reproducible and verifiable. *Monteiro*, 407 F. Supp. at 374 ("Until the basis for the identification is described in such a way that the procedure performed…is reproducible and verifiable, it is inadmissible under Rule 702"); *Green,* 405 F. Supp.2d at 120 (absence of notes and photographs by firearms examiner "makes it difficult, if not impossible," for another expert to reproduce what examiner did); *Commonwealth v. Pytou Heang*, 458 Mass. 827, 847 (2011) ("[B]efore trial, the examiner must adequately document the findings or observations that support the examiner's ultimate opinion, and this documentary evidence, whether in the form of measurements, notes, sketches, or photographs, shall be provided in discovery, so that defense counsel will have an adequate and informed basis

to cross-examine the forensic ballistics expert at trial."). In *Monteiro*, the government sought to admit evidence regarding firearm identification. The court found that subjective firearm methodology required, as a "prevailing and established standard of reliability" that examiners "document identification by notes, sketches, or photographs." *Id.* at 373. But the *Monteiro* examiner failed to do so. His notes "contain[ed] no description of what led [the examiner] to his conclusions. *Id.* For that reason, the court excluded the identification, explaining that: "Until the basis for the identification is described in such a way that the procedure performed by [the examiner] is reproducible and verifiable, it is inadmissible under Rule 702." *Id.* at 374.

By excluding any basis for their assertions, the government's examiners failed to conform to either recognized standards of quality laboratory practice, the Forensic Science Division's own Standards of Policies and Practices, and the requirements of Rule 702. The documentation, or lack thereof, does not divulge the data upon which the conclusions were drawn. While the examiners have turned over photographs they do not document or note anywhere which individual characteristics were relied on to reach their conclusions. *See Medley.* That the Government's examiners purport to have followed a process does not provide the needed "facts or data" or demonstrate that they "reliably applied the principles and methods to the facts of the case." *See* Fed. R. Evid. 702. The missing "facts and data" are necessary to connect the examiners' process to their conclusions.[11] The examination conducted in this case is not reproducible or verifiable, and thus must be excluded under Rule 702.

V. THE GOVERNMENT HAS NOT PROVIDED A BASIS FOR ITS EXAMINER'S OPINION

[11] *See, e.g.*, **Exhibit M** ¶ 9, DEPT. OF JUSTICE, Code of Professional Responsibility for the Practice of Forensic Science (Forensic science providers must meet 15 requirements including "[M]ake and retain contemporaneous, clear, complete, and accurate records of all examinations, tests, measurements, and conclusions, in sufficient detail to allow meaningful review and assessment by an independent professional proficient in the discipline.").

The same defects that render the firearm identification evidence inadmissible under Rule 702 dictate its exclusion under Rule 16(a)(1)(g). The Baltimore Police Department IBIS Hit Reports prepared by the government's experts did not adequately lay out the basis for the expert opinions contained therein. *See* **Exhibit E.** None of the paperwork describes the basis for the examiners' conclusions. The defense is entitled to know the basis for the experts' conclusions; not speculate. Any expert disclosure that fails to detail this basis is insufficient under Rule 16. [12]

Equally important, as discussed above, by omitting the data used to reach the examiner's conclusion, the government left out the critical link between any methodology and the conclusion. The process is the steps followed in a methodology. The data gathered during each step, however, is what forms the basis of the expert's opinion. *See, e.g.*, *United States v. Saunders*, 826 F. 3d 363, 369 (7th Cir. 2016) (finding a Rule 16 violation for failure to provide the basis of the examiner's opinion where the government did not disclose the number of points of similarity for a fingerprint identification). Here, the Baltimore Police Department IBIS Hit Reports conclude that after microscopic comparison of evidence cartridge cases, bullets, and bullet fragments recovered from the alleged shooting at the 2500 block of Springhill Avenue, evidence cartridge cases and a bullet recovered from the alleged shooting at 3405 Annapolis Road "have revealed that sufficient agreement of individual characteristics exist to identify (the recovered evidence) as having been fired with the same *unknown firearm*." *See* **Exhibit E**. Without more, this Court and most importantly, the jury is forced to speculate as to what served as the firearm examiner's "basis" for

[12] Again, because the government has yet to provide its expert disclosures, defense makes this argument based upon the discovery turned over to defense counsel to date. Upon information and belief, defense counsel anticipates that the expert disclosures from the government would mirror the summaries and conclusions contained within the reports completed by these same experts.

his ultimate conclusion regarding whether the recovered evidence was fired from the firearm. *See Medley* at 46-52.

The key bases of the firearms examiner's opinion have not been disclosed, and thus the defense has been denied the opportunity to challenge the government's evidence. At the time of this filing, expert disclosures have not been provided to defense counsel. Thus, defense counsel must further speculate beyond the questionable methodology and basis for the government's expert opinion regarding the firearm identification evidence in this case. Defense counsel must also speculate as to what the ultimate conclusions of the government's expert(s) are. This does not comport with any fair or reasonable reading of Rule 16. *Su7ijoklee* Fed R. Crim. P. 16.

VI. AT A MINIMUM, THE COURT MUST LIMIT THE TESTIMONY OF THE FIREARMS EXAMINER SO THE JURY IS NOT MISLED

Should this Court refuse to exclude the examiner's testimony on firearms identification, it should nonetheless limit the examiner's conclusions to describing the similarities he or she sees between the two sources, without declaring that the spent ammunition was fired from the same gun or that the spent ammunition was fired from a specific gun. This Court should also insist that firearms examiners present the only documented error rate – between 1 in 46 and 1 and 66 – to the jury. *See* PCAST Addendum at 7. Failure to limit this testimony will mislead the jury, violating Federal Rules of Evidence 702 and 403, and Mr. Slater's Due Process rights. The examiner must not be permitted to overstate the significance of his conclusion by making claims that exceed the empirical evidence and the applications of valid statistical principles to that evidence. Instead, the examiner must "report the overall false-positive rate and sensitivity for the method established in the studies of foundational validity," and should "demonstrate that the foundational [or black-box] studies are relevant to the facts of the case." PCAST Report at 6.

Courts must limit the examiner's testimony if there is a gap between the conclusions supported by existing data and the examiner's conclusions. *Gen. Elec. Co. v. Joiner*, 522 U.S. at 146. Permitting the examiner to state conclusions beyond those supported by the data blindsides the jury into giving the examiner's testimony more significance than is due. For this reason, courts have refused to allow firearms examiners to make conclusions of absolute certainty when declaring a match, as no empirical evidence shows that toolmarks are always unique, or that examiners are generally right. *See, e.g. Willock*, 696 F.Supp.2d at 549 (requiring the expert to state his opinions and conclusions without any characterization to the degree of certainty); *Taylor*, 663 F.Supp.2d at 1180 ("[B]ecause of the limitations on the reliability of firearms identification evidence . . . [the examiner] will not be permitted to testify that his methodology allows him to reach this conclusion as a matter of scientific certainty."); *Glynn*, 578 F.Supp.2d at 574 (emphasizing that examiners tend to make assertions "that their matches are certain beyond all doubt, that the error rate of the methodology is 'zero,' and other such pretensions."); *Monteiro*, 407 F.Supp.2d at 372.

This Court should therefore preclude the government from introducing testimony suggesting there is any statistical significance tied to similar toolmarks found on ammunition unless the firearms community presents data showing that certain characteristics are unique. As the three reports discussed throughout demonstrate, there is insufficient empirical evidence suggesting that toolmarks are unique or that examiners can declare a match at the exclusion of all other weapons.[13] Instead, this Court should limit the examiner to pointing to the similarities he

[13] It is not enough to simply bar the examiner from using the phrase, "to the exclusion of all others." "A statement that markings are 'unique' to a particular gun is a statement that that the probability of finding another gun that can create identical bullet markings is zero. If purportedly unique patterns on bullets are declared to match, that declaration likewise negates the possibility that more than one gun could have fired bullets—it is a statement of unqualified certainty that the bullets were fired from a specific gun to the exclusion of all others." *See, e.g., Williams*, 130 A.3d at 352.

sees between the ammunition, and any differences identified.[14] Recently, after a *Daubert* hearing, Judge Grimm ruled that an examiner from a laboratory subjected to the same accreditation standards as the Baltimore Police Department laboratory at issue here would only be permitted to:

> "…put up his pictures. He can show the similarities between one and the other, and he can even express the opinion that the marks from the .45 that he test fired, the marks on the cartridges are consistent with the marks on the other one that were found at the crime scene, but I won't allow him to express the opinion that they were produced by the same gun, and I won't allow him to express a confidence level as to his opinion."

Medley at 54. As explained *supra*, no researchers have conducted reliable scientific studies analyzing the frequency of toolmark characteristics. The firearm examiner, therefore, has no more idea than the jury as to the significance of similarities or differences between toolmarks left on ammunition.

Alternatively, this Court should limit the examiner to testifying only that "this gun cannot be eliminated as the source of the bullet/cartridge." This is the ruling made recently in the Superior Court of the District of Columbia. Associate Judge Todd E. Edelman found that:

> [P]articularly in light of the inability of the published studies to establish an error rate, the absence of an objective standard for identification, and the lack of general acceptance of the foundational validity of the field outside of the community of practitioners within the field – reliable principles and methods do not adequately support the theory that a firearms examiner can identify a particular firearm as having fired a particular bullet or cartridge casing. Accordingly, the Court will not permit Mr. Coleman, the firearms examiner who conducted the comparison in the above-captioned case, to testify in the form of such a source attribution statement. Again, in light of the state of the evidence presented here, a conclusion that a particular firearm was the source of a particular bullet or cartridge case does not yet find support in sufficiently reliable principles and methods.

[14] "[T]he subjective nature of the process, lack of quantitative standards, and limited scope of foundational testing do not demonstrate the scientific principles necessary to establish the origin of the marks with any specific amount of certainty." *United States v. St. Gerard*, APO AE 09107, at 4 (U.S. Army Tr. Judiciary, 5th Judicial Cir. June 7, 2010).

See **Exhibit N**, Opinion, *United States v. Marquette Tibbs*, Case No. 2016 CF1 19431 (Sept. 5, 2019); *see also State of Missouri v. Scott Goodwin-Bey*, No. 1531-CR00555-01 (Dec. 16, 2016) ("As it stands today," the Court noted, "independent scientists have uniformly concluded that firearm and toolmark analysis has not been scientifically validated. Only current and former law enforcement personnel – who have proverbial skin the game – believe otherwise." *Id*. at *4-5.[15]) This lack of objective reliability and review, coupled with a flawed methodology "permits the ultimate finding of 'sufficient agreement' whenever an individual examiner concludes that she would be hard pressed (for reasons not specified in the governing standard) to find such similar markings on casings or bullets fired by different firearms." *See* **Exhibit N** at 46. The admission of this brand of expert testimony concerning purported matches by the government's experts because "under this so-called standard, the process for determining what constitutes a 'match' lacks defined criteria; it is merely unconstrained subjectivity masquerading as objectivity." *Id.*

Finally, this Court must require the examiners to accurately report an error rate. To date, the only available error rate comes from the Ames study. The expert should therefore have to tell the jury that the field has an error rate between 1 in 46 and 1 in 66 and that there is no data on this examiner's ability.[16] "Claims of higher accuracy are not justified at present." PCAST at 12.

[15] The Court emphasized that toolmark evidence is "all subjective," that there existed no "large scientific studies to determine an error rate," and that the "peer community is almost exclusively law enforcement." "Toolmark identification is a very valuable tool," the Court stated, but "that is where it should stay, in the area of law enforcement, not in the courts." *Id*. at 7.

[16] The defense requested information with regard to proficiency testing taken by the examiners in this case. To date, the defense has not received any information. It is well-documented that the firearms field lacks the rigorous proficiency testing and controls for minimizing human error and bias that ensure the method is reliably applied. Whereas "[s]cience takes great pains to avoid biases by using strict protocols to minimize their efforts," NRC Forensics at 122, the field of firearms identification has not taken any steps in that regard. *Id*. at 8 n.8 ("Unfortunately . . . there is no good evidence to indicate that the forensic science community has made sufficient effort to address the bias issue."). To the contrary, firearms examiners are often given contextual information about the case and evidence before performing examinations. *Id*. at 123; *see also Taylor*, 663 F. Supp.2d at 1178 (quoting *Green*, 405 F.Supp. 2d at 108. And the field lacks

Without this qualifying information, there is a grave risk that the jury will overvalue the expert's testimony.

CONCLUSION

For the reasons set forth in this motion, Mr. Slater respectfully requests that this Court exclude the proposed testimony of the firearms examiner, or in the alternative limit such testimony as described above. Mr. Slater further requests a hearing on this matter to enable him a meaningful opportunity to demonstrate to the Court the necessity for the relief requested herein.

Respectfully submitted,

James Wyda
Federal Public Defender
for the District of Maryland

___/s/_____
Christian Lassiter (#805576)
Devin A. Prater (#810494)
Assistant Federal Public Defenders
100 South Charles Street
Tower II, 9th Floor
Baltimore, Maryland 21201
Phone: (b) (6)
Fax: (b) (6)

the rigorous proficiency testing showing that specific examiners are capable of conducting accurate evaluations in each case. PCAST Report at 111-12.

CERTIFICATE OF SERVICE

I hereby certify that on September 18, 2019, a copy of the foregoing was served via CM/ECF to parties in this matter.

/s/
Christian Bryan Lassiter

{ SEQ CHAPTER \h \r 1}**UNITED STATES DISTRICT COURT**
FOR THE DISTRICT OF MARYLAND

UNITED STATES OF AMERICA	:	
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	:	
v.	:	**Crim. No. CCB-16-0267**
	:	
	:	
DANTE BAILEY, et al.	:	
	:	

GOVERNMENT'S MEMORANDUM OF LAW IN OPPOSITION TO DEFENDANT'S MOTION TO EXCLUDE OR LIMIT FIREARMS IDENTIFICATION EVIDENCE

The United States of America, by counsel, respectfully submits this response to Dante Bailey's Motion to Exclude Firearm Identification Evidence, or in the Alternative, to Limit Such Testimony (ECF 1007). Counsel for Randy Banks, Jamal Lockley, Shakeen Davis, and Sydni Frazier have moved to adopt Bailey's motion. *See* ECF 1010 (Banks), 1022 (Frazier), 1023 (Lockley), 1032 (Davis).

INTRODUCTION

The defendants seek to deprive the jury of the opportunity to hear from qualified, experienced firearms examiners from the Baltimore Police Department's Firearms Examination Unit, James Wagster and Daniel Lamont, about their conclusions that (1) casings and live rounds from the scene of the James Edwards murder on February 12, 2015 were fired from the same firearm as casings and a live round from the scene of the shooting at the BP gas station in the 5200 block of Windsor Mill Road three nights earlier, and (2) casings and projectiles from the scene of the Ricardo Johnson murder on August 10, 2016 were fired from the two firearms abandoned in the 2100 block of Tucker Lane roughly twelve hours later. The Court should admit the testimony by Mr. Wagster and Mr. Lamont and deny the defendants' motion.

The crux of the defendants' argument is that the issuance of three reports—(1) the National Research Council's Committee on Assessing the Feasibility, Accuracy, and Technical Capability of a National Ballistics Database, *Ballistic Imaging* ("2008 NRC Report") (ECF 1007-1); (2) the National Research Council's Committee on Identifying the Needs of the Forensic Science Community, *Strengthening Forensic Science in the United States: A Path Forward* ("2009 NRC Report") (ECF 1007-4), and (3) the President's Counsel of Advisors on Science and Technology's *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods* ("PCAST Report") (excerpts attached as Exhibit 1)—supports the exclusion or drastic limitation of firearms and toolmark identification testimony at trial. The defendants fail to cite to a single case finding that any of these three reports supports exclusion of expert testimony regarding firearms and toolmark identification. More importantly, the defendants ignore a wealth of case law here and throughout the country soundly rejecting such a request. Courts that have applied the five-factor test set forth in *Daubert v. Merrell Dow Pharm. Inc.*, 509 U.S. 579 (1993), have universally concluded that firearms identifications should be admitted.

As discussed below, the 2008 NRC Report is simply not germane to the question before the Court, as its purpose was to assess the feasibility of creating a ballistics database, *not* the admissibility of ballistics evidence in legal proceedings. The 2009 NRC Report is outdated, and efforts to use the report to exclude or limit expert firearms testimony in the way the defendants propose have been rejected in every opinion to consider the issue, including the oft-cited opinion by Judge Paul Grimm (adopted by Judge William Quarles) in *United States v. Willock*, 696 F. Supp. 2d 536 (D. Md. 2010) (holding that the firearms expert could state his opinion that the cartridge casings from two murder scenes were discharged from the same gun, but without any

characterization of his degree of certainty).

Similarly, the PCAST Report provides nothing to undermine the admissibility of firearms and toolmark identification evidence. As discussed below, rather than evaluate the discipline under the five criteria set forth in *Daubert*, PCAST proposes a limited standard for admissibility by focusing on a single criterion—validation (*i.e.*, studies regarding error rate). Most problematically, PCAST's assessment of this single criterion is scientifically lacking because it ignores huge bodies of scientific validation. Moreover, the PCAST's assessment of the validation studies it did review was without transparency, not subjected to peer-review, and riddled with basic mathematical errors. Not surprisingly, PCAST's approach has not been embraced by leaders in the various forensic disciplines.

As noted by Dr. Bruce Budowle, the most published forensic geneticist in the world, the PCAST Report itself would not have survived the very peer-review process advocated by its authors, and it missed the mark on its evaluation of DNA, widely recognized as the gold standard of forensics. *See* Exhibit 2 (Budowle Statement). Dr. Budowle's critique is echoed by Dr. John Buckleton, another renowned and widely published geneticist who was one of the developers of the probabilistic genotyping software (STR-mix) validated by laboratories throughout the country—including the FBI. *See* Exhibit 3 (Buckleton Statement). Although Dr. Budowle was initially going to publish on the topic of the PCAST Report, he decided against it when it became apparent that scientific leaders were not paying much attention to the recommendations contained therein. In evaluating the overall impact of the report on the scientific community, Dr. Budowle does not mince words: "[T]he PCAST Report 1) is not scientifically sound, 2) is not based on data, 3) is not well-documented, 4) misapplies statistics, 5) is full of inconsistencies, and 6) does not

provide helpful guidance to obtain valid results in forensic analysis." Exhibit 2, at 12. PCAST also ignored the vast body of peer-review literature on three-dimensional imaging with sophisticated computer algorithms and the application of statistical modeling through firearms population databases, which provides objective, empirical support for identifications based on markings left on bullets and cartridge cases. *See* Exhibit 4 (Weller Statement).

Firearms and toolmark examination meets all of the criteria set forth in *Daubert*. Accordingly, there is no scientific or legal basis to exclude this evidence or limit it in the way proposed by the defendants. The Court should allow the examiners to describe the methods and steps they took in conducting their analysis; what they saw when they looked at the firearms evidence through the comparison microscope; their observations of agreement (or disagreement) in the toolmarks on the firearms evidence; and their opinions about whether the ammunition components in question came from the same known or unknown firearm. In line with prior published rulings in this district, and guidance from Attorney General Loretta Lynch,[1] the government will not elicit *any* characterization of the expert's certainty level, whether it be 100% certainty, 95% certainty, a "reasonable degree" of certainty, "scientific certainty"; or certainty that "every other firearm in the world" can be excluded or that it is a "practical impossibility" that a different gun fired the ammunition components.

While the government agrees not to elicit testimony about the experts' certainty level, the government opposes a requirement that the experts affirmatively place an upper bound on their

[1] *See* Exhibit 5 (Attorney General Memo) (directing Department of Justice components to "ensure that forensic examiners are not using the expressions 'reasonable scientific certainty' or 'reasonable [forensic discipline] certainty' in their reports or testimony" and stating that "department prosecutors will abstain from use of these expressions while presenting forensic reports or questioning forensic experts in court unless required by a judge or applicable law").

certainty level. However, if the Court is inclined to impose such a requirement, the government urges the Court to follow the approach taken by this Court in *United States v. Montana Barronette, et al.*, Criminal No. CCB-16-0597, and by Chief Judge James K. Bredar in *United States v. Gerald Johnson, et al.*, Criminal No. JKB-16-0363, and require the experts to testify "**to a reasonable degree of certainty**" in the field of firearms and toolmark identification. *See* Exhibit 17 (Barronette Ruling); Exhibit 6 (Johnson Ruling). The Court should *not* follow the approach taken by Judge Grimm in *United States v. Jovan Medley*, Criminal No. PWG-17-0242, an unpublished oral ruling that did not consider or address the shortcomings in the PCAST Report, conflicted with decisions in this district and other districts, and was at odds with Judge Grimm's own published opinion in *Willock*. *See* Exhibit 7 (Medley Ruling).

Finally, the government has complied with its obligations under Rule 16 of the Federal Rules of Criminal Procedure by providing ample disclosures on the proposed testimony by Messrs. Wagster and Lamont—including lengthy reports and photographs of microscopic comparison testing—many months in advance of trial. Even more importantly, the government has made the firearms evidence available to the defense for inspection by their own experts. None of the defendants have sought to challenge the conclusions drawn by the government's experts through their own experts' examination of the evidence.

FACTUAL AND PROCEDURAL BACKGROUND

Murder of James Edwards a/k/a Bangout

On February 8, 2015, at approximately 10:05 p.m., members of the Baltimore Police Department responded to the scene of a shooting at the BP gas station in the 5200 block of Windsor Mill Road in Baltimore, Maryland. From the scene, investigators recovered six fired .40 S&W

caliber cartridge casings, one .40 S&W caliber cartridge (*i.e.*, a live, unfired round of ammunition), and a bullet fragment.[2]

Three nights later, on February 12, 2015, at approximately 12:59 a.m., James Edwards a/k/a "Bangout" was shot to death in the 300 block of Collins Avenue in Baltimore, Maryland. At the scene, BPD investigators recovered four .40 S&W caliber cartridge casings, seven .40 S&W caliber cartridges, and a bullet that fell out of the victim as they were treating him. During the autopsy of the victim, the medical examiner recovered three additional bullets from the victim's neck, head, and left clavicle.

The cartridge casings, live rounds, and bullets were submitted to the BPD Firearms Examination Unit. The examination of the items was conducted by examiner James Wagster and co-examiner Daniel Lamont. Mr. Wagster has over 32 years of experience as a firearms examiner—first with the Baltimore County Police Firearms Identification Unit (from 1986 to 1992), and then with the BPD Firearms Examination Unit (from 1992 to the present). He has completed extensive training, toured numerous firearms manufacturing facilities, and conducted many thousands of firearms examinations. He is a member of the Association of Firearm and Toolmark Examiners (AFTE) and has taught courses on firearms identification for multiple police agencies. He has been qualified as an expert over five hundred times in Baltimore City Circuit Court, Baltimore County Circuit Court, Howard County Circuit Court, Harford County Circuit Court, and the United States District Court for the District of Maryland in Baltimore and Greenbelt.

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2 The presence of the cartridge along with the fired casings indicates that when the firing pin struck the primer of the cartridge, the gunpowder failed to ignite, causing the gun to "misfire" and eject a live round of ammunition. A misfire can be caused by damage to the gun or by human error in the loading process (*e.g.*, use of damp ammunition).

Mr. Lamont has been with the BPD Firearms Examination Unit for close to 12 years. He, too, has gone through extensive training, toured numerous firearms manufacturing facilities, and conducted thousands of firearms examinations. He, too, is a member of the Association of Firearm and Toolmark Examiners (AFTE). He has been qualified as an expert in firearms identification and operability approximately 280 times, including six times in the United States District Court for the District of Maryland in Baltimore.

Mr. Wagster conducted a microscopic examination of the fired cartridge casings, live rounds, and projectiles from the February 8, 2015 shooting and the Edwards murder through a comparison microscope. He documented his findings in his reports and in photographs taken through the comparison microscope. Exhibit 8 (Wagster Reports).[3] With respect to the February 8, 2015 shooting, he determined that the six cartridge casings from the scene were fired from the same unknown firearm due to matching breech face and firing pin impressions. *Id.* at 43, 57, 60, 63. He also determined that the live round had a firing pin impression that matched the firing pin impressions on the six cartridge casings. *Id.* at 43, 57, 61, 63. Finally, he determined that the bullet jacket fragment was of no value for comparison due to its size and lack of microscopic markings. *Id.* at 43, 57, 63.

With respect to the Edwards murder, Mr. Wagster determined that the four cartridge casings from the scene were fired from the same unknown firearm based on matching breech faces and firing pin impressions. *Id.* at 5, 20, 24–25, 27. He determined that one of the live rounds

3 No photograph will ever have the same quality as actually looking through a comparison microscope. Nonetheless, the photographs are the best available memorialization of the identification.

was fired from the same unknown firearm as the four cartridge casings due to matching firing pin impressions. *Id.* at 5, 20, 26–27. The other six live rounds could not be positively identified as having been chambered in the same firearm as the four cartridge casings. *Id.* Mr. Wagster also found that the four bullets could not be identified or eliminated as having been fired with the same unknown firearm due to lack of microscopic markings present; however, they bore similar rifling class characteristics—namely, those most common to Smith & Wesson firearms. *Id.*

Finally, Mr. Wagster compared the firearms evidence from both scenes. He determined that the six cartridge casings from the scene of the February 8, 2012 shooting were fired from the same unknown firearm as the four cartridge casings from the Edwards murder. *Id.* at 28, 36–38. He also determined that the live round from the scene of the February 8, 2012 shooting and one of the live rounds from the Edwards murder had firing pin impressions that were made by the same firing pin as the cartridge casings from both scenes. *Id.*

In line with the BPD laboratory's quality assurance procedures, another examiner—Daniel Lamont—conducted an independent examination of the evidence. Mr. Lamont's signature appears on Mr. Wagster's reports because he reached the same conclusions about the evidence based on his own, independent microscopic comparison examination.

Murder of Ricardo Johnson

On August 10, 2016 at approximately 6:25 a.m., members of BPD responded to a report of a homicide in the 2200 block of Kloman Street in Baltimore, Maryland. In a stolen van near the light rail tracks, they found the body of Ricardo Johnson, a/k/a Uncle Rick. He had been blindfolded, bound at the wrists and ankles, and shot at least twenty times in the head, neck, back, and buttocks. Investigators recovered twenty-two 9mm caliber cartridge casings and three

projectiles from the van and surrounding area. During the autopsy of the victim, the medical examiner recovered sixteen additional projectiles—fifteen from the homicide and one artifact from an earlier shooting.

Later that same day, at approximately 5:17 p.m., members of BPD's Dirt Bike Task Force were in the area of 2100 Tucker Lane when they observed an unknown black male—later identified as defendant Sydni Frazier—riding a neon green dirt bike. Because the use of dirt bikes is illegal in Baltimore City, the officers attempted to stop Frazier and confiscate the bike. Frazier fled on foot and, in the process, abandoned the dirt bike and a backpack and gloves he had been wearing. The abandoned backpack was found to contain a jacket, two cell phones, and two firearms—a Taurus 9mm caliber semi-automatic handgun with serial number TJN73204, and a Smith & Wesson 9mm caliber semi-automatic handgun with serial number HAE0455.

The cartridge casings, bullets, and firearms were submitted to the BPD Firearms Examination Unit. Mr. Lamont conducted a microscopic examination of the fired cartridge casings and bullets from the Johnson murder and test-fired cartridge casings and bullets from the recovered firearms through a comparison microscope. He documented his findings in his reports and in photographs taken through the comparison microscope. Exhibit 9 (Lamont Reports).

Mr. Lamont made the following determinations:

- Cartridge cases Q1 through Q4, Q6, Q15, and Q17 through Q22 from the Johnson murder were fired from the Taurus 9mm caliber firearm recovered from the 2100 block of Tucker Lane due to matching breech faces. *Id.* at 39–40, 43, 45.

- Bullet specimens Q2B, Q5B, Q7B, Q9B, Q12B, Q14B, and Q15B from the Johnson murder were fired from the Taurus 9mm caliber firearm recovered from the 2100 block of Tucker Lane due to matching land impressions. *Id.* at 39–40, 44, 45.

- Cartridge cases Q5, Q7 through Q14, and Q16 from the Johnson murder were fired from the Smith & Wesson 9mm caliber firearm recovered from the 2100 block of Tucker Lane

due to matching breech faces. *Id.* at 49, 53, 54.

- Bullet specimens Q1B, Q4B, BF1, Q6B, Q10B, Q11B, Q13B, and Q16B from the Johnson murder were fired from the Smith & Wesson 9mm caliber firearm recovered from the 2100 block of Tucker Lane due to matching land impressions. *Id.* at 49, 52, 54.

In line with the BPD laboratory's quality assurance procedures, another examiner—Christopher Faber—conducted an independent examination of the evidence. Mr. Faber's signature appears on Mr. Lamont's reports because he reached the same conclusions about the evidence based on his own, independent microscopic comparison examination.

BACKGROUND CONCERNING FIREARMS & TOOLMARK EXAMINATION

Firearms identification has been an established forensic discipline for close to a century. *See* Hamby, J., Thorpe, J., *The History of Firearm and Toolmark Identification*, AFTE Journal ("AFTEJ") 31(3) (Summer 1999), at 266–84; *see also Response of the Association of Firearm and Toolmark Examiners to the National Academy of Sciences 2008 Report Assessing the Feasibility, Accuracy, and Technical Capability of a National Ballistics Database*, AFTEJ 40(3) (Aug. 20, 2008) at 237–38 ("AFTE Response") (attached as Exhibit 10). Firearms identification is a subset of "toolmark" identification, in which trained toolmark examiners analyze marks left by tools on various surfaces in an attempt to associate or match a left toolmark to a particular tool that may have left the mark. Firearms are, in this sense, "tools" that impart particular types of marks on bullets and cartridge cases when they fire. *See* Exhibit 10, AFTE Response, at 237–38.

When its trigger is pulled, the mechanisms of a firearm engage in a series of steps that result in firing. During that process, component parts of the firearm—the "tool" in this case—impart various types of "marks" on the components of the cartridge inside the weapon. For example:

With respect to bullets, marks are left on the bullet as the bullet travels through the barrel of the firearm. Those marks result from "grooves" and "lands" within the barrel.[4] Grooves are cuts within the gun barrel, and grooves leave corresponding raised "groove impressions" on the bullet as it is expelled. Lands are raised surfaces in the barrel, which leave depressed "land impressions" on the bullet as it is expelled. The individual positioning of the land and groove impressions, combined with the direction of the "twist" imparted on a fired bullet (right or left) allow firearms examiners to make identification comparisons.

With respect to cartridges, a firing gun may leave individual marks in two ways. First, when the cartridge contacts with the "breech,"[5] that contact leaves "breech face marks" on the cartridge. Second, when the firing pin strikes the primer of the cartridge during firing, that contact leaves a "firing pin impression" on the primer itself. Each of those marks is an individualized toolmark that can be compared on multiple cartridges to determine whether the cartridges were fired from the same firearm.

All of these events – groove impressions, land impressions, breech face marks, and firing pin impressions – involve a hard-material tool surface (the lands, groves, breeches, and firing pins) striking a surface (the bullet or cartridge). The surfaces of those tools contain random,

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4 The lands and grooves of the barrel together are the "rifling" of a firearm. The spin (twist) placed on a bullet by the rifling as the bullet passes through the barrel is part of what allows the bullet to be fired in a straight direction. The rifling of a firearm is thus part of the functionality of the weapon.

5 The "breech" of a firearm is the rear of the firing chamber or barrel of the firearm. When a firearm fires, the explosive force triggered by the firing pin causes the bullet to be expelled through the barrel and out the front of the firearm; at the same time, the now-empty cartridge case is pushed back by the explosive force into the rear breech. That backward impact causes breech face marks to be left on the rear of the cartridge case.

microscopic irregularities that are produced during the tool's manufacture and/or result from the wear, use and abuse of the individual tool during the course of its history. Using specialized equipment to conduct a microscopic examination, and aided by their training and experience, firearms examiners can conduct a comparative analysis of multiple imparted markings on fired bullets or cartridges, and thereby determine whether the markings were left by the same tool in the same firearm, *i.e.* whether the bullets and cartridges were fired from the same gun.

Using that technique, firearms examiners analyze and evaluate the following characteristics from items like fired bullets and spent cartridge cases:

- "Class characteristics" for a fired bullet include the number of land and groove impressions, the direction of the rifling "twist" (right or left), and the width of the impressions. For a cartridge case, class characteristics include the shape of the firing pin impression (round, square, etc.) and the shape of the firing pin aperture and type of breech face impression (arched, circular, parallel, etc.). Class characteristics are measurable, identifiable features, and result from design factors that exist prior to the manufacturing process of a firearm.[6] *See* Exhibit 10, AFTE Response, at 238.
- "Subclass characteristics" are more restrictive than class characteristics and generally result from two tools manufactured by the same manufacturing device at the same approximate state of wear. Essentially, subclass characteristics arise as

6 In firearms analysis, class characteristics may establish the existence of similarities between two fired specimen items (bullets, cartridges), but are not sufficient to establish a definitive match between specimens. Class characteristics may allow a *negative* identification, *i.e.* that specimens come from different firearms, where the class characteristics on two items are different.

follows: the manufacturing device making firearms components (like a firing pin) has an imperfection on it; the imperfection persists during the production of multiple firearm components, thus leaving an imprint of the same imperfection on a series of components (like a series of firing pins); and those manufactured firing pins then leave an imprint of that same imperfection on a series of fired cartridge primers. Identifications may not be made from subclass characteristics, and firearms examiners are trained to distinguish subclass characteristics from individual characteristics. *See* Exhibit 10, AFTE Response, at 238.

- "Individual characteristics" consist of random, microscopic imperfections and irregularities in the barrel or firing mechanism of a firearm. Individual characteristics result from events incidental to the manufacturing process, or from use, corrosion, or damage to a component over the life of the firearm. *See* Exhibit 10, AFTE Response, at 238.

In general, the tool-working surfaces of a firearm (like the rifling, the firing pin, and the breech) slowly change due to wear and tear and may leave different marks on bullets and casings over time. As a result, a firearm may over time create diminished microscopic similarities or increased microscopic differences on bullets and casings fired from the gun. Such changes increase the possibility of an inconclusive identification result, but they do not increase the likelihood of a false positive identification. *Id.*[7]

7 The defendants suggest that the ability to identify unique toolmarks caused by wear and tear is inconsistent with the concept of wear and tear, which presupposes changes over time. *See* ECF 1007, at 8 n.3. Certainly, the *totality* of the scratches, bumps dents, etc., on a tool will change over time. But an identification will be made only if enough *individual* hallmarks of wear and tear (individual scratches, bumps, dents, etc.) remain constant over time. Wear and tear

There are several types of individual marks that figure in an examiner's analysis:

- Striated marks are made by the movement of a bullet through a gun's barrel, and generally result from scratches and striations on a barrel's surface. Bullets may get striated marks during firing; cartridges may also gain striated marks during the process of a cartridge being fed into a firearm chamber; and finally, striated marks may be left on the cartridge case wall (the side of the cartridge) during the firing. *See* Exhibit 10, AFTE Response, at 239.
- Impressed marks are pressed on a surface. Impressed marks are imparted on a cartridge case by the firearm's firing pin and breech. *See* Exhibit 10, AFTE Response, at 239.

"Pattern matching" is the technique used by firearms and toolmark examiners to determine whether sufficient similarity exists between toolmarks to conclude that two bullets or cartridge cases came from the same firearm. *See* Exhibit 10, AFTE Response, at 239. The Association of Firearms and Toolmark Examiners (AFTE) has established the Theory of Identification to memorialize and explain the basis by which toolmark comparisons are done and matches are made:

> 1. The theory of identification as it pertains to the comparison of toolmarks enables opinions of common origin to be made when the unique surface contours of two toolmarks are in "sufficient agreement."
>
> 2. This "sufficient agreement" is related to the significant duplication of random toolmarks as evidenced by a pattern or combination of patterns of surface contours. Significance is determined by the comparative examination of two or more sets of surface contour patterns comprised of individual peaks, ridges and furrows. Specifically, the relative height or

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decreases the chance that firearms examiners will be able to match firearms components to the right gun as the gun ages. It does not increase the likelihood of false positive identification. Furthermore, wear and tear is of little significance in this case, where the relevant firearms components matched to one another were recovered between twelve hours and three days apart.

> depth, width, curvature and spatial relationship of the individual peaks, ridges and furrows within one set of surface contours are defined and compared to the corresponding features in the second set of surface contours. **Agreement is significant when agreement in individual characteristics exceeds the best agreement demonstrated between toolmarks known to have been produced by different tools and is consistent with agreement demonstrated by toolmarks known to have been produced by the same tool.** The statement that "sufficient agreement" exists between two toolmarks means that the agreement of individual characteristics is of a quantity and quality that *the likelihood another tool could have made the mark is so remote as to be considered a practical impossibility*.
>
> 3. Currently the interpretation of individualized/identification is subjective in nature, founded on scientific principles and based on the examiner's training and experience.

See Association of Firearms and Toolmark Examiners, *AFTE Theory of Identification as it Relates to Toolmarks*, https://afte.org/about-us/what-is-afte/afte-theory-of-identification (last accessed Mar. 10, 2019) (ECF 1007-9); Exhibit 10, AFTE Response, at 239 (discussing the history of the AFTE Theory of Identification).

To practice that theory, firearms examiners follow an established, multi-part examination methodology[8]: (1) evaluation based on class characteristics; (2) comparison via pattern matching; (3) conclusion; and (4) verification. *See* AFTE Website, Summary of the Examination Method, https://afte.org/resources/swggun-ark/summary-of-the-examination-method (last accessed Mar. 10, 2019). During the evaluation step, the examiner compares two specimens for their class characteristics. If class characteristics are different (for example, a differently shaped firing pin or breech face impression) then it can be concluded that items definitely were not fired from the

8 This assumes that particular firearms specimens are suitable for comparison. Sometimes, firearms specimens, especially bullets, are recovered in a state of damage in which they are simply not suitable for comparison analysis.

same firearm. If the class characteristics are the same, then it is possible that items came from the same gun, and the examiner moves to comparison.

During the comparison step, an examiner uses a comparison microscope to do a comparative examination of the specimens. The method used at this stage is the aforementioned "pattern matching." The examiner makes two determinations: whether the marks are subclass or individual characteristics; and whether there is sufficient correspondence between the individual characteristics to reach a match conclusion.

The examiner then reaches a conclusion: if sufficient agreement of individual characteristics is observed between two specimens, an identification conclusion is rendered; if all of the discernible class characteristics are the same, but sufficient agreement of the individual characteristics is not observed, an inconclusive result is rendered. In some situations, an elimination conclusion may be drawn based on observed differences in individual characteristics.

Finally, the verification process is employed to ensure proper conclusions are rendered. *See* afte.org/resources/swggun-ark/summary-of-the-examination-method (last accessed Mar. 10, 2019). Many laboratories, such as BPD's, require verification of all identifications by a second, independent examiner.

Using this methodology for examining toolmarked surfaces, there are four conclusions that examiners reach when conducting an examination: (1) identification, (2) inconclusive, (3) elimination, and (4) unsuitable for comparison. Examiners typically undergo extensive, standardized technical training designed to develop skills to recognize patterns of individual characteristics necessary to make an identification.

ARGUMENT

The Court should admit the firearms examination testimony without the proposed limitations, and should deny the defendants' motion. As discussed below: (1) firearm identifications are the result of rigorous and reliable analysis and employ a well-tested methodology that has achieved general acceptance in courts across the country, including in this District; (2) regardless of whether the discipline is considered "science," the firearm identification at issue is admissible under Rule 702 as "technical" or "specialized" evidence; (3) Mr. Wagster and Mr. Lamont are experienced firearms examiners, who are qualified to conduct the toolmark identification analysis involved in this case, and who will ultimately help the jury understand important evidence. The examiners' opinions are based on sufficient facts, and they reliably applied the principles and methods of firearms identification analysis to this case, while accurately and contemporaneously documenting their steps in the process; and (4) the government has satisfied its obligations under Federal Rule of Criminal Procedure 16.

I. THE FIREARMS OPINION AND TESTIMONY ARE ADMISSIBLE.

A. Relevant Law Concerning Fed. R. Evid. 702 and *Daubert*

Under Rule 702 of the Federal Rules of Evidence, 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: (a) 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) testimony is based on sufficient facts or data; (c) testimony is the product of reliable principles and methods; and (d) expert has reliably applied the principles and methods to the facts of the case. *See* Fed. R. Evid. 702.

In *Daubert*, the Supreme Court provided a non-exhaustive list of factors for a court to evaluate when deciding whether to admit expert testimony: (1) whether the particular scientific theory can be (and has been) tested; (2) whether the theory has been subjected to peer review and publication; (3) the known or potential rate of error; (4) the "existence and maintenance of standards controlling the technique's operation"; and (5) whether the technique has achieved general acceptance in the relevant scientific or expert community. *See* 509 U.S. at 593–94; *United States v. Hassan*, 742 F.3d 104, 130 (2014); *see United States v. Crisp*, 324 F.3d 261, 265-66 (4th Cir. 2003) (quoting *Daubert*, 509 U.S. at 593-94).

In setting forth its non-exhaustive list of factors, the *Daubert* Court also recognized that "vigorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence." *Daubert*, 509 U.S. at 596.

Applying those principles, courts have routinely admitted firearms identification testimony. *See, e.g., United States v. Foster*, 300 F.Supp. 2d 375, 376–77 & n. 1 (D. Md. 2004) (Blake, J.); *United States v. Diaz*, 2007 WL 485967 at *5 (N.D. Cal. 2007) (admitting firearms identification testimony but not allowing expert to state opinion to exclusion of all other firearms in the world); *United States v. Green*, 405 F.Supp.2d 104, 108 (D. Mass. 2005) ("[T]he problem for the defense is that every single court post-*Daubert* has admitted this testimony, sometimes without any searching review, much less a hearing."). Indeed, the defense has not cited to a single case—and the government is not aware of one—in which a court has excluded firearms identification testimony.

Even after the publication of the reports cited by the defense, courts have continued to

admit firearms identification testimony without the limitations proposed by the defense. *See, e.g.*, *Willock*, 696 F. Supp. 2d at 568; *United States v. Chester*, No. 13-CR-00774, at 3 (N.D. Ill. Oct. 7, 2016) ("PCAST report does not undermine the general reliability of firearm toolmark analysis or require exclusion of the proffered opinions.") (attached as Exhibit 11); *Commonwealth v. Hernandez*, SUCR2014-10417, *5 (Sup. Ct. Mass., Dec. 21, 2016) (denying defendant's motion to preclude firearms and toolmark identification evidence based on PCAST) (attached as Exhibit 18); *Commonwealth v. Legore*, SUCR2015-10363, *2 (Sup. Ct. Mass., Nov. 17, 2016) ("After a non-evidentiary hearing and argument, and upon review of the PCAST report …, there is no basis to disturb settled law permitting a properly qualified firearms expert from offering opinion evidence under [*Daubert* and related state cases] relating to a comparison and match between a bullet recovered from the alleged victim, and a bullet test-fired from a firearm allegedly associated with the defendant.") (attached as Exhibit 19); *Gardner v. United States*, 140 A.3d 1172, 184 n.19 (D.C. 2016) (reaffirming that it is permissible for "toolmark experts to offer an opinion that a bullet or shell casing was fired by a particular firearm," but noting that they are not permitted to do so "with absolute or 100% certainty"); *State v. Lee*, 2017 WL 1494012, *10 (La. 4th Cir., Apr. 26, 2017) ("[E]ven after publication of the NAS Report, courts have addressed, in detail, the reliability of [firearms and toolmark identification] testimony and ruled it admissible, although to varying degrees of specificity."); *Spears v. Ryan*, 2016 WL 6699681, *5 (D. Ariz., Nov. 15, 2016) ("[T]he NAS Report would have had no effect on the admissibility of the toolmarks evidence in this case."); *Napier v. Commonwealth*, 2014 WL 3973113, *9 (Ky. Ct. App., Aug. 15, 2014) (holding that it was not the purpose of the 2009 NAS Report to opine on the long-established admissibility of toolmark and firearms testimony in criminal prosecutions and there was no error in taking

judicial notice of scientific reliability of ballistic analysis under *Daubert*); *United States v. Sebbern*, 2012 WL 5989813, at * 8 (E.D.N.Y 2012) (no need for a *Daubert* hearing before admitting ballistics evidence); *United States v. Cema*, 2010 WL 3448528, at *5 (N.D. Cal. Sept. 1, 2010) (finding that the NAS report "does not necessitate exclusion of expert [ballistics] testimony").

B. Firearm Identification Satisfies the Requirements of *Daubert.*

Application of the *Daubert* criteria to firearms examination supports admission of such testimony (and particularly the opinions of Mr. Wagster and Mr. Lamont in this case).

1. Firearm Identification Is a Science That Has Been Tested.

As discussed above, the field of forensic firearm identification has existed for decades. Forensic firearm identification is an applied science. *See SWGGUN and AFTE Committee for the Advancement of the Science of Firearm and Toolmark Identification's Response to 25 foundational firearm and toolmark examination questions received from the Subcommittee on Forensic Science ('SoFS'), Research, Development, Testing, & Evaluation Interagency Working Group*, at 1 (June 14, 2011) ("SWGGUN Report") (attached as Exhibit 12). The forensic science of firearm identification is derived from several validated bodies of knowledge in the physical sciences, including: physics (*e.g.*, studies of pressure, temperature, friction, and heat), metallurgy (including plastic deformation, failure mechanics, compression, torsion, and shear), material science (including fatigue, fracture mechanics, hardness, texture, and tribology), and machining. *Id.* at 1–2.

The ability of firearms identification to be subjected to and to pass rigorous testing has been proven throughout the field's history. Numerous peer-reviewed studies of both an empirical

and a practical nature support the proposition that a properly trained and experienced forensic firearms examiner can correctly associate a fired bullet or cartridge case with the specific firearm that discharged it, and that such evaluations are subject to testing.[9] A 2007 journal review highlights some of the past research and illustrates how the profession has studied, characterized, and shared their findings.[10] It is through this type of research and publication that firearms examiners have been able to understand and disseminate the foundational knowledge for the discipline. *See also* https://afte.org/resources/swggun-ark/testability-of-the-scientific-principle (last accessed Mar. 10, 2019).

Examples of scientific testing of firearms examination in literature are substantial. One study examined a series of thousands of firings from a Glock .40 caliber handgun[11]; one study also examined firings numbering in the thousands, fired from five Turkish-manufactured pistols[12];

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9 *See* Hamby, J.E., Brundage, D., Thorpe, J., *The Identification of Bullets Fired from 10 Consecutively Rifled 9mm Ruger Pistol Barrels: A Research Project Involving 507 Participants from 20 Countries*, AFTEJ 41(2) (Fall 2009) at 107 (in a study involving 507 participants, 7597 correct answers and no false positive findings recorded).

10 Nichols, R., *Defending the Scientific Foundations of the Firearms and Tool Mark Identification Discipline: Responding to Recent Challenges*, Journal of Forensic Sciences, Vol 52(3) (May 2007) at 590–94.

11 Gouwe, J., Hamby, J.E., Norris, S., *Comparison of 10,000 Consecutively Fired Cartridge Cases from a Model 22 Glock .40 S&W Caliber Semiautomatic Pistol*, AFTEJ 40(1), (Winter 2008) at 61 (hereinafter the "*10,000 Consecutively Fired Glock Study*") (finding that after 10,000 .40 S&W caliber cartridge cases fired from a Glock, model 22, pistol were compared, all 10,000 fired cases could be identified to each other—validating previous durability studies that showed identifiable markings from a tool could persist for a long period of time). Because this study involved thousands of firings from the known weapon, it allowed researchers to observe the first to last cartridge case/bullets fired from a firearm.

12 Saribey, A. et al., *An Investigation into Whether or Not Class and Individual Characteristics of Five Turkish Manufactured Pistols Change During Extensive Firing,* J. Forensic Science 54(5) (Sept. 2009) at 1071-1072. This study noted "some slight changes" in the

and studies of subclass characteristics have been conducted to learn what type of manufacturing methods cause subclass markings and to confirm that such characteristics do not interfere with an examiner's ability to distinguish between cartridge cases/bullets fired from two firearms despite the presence of subclass characteristics.[13] Thus, the theory has been well tested and favors admissibility, as courts have recognized. *See United States v. Otero*, 849 F. Supp.2d, 425, 433 (D.N.J. 2012) ("The literature in the field of firearms and toolmark identification documents that the theory has been repeatedly tested."); *United States v. Taylor*, 663 F. Supp.2d 1170, 1175-76 (D.N.M. 2009) (noting studies "demonstrating that the methods underlying firearms identification can, at least to some degree, be tested and reproduced"); *Diaz*, 2007 WL 485967, at *6 (holding that the theory of firearms identification, though based on examiners' subjective assessment of individual characteristics, "has been and continues to be tested").

As discussed above, recent attacks on firearms identification, including in the instant motion, have arisen from the 2008 NRC Report, the 2009 NRC Report, and the 2016 PCAST Report. Extrapolating from these reports, the defendants argue that the science of firearm

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individual marks from the first through final firings, but not enough to effect an examiner's ability to make an identification. The fact that the study involved thousands of firings also had the advantage of observing the "first-to-last" evolution noted in the Gouwe et al.'s *10,000 Consecutively Fired Glock Study*, *see* note 13.

13 Churchman, J.A., *The Reproduction of Characteristics in Signatures of Cooey Rifles*, RCMP Gazette (1949); Skolrood, R.W., *Comparison of Bullets Fired From Consecutively Rifled Cooey .22 Calibre Barrels,* Can.Soc.Forensc.Sci Vol 8(2) (1975) at 50-52; Coody, A. C., *Consecutively Manufactured Ruger P-89 Slides*, AFTE Journal, Volume 35, Number 2 (Spring 2003) at 159-160; Biasotti, A. A. (1981) at 34-35; Rivera, G. *Subclass Characteristics in Smith and Wesson SW40VE Sigma Pistols*, AFTEJ Vol 39(3) (Summer 2007) at 256 (noting challenges with tools manufactured in a way to minimize wear and tear); Lightstone, L., *The Potential for and Persistence of Subclass Characteristics on the Breech Faces of SW40VE Smith and Wesson Sigma Pistols*, AFTE Journal Vol 42(4) (Fall 2010) at 321.

identification is based on fundamental assumptions that have not been demonstrated, that the field is not based on a scientific theory, that it is defective because it is subjective and because 100% certainty is impossible, and that there is insufficient empirical evidence to establish that the discipline is valid and reliable. ECF 1007, at 5. The defense is incorrect.

Firearm identification is grounded in scientific principles. It is based on a number of objective measurements and observations that greatly narrow the possible source of firearms, including caliber determination, land/groove count and widths, shape of the firing pin, finish on the breech face, and the spatial relationship between the extractor and ejector in semi-automatic firearms. AFTE Response, Exhibit 10, at 239. It is true that the identification process involves some degree of subjectivity. But a degree of subjectivity is neither fatal to the identification process, nor unique to firearm and toolmark identification. As explained in the AFTE Response:

> It should be noted that virtually all sciences involve some element of subjectivity. Even an analytical chemist comparing two matching infrared spectra of a standard (known) sample of a pure organic compound and an unknown compound will see small differences between one or more absorption bands in the two spectra. . . . These small differences between a standard spectrum and that of the previously unknown compound do not preclude or even detract from the correct identification of the unknown substance because the analytical chemist knows through his or her training and experience that small variations in absorption peak intensities or shapes do occur from sample to sample of the same material. Even with these small variations, spectral database libraries are commonly used to narrow an analysis to just a few potential candidate compounds.

Id. at 240.

Nor does it matter that an examiner cannot rule out the possibility that two different firearms will produce indistinguishable marks (since it is impossible to examine the marks created by every firearm produced since the invention of the modern day firearm). First, there are no documented cases of different firearms making indistinguishable marks. Such an occurrence

remains theoretical. But more importantly, *Daubert* does not impose a standard of 100% certainty. **The possibility of error is present in virtually every field of forensic science, and does not defeat testability. For example, there is no way to rule out the possibility that two human beings have indistinguishable fingerprints or DNA. Nonetheless, fingerprint and DNA analysis have gone through rigorous testing establishing very low error rates and have been deemed reliable by courts throughout the country.** As explained in the AFTE Response:

> At the most fundamental level it is somewhat analogous to the manner in which we recognize friends and relatives in everyday life. When we see a friend or relative amid a large crowd we are able to make an identification based upon patterns of features that match our memories. While none of us will ever view the face of every living individual in the world, we can easily agree that we would be confident that we have specifically identified our friend or relative. The firearms examiner learns to recognize the 'face of the submitted firearm' through the careful study of test-fired bullets or cartridge cases from that firearm. This 'face' takes the form of reproducible patterns or arrays of striae on fired bullets and any number of striated or impressed marks on fired cartridge cases. . . . The visual, side-by-side comparison, made on the comparison microscope, of toolmarks is an objective process that precedes the final step: the subjective evaluation of the significance of the extent of agreement/disagreement objectively observed.

Id. at 239–40.

Notwithstanding the degree of subjectivity involved and the impossibility of 100% certainty, firearm identification has gone through rigorous testing and has achieved widespread acceptance in federal courts. As stated by the Fourth Circuit in *United States v. Crisp*, 324 F.3d 261, 324 (4th Cir. 2003), which rejected a *Daubert* challenge to testimony regarding fingerprint and handwriting analysis, "the touchstones for admissibility under *Daubert* are two: reliability and relevancy." Again, courts in this District and elsewhere have routinely confirmed the reliability of firearms identification. *See, e.g.*, *Foster*, 300 F. Supp. 2d 375, 376–77 & n. 1 (D. Md. 2004); *United States v. Chester*, No. 13-CR-00774, at 3 (Northern D. Ill. Oct. 7, 2016) ("[The] PCAST

report does not undermine the general reliability of firearm toolmark analysis or require exclusion of the proffered opinions.") (Exhibit 11, at 2); *United States v. Santiago*, 199 F. Supp. 2d 101, 111 (S.D.N.Y. 2002) (rejecting defendant's argument that the field of ballistics identification is "unacceptable pseudo-science").

2. Firearms Identification Satisfies *Daubert*'s Encouragement of a Known or Potential Error Rate.

Firearms identification is a discipline of study that encourages and supports rigorous analysis to test its capacity for error. Many validation studies have been conducted in which examiners are given a series of samples where there is "ground truth"—*i.e.*, where researchers know with absolute certainty where each of the test components came from. The examiners will then perform comparisons and report their findings, and the test provider will report on the examiners' performance.

Such studies commonly involve the use of "consecutively manufactured" samples. "Consecutively manufactured" means these are samples that have been produced one directly after the other, on the same production line, using the same tools. This is important because these are samples that are most likely to have subclass characteristics (or toolmarks with little change or variation from one machined part to the next) and thus have the greatest likelihood of producing a false positive identification; they are also, as a matter of common sense, the *least likely* to occur in actual case work. It is, of course, highly unlikely that two firearms manufactured on exactly the same assembly line, at the same time, will find their way into the same city, where they will both be used in crimes within a very short span of time.

Despite these *worst-case scenario* samples, peer-reviewed research consistently has shown a low error rate in this field. In other words, trained firearms examiners have consistently

demonstrated that they can take cartridge cases/bullets fired from consecutively manufactured firearms and correctly associate each cartridge case/bullet with the correct firearm despite the fact that all the firearms used in the study came off the assembly line next to one another. Although the PCAST Report (and the earlier NRC reports) minimized the import of these worst-case-scenario validation studies, courts have appreciated the significance of the studies in assessing reliability under Rule 702. *See, e.g., Otero*, 849 F. Supp.2d 432 ("Some of these 'validation studies' seek to validate the theory that one can individualize tools, even when comparing marks made by tools of the greatest possible similarity, such as those involved in the consecutive manufacture of various firearms of the same make.") (*citing* Coody, *Consecutively Manufactured Ruger P-89 Slides*, ATFE Journal 35(2) (Spring 2003) at 157; Brundage, D.J., *The identification of Consecutively Rifled Gun Barrels*, AFTEJ 30(3) (Summer 1998) at 438).

The following is a non-comprehensive listing of studies and accompanying rate of false positives:

Study	**Error Rate**
Brundage, D.J., *The Identification of Consecutively Rifled Gun Barrels*, AFTEJ 30(3) (Summer 1998) at 440.	0% (no incorrect responses, one inconclusive)
DeFrance and Van Arsdale, *Validation study of electrochemical rifling*, AFTEJ 35(1) (Winter 2003) at 36.	0% (no false identifications, no false eliminations)
Smith, E., *Cartridge case and bullet comparison validation study with firearms submitted in casework*, AFTEJ 37(2) (2005) at 132.	0% (no false positives or negatives)
Hamby, J.E., Brundage, D.J., and J.W. Thorpe, *The identification of bullets fired from 10 consecutively rifled 9mm Ruger pistol barrels: a research project involving 507 participants from 20*	0% (no errors from 507 responses, involving 15

countries, AFTE Journal, Vol. 41, No. 2 (2009): pp. 99-110.	unknowns from 10 consecutively rifled barrels)
Mayland B., Tucker C., *Validation of Obturation Marks in Consecutively Reamed Chambers*, AFTEJ 44(2) (Spring 2012) at 167-169. One out of 64 examiners reported 3 false identifications, and the remaining 63 examiners reported no false identifications (overall error rate of 1.6%).[14] *See* Exhibit 4, Weller Statement, at 8.	1.6%
Fadul, T.G., Hernandez, G.A., Stoiloff, S., and S. Gulati, *An Empirical Study to Improve the Scientific Foundation of Forensic Firearm and Tool Mark Identification Utilizing 10 Consecutively Manufactured Slides*, AFTEJ 45(4) (Fall 2013) at 385-87.	The error rate was summarized for all participants as 0.000636 for phase 1 and 0.0017699 for phase 2. Weller summarizes that result as 0.064% for Phase 1 and .18% Phase 2. Exhibit 4, Weller Statement, at 8.
Fadul, T.G., Hernandez, G.A., Stoiloff, S., and S. Gulati, *An empirical study to improve the scientific foundation of forensic firearm and tool mark identification utilizing consecutively manufactured Glock EBIS barrels with the same EBIS pattern*, National Institute of Justice Grant #2010-DN-BX-K269 (2013) at 33.	.7% (with a maximum error rate of 1.2% with 95% certainty)
Baldwin, D.P., Bajic, S.J., Morris, M., and D. Zamzow, *A study of false-positive and false-negative error rates in cartridge case comparisons,* Ames Laboratory, USDOE, Technical Report #IS-5207 (2014) at 17-18, 33. This is referred to herein as the Ames Study.	Approximately 1%, measured by false positives (with a 95% confidence range, a false positive rate of .360% - 2.261%)
Stroman, A., *Empirically Determined Frequency of Error in Cartridge Case Examinations Using a Declared Double Blind Format*, AFTEJ 46(2) (Spring 2014) at 157-175.	0% (74 out of 75 cases correctly identified, one inconclusive)
Smith, Smith, Snipes, J.B., *A Validation Study of The Bullet and*	.144% (false positive

14 The Mayland/Tucker article noted that their study illustrated the issue of the variable ability of individual examiners. The only false positives in that case were made by a single examiner out of the 64 tested.

Cartridge Case Comparisons Using Samples Representative of Actual Casework, Journal of Forensic Sciences (2016) at 5.	error rate; overall error rate was .303%, including false negatives)

The PCAST Report places emphasis on a single study that satisfied PCAST's restrictive standard for appropriate "black box" studies: Baldwin, D.P., Bajic, S.J., Morris, M., and D. Zamzow. *A study of false-positive and false-negative error rates in cartridge case comparisons*, Ames Laboratory, USDOE, Technical Report #IS-5207 (2014), commonly referred to as the "Ames Study." *See* PCAST Report, Exhibit 1, at 11. The Ames Study reported its error rate as approximately 1.01%, with a range of .360% - 2.261% with a 95% confidence level. Ames Study, at 3, 18. The PCAST Report describes the Ames Study error rate as 1 in 66, or potentially as high as 1 in 46 when considering the 95% confidence rate. Exhibit 1, PCAST Report, at 11. Even if the Court accepts the Ames Study to the exclusion of *every other study*, it still establishes a very low error rate.[15] Moreover, the Ames Study itself notes that there are reasons to believe that there was an overestimation of false positive results in the study:

> All but two of the 22 false identification calls were made by five of the 218 examiners, strongly suggesting that this error probability is not consistent across examiners (or in effect, that each examiner has

15 The Ames Study appears to be the source for the defense's position that the examiners should be required to adopt an error rate of 1 in 46. ECF 57 at 17. In making that request, however, the defense appears to misunderstand the results of the Ames Study. The defense asks that the 1:46 error rate is used by the examiner and *also* that the examiner be required only to "describe[] the similarities" he sees between the questioned items. ECF 57 at 17. The Ames Study did not state that examiners had a 1:46 error rate when "describing similarities"; the Ames Study found that error rate when examiners made actual identifications. The defense proposal would water down the examiner's opinion in this case *and* use the unproven Ames Study error rate for identifications. Put another way, the defense wants to use the error rate for apples while forcing the examiner to state an opinion about oranges. If the defense wants to require use of the Ames Study error rate, the examiner would have to be allowed to actually state an opinion about whether the specimens came from the same gun.

> his or her own false identification probability, and that these probabilities vary substantially).
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> **This finding does *not* mean that 1% of the time each examiner will make a false-positive error. Nor does it mean that 1% of the time laboratories or agencies would report false positives, since this study did not include standard or existing quality assurance procedures, such as peer review or blind reanalysis.** What this result does suggest is that quality assurance is extremely important in firearms analysis and that an effective QA system must include the means to identify and correct issues with sufficient monitoring, proficiency testing, and checking in order to find false-positive errors that may be occurring at or below the rates observed in this study.

Ames Study at 16, 18 (emphasis in original), quoted in Exhibit 4, Weller Statement, at 8–9.

In other words, as the Ames Report itself acknowledges, the accuracy of individual casework can be enhanced through quality assurance measures requiring all identifications to be documented and then subjected to confirmation by a second, independent examiner. In this case, the BPD laboratory had quality assurance controls in place that provided for such verification, and Mr. Wagster and Mr. Lamont followed those procedures in their analysis. Mr. Wagster's results were independently reviewed and verified by a second examiner, Mr. Lamont. And Mr. Lamont's results were independently reviewed and verified by a second examiner, Mr. Faber. **Even assuming an error rate of 1 in 46 for a single examiner, the odds of two examiners independently making the same error would be 1 in 2,116. In other words, the error rate associated with the two-examiner approach used in this case is, at worst, .00047.**

Even when courts have recognized the challenges in quantifying a firearms identification error rate, they have admitted firearms testimony on the recognition that the existing research, even when imperfect, suggests an "error rate [that] is quite low." *United States v. Taylor*, 663

F.Supp.2d 1170, 1176–77 (D.N.M. 2009) (citing *United States v. Monteiro*, 407 F.Supp.2d 351, 367 (D. Mass. 2006)). Courts have properly relied on such research in admitting firearms identification testimony. *See, e.g., United States v. Ashburn*, 88 F.Supp.3d 239, 246 (E.D.N.Y. 2015) ("The court finds that due to the subjective nature of the inquiry, a definitive error rate is impossible to calculate, but also finds that the error rate, to the extent it can be measured, appears to be low, weighing in favor of admission of the expert testimony."); *Otero*, 849 F. Supp.2d at 434 ("information derived from [] proficiency testing is indicative of a low error rate"); *Taylor*, 663 F. Supp.2d at 1177 (concluding that the error rate is "quite low"); *Diaz*, 2007 WL 485967, *8 (concluding that due to the subjective nature of the methodology, "it is not possible to calculate an absolute error rate for firearms identification," but that "the government has provided enough data to show that the error rates among trained firearms examiners are sufficiently low to counsel in favor of admitting the evidence"). Indeed, the data generated in the aforementioned Ames Study suggested (as characterized in the PCAST Report) error rates of 1 in 46 or 1 in 66, which would also be, in the words of the *Taylor* district court, "quite low."

Moreover, the firearm and the specimens remain available for analysis by a defense expert; because firearms evidence is non-consumptive by nature, the internal laboratory quality assurance programs are further enhanced by the fact that the defense has that opportunity for additional review through independent testing if there is any reason to suspect that an error has occurred. To the extent that the defense wishes to subject Mr. Wagster's or Mr. Lamont's opinion to further challenge, testing, or review, the defense has the option of having its own expert witness re-examine the evidence. If the defense expert reaches a different conclusion, that expert would have a chance to present his own opinion to the jury. The defense will also have the opportunity

to cross-examine Mr. Wagster and Mr. Lamont, which is the traditional and best way to challenge and test opinion testimony. *See Daubert*, 509 U.S. at 596.

3. Firearms Identification Is Subject to Peer Review and Testing.

Numerous examples of peer review and testing in the firearms identification field have already been discussed herein. Firearms examination studies have tested the foundational research of firearms and toolmark identification and examiners' ability to reliably match a cartridge case/bullet to a particular firearm. Such studies appear in peer-reviewed scientific journals such as the AFTE Journal.[16] Thus, the field has subjected itself to significant scientific peer-review. *See Ashburn*, 88 F.Supp.3d at 246 ("The court finds that the AFTE methodology has been published and subject to peer review, weighing in favor of admission …."); *Diaz*, 2007 WL 485967, at *8 ("The fact that articles submitted to the AFTE Journal are subject to peer review weighs strongly in favor of admission."); *Otero*, 849 F. Supp.2d at 433 (noting AFTE Journal's formal process for the submission of articles); *Taylor*, 663 F. Supp.2d at 1176 (finding the peer review factor "clearly weighs in favor of admissibility").

As noted above, in addition to peer-review in scientific journals, casework laboratories also conduct internal peer-review with casework through a technical review and verification – a quality assurance step that Dr. Bruce Budowle characterizes as a critical part of a holistic approach to the

16 The AFTE Journal and peer-review process is discussed in Denio, Dominic J., *The History of the AFTE Journal, the Peer Review Process and Daubert Issues*, AFTEJ (Spring 2002) at 210-214. Also, numerous examples of peer-reviewed forensic science literature appear in the statement by Todd Weller. *See* Exhibit 4. Weller himself has served as peer reviewer for both the Journal of Forensic Science and AFTE Journal. Although the process differs, the result is the same: articles are reviewed by subject matter experts who judge the paper on its scientific merit. Weller has accepted, revised, and rejected papers for both journals. Exhibit 4, at 9–10.

evaluation of a forensic science. Exhibit 2, Budowle Statement, at 9. Moreover, as already pointed out, the defense may also elect to have its own expert review the conclusions proffered by the government's expert. *Cf. United States v. John*, 597 F.3d 263, 276 (5th Cir. 2010) ("[Appellant] had the opportunity to analyze the fingerprint evidence herself and question its validity.").

4. Firearms Examiners, Including the Examiners in This Case, Operate Pursuant to Standards Providing Appropriate Standards and Controls.

Standards and controls for the firearms and toolmark profession are published and maintained in several sources. AFTE has published the standards for professional guidance and use, including the AFTE Training Manual (166-page document outlining all steps a new trainee should undertake prior to staring casework), the AFTE Technical Procedures Manual (116-page document providing technical procedures for typical examinations that may occur in firearms and toolmark identification laboratories), the AFTE Glossary (244-page document providing the profession with standardized terminology and definitions), and the aforementioned AFTE Theory of Identification. *See* Exhibit 4, Weller Statement, at 10.

Another set of standardized guidelines for the profession was established by the Scientific Working Group for Firearms and Toolmarks (SWGGUN). *Id.* SWGGUN was a committee of firearms examiners whose responsibility was to publish guidelines for the firearm and toolmark community.[17] The SWGGUN has been replaced by the Organization of Scientific Area Committees for Forensic Sciences (OSAC), for which Todd Weller has served as the Vice Chair.

17 The SWGGUN guidelines can currently be found on the OSAC website: https://www.nist.gov/topics/forensic-science/firearms-and-toolmarks-subcommittee (last accessed Mar. 10, 2019).

According to Weller, the OSAC is in the process of revising and writing standards that are discipline specific, so the field continues to move forward on this front as well. *Id.* at 10-11. Accordingly, the field maintains, and continues to develop, standards controlling the technique's operation. *Otero*, 849 F. Supp.2d at 435 ("In sum, the Court concludes that the maintenance of industry-compliant standards by the [New Jersey State Police] for conducting a firearms and toolmark identification examination, and the adherence to those standards and procedures by [the examiner], further support the reliability and therefore admissibility of the expert testimony.").

The proper course, noted in these cases and in other cases, and as recommended in *Daubert* itself, has been to admit the firearms testimony with the understanding that the opposing party has the opportunity to review the specimens, to examine the specimens, present opposing expert witness testimony, and of course to cross-examine the examiners. Moreover, importantly, nothing in the hundreds of peer-reviewed journal articles to date has invalidated the foundational premise that a trained examiner can reliably identify a cartridge case/bullet to a particular gun. *See generally* Exhibit 4, Weller Statement, at 6–9 (discussing studies). In other words, even though subjectivity remains in the methodology, peer-reviewed research provides objective empirical support for this work.

Moreover, the firearms and toolmark identification community is constantly improving its validation testing. For example, the limitations noted in some cases may become outdated by the extensive research the field has devoted to objectively quantifying the markings associated with an identification through 3D imaging and sophisticated computer algorithms, combined with the establishment of ballistic databases that enable statistical calculations in casework. So far, this emerging field provides objective, empirical support for identifications based on markings left on

bullets and cartridge cases. None of the 3D research has found evidence contradictory to the foundational principles of firearms identification. Exhibit 4, Weller Statement, at 6.

5. Firearms Identification Has Gained General Acceptance.

The numerous cases admitting firearms toolmark testimony have already been cited. There seems little doubt that this is a field of inquiry that has gained general acceptance. *See Jones v. United States*, 27 A.3d 1130, 1137 (D.C. 2011) (affirming decision not to conduct *Frye* hearing in firearms examination pattern matching case). Nothing has altered the wide consensus within the firearms examination discipline about the reliability of the science, and the consensus in the case law admitting firearms identification testimony. As noted by Weller, the discipline is practiced in crime laboratories throughout the United States as well as internationally. Exhibit 4, Weller Statement, at 11.

It is correct that under *Daubert*, a court should not admit expert testimony merely because previous courts have done so. Rather, *Daubert* calls upon trial courts to conduct their gatekeeping function in light of the continuing development of science. At the same time, nothing in *Daubert* or in its progeny calls upon a trial court to conduct fresh *Daubert* hearings on an hour-by-hour or minute-by-minute basis. Numerous courts, including in this District, have admitted firearms identification testimony. The overwhelming consensus of courts have accepted firearms identification testimony as a reliable subject for expert opinion testimony.

In the face of that longstanding precedent, the defense's request that this Court revisit that prevailing case law is based, fundamentally, on a single recent publication: the PCAST Report.[18]

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[18] The defense also refers to the 2008 and 2009 reports by the National Research Council. Those reports were addressed in depth in the memorandum opinion by then-Magistrate Judge Grimm in *United States v. Willock*, 696 F. Supp. 2d 536 (D. Md. 2010). *Willock* rejected a

The next section will discuss why the PCAST Report should not be relied on to draw the entire field of firearms identification into question.

C. The PCAST Report Does Not Undermine the Admissibility of Firearms and Toolmark Identification.

The defense places tremendous reliance on the PCAST Report in its attack on firearms identification. ECF 11-12. In fact, the PCAST Report is a profoundly imperfect and unreliable document, and should not impact this Court's decision. The problems with the PCAST Report are both general and specific to its criticisms of firearms examination.

1. The PCAST Report Is Not Consistent with *Daubert*.

As a threshold matter, it should be noted that the PCAST Report makes no attempt to evaluate any forensic discipline under Fed. R. Evid. 702, which is the legal rule governing the entire issue of whether opinion testimony should be admitted in federal court. The Rule 702/*Daubert* standard evaluates the admissibility of expert opinion testimony based on multiple factors, including, but not exclusive to, the factors set forth in *Daubert*. The *Daubert* Court itself emphasized that the standard for admissibility under Rule 702 was a "flexible one." 509 U.S. at 594-95. The fundamental issue is whether expert opinion testimony is helpful to a jury and reliable, not whether it rigidly satisfies one or the other factor. Indeed, the factors set forth in *Daubert* do not necessarily apply to all experts or in every case, and are not intended to be

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defense argument that the examiner's identification opinion should be excluded based on the 2008 and 2009 NRC Reports. The examiner was permitted to give his opinion that the firearms specimens had matching markings and were fired with the same unknown firearm, with the caveat that he was not allowed to testify regarding his certainty level—the same approach proposed by the government here. It is the more recent PCAST Report, however, that has been the subject of more discussion recently, and which seems to have precipitated Judge Grimm to revisit the *Willock* approach in *Medley* (Exhibit 7). Accordingly, the government's analysis will focus on the PCAST Report.

exhaustive. *See Kumho Tire v. Carmichael*, 526 U.S. 137, 141 (1999). Instead, trial courts applying *Daubert* have broad latitude when deciding how to determine reliability. *Id.* at 142.

In contrast to the Rule 702/*Daubert* approach, the PCAST Report takes what Dr. Budowle characterizes as a "myopic," rather than a scientifically preferable "holistic," approach that essentially focuses on a single criterion, *i.e.,* black box validation (discussed in more detail below). On top of that, even PCAST's application of its own myopic criterion is flawed in ignoring vast bodies of scientific foundational research, peer-reviewed publications, and even validation. In effect, PCAST applies a test contrary to *Daubert*.

The PCAST Report's incompatibility with *Daubert* is one of the reasons that led the Northern District of Illinois to affirm the numerous courts that have admitted firearms opinion testimony over the years, rather than to exclude or strip down firearms opinion testimony as the defense suggests. *Chester*, Exhibit 11, at 1 ("The [PCAST] report is clear that '[j]udges' decisions about the admissibility of scientific evidence rest solely on legal standards; they are exclusively the province of the courts and PCAST does not opine on them.' Rather, the report provides foundational scientific background and recommendations for further study."). Indeed, the *Chester* court expressed hope that the firearms examination community will improve itself based on questions posed by PCAST, but did not take the position that firearms identification should be excluded. *Id.* at 2. Instead, and as suggested by the *Daubert* Court, the *Chester* memorandum opinion invited the defense to cross-examine the government's experts regarding error rate and other matters discussed in the PCAST report. *Id.* Fundamentally, however, *Chester* concluded that "[i]n short, the PCAST report does not undermine the general reliability of firearm toolmark analysis or require exclusion of the proffered opinions in this case. Questions

about the strength of the inferences to be drawn from the analysis of the examiners presented by the government may be addressed on cross-examination." *Id.*

Other courts, continuing to apply the flexible approach provided by *Daubert* and *Kumho Tire*, have also continued to admit firearms identification and other forensic opinion testimony, even in the face of PCAST-based objections. *See, e.g., State of Louisiana v. Allen*, 2017 WL 4974768 at * 6 (La. App. 2017) (admitting firearms and fingerprint identification testimony post-PCAST report); *cf. State of Connecticut v. Patel*, 2016 WL 8135385 at * 8 (Conn. Superior Court, Dec. 28, 2016) ("There is no basis on which this court can conclude, as defendants would have it, that the PCAST report constitutes 'the scientific community.' Nor is there any evidence that the authors of the PCAST report have any understanding of the analysis that [the Connecticut] Supreme Court has given to this issue.").

For these and other reasons, leaders throughout the forensic science community have rejected the PCAST Report's approach and recommendations. For instance, Dr. Bruce Budowle, one of the most renowned forensic scientists in the world, has stated that the PCAST Report is an "unsound, unsubstantiated, non-peer reviewed document that should not be relied upon for supporting or refuting the state of the forensic sciences." Exhibit 2, Budowle Statement, at 1.

2. The Methodologies of the PCAST Report Are Flawed in General.

In addition to conducting an analysis that is inconsistent with the parameters of Rule 702 and *Daubert*, the PCAST Report has imperfections in its general analysis of science.

The aforementioned Dr. Bruce Budowle is one of the most renowned forensic scientists in the world. Dr. Budowle is currently the head of the Center for Human Identification at the University of North Texas and previously worked for the FBI as Chief of the Forensic Science

Unit and Senior Scientist for the FBI Laboratory Division. Importantly, Dr. Budowle is uniquely qualified to comment on the scientific impact of the PCAST report because he: 1) is a published forensic geneticist; 2) has been at the forefront of many major developments of forensic DNA methodologies—the "gold standard" of forensics—including authoring the Quality Assurance Standards that are followed in the United States and most of the world; 3) is cited by the PCAST Report as a noted expert[19]; and 4) is the forensic geneticist who discovered the errors associated with the application of the Combined Probability of Inclusion (CPI) statistical analysis in connection with DNA mixture interpretation at the D.C. Department of Forensic Sciences (DFS) and elsewhere throughout the United States—a topic discussed under the DNA section of the PCAST Report.

Dr. Budowle's statement is a powerful analysis and criticism of the foundational problems with the PCAST Report. First, Dr. Budowle criticizes the PCAST Report for the report's overall vagueness in its own criticisms and its failure to delve into the disciplines it was critiquing. Exhibit 2, Budowle Statement, at 3. Although the report claims to have reviewed 2000 papers, there are "no indications that the PCAST Committee actually assessed the data in the literature." *Id.* at 3. Dr. Budowle finds the lack of documentation "disconcerting" and "troubling" given PCAST's advocacy for validation, documentation, and peer-review publication for the forensic community; something Dr. Budowle characterizes as a "do as I say, not as I do" position. *Id.* The report contains no discussion on the "criteria that were used to assess the literature" or "the criteria that were used to dismiss the literature as inadequate," so there is no basis to assess whether

19 Dr. Budowle is the "forensic scientist for the FBI Laboratory" mentioned favorably by the PCAST Report itself, at footnote 17 of the PCAST Report. Dr. Budowle's work is also cited in footnotes 20, 33, 149, 183, 187, and 209 of the PCAST Report.

PCAST conducted a sound review. *Id.* Dr. Budowle states:

> Again, these issues are most disconcerting because it is apparent that the PCAST Committee in its undertaking did not hold itself up to the same standards of validation, documentation, and peer-review that it espouses the forensic community should embrace (compounded as a number of the criticisms in the report are unfounded).
>
> * * *
>
> The report advocates emphatically and repeatedly the virtues of validation, documentation, and peer-review. Yet the report does not contain such information and thus does not meet as a minimum the requirements that it lambasted the forensic science community for lacking.
>
> * * *
>
> The academic and professional standings of the PCAST Committee members are not a substitute for good practices (none of which are documented). No one should take seriously this report because it has little substance to support its contentions.

Exhibit 2, Budowle Statement, at 3–5.[20]

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20 PCAST did issue an addendum that responded to arguments made by the firearms identification community, including AFTE, following the initial report. *See* ECF 1007-3. The Addendum does little to address the faults in the initial report, however. The Addendum states that it reviewed "more than 400 papers" in re-examining its analysis of various studies, but did not discuss with any detail what this analysis was comprised of, except to state, generally with respect to a series of forensic disciplines, that the previous studies were not good enough. *Id.* at 5. As to firearms identification specifically, the Addendum stated that the firearms identification discipline "recognized the importance of empirical studies. However, ***most of these studies*** used flawed designs." *Id.* at 6. The Addendum does little to specify which studies are flawed versus unflawed, except for repeating its categorical statement that only a particular type of black box study is valid, and then only if there is more than one. *Id.* at 7. The Addendum does state that in the end, it is for courts to decide whether one proper study (the aforementioned Ames Study) combined with "ancillary evidence from imperfect studies" is enough to satisfy the legal criteria for scientific validity. *Id* at 7-8. That is the closest the PCAST Report comes to acknowledging that it is not applying a legal standard in its opinions. At no point does the Addendum provide any detail or citation in its position, with the exception of citing to the Ames Study and its 1-in-46 error rate. *Id.* at 7.

Second, Dr. Budowle's criticism of the PCAST Report's treatment of DNA (an understandable focus given that Dr. Budowle is a renowned DNA expert) is a demonstration of the basic problems with the PCAST Report methodology. Dr. Budowle explains that all science continues to improve; it is never static. *Id.* For example, Dr. Budowle is currently working to improve the widely accepted DNA typing methods through the use of next generation sequencing and new software tools. *Id.* It would be naïve to believe that any method is perfect and cannot be improved upon; however, this should not be interpreted as a wholesale condemnation on any forensic discipline. *Id.* Each application of each discipline should be evaluated through what Dr. Budowle characterizes as a "holistic system"—not solely based on a narrowly crafted validation criterion "as the report seemingly myopically espouses." *Id.* at 3.[21]

PCAST recommends that a subjective feature-comparison method "must be evaluated as if it were a 'black box.'" *See* ECF 1007-3 (PCAST Addendum), at 1. Notably, Dr. Budowle and others recommended the black box approach after the review of the FBI laboratory's latent print misidentification related to the Madrid bombing incident. Exhibit 2, Budowle Statement, at 7. The PCAST Report "calculated upper bound error rates based on the results of the very few black box studies they discuss." Exhibit 2, Budowle Statement, at 7. However, Dr. Budowle warns that such a calculation "does not necessarily help address error that may or may not have

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21 Another deficiency in the PCAST Report that Dr. Budowle characterizes as "egregious" is the "misuse and disregard for statistics." Exhibit 2, at 5. For example, the report discusses the fact that DNA testing has led to 342 exonerations – a fact Dr. Budowle characterizes as "statistically meaningless and out of context." *Id.* at 6. Yet, the PCAST Committee did not perform any statistical analyses or "even appear to collect the data necessary to put these numbers in the proper context." *Id.*

occurred during a specific case analysis," and he goes on to delineate the myriad problems associated with such an overly simplistic approach. *Id.* First, a black box study only tests those in the study; the average rate inflates the performance of the poorer analysts and deflates the performance of the better analysts. *Id.* Moreover, "the information content and quality of the results from a forensic science analysis vary from sample to sample." *Id*. A single black box error rate does not take into account the difficulty of a particular sample in a particular case. Although the PCAST Committee recognized that differences in the quality of DNA evidence affect the difficulty of interpretation, it failed to realize that a single black box error rate cannot be representative of every case sample, something Dr. Budowle characterized as "another obvious inconsistency in the [PCAST] report." *Id.*

Third, Dr. Budowle correctly points out that the PCAST Report is "oddly" silent on the fact that "the most direct way to measure the truth of the purported results is to have another expert conduct his/her own review, as is advocated by the National Research Council Report II for DNA analysis." According to Dr. Budowle, this form of quality assurance is a critical part of a holistic approach that increases validity and reliability in any one case:

> Quality assurance provides an infrastructure to promote high performance, address errors that arise, and improve process. In addition to validation studies, there are other mechanisms such as technical review of a case that reduce error. This technical review is performed within the laboratory before issuing a report and also outside the laboratory when an expert witness is acquired by the opposing side to assess results and interpretations. The PCAST Report seems to ignore the value of these additional quality measures and the strength of the adversary system.

Exhibit 2, Budowle Statement, at 8.

PCAST wholly dismisses factors such as "experience" and "judgment" and peer-review

in evaluating a forensic discipline. But as Dr. Budowle notes:

> Even to a lay person these statements should be obviously inconsistent, troubling and point to the inadequacy of the PCAST Committee addressing the topic of forensic science reliability. I fail to see why the medical and psychology fields can have another expert review another's work (on what may be life and death decisions) and opine on the analysis/interpretations; yet a qualified forensic science analyst cannot perform a technical review of forensic work to assess analysis/interpretations (especially since the report has ignored data that support that at some level forensic testing is reliable). The logic of the PCAST Committee escapes me.

Exhibit 2, Budowle Statement, at 9.

Fourth, a concrete example of the PCAST Report's problems is found in its treatment of Combined Probability of Inclusion (CPI) statistic and genotyping software in the area of DNA analysis.[22] The PCAST Report concludes that such measures are not foundationally valid (similarly, it appears, to its conclusions about firearms identification). According to two of the most respected, renowned DNA experts in the world, the PCAST Report is wrong on those points.

With respect to CPI, Dr. Budowle explains that the issue with CPI was in its *application* by forensic scientists and not because of the subjective nature of analysis, or any lack of scientific validity in the process. Exhibit 2, Budowle Statement, at 9. As a fix, Dr. Budowle states, PCAST proposed use of another statistic (Random Match Probability) that is based on principles of foundational validity that are "the same as those for the random match probability." *Id.* at 10. Dr. Budowle sums up the problem as follows: "it borders on the bizarre that the PCAST Committee

22 The government understands that this is not a DNA case. But the PCAST Report's utter failure to correctly assess DNA is important to understand. Dr. Budowle and Dr. Buckleton identify problems with the DNA analysis in the PCAST Report; those problems mirror the flaws in PCAST's attack on firearms identification.

failed to understand the foundations of DNA statistics." *Id.* PCAST even ignored a peer-reviewed article on the issue: Bieber, F.R., Buckleton, J. Budowle, B., Butler J., and Coble, M.D., *Evaluation of forensic DNA mixture evidence: protocol for evaluation, interpretation, and statistical calculations using the combined probability of inclusion*, BMC Genetics 17(1):125 (2015).

With respect to probabilistic genotyping, the PCAST Report was also flawed. As Dr. Buckleton puts it in his statement, PCAST's approach to that area of genetic identification excluded experts from the field, sought rushed information from experts with little notice, and then appeared to not take the proffered data into consideration. Exhibit 3, Buckleton Statement, at 1. Dr. Buckleton is generally critical of the PCAST committee's approach overall.

In sum, Dr. Budowle's and Dr. Buckleton's statements (along with other criticisms of the PCAST Report) correctly demonstrate that the PCAST Report unfairly evaluates forensic sciences based on unrealistic criteria that are not practical in the forensic science field, and that are not even common among other scientific disciplines. In effect, this is a "do as I say, not as I do" approach that should not be taken at face value by a court considering the issue of admissibility under *Daubert.*

3. The 2016 PCAST Report Analysis Is Flawed as to Firearms Identification.

The previous sections have focused on the PCAST Report's inconsistency with Rule 702/*Daubert*, and with the general methodological problems with the PCAST Report. There are several more specific problems with the Report that should be discussed.

Most notably, the PCAST Report seriously mischaracterizes the results of four of the nine validation studies used in its analysis of firearm and toolmark identification. *See* Organization

of Scientific Area Committees ("OSAC"), *Response to the PCAST Call for Additional References Regarding its Report "Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods,"* at 11 (December 14, 2016) (attached as Exhibit 13) (cataloguing the more significant errors and omissions in the PCAST Report).[23] The PCAST Report also ignores critical details in the remaining five of nine. Additionally, at least six other validation studies were completely ignored by PCAST. Exhibit 13, at 2.

As already discussed in connection with its DNA critique, the 2016 PCAST Report is highly critical of any research that is not considered a "black box" study. But there is quite a difference between identifying potential problems with "closed set" studies and discrediting the results entirely. While AFTE agrees that "black box" studies are valuable and should be utilized more going forward, AFTE correctly points out that this is not the sole standard by which good science is measured. Exhibit 13, at 1. PCAST's central argument is that "closed set" studies skew the error rate, because the correct answer is always present. *See* Exhibit 1, PCAST Report, at 106. The assumption is that examiners might deconstruct the test design—which PCAST likened to solving a "Sudoku" puzzle. Exhibit 13, OSAC Response, at 3.

But this analogy misrepresents the challenge posed by these tests. For example, three of the criticized validation studies used consecutively manufactured firearms, which have been shown to have the potential for subclass characteristics. *Id.* at 3-4. Though consecutively manufactured firearms are not likely to be encountered in actual casework, the authors used them in an attempt to create a worst-case scenario (*i.e.*, the potential best known non-matches). *Id.* at

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[23] Todd Weller was the primary author of the OSAC response. Exhibit 4, Weller Statement. AFTE submitted its own response to the PCAST Report on October 31, 2016, attached as Exhibit 14.

4. Additionally, each test used more questioned samples than knowns (15 questioned samples from 10 consecutively manufactured firearms). *Id.* at 4. Therefore, obtaining a perfect score was not as simple as figuring out a few of the correct answers and then deducing the rest. *Id.* Because consecutively manufactured samples were used, it was just as important to know if examiners could correctly identify samples as it was to know if samples were falsely identified. *Id.* These studies independently show a very low overall error rate,[24] and therefore provide evidence that firearm and toolmark examiners can reliably and accurately associate questioned toolmarks to the correct source tool.

Overall, the OSAC response reflects to a substantial degree the firearms identification community's response to the PCAST Report, provided substantial data that was ignored or disregarded in the PCAST Report, and at a minimum demonstrates that the PCAST Report cannot be the final word on the reliability or history of firearms and toolmark identification. The OSAC Report also correctly points out that to the extent that the PCAST Report did cite data, that data largely supported the reliability of firearms and toolmark analysis.

[24] *See* Exhibit 1, PCAST Report, at 111 (the estimated error rate in the four set-to-set/closed set studies was 1 in 5103).

4. Firearms Identification Experts Have Persuasively Pointed Out the Flaws of the PCAST Criticism of Firearms Identification Analysis.

Finally, the Court should consider the responses of the firearms identification community prior to the PCAST Report. The comments of firearms identification experts are significant because those writers and critics are actually trained and experienced in the field of firearms identification. Second, the comments are significant for the simple reason that the PCAST Report has failed to address them, either in the Report itself or in its later Addendum (see note 12).

Prior to the issuance of the report, the PCAST Committee solicited information and comments from scientists in the fields under study. In response to that request, OSAC, AFTE, and other groups provided PCAST with validation studies for firearms and toolmark identification.[25] More than 400 articles and studies were provided to PCAST by those organizations. *See generally* Exhibit 4, Weller Statement, at 12. Despite being provided with that wealth of data and expertise, PCAST discussed only 9 articles at length – that is, 9 articles out of more than 400 – in its report. *Id.* Moreover, according to Todd Weller, PCAST actually made mistakes and omissions in its discussion of 4 of the 9 articles that it did elect to rely upon. Exhibit 4, Weller Statement, at 13; Exhibit 13, OSAC Response, at 11.

In his statement in the D.C. *Valdez* case, Weller discusses why OSAC concluded that PCAST had missed the mark on firearms and toolmark analysis:

> OSAC concluded that PCAST's preferred study design was too narrow, and other types of studies have value in assessing overall error. For example, PCAST failed to recognize that many of the validation studies used consecutively manufactured firearms. By

25 Those responses include: OSAC Firearms and Toolmark Subcommittee, "Response to the President's Council of Advisors on Science and Technology (PCAST)," December 23, 2015 (attached as Exhibit 15); AFTE, "The Association of Firearm and Tool Mark Examiners (AFTE), December 23, 2015 Response to Seven Questions Related to Forensic Science Posed on November 30, 2015 by the President's Council of Advisors on Science and Technology (PCAST)," December 23, 2015 (attached as Exhibit 16).

> doing so, the firearms and toolmark profession were attempting to create error-rate tests with worst-case scenario samples. Despite these challenging samples, test takers reported few false identifications. Additionally, PCAST preferred the Baldwin et al. study test design where examiners only compared and reported on one questioned item at a time. While this test design has utility (it allows for precise and easy error rate calculations), it does not mimic casework where examiners are tasked with inter-comparing numerous items all at once. It was OSAC's view that when taken as a whole, each validation study provides independent data points that show a low overall error rate.

Exhibit 4, Weller Statement, at 13.

OSAC hoped that PCAST would recognize the flaw in its narrowly crafted criteria and consider all the research that had been overlooked. *Id.* In other words, the OSAC advocated for the type of holistic approach discussed *supra* by Dr. Budowle rather than the narrow approach of focusing only one form of validation. As the government has already argued herein, such a holistic approach would also have been more helpful to a court assessing these issues under *Daubert*.

The conclusion of the OSAC 2016 response sums up the problems with the PCAST Report as follows:

> The Firearms and Toolmarks Subcommittee of OSAC fundamentally disagrees with the conclusions regarding the firearm and toolmark identification discipline presented in the PCAST report. Four major points have been put forth in this response. First, we disagree with the premise that a structured black-box study is the only useful way to gain insight into both the foundations of firearm and toolmark identification and examiner error rates. Taken collectively, the published studies support the underlying principles of firearm and toolmark examination and the fact that examiner error rates are quite low. PCAST's critique of these studies included several misunderstandings. Second, PCAST's dismissal of methods employing a subjective component discounts the core scientific methods that have been used for hundreds of years. Third, PCAST misunderstands and misquotes the AFTE Theory of Identification. PCAST's summary of the AFTE Theory of Identification leaves out important provisions. Fourth, PCAST minimizes the value of training and experience. The training received by firearm examiners includes

> both subjective and objective components and is comparable to the domain-specific rigor of other applied scientific fields.

Exhibit 13, OSAC Response at 10; *see also* Exhibit 4, Weller Statement at 13.

D. Regardless of Whether Firearm Identification is Considered a "Science," it is Admissible as "Technical" or "Specialized" Evidence

In the end, the issue here is not whether PCAST's scientists approve of firearms identification testimony, but whether the discipline is reliable and helpful to a jury and therefore admissible under Fed. R. Evid. 702. Rule 702 is not limited to admissibility of scientific evidence alone, but also governs "technical" or "specialized" evidence which, by necessity, does not meet the rigors of scientific analysis. *See United States v. Willock*, 696 F. Supp. 2d 536, 569 (D. Md. 2010) (Grimm, U.S.M.J.). In fact, Rule 702 permits the introduction of technical or specialized evidence if it is given by qualified witnesses, based on sufficient facts, and produced through reliable methods that have been applied reliably to the facts of the case, so long as it is "helpful" to the jury's understanding of the case or will assist the jurors in making their factual determinations. *Id.* Hence, the identification at issue and the testimony of the government's experts should be admissible, if only as technical or specialized evidence—based on the rigorous and reliable methodology described above.

Recently, in an unpublished oral ruling, Judge Grimm admitted firearms examination testimony with greater limitations than in *Willock*. *See United States v. Jovon Medley*, Criminal No. PWG-17-242 (D. Md. Apr. 24, 2018) (Exhibit 7). Relying heavily on the 2016 PCAST Report, Judge Grimm ruled:

> I believe that it would be appropriate for [firearms expert] McVeigh to be able to express an opinion that the marks that were produced by the – that were found on the crime scene cartridges are consistent with the marks that were found on the test fire from the .45 known to be associated with the defendant, but I will not permit

> him to express the opinion that they were fired by the same gun, and I will not permit him to express any confidence level as to it.

Exhibit 7, at 54. In sum, the examiner was allowed to identify the consistent marks, but was deprived of the opportunity to state his ultimate opinion, which is that the cartridge cases came from the same gun.

With due respect to the Court in *Medley*, the government urges this Court to allow the firearms examiners to state an actual opinion regarding whether the firearms specimens they examined were fired from the same known or unknown gun. There are several reasons why the Court should allow the examiners to state their opinions in full. First, Rule 702 and *Daubert* are focused on admitting expert opinion testimony that is helpful to a jury. Limiting a firearms examiner to a mere identification or description of matching marks, and/or a mere suggestion that marks are "consistent," renders such testimony far less helpful, and almost renders it not an "opinion" at all. None of the existing case law supports the kind of restrictions imposed in *Medley*. If firearms examination is an accepted, admissible area of opinion testimony under *Daubert* – and every court to rule on the issue says that it is – than a firearms examiner should actually be allowed to state an opinion.

Second, forcing Mr. Wagster and Mr. Lamont to limit their testimony to merely a statement that the firearms specimens are "consistent" may leave the jury with the incorrect impression that the examiner was *unable* or *unwilling* to make an identification. They will assume that if the government had better evidence or more definitive expert testimony, then the government would have presented that testimony. They will be wondering whether the examiners thought the gun fired the shots, and when they do not hear that, they will wonder why.

Third, the government believes that *Medley* places too much reliance on the

aforementioned PCAST Report. Judge Grimm was not presented with the research discussed herein addressing the many flaws in PCAST's methodology and conclusions. The government respectfully submits, for the reasons discussed earlier, that the PCAST Report is simply not a helpful or reliable study for evaluating this area of forensic science.

Fourth, *Medley* suggests that the jury may conduct its own evaluation of the cartridge case photos, see Exhibit 7, at 52–53 (analogizing to a jury's ability to make its own authentication determinations under Fed. R. Evid. 901(b)(3)), but that approach, without the benefit of an examiner's opinion, runs the risk of leaving the jury with an incomplete understanding (or little understanding at all) of the evidence. The government has no quarrel with the jury being allowed to see the evidence and photographs, and to make its own evaluation (or with counsel for the parties arguing competing inferences to the jury). But a trained firearms examiner is not merely rendering an opinion based on a layman's review of photographs. First, unlike a lay jury making an evaluation under Fed. R. Evid. 901, a firearms examiner makes an evaluation based on training and experience and a career of examining firearms specimens through a comparison microscope.

The importance of the comparison microscopy cannot be overemphasized. Examiners Wagster and Lamont looked at the specimens through a powerful microscope that, in conjunction with their experience, greatly enhanced their ability to compare the items. The comparison microscope allows the examiner to observe the three-dimensionality of the marks on the items (including grooves, lands, indentations, scratches, etc) in a way that photographs cannot. Photographs are important and helpful as documentation. But there is no substitute for a comparison done by a trained, experienced human eye looking at items through an actual

microscopic lens. The jury should have the benefit of an opinion aided by that experience.[26]

Fifth, there are better ways to address whatever imperfections may exist in the firearms identification field. That includes the subjectivity in the field, about which Judge Grimm expressed concerns in the *Medley* opinion (consistently with the criticisms stated in the PCAST Report). *Id.* at 52. For example, the defense is entitled to answer government testimony through cross-examination and by considering using their own expert. But to force a government witness to follow a constricted script, the Court would be imposing too much of the wrong cure for whatever imperfections may exist in the firearms identification field. This is a case in which we have two highly qualified expert witnesses, with years of experience, in thousands of cases, who conducted their analyses using specialized machinery. They should be allowed to state their opinions. The defense has numerous responsive options: they may retain their own expert witness to examine the firearms evidence; they may show Mr. Wagster's and Mr. Lamont's reports and photos to that witness; or they may use such an expert witness to craft an effective cross-examination of the government's experts, using their reports, photos, etc.

To further address those issues, while also preserving the integrity and helpfulness of the firearms identification opinion, the government urges this Court to take a different approach than in *Medley*, an approach that will allow the examiner to give an honest, helpful, complete opinion, in a way that will not be misleading and will not be unfairly prejudicial to the defense:

- The examiners should be allowed to describe the methods and steps they took

[26] The government would suggest that if the Court were interested, arrangements could be made for the Court to view the specimens in this case through the comparison microscope actually used by examiners Wagster and Lamont. At a minimum, such an experience would help the Court see the advantages of comparison microscopy.

in conducting their analysis.

- The examiners should be allowed to describe what they saw when they looked at the cartridge casings through the comparison microscope, including their observations of agreement (or disagreement) in the marks on ammunition components, whether it be from firing pin impressions, breech face impressions, or land impressions.
- The examiners should be allowed to state their opinions (as described in more detail above and in their reports) that the firearms specimens at issue were fired from the same known or unknown firearm.
- The government will not elicit *any* characterization of the expert's certainty level, whether it be 100% certainty, 95% certainty, a "reasonable degree" of certainty, "scientific certainty"; or certainty that "every other firearm in the world" can be excluded or that it is a "practical impossibility" that a different gun fired the ammunition components. A similar limitation was imposed in *Willock,* 696 F. Supp.2d at 549.
- The government opposes a requirement that the experts affirmatively place an upper bound on their certainty level. However, if the Court is inclined to impose such a requirement, the government urges the Court to follow the approach taken by this Court in *United States v. Montana Barronette, et al.*, Criminal No. CCB-16-0597, and by Chief Judge James K. Bredar in *United States v. Gerald Johnson, et al.*, Criminal No. JKB-16-0363, and require the experts to testify "**to a reasonable degree of certainty**" in the field of

firearms and toolmark identification.

- The defendants will be able to cross-examine the experts, if they wish, by asking them about the element of subjectivity or about error rates.
- The government has proposed a standard jury instruction about expert opinion testimony, which explains: "You may give the expert testimony whatever weight, if any, you find it deserves in light of all the evidence in this case. You should not, however, accept this witness's testimony merely because he or she is an expert. Nor should you substitute it for your own reason, judgment, and common sense."

These measures, combined with the defense's ability to cross-examine or present contradicting evidence, will ensure that the jury received a helpful, properly restrained, properly challenged expert opinion, that will satisfy the requirements of *Daubert*.

II. THE GOVERNMENT HAS COMPLIED WITH ITS OBLIGATIONS UNDER RULE 16 AND PROVIDED SUFFICIENT EXPLANATION FOR THE BASIS OF THE FIREARMS EXAMINERS' OPINIONS.

The government is confident that it has complied with its discovery obligations under Rule 16 and has provided sufficient explanation for the basis of the examiners' opinions. Specifically, the government has provided Mr. Wagster's and Mr. Lamont's reports, worksheets, photographs, and other materials, totaling over 125 pages of discovery. In fact, the government submitted formal discovery requests to the BPD laboratory and produced the complete files on the comparisons in question. The government has also provided contact information for the laboratory's legal affairs department to enable the defendants to obtain the laboratory's protocols regarding quality assurance and proficiency testing if they wish to do so. Most importantly, the

government has made the specimens themselves—the firearms, cartridges, casings, and projectiles—available to the defense for inspection by their own experts.

CONCLUSION

For the foregoing reasons, the Government respectfully submits that this Court should deny the defendants' motion.

Respectfully submitted,

Robert K. Hur
United States Attorney

By: /s/
Christina A. Hoffman
Lauren E. Perry
Assistant United States Attorneys

36 South Charles Street
Fourth Floor
Baltimore, Maryland 21201
(b) (6)
(b) (6)

CERTIFICATE OF SERVICE

This is to certify that on March 11, 2019, I caused a copy of the foregoing document and accompanying exhibits to be served on all parties through CM/ECF.

/s/
Christina A. Hoffman
Assistant United States Attorney

Draft Fordham Forensics Articles - comments by January 18

From: "Antell, Kira M. (OLP)" <(b) (6)>
To: "Hafer, Zachary (USAMA)" <(b) (6)>, "Young, Cynthia (USAMA)" <(b) (6)>, "Goodhand, David (CRM)" <(b) (6)>, "Ibrahim, Anitha (CRM)" <(b) (6)>, (b)(6), (b)(7)(C), (b)(7)(E) per FBI (OGC) (FBI)" <(b)(6), (b)(7)(C), (b)(7)(E) per FBI>, "Hulser, Raymond (CRM)" <(b) (6)>, "Wroblewski, Jonathan (CRM)" <(b) (6)>, "Smith, David L. (USAEO)" <(b) (6)>
Cc: "Hunt, Ted (ODAG)" <(b) (6)>, "Isenberg, Alice R. (LD) (FBI)" <(b)(6), (b)(7)(C), (b)(7)(E) per FBI>, "Goldsmith, Andrew (ODAG)" <(b) (6)>, "Shapiro, Elizabeth (CIV)" <(b) (6)>
Date: Tue, 09 Jan 2018 14:30:06 -0500
Attachments: Hunt Article 01092018_DISTRIBUTED.docx (53.03 kB); ADG Article 01092018_DISTRIBUTED.docx (56.57 kB)

Good afternoon,

As you know, in October the Department presented at a forensics evidence symposium at Boston College. You all participated in preparing Department presenters and we appreciate your assistance. The transcript of the event will be published in an upcoming issue of the Fordham Law Review. Department speakers were invited to provide supplementary articles to the Fordham Law Review Online. Andrew Goldsmith, Ted Hunt, and Alice Isenberg have elected to submit articles.

I am circulating the draft articles by Andrew and Ted here for your review and suggestions before they are sent to Fordham. Dr. Isenberg's article about modern lab practice is being reviewed by FBI and FBI-OGC before ODAG approval.

(b)(5) per CIV (b)(5) per CIV No need to focus

Please review and provide your edits and suggestions in redline to me by 6:00 pm, Thursday, January 18. If it would be helpful, we could meet in person on this next week on Tuesday or Wednesday.

Thanks,
Kira

Kira Antell
Senior Counsel
Office of Legal Policy
U.S. Department of Justice
950 Pennsylvania Avenue, NW
Washington, DC 20530
(b) (6)
(b) (6)

RE: Draft Fordham Forensics Articles - comments by January 18

From: (b)(6), (b)(7)(C), (b)(7)(E) per FBI (OGC) (FBI)" <(b)(6), (b)(7)(C), (b)(7)(E) per FBI>
To: "Antell, Kira M. (OLP) (JMD)" <(b) (6)>, "Hafer, Zachary (USAMA)" <(b) (6)>, "Young, Cynthia (USAMA)" <(b) (6)>, "Goodhand, David (CRM)" <(b) (6)>, "Ibrahim, Anitha (CRM)" <(b) (6)>, "Hulser, Raymond (CRM)" <(b) (6)>, "Wroblewski, Jonathan (CRM)" <(b) (6)>, "Smith, David L. (USAEO)" <(b) (6)>
Cc: "Hunt, Ted (ODAG) (JMD)" <(b) (6)>, "Isenberg, Alice R. (LD) (FBI)" <(b)(6), (b)(7)(C), (b)(7)(E) per FBI>, "Goldsmith, Andrew (ODAG) (JMD)" <(b) (6)>, "Shapiro, Elizabeth (CIV)" <(b) (6)>
Date: Wed, 10 Jan 2018 16:42:10 -0500

Kira, Ted, Andrew: I think these are both very well written and my only small comment relates to Ted's article which I've left him in a vm.

(b)(6), (b)(7)(C), (b)(7)(E) per FBI
Chief, Forensic Science Law Unit
Office of the General Counsel
Federal Bureau of Investigation
Desk: (b)(6), (b)(7)(C), (b)(7)(E) per FBI
Cell: (b)(6), (b)(7)(C), (b)(7)(E) per FBI

From: Antell, Kira M. (OLP) [(b) (6)]
Sent: Tuesday, January 09, 201
To: Hafer, Zachary (USAMA) <(b) (6)>; Young, Cynthia (USAMA) <(b) (6)>; nd, David (CRM (b) (6)>; Ibrahim (b) (6)>; (b)(6), (b)(7)(C), (b)(7 (OGC) (FBI) <(b)(6), (b)(7)(C), (b)(7)(E) per FBI nd (CRM) <(b) (6), Jo an (CRM) <(b) (6) David L. (USAEO) <(b) (6)
Cc: Hun (b) (6)>; Isenberg, Alice R (b)(6), (b)(7)(C), (b)(7)(E) per FBI>; Goldsmith, Andrew (ODAG) (JMD) <(b) (6)>; Shapiro, Elizabeth (CIV) <(b) (6)>
Subject: Draft Fordham by January 18

President Donald J. Trump Announces Intent to Nominate and Appoint Individuals to Key Administration Posts

From: White House Press Office <info@mail.whitehouse.gov>
To: (b)(6) Patrick Hovakimian
Date: Mon, 20 Apr 2020 15:36:47 -0400

Office of the Press Secretary

FOR IMMEDIATE RELEASE
April 20, 2020

President Donald J. Trump Announces Intent to Nominate and Appoint Individuals to Key Administration Posts

Today, President Donald J. Trump announced his intent to nominate the following individuals to key positions in his Administration:

Julie D. Fisher, of Tennessee, to be Ambassador Extraordinary and Plenipotentiary of the United States of America to the Republic of Belarus.

Julie Fisher, a career member of the Senior Foreign Service, class of Counselor, currently serves as Deputy Assistant Secretary for Western Europe and the European Union in the State Department's Bureau of European and Eurasian Affairs. She also served on special assignment as Chargé d'Affaires a.i. of the U.S. Embassy in Russia.

Previously, Ms. Fisher was the Deputy Chief of Mission of the U.S. Mission to NATO; the Chief of Staff to the State Department's Deputy Secretary for Management and Resources; and the Director of the State Department Operations Center.

Earlier assignments include service as Deputy Director of the Private Office of the Secretary General of NATO and, before that, as Counselor for Political and Economic Affairs at the U.S. Embassy in Tbilisi, Georgia.

Ms. Fisher earned her B.A. from the University of North Carolina at Chapel Hill and an M.P.P. from Princeton University. She speaks Russian, French, and Georgian.

Erik Paul Bethel, of Florida, to be Ambassador Extraordinary and Plenipotentiary of the United

States of America to the Republic of Panama.

Mr. Bethel recently completed his term as United States Alternate Executive Director of the World Bank. In that role, Mr. Bethel spearheaded a number of initiatives, including streamlining World Bank operations and promoting new technologies such as machine learning, artificial intelligence, and blockchain.

A financial professional with more than 25 years of private equity and investment banking experience in Latin America and Asia, Mr. Bethel is a recognized expert on Chinese investment and financial activities in the Latin American region. He began his career in New York covering Brazil, Colombia, and Mexico. Subsequently he moved to Mexico City as an investment banker and later to Shanghai, China as a private equity professional. He has served on the Board of Governors of Opportunity International, a non-profit organization that provides financial services to people living in poverty in developing countries.

Mr. Bethel is a graduate of the U.S. Naval Academy, where he was an Olmsted Scholar, a Cox Fund Scholar, and a Battalion Commander. He earned an MBA from The Wharton School of the University of Pennsylvania, where he was a Milken Scholar. He speaks Spanish, Portuguese, and Mandarin.

Joel Szabat, of Maryland, to be Under Secretary of Transportation for Policy.

Joel Szabat is currently the Assistant Secretary of Transportation for Aviation and International Affairs. The Senate confirmed him by voice vote in January 2019, and he has been performing the duties of the Under Secretary of Transportation for Policy since June 2019. Previously, Mr. Szabat served as the Executive Director of the Maritime Administration.

Since first joining the Department of Transportation in 2002, Mr. Szabat has served as Deputy Assistant Secretary for Management and Budget; for Policy; and for Aviation and International Affairs. In 2009, Mr. Szabat was the department's designated Federal official overseeing $48 billion of ARRA transportation infrastructure investments. From 2006–2007, Mr. Szabat briefly left the Department of Transportation to be the Chief of Staff of the Small Business Administration. In 2005, he led United States Government efforts to rebuild airports, ports, and railroads in Iraq.

Mr. Szabat began his career as a cavalry officer in the U.S. Army, commanding tank units patrolling the East-West German border during the Cold War. He earned his B.A. from Georgetown University and his M.B.A. from Harvard Business School.

Today, President Donald J. Trump announced his intent to appoint the following individuals to key positions in his Administration:

Tony E. Sayegh Jr., of New York, to be a Member of the President’s Advisory Committee on the Arts of the John F. Kennedy Center for the Performing Arts.

Abraham Loeb, of Massachusetts, to be a Member of the President's Council of Advisors on Science and Technology.

Daniela Rus, of Massachusetts, to be a Member of the President's Council of Advisors on Science and Technology.

Aaron Dominguez, of Maryland, to be a Member of the National Science Board for a six-year term.

Dario Gil, of New York, to be a Member of the National Science Board for a six-year term.

Sudarsanam Babu, of Tennessee, to be a Member of the National Science Board for a six-year term.

Roger Beachy, of Maryland, to be a Member of the National Science Board for a six-year term.

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FW: PCAST UPDATE

From: "Crowell, James (ODAG)" <(b) (6)>
To: "Hunt, Ted (ODAG)" <(b) (6)>
Cc: "Terwilliger, Zachary (ODAG)" <(b) (6)>
Date: Thu, 26 Oct 2017 11:18:13 -0400

Ted: Was this run through you? Do you have visibility on this down in CRM? EOUSA?

From: Crowell, James (USAMD) [(b) (6)]
Sent: Thursday, October 26, 2017
To: Crowell, James (ODAG) <(b) (6)>
Subject: FW: PCAST UPDATE

From: Smith, David L. (USAEO)
Sent: Wednesday, October 18, 2017 5:25 PM
To: USAEO-CrimChiefs <USAEO-CrimChiefs@usa.doj.gov>
Cc: Goodhand, David (CRM) <(b)(6); (b)(7)(C) per CRM>; Hunt, Ted (ODAG) (JMD) <(b) (6)>; Antell, Kira M. (OLP) (JMD) <(b) (6)>
Subject: PCAST UPDATE

TO: ALL CRIMINAL CHIEFS

Please see the below PCAST update and reminder.

UPDATE ON THE PCAST REPORT

In September 2016, the President's Council of Advisors on Science and Technology (PCAST) released a report entitled:
Feature-Comparison Methods (b) (5)

artment distributed a fact sheet and talking points to the U.S. Attorney community and publicly declined to accept the report's recommendations stating that "the Department believes that the current legal standards regarding the admissibility of forensic evidence are based on sound science and sound legal reasoning."

The Department's position on PCAST has not changed (b) (5)

Please be reminded that the Department has a coordinated response ST. se contact David Goodhand at the Criminal Division by phone at (b)(6) per EOUSA or via email at (b)(6); (b)(7)(C) per CRM if you receive any PCAST-rel ons.

See the earlier memo at this link. https://usanetsp.usa.doj.gov/memos/Lists/Memo/DispForm.aspx?ID=877&Source=https%3A%2F%2Fusanetsp%2Eusa%2Edoj%2Egov%2Fmemos%2FPages%2F2016%2Easpx&ContentTypeId=0x0100FCFF883D0BBFF446839261FFAC2CBF8B

Thank you

David L. Smith
Counsel for Legal Initiatives

EOUSA
(b)(6) per EOUSA

Re: PCAST UPDATE

From: "Hunt, Ted (ODAG)" <(b) (6) >
To: "Crowell, James (ODAG)" <(b) (6) >
Cc: "Terwilliger, Zachary (ODAG)" <(b) (6) >
Date: Thu, 26 Oct 2017 11:29:15 -0400

Jim,

Yes, this had apparently been sent out once before I arrived, but I was advised by OLP that in light of recent Daubert motions citing PCAST that a reminder might be in order. I did see this, and have good coordination on this issue with both CRM and EOUSA.

Ted

On Oct 26, 2017, at 11:18 AM, Crowell, James (ODAG) < b) (6) > wrote:

RE: Forensics Symposium in Fordham Law Review

From: "Antell, Kira M. (OLP)" <(b) (6)>
To: "Goldsmith, Andrew (ODAG)" <(b) (6)>, "Hunt, Ted (ODAG)" <(b) (6)>, "Hafer, Zachary (USAMA)" <(b) (6)>, "Isenberg, Alice R. (LD) (FBI)" <(b)(7)(E) per FBI>
Cc: "Shapiro, Elizabeth (CIV)" <(b) (6)>, "Young, Cynthia (USAMA)" <(b) (6)>, "Hur, Robert (ODAG)" <(b) (6)>, "Smith, David L. (USAEO)" <(b) (6)>
Date: Thu, 15 Mar 2018 13:52:49 -0400
Attachments: Isenberg-_Oien_DOJ-39.pdf (48.06 kB); Hunt_DOJ-24.pdf (82.66 kB); Goldsmith_DOJ-16.pdf (45.85 kB)

Good afternoon,

The Department's symposium articles are now available online here: http://fordhamlawreview.org/online/. I have also attached them here.

Thanks very much,
Kira

From: Antell, Kira M. (OLP)
Sent: Thursday, March 1, 2018 12
To: Goldsmith, Andrew (ODAG) <(b) (6)>; Hunt, Ted (ODAG) <(b) (6)>; Hafer, Zachary (USAMA) <(b) (6)>; g, Alice R. (LD) (FBI) <(b)(7)(E) per FBI>
Cc: Shapiro, Elizabe (b) (6)>; Young, Cynthia (US (b) (6)>; Hur, Robert (ODAG) <(b) (6)>; Smith, David L. (USAEO) <(b) (6)>
Subject: Forensic dham Law Review

Good afternoon,

The Advisory Committee on Evidence forensics symposium issue of the Fordham Law Review is now available online: http://fordhamlawreview.org/law-review/current-issue/. This issue includes the event transcript and several articles.

As you know, the Department's articles will be published in the companion online version. Those articles will be posted in the next two weeks – around the same time the hard copy of the symposium issue is mailed. I will share a link when it is available. Please let me know if you have any questions.

Thanks,
Kira

Kira Antell
Senior Counsel
Office of Legal Policy
U.S. Department of Justice
950 Pennsylvania Avenue, NW
Washington, DC 20530
(b) (6)
(b) (6)

SCIENTIFIC EXCELLENCE IN THE FORENSIC SCIENCE COMMUNITY

Alice R. Isenberg & Cary T. Oien***

INTRODUCTION

The practice of forensic science has existed for centuries. Each year, hundreds of thousands of cases are closed, suspects cleared, and offenders convicted through routine, accurate, and reliable forensic testing. Forensic testing includes chemical analysis to determine the nature of seized drugs; examinations performed on physical materials such as fibers, glass, and spent bullet casings; and examination of biological materials such as DNA.[1] Tests performed for each of these examinations, regardless of the materials examined, are strictly prescribed by laboratory policies, supported by peer-reviewed research, and lead to accurate and reliable results.[2]

A casual reader of recent media reports might be led to believe that forensic science lacks any scientific credibility.[3] However, this narrative is completely inaccurate and at odds with the scientific excellence that exists throughout the forensic science community. Forensic disciplines are grounded in diverse sciences such as chemistry, biology, and physics, and every forensic discipline practiced in an accredited forensic laboratory must demonstrate that it is reliable, accurate, and fit for its intended use.

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* Deputy Assistant Director, Laboratory Division, Federal Bureau of Investigation.

** Senior Forensic Scientist, Laboratory Division, Federal Bureau of Investigation. The authors would like to thank the Federal Bureau of Investigation Office of General Counsel and the U.S. Department of Justice for their thoughtful reviews of this paper. This is publication 18-08 of the Federal Bureau of Investigation Laboratory. Names of commercial products are provided for identification purposes only, and inclusion does not imply endorsement by the Federal Bureau of Investigation. The views expressed are those of the authors and do not necessarily reflect the official policy or position of the Federal Bureau of Investigation or the U.S. Government.

This Article was prepared as a companion to the *Fordham Law Review* Reed Symposium on Forensic Expert Testimony, *Daubert*, and Rule 702, held on October 27, 2017, at Boston College School of Law. The Symposium took place under the sponsorship of the Judicial Conference Advisory Committee on Evidence Rules. For an overview of the Symposium, see Daniel J. Capra, *Foreword: Symposium on Forensic Testimony*, Daubert, *and Rule 702*, 86 FORDHAM L. REV. 1459 (2018).

1. *See Laboratory Services*, FBI, https://www.fbi.gov/services/laboratory [https://perma.cc/6NQP-7YQ7] (last visited Feb. 26, 2018).
2. *Id.*
3. *See* Eric S. Lander, *Fix the Flaws in Forensic Science*, N.Y. TIMES (Apr. 21, 2015), https://www.nytimes.com/2015/04/21/opinion/fix-the-flaws-in-forensic-science.html [https://perma.cc/5FV8-BE4M].

I. ACCREDITATION AND ITS REQUIREMENTS

Accreditation and quality assurance systems assure the public that accredited organizations are competent and their results can be relied upon.[4] Many groups—such as the National Commission on Forensic Science,[5] the National Academy of Sciences,[6] the President's Council of Advisors on Science and Technology (PCAST),[7] and the Department of Justice (DOJ)—recognize that accreditation is critically important. In fact, in December 2015, the Attorney General directed that all DOJ forensic laboratories must obtain or maintain accreditation.[8]

Accreditation is an external assessment of a laboratory's technical competence to perform specific types of testing.[9] Accreditation demonstrates that a laboratory is performing its work correctly and consistent with appropriate standards.[10] To maintain this recognition, a laboratory is periodically reevaluated to ensure its ongoing compliance with accreditation requirements.[11] Laboratory accreditation is internationally regarded as a reliable indicator of technical competence, and it provides credibility and public confidence in laboratory operations.[12] An accredited laboratory's quality assurance system must include written standard operating procedures, proficiency testing, training programs, processes for technical review of reports, testimony monitoring, and many other requirements.[13]

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4. *See Forensic Accreditation*, ANSI-ASQ NAT'L ACCREDITATION BD., https://www.anab.org/forensic-accreditation [https://perma.cc/E4WG-DHYC] (last visited Feb. 26, 2018).

5. *See* NAT'L COMM'N ON FORENSIC SCI., RECOMMENDATION ON UNIVERSAL ACCREDITATION (2015), https://www.justice.gov/archives/ncfs/file/477851/download [https://perma.cc/24BX-93RG].

6. *See* NAT'L RESEARCH COUNCIL, NAT'L ACADS., STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD 6 (2009), https://www.ncjrs.gov/pdffiles1/nij/grants/228091.pdf [https://perma.cc/9Q84-RC6S].

7. *See* President's Council of Advisors on Sci. & Tech., *An Addendum to the PCAST Report on Forensic Science in Criminal Courts*, WHITE HOUSE 4 (Jan. 6, 2017), https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_forensics_addendum_finalv2.pdf [https://perma.cc/8A4D-57HX] ("Forensic scientists cite the role of professional organizations, certification, accreditation, best practices manuals, and training within their disciplines. PCAST recognizes that such practices play a critical role in any professional discipline.").

8. Press Release, U.S Dep't of Justice, Justice Department Announces New Accreditation Policies to Advance Forensic Science (Dec. 7, 2015), https://www.justice.gov/opa/pr/justice-department-announces-new-accreditation-policies-advance-forensic-science [https://perma.cc/YFK7-NEYL].

9. *Forensic Accreditation*, *supra* note 4.

10. *See id.*

11. *See Laboratory Services*, *supra* note 1.

12. *The Advantages of Being Accredited*, INT'L LAB. ACCREDITATION COOPERATION (2015), http://ilac.org/?ddownload=898 [https://perma.cc/X9X8-ZLPZ].

13. *See Laboratory Services*, *supra* note 1.

According to the Bureau of Justice Statistics, 88 percent of the 409 publicly-funded forensic crime labs in the United States are accredited.[14] Unaccredited labs are often very small—less than ten people—and offer services in a limited number of disciplines. In addition to forensic laboratories, laboratories performing other types of tests are accredited according to the same international standard.[15] This includes environmental labs checking for levels of lead in groundwater, chemistry labs preparing chemicals for consumer use, or food labs ensuring the safety of our food supply.[16]

The validation of test methods is also an accreditation requirement. Validation is the "confirmation, through the provision of objective evidence (3.8.3), that the requirements (3.6.4) for a specific intended use or application have been fulfilled."[17] Validation experiments are designed to determine whether a method yields correct results when the right answer—the ground truth—is known. These are empirical tests that are conducted prior to laboratory implementation of a method.

Validation experiments are fundamentally different than equipment checks, which simply ensure that a particular piece of equipment is operating within defined parameters.[18] Validation may test the limitations of a method by analyzing a wide range of factors that are relevant and appropriate to a given application.[19] When validation provides insight regarding the limitations of a method, these limitations should be shared in legal proceedings.[20] The focus of validation is to confirm, through objective data, that the requirements for a specific intended use are fulfilled.[21] In contrast, method verification is the confirmation that the laboratory can properly use the method prior to its implementation.[22] However, neither method validation nor verification can produce an error rate for an entire discipline or an individual examiner.

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14. ANDREW M. BURCH ET AL., U.S. DEP'T OF JUSTICE, PUBLICLY FUNDED FORENSIC CRIME LABORATORIES: QUALITY ASSURANCE PRACTICES, 2014, at 1 (2016), https://www.bjs.gov/ content/pub/pdf/pffclqap14.pdf [https://perma.cc/MYS4-L6JS].

15. *See ISO/IEC 17025:2017*, ISO, https://www.iso.org/obp/ui/#iso:std:iso-iec:17025:ed-3:v1:en [https://perma.cc/27J4-Y43U] (last visited Feb. 26, 2018). The International Organization for Standardization (ISO) is an independent, non-governmental international organization with a membership of 161 national standards bodies. *All About ISO*, ISO, https://www.iso.org/about-us.html [https://perma.cc/CP5P-BE7M] (last visited Feb. 26, 2018). The members develop voluntary, consensus-based market-relevant standards. *Id.* The ISO/IEC 17025:2017 standard focuses specifically on requirements for the competence, impartiality, and consistent operation of testing and calibration laboratories. *See ISO/IEC 17025:2017*, *supra*.

16. *Forensic Accreditation*, *supra* note 4.

17. *ISO 9000:2015*, ISO, https://www.iso.org/obp/ui/#iso:std:iso:9000:ed-4:v1:en [https://perma.cc/ZLW3-RG7L] (last visited Feb. 26, 2018).

18. *See Validation Information for Public DNA Laboratories*, NAT'L INST. JUST., https://www.nij.gov/topics/forensics/lab-operations/Pages/validation.aspx [https://perma.cc/74J5-Q97C] (last visited Feb. 26, 2018).

19. *See id.*

20. *See id.*

21. *See id.*

22. *ISO/IEC 17025:2017*, *supra* note 15.

Forensic examiners must complete extensive training to be qualified to perform casework in accredited laboratories.[23] Training programs can be one to two years, or longer, and require examiners to perform analyses on samples with a known correct answer.[24] The examiner must also demonstrate a thorough understanding of the science behind the method employed and an understanding of lab policies, procedures, legal rules, evidence handling, etc.[25] The examiner must undergo oral examinations, mock trials, and competency tests for which the correct answer is known.[26] In addition, all examiners must demonstrate competency to apply the processes accurately and reliably before they are assigned actual cases.[27] Once qualified to conduct casework in an accredited laboratory, every examiner undergoes continual competency monitoring through proficiency tests administered at least once per year.[28]

Testimony monitoring is also a requirement for accredited laboratories.[29] The Federal Bureau of Investigation (FBI) Laboratory requires that examiners request a transcript for each testimony provided.[30] FBI examiners also must follow approved standards for scientific testimony and reports,[31] which document the acceptable range of conclusions expressed in both laboratory reports and testimony.[32] The DOJ is developing similar documents called Uniform Language for Testimony and Reports,[33] as well as a testimony-monitoring framework, which will apply to all DOJ laboratories.[34] The purpose of these testimony-monitoring activities is to prevent examiner testimony from exceeding scientific limitations.[35]

Forensic science research plays a critical role in the culture of continuous improvement that is part of a rigorous quality assurance program. Such research seeks to develop new capabilities while providing enhancement and support for existing capabilities. For example, forensic science

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23. *See generally* AM. SOC'Y CRIME LAB. DIRS./LAB. ACCREDITATION BD., SUPPLEMENTAL REQUIREMENTS FOR THE ACCREDITATION OF FORENSIC SCIENCE TESTING LABORATORIES (2011), http://des.wa.gov/sites/default/files/public/documents/About/1063/RFP/Add7Item4ASCLD.pdf [https://perma.cc/45LX-4NZU].

24. *Id.* at 21.

25. *See id.* at 11–13.

26. *Id.*

27. *Id.*

28. *Id.* at 18.

29. U.S. GOV'T ACCOUNTABILITY OFFICE, CHEMISTRY AND TRACE EVIDENCE UNITS GENERALLY ADHERE TO QUALITY STANDARDS, BUT COULD REVIEW MORE EXAMINER TESTIMONIES (2017), https://www.gao.gov/assets/690/685507.pdf [https://perma.cc/RS9V-XHKV].

30. *Id.*

31. *See Forensic Science*, U.S. DEP'T JUST., https://www.justice.gov/archives/dag/forensic-science#prop [https://perma.cc/APD8-AZLW] (last visited Feb. 26, 2018) (denoting laboratory standards and reporting requirements).

32. *Id.*

33. *See id.*

34. Press Release, U.S Dep't of Justice, Justice Department Announces Plans to Advance Forensic Science (Aug. 7, 2017), https://www.justice.gov/opa/pr/justice-department-announces-plans-advance-forensic-science [https://perma.cc/56VJ-F39E].

35. *See id.*

research and development in the 1980s provided the groundwork for monumental progress in the development and advancement of DNA testing.[36] In addition, the FBI's studies on latent print examinations have provided tremendous insight into the reliability of latent fingerprint examination and the decision-making process of latent print examiners.[37] The FBI recognizes the importance of these studies and has begun similar studies in three pattern-comparison disciplines.

Accreditation, validation, research, training, and testimony monitoring are important activities for demonstrating the reliable practice of forensic science. Together, they help ensure the overarching goals of finding the right answer, correctly communicating that answer, and continuously improving our ability to deliver quality results.

II. VALIDATION STUDIES

Validation is the process used to determine whether or not a method or technique is fit for a given application. The PCAST Report ("Report") asserts that a forensic discipline must demonstrate "foundational validity" and "validity as applied" for a discipline to be scientifically valid and reliable.[38] However, the Report conflates two disparate topics in its discussion of "validity."

The authors claim that foundational validity requires the performance of multiple "black box" studies.[39] However, black-box studies are decision-analysis experiments performed across a broad range of practitioners, and do not validate a specific methodology.[40] The authors do not offer any scientific basis to support their assertions. At the same time, the authors encourage federal judges to "take into account the appropriate scientific criteria for assessing scientific validity" in their "gatekeeper" role.[41] The authors use their unique criteria in their effort to discredit numerous validation studies.[42] They argue that, because the research reviewed did not

36. *See* Peter Gill et al., *Forensic Application of DNA 'Fingerprints,'* 318 NATURE 577 (1985).

37. *See generally* R. Austin Hicklin et al., *Assessing the Clarity of Friction Ridge Impressions*, 226 FORENSIC SCI. INT'L 106 (2013); R. Austin Hicklin et al., *Latent Fingerprint Quality: A Survey of Examiners*, 61 J. FORENSIC IDENTIFICATION 385, 385–419 (2011); Bradford T. Ulery et al., *Changes in Latent Fingerprint Examiners' Markup Between Analysis and Comparison*, 247 FORENSIC SCI. INT'L 54 (2015); Bradford T. Ulery et al., *Measuring What Latent Fingerprint Examiners Consider Sufficient Information for Individualization Determinations*, 9 PLOS ONE 1 (2014); Bradford T. Ulery et al., *Repeatability and Reproducibility of Decisions by Latent Fingerprint Examiners*, 7 PLOS ONE 1 (2012); Bradford T. Ulery et al., *Understanding the Sufficiency of Information for Latent Fingerprint Value Determinations*, 230 FORENSIC SCI. INT'L 99 (2013).

38. PRESIDENT'S COUNCIL OF ADVISORS ON SCI. & TECH., EXEC. OFFICE OF THE PRESIDENT, FORENSIC SCIENCE IN CRIMINAL COURTS: ENSURING SCIENTIFIC VALIDITY OF FEATURE-COMPARISON METHODS 44–56 (2016) [hereinafter PCAST REPORT], https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_forensic_science_report_final.pdf [https://perma.cc/VJB4-5JVQ].

39. *Id.*

40. *See id.* at 65–66.

41. *Id.* at 41, 142.

42. *See generally id.*

fit the authors' validation paradigm, these scientific disciplines lack empirical evidence to support PCAST's approval as valid science.[43] This position ignores much peer-reviewed research, overlooks critical aspects of many studies, and fails to acknowledge the empirical value of these studies.

For example, in the firearms discipline, PCAST ignores a large number of studies based on their criticism of the test designs. Two studies were discarded because for using a "within-set comparison" design in which the samples were examined in a pair-wise approach.[44] The Report asserted that it was "impossible to estimate the false positive rate among conclusive examinations, which is the key measure for consideration" as the reason for rejecting these studies.[45] However, these same studies showed that of 1037 different-source comparisons performed, *no* false identifications or false eliminations were reported.[46] PCAST dismissed four additional studies based on the use of a "closed-set" experimental design because the source gun was always present.[47] PCAST opined that "the closed-set design is problematic in principle," and was therefore "not appropriate for assessing scientific validity."[48] In these studies, the researchers utilized particularly challenging samples that employed consecutively-manufactured firearms.[49] This represents the worst-case scenario for toolmarks that carry over from one machined part to the next. Despite these challenging samples, all of these studies showed that firearms examiners reliably and accurately associated the questioned toolmarks with the correct source.[50] In a final example, PCAST ignored another study due to the partly open-set design, in which some of the questioned samples did not have a matching known standard.[51] Each of these studies provide important insights into the

43. *See id.*

44. *Id.* at 107 & nn.319–20; *see also* Charles S. DeFrance & Michael D. Van Arsdale, *Validation Study of Electrochemical Rifling*, 35 ASS'N FIREARM & TOOLMARK EXAMINERS J. 1 (2003); Erich D. Smith, *Cartridge Case and Bullet Comparison Validation Study with Firearms Submitted in Casework*, 36 ASS'N FIREARM & TOOLMARK EXAMINERS J. 130 (2005).

45. PCAST REPORT, *supra* note 38, at 107.

46. *Id.* at 107 n.320.

47. *Id.* at 108–09 & nn.324–28; *see also* David J. Brundage, *The Identification of Consecutively Rifled Gun Barrels*, 30 ASS'N FIREARM & TOOLMARK EXAMINERS J. 438, 438–44 (1998); Thomas G. Fadul Jr. et al., *An Empirical Study to Improve the Scientific Foundation of Forensic Firearm and Tool Mark Identification Utilizing Ten Consecutively Manufactured Slides*, 45 ASS'N FIREARM & TOOLMARK EXAMINERS J. 376, 376–93 (2013); James E. Hamby et al., *The Identification of Bullets Fired from Ten Consecutively Rifled 9mm Ruger Pistol Barrels: A Research Project Involving 507 Participants from Twenty Countries*, 41 ASS'N FIREARM & TOOLMARK EXAMINERS J. 99, 99–100 (2009); Angela Stroman, *Empirically Determined Frequency of Error in Cartridge Case Examinations Using a Declared Double-Blind Format*, 46 ASS'N FIREARM & TOOLMARK EXAMINERS J. 157, 157–75 (2014).

48. PCAST REPORT, *supra* note 38, at 109.

49. *See supra* note 47 and accompanying text.

50. *See supra* notes 44–49 and accompanying text.

51. PCAST REPORT, *supra* note 38, at 108–09 & n.326; *see also* THOMAS G. FADUL JR. ET AL., MIAMI-DADE POLICE DEP'T CRIME LAB., AN EMPIRICAL STUDY TO IMPROVE THE SCIENTIFIC FOUNDATION OF FORENSIC FIREARM AND TOOL MARK IDENTIFICATION UTILIZING CONSECUTIVELY MANUFACTURED GLOCK EBIS BARRELS WITH THE SAME EBIS PATTERN (2013), www.ncjrs.gov/pdffiles1/nij/grants/244232.pdf [https://perma.cc/6UKW-6FYF].

science of firearms analysis and additional empirical support for the validity of the discipline.

III. ERROR RATE STUDIES SHOULD NOT BE MISTAKEN FOR VALIDATION

The Report claimed that "the foundational validity of subjective methods can be established *only* through empirical studies of examiner's performance . . . such studies are referred to as 'black-box' studies."[52] Black-box studies are a way to analyze the decisions made by a range of examiners under defined conditions.[53] However, black-box studies should not be mistaken as a way to establish the validity of a specific method or *the* error rate for an entire discipline. The entire body of research and testing relative to a particular forensic method provides support for its scientific validity—not simply the number of black-box studies performed.

Some forensic commentators conflate distinct issues when criticizing the reliability of forensic disciplines.[54] These issues concern whether: (1) a forensic discipline is scientifically valid and based upon sound scientific principles; (2) individual practitioners can identify the right answer when that answer is known (personal error rate); (3) different practitioners obtain the same answer when reviewing the same materials and data; and (4) there is a universal error rate for a specific discipline.[55] The Report focuses on the fourth issue,[56] which has nothing to do with the method validity, but rather the decisions made by examiners under a defined range of conditions. Furthermore, it is problematic when scientific validity is confused with the legal standard for admissibility. Unfortunately, the Report only exacerbates the confusion.

Regarding microscopic hair analysis, PCAST discussed a 2002 paper by Max M. Houck and Bruce Budowle.[57] The study found that in 11 percent of cases in which hairs were microscopically associated, DNA analysis revealed that the samples originated from different individuals.[58] Unfortunately, many misinterpret the results of this study to mean that microscopic hair comparison has an 11 percent error rate. PCAST correctly noted that these associations may not have been incorrect but, instead, were simply characteristics that were shared by chance.[59] Because microscopic hair comparison involves class-level associations, hair cannot be used as a

52. PCAST REPORT, *supra* note 38, at 49.
53. *Id.*
54. *See generally* KELLY PYREK, FORENSIC SCIENCE UNDER SIEGE: THE CHALLENGES OF FORENSIC LABORATORIES AND THE MEDICO-LEGAL INVESTIGATION SYSTEM (2007).
55. *See id.* at 241–43 (discussing the need to disclose errors, error rates, and sources of errors in forensic science experiments to maintain confidence in the scientific integrity of the results).
56. *See generally* PCAST REPORT, *supra* note 38.
57. *Id.* at 28 & n.33; *see also* Max M. Houck & Bruce Budowle, *Correlation of Microscopic and Mitochondrial DNA Hair Comparisons*, 47 J. FORENSIC SCIS. 1, 1–4 (2002).
58. PCAST REPORT, *supra* note 38, at 28.
59. *Id.*

unique identifier.[60] One key point of the Houck and Budowle study that PCAST did not discuss was the combined power of discrimination by the joint use of microscopic and mitochondrial DNA analysis.[61] Instead, the Report characterized the false positive rate for microscopic hair comparison in the study as applicable to the technique in general.[62]

CONCLUSION

Science continuously evolves and is built upon observation, study, and experience that spans hundreds of years. The justice system would not be well served by the exclusion of reliable forensic methods and techniques that provide valuable information to a wide range of stakeholders. Critical reviews of past and current practices assist in the continual process of evaluation and improvement. However, they do not invalidate the entire body of past scientific research and achievement.[63]

60. Class-level evidence encompasses a group of objects or persons with characteristics that are shared by the group. The characteristics are not unique to a particular object or person but serve to place the evidence into a smaller group of objects.

61. Houck & Budowle, *supra* note 57, at 2–4. *See generally* PCAST REPORT, *supra* note 38.

62. *See generally* PCAST REPORT, *supra* note 38.

63. *See* ERNST MAYR, THE GROWTH OF BIOLOGICAL THOUGHT: DIVERSITY, EVOLUTION, AND INHERITANCE 831 (1982) ("All interpretations made by a scientist are hypotheses, and all hypotheses are tentative. They must forever be tested and they must be revised if found to be unsatisfactory. Hence, a change of mind in a scientist, and particularly in a great scientist, is not only not a sign of weakness but rather evidence for continuing attention to the respective problem and an ability to test the hypothesis again and again.").

SCIENTIFIC VALIDITY AND ERROR RATES: A SHORT RESPONSE TO THE PCAST REPORT

*Ted Robert Hunt**

INTRODUCTION

In *Daubert v. Merrell Dow Pharmaceuticals*,[1] the U.S. Supreme Court set the standard for admitting scientific evidence in federal court. The Court ruled that testimony concerning scientific evidence must be founded, in part, on scientific knowledge supported by "appropriate validation—i.e. 'good grounds,' based on what is known."[2] It also instructed that "in a case involving scientific evidence, *evidentiary reliability* will be based upon *scientific validity*."[3] The task of determining scientific validity, and therefore legal reliability, fell to trial judges.[4]

The Court offered some "general observations" about the types of things trial judges might take into account when assessing whether a theory or technique amounts to scientific knowledge.[5] These five observations are now widely known as the "*Daubert* factors."[6] Importantly, however, the Court declined to adopt a strict legal or scientific litmus test for establishing scientific validity. Instead, its general observations were framed by bookend admonitions that sought to dissuade the rigid application of those factors.[7] To that end, the Court stated: "we do not presume to set out a

* Senior Advisor on Forensic Science, U.S. Department of Justice. Prior to joining the U.S. Department of Justice, Mr. Hunt was Chief Trial Attorney at the Jackson County Prosecutor's Office in Kansas City, Missouri, where he served as a prosecuting attorney for over twenty-five years.

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1. Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579 (1993).
2. *Id.* at 590.
3. *Id.* at 591 n.9.
4. *Id.* at 589.
5. *Id.* at 593–94.
6. *See generally* Harvey Brown, *Eight Gates for Expert Witnesses*, 36 HOUSTON L. REV. 743 (1999); Harvey Brown & Melissa Davis, *Eight Gates for Expert Witnesses: Fifteen Years Later*, 52 HOUSTON L. REV. 1 (2014); John B. Meixner & Shari Seidman Diamond, *The Hidden* Daubert *Factor: How Judges Use Error Rates in Assessing Scientific Evidence*, 2014 WIS. L. REV. 1063 (2014).
7. *Daubert*, 509 U.S. at 593.

definitive checklist or test,"[8] as "[t]he inquiry envisioned by [Federal Rule of Evidence] 702 is, we emphasize, a flexible one."[9]

In September 2016, the President's Council of Advisors on Science and Technology (PCAST) released a report titled *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods* ("Report").[10] At that time, the Department of Justice (DOJ) issued a short statement in support of PCAST's efforts to advance the reliability of forensic science.[11] However, the DOJ also noted that PCAST had overstepped its role as a science and technology advisory council by making recommendations about the courtroom use of forensic science.[12] The DOJ stated, "[w]hile we appreciate [PCAST's] contribution to the field of scientific inquiry, the [DOJ] will not be adopting the recommendations related to the admissibility of forensic science evidence."[13]

Much of the Report describes PCAST's view of how it believes the scientific validity of forensic feature-comparison methods should be established. To develop its novel position on this issue, PCAST co-opted the term "scientific validity" from the *Daubert* decision and divided it into two parts: "foundational validity"[14] and "validity as applied."[15] PCAST then equated its new term, foundational validity, with *Daubert*'s term, scientific validity.[16] Next, PCAST described foundational validity as the scientific benchmark that corresponds to the legal requirement, in Rule 702,[17] that evidence must be based on "reliable principles and methods."[18]

After the Report's release, some advocates have urged that it be used to exclude or limit the use of forensic feature-comparison evidence in criminal cases.[19] Defense attorneys who have enlisted this strategy generally cite PCAST's conclusion that some forensic methods are not reliable or have

8. *Id.*
9. *Id.* at 594.
10. PRESIDENT'S COUNCIL OF ADVISORS ON SCI. & TECH., EXEC. OFFICE OF THE PRESIDENT, FORENSIC SCIENCE IN CRIMINAL COURTS: ENSURING SCIENTIFIC VALIDITY OF FEATURE-COMPARISON METHODS (2016), https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_forensic_science_report_final [https://perma.cc/VJB4-5JVQ] [hereinafter PCAST REPORT].
11. Gary Fields, *White House Advisory Council Is Critical of Forensics Used in Criminal Trials*, WALL ST. J. (Sept. 20, 2016, 4:25 PM), https://www.wsj.com/articles/white-house-advisory-council-releases-report-critical-of-forensics-used-in-criminal-trials-1474394743 [https://perma.cc/N9KM-NHJL].
12. *Id.*
13. *Id.*
14. PCAST REPORT, *supra* note 10, at 43.
15. *Id.*
16. *Id.* at 4–5, 43; *see* Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579, 590–91 n.9 (1993).
17. FED. R. EVID. 702.
18. PCAST REPORT, *supra* note 10, at 4–5, 43.
19. *See, e.g.*, Eric Alexander Vos, *Using the PCAST Report to Exclude, Limit, or Minimize Experts*, CRIM. JUST. (Am. Bar Ass'n, New York, N.Y.), Summer 2017, at 15, https://www.americanbar.org/content/dam/aba/publications/criminal_justice_magazine/v32/VOS.authcheckdam.pdf [https://perma.cc/6LSC-5R6C].

not been sufficiently validated.[20] The DOJ strongly disagrees with this position. It also disagrees with PCAST's novel and purportedly exclusive "litmus test" for determining scientific validity. The DOJ is firmly committed to only using valid and reliable forensic methods.

To date, the DOJ has largely responded to the Report through the filing of legal briefs in criminal cases. While overwhelmingly successful in litigation, these responses are not widely circulated.[21] To clarify the DOJ's position, this Article is a short response to the Report's discussion of scientific validity. The focus is on PCAST's use of the term foundational validity, its views on error rates, and the proposed application of these concepts to forensic feature-comparison methods. First, Part I explains the standards for scientific validation of forensic methods, including those set forth by PCAST, international organizations, and other countries. Then, Part II describes the problems with PCAST's view and demonstrates how it is inconsistent with mainstream and international scientific thought. Finally, this Article concludes that the Supreme Court's standard for the admission of scientific evidence, as outlined in *Daubert*, is appropriate in the context of forensic evidence.

I. STANDARDS FOR SCIENTIFIC VALIDATION

According to PCAST, foundational validity for a forensic feature-comparison method "requires that [the method] be shown, based on empirical studies, to be *repeatable*, *reproducible*, and *accurate*, at levels that have been measured and are appropriate to the intended application."[22] This statement is correct and consistent with mainstream scientific thought.[23] However, PCAST's discussion of validation does not end there. Instead, it takes the extraordinary step of purporting to impose a novel, non-severable, nine-part test that prescribes the *exclusive* experimental design and mandatory criteria for validating "subjective feature-comparison methods."[24] This claim puts PCAST at odds with mainstream scientific thought.

20. *See, e.g.*, United States v. Pitts, No. 16-CR-550, 2018 U.S. Dist. LEXIS 30589, at *9–11 (E.D.N.Y. Feb. 26, 2018) (fingerprints); United States v. Casaus, No. 14-cr-00136-CMA-09, 2017 U.S. Dist. LEXIS 212945, at *1–3 (D. Colo. Dec. 29, 2017) (fingerprints); United States v. North, No. 1:16-cr-309-WSD, 2017 U.S. Dist. LEXIS 190935, at *8 (N.D. Ga. Nov. 17, 2017) (gunshot residue); United States v. Bonds, No. 15 CR 573-2, 2017 U.S. Dist. LEXIS 166975, at *4–6 (N.D. Ill. Oct. 10, 2017) (fingerprints).

21. *See, e.g.*, *Casaus*, 2017 U.S. Dist. LEXIS 212945, at *3–5; *North*, 2017 U.S. Dist. LEXIS 190935, at *7–9; *Bonds*, 2017 U.S. Dist. LEXIS 166975, at *5–13.

22. PCAST REPORT, *supra* note 10, at 4–5.

23. *See infra* Part I.B–C.

24. PCAST REPORT, *supra* note 10, at 46.

A. PCAST's Novel Validation Litmus Test

PCAST describes experiments that meet *each* of the nine requirements as "appropriately designed studies."[25] Its litmus test for establishing foundational validity is as follows:

> Scientific validation studies—intended to assess the validity and reliability of a metrological method for a particular forensic feature-comparison application—must satisfy a number of criteria.
>
> (1) The studies must involve a sufficiently large number of examiners and must be based on sufficiently *large* collections of *known* and *representative* samples from *relevant* populations to reflect the range of features or combinations of features that will occur in the application. In particular, the sample collections should be:
>
> (a) representative of the quality of evidentiary samples seen in real cases. (For example, if a method is to be used on distorted, partial, latent fingerprints, one must determine the *random match probability*—that is, the probability that the match occurred by chance—for distorted, partial, latent fingerprints; the random match probability for full scanned fingerprints, or even very high quality latent prints would not be relevant.)
>
> (b) chosen from populations relevant to real cases. For example, for features in biological samples, the false positive rate should be determined for the overall US population and for major ethnic groups, as is done with DNA analysis.
>
> (c) large enough to provide appropriate estimates of the error rates.
>
> (2) The empirical studies should be conducted so that neither the examiner nor those with whom the examiner interacts have any information about the correct answer.
>
> (3) The study design and analysis framework should be specified in advance. In validation studies, it is inappropriate to modify the protocol afterwards based on the results.
>
> (4) The empirical studies should be conducted or overseen by individuals or organizations that have no stake in the outcome of the studies.
>
> (5) Data, software and results from validation studies should be available to allow other scientists to review the conclusions.
>
> (6) To ensure that conclusions are reproducible and robust, there should be multiple studies by separate groups reaching similar conclusions.[26]

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25. *Id.* at 9 ("As noted above, the foundational validity of a subjective method can only be established through multiple, *appropriately designed* black-box studies." (emphasis added)). PCAST claimed to have reviewed 2100 scientific studies and found only three studies to be "appropriately designed"—two latent print studies and one firearms and toolmarks study—according to its newly-minted criteria for establishing what it described as "foundational validity." *Id.* at 96, 111. For a list of PCAST references, see Office of Sci. & Tech. Pol'y, *PCAST Documents & Reports*, WHITE HOUSE: PRESIDENT BARACK OBAMA, https://obamawhitehouse.archives.gov/administration/eop/ostp/pcast/docsreports [https://perma.cc/BJF4-EZXY] (last visited Feb. 26, 2018).

26. PCAST REPORT, *supra* note 10, at 52–53.

To be clear, none of the listed criteria is novel or controversial. All are well-known aspects of good experimental design and sound scientific practice. Each can play an important role in the validation process. However, what *is* novel and controversial is PCAST's claim that a single experimental design and the non-severable use of these criteria is the *only* way to establish the scientific validity of "subjective" forensic feature-comparison methods.[27]

To that end, PCAST states: "the *sole* way to establish foundational validity is through multiple independent 'black-box' studies that measure how often examiners reach accurate conclusions across many feature-comparison problems involving samples representative of the intended use. In the absence of such studies, a feature-comparison method cannot be considered scientifically valid."[28] This position is out of step with mainstream scientific thought.

B. The International Scientific Standard for Scientific Validation

The International Organization for Standardization (ISO) is the preeminent body for developing and publishing consensus international standards. ISO is composed of 161 national standards bodies from countries across the world.[29] Subject matter experts from various fields develop these standards. An ISO International Standard represents "a global consensus on the state of the art in the subject of that standard."[30]

ISO/IEC 17025 is the standard that governs the general requirements for the competence of testing and calibration laboratories.[31] This standard guides the core scientific activities and management operations of labs engaged in a diverse range of activities.[32] These activities include clinical testing, research, and forensic science, among others.[33] Identical accreditation requirements apply to all labs, regardless of whether they test clinical samples, groundwater, or forensic evidence.[34]

ISO does not recognize or use PCAST's term, foundational validity, in any of its standards or definitions. Instead, the non-bifurcated term, validation, is used to describe the process of determining whether a method

27. *Id.* at 68.
28. *Id.* (emphasis added).
29. *See All About ISO*, ISO, https://www.iso.org/about-us.html [https://perma.cc/CP5P-BE7M] (last visited Feb. 26, 2018).
30. INT'L ORG. FOR STANDARDIZATION, GUIDANCE FOR ISO NATIONAL STANDARDS BODIES: ENGAGING STAKEHOLDERS AND BUILDING CONSENSUS 2 (2010), https://www.iso.org/files/live/sites/isoorg/files/archive/pdf/en/guidance_nsb.pdf [https://perma.cc/8NWL-JLAT].
31. *See ISO/IEC 17025:2017*, ISO, https://www.iso.org/obp/ui/#iso:std:iso-iec: 17025: ed-3:v1:en [https://perma.cc/C4V5-2RU4] (last visited Feb. 26, 2018).
32. *Id.* § 1.
33. *Id.*
34. *Id.*

is fit for its intended purpose.[35] For example, ISO generally defines validation as "confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled."[36] Likewise, in the context of ISO/IEC 17025, validation is defined as when "the specified requirements are adequate for an intended use."[37] Section 7.2.2 governs the validation of test methods.[38] It states that "validation shall be as extensive as is necessary to meet the needs of the given application or field of application."[39]

A separate note to section 7.2.2 provides a non-exclusive, non-prescriptive list of techniques that can be used—either alone or in combination with others—to validate a method.[40] These techniques include: the evaluation of bias and precision using reference standards or reference materials, systematic assessment of the factors influencing the result, evaluation of method robustness through variation of controlled parameters, comparison of results achieved with other validated methods, inter-laboratory comparisons, evaluation of measurement uncertainty based on theoretical principles of the method, and practical experience in performing the sampling or test method.[41]

In direct contrast to PCAST's validation litmus test, the ISO does not prescribe *how* labs must validate their methods, *which* criteria must be included, or *what* experimental design must be used. Instead, "[t]he performance characteristics of validated methods, as assessed for the intended use, shall be relevant to the customer's needs and consistent with specified requirements."[42] The selection of those specified requirements and experimental designs are the responsibility of each laboratory.[43]

C. The Holistic, Flexible Approach to Scientific Validation

The American Association for the Advancement of Science (AAAS) recently published a study on latent fingerprint examination.[44] The authors

35. *See id.* § 3.9; *ISO/IEC 9000:2015* § 3.8.13, ISO, https://www.iso.org/obp/ui/#iso:std:iso:9000:ed-4:v1:en [https://perma.cc/7E5R-MMDH] (last visited Feb. 26, 2018).
36. *ISO/IEC 9000:2015*, *supra* note 35, § 3.8.13.
37. *ISO/IEC 17025:2017*, *supra* note 31, § 3.9.
38. *Id.* § 7.2.2.
39. *Id.* § 7.2.2.1.
40. *Id.* § 7.2.2.1 n.2.
41. *Id.*
42. *Id.* § 7.2.2.3.
43. JOHN W. CRESWELL, RESEARCH DESIGN: QUALITATIVE, QUANTITATIVE, AND MIXED METHODS APPROACHES 21 (4th ed. 2014) ("In planning a research project, researchers need to identify whether they will employ a qualitative, quantitative, or mixed methods approach. This approach is based on bringing together a worldview or assumptions about research, a specific design, and research methods. Decisions about choice of an approach are further influenced by the research problem or issue being studied, the personal experiences of the researcher, and the audience for whom the researcher writes.").
44. *See* WILLIAM THOMPSON ET AL., FORENSIC SCIENCE ASSESSMENTS: A QUALITY AND GAP ANALYSIS (2017), https://mcmprodaaas.s3.amazonaws.com/s3fs-public/reports/Latent%20Fingerprint%20Report%20FINAL%209_14.pdf?i9xGS_EyMHnIPLG6INIUyZb66L5cLdlb [https://perma.cc/C9K2-T6QG].

disagreed with PCAST's premise that *only* those research papers "intentionally and appropriately designed" should be considered when assessing evidential support for method validation.[45] Instead, the AAAS used the concept of "convergent validity" to draw conclusions regarding scientific validity from the body of relevant literature as a whole.[46] This conceptual approach acknowledges that various studies will have different strengths and weaknesses.[47] It also recognizes that some studies can reinforce others and collectively support conclusions not warranted on the basis of a single study.[48]

Others share this same general point of view. For example, one group of experts has observed: "There is *no one best way* to study a phenomenon of interest. Each methodological choice involves trade-offs."[49] Trade-offs, in turn, require flexibility, and flexibility is required by the pull of competing interests, existing resources, and countless other operational considerations.[50] The international scientific community, through ISO/IEC 17025, acknowledges these realities by observing that "[v]alidation is always a balance between costs, risks and technical possibilities."[51] This balancing requires a realistic assessment of the object of inquiry, the nature of the analysis, and the specifications for a given application.

Many feature-comparison methods rely on human interpretation and judgment. In the United Kingdom, the Forensic Science Regulator publishes the Forensic Code of Practice and Conduct ("Code"), which states:

> The functional and performance requirements for interpretive methods are less prescriptive than for measurement-based methods. They concentrate on the competence requirements for the staff involved and how the staff shall demonstrate that they can provide consistent, reproducible, valid and

45. *Id.* at 44.
46. *Id.*
47. *Id.*
48. *Id.* at 94.
49. 1 DAVID L. FAIGMAN ET AL., MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY, STATISTICS & RESEARCH METHODS § 1:22 (2010) (emphasis added); *see also ISO/IEC 17025:2005* § 5.4.5.3. n.3, ISO, https://www.iso.org/obp/ui/#iso:std:iso-iec:17025:ed-2:v1:en [https://perma.cc/ER8Y-CRNY] (last visited Feb. 26, 2018) ("Validation is always a balance between costs, risks and technical possibilities. There are many cases in which the range and uncertainty of the values (e.g. accuracy, detection limit, selectivity, linearity, repeatability, reproducibility, robustness and cross-sensitivity) can only be given in a simplified way due to lack of information.").
50. GEOFFREY MARCZYK ET AL., ESSENTIALS OF RESEARCH DESIGN AND METHODOLOGY 137 (2005) ("The most obvious limitation of studies that employ a randomized experimental design is their logistical difficulty. Randomly assigning participants in certain settings (e.g., criminal justice, education) may often be unrealistic, either for logistical reasons or simply because it may be considered inappropriate in a particular setting. Although efforts have been made to extend randomized designs to more real-world settings, it is often not feasible. In such cases, the researcher often turns to quasi-experimental designs.").
51. *ISO/IEC 17025:2005*, *supra* note 49, § 5.4.5.3 n.3.

> reliable results that are compatible with the results of other competent staff.[52]

Similar to ISO, the Code provides a non-prescriptive, non-exclusive combination of measures that may be used to validate interpretive methods.[53] These include blind confirmation by a second examiner, inter-laboratory comparisons and proficiency tests, and the in-house use of competency tests.[54] The Code also states that an interpretive method "shall require only the relevant subset of . . . parameters and characteristics for measurement-based methods."[55]

Finally, an equally-flexible view of validating interpretive methods is shared by Australia's National Association of Testing Authorities (NATA). NATA recognizes that the validation of interpretive methods "is more challenging and less proscriptive than it is for analytical methods."[56] However, validity can be established "if the analyst or examiner repeatedly obtains correct results for positive and negative known tests."[57] In addition, NATA correctly concedes that certain validation parameters "are not relevant in subjective tests."[58]

Unlike PCAST, these scientific bodies do not require that multiple, independent black-box studies be performed to establish the scientific validity of forensic feature-comparison methods. Instead, they all promote a holistic, flexible, and pragmatic approach to validation.[59] This approach considers the body of *all* relevant evidence that bears upon a method's accuracy and precision. It is also consistent with the view that interpretive methods require flexible, non-prescriptive validation criteria.[60] Finally, it understands that validation is always a balance of competing interests and that various experimental techniques may be used when assessing a method's fitness for a particular use.

II. CONCERNS WITH THE PCAST APPROACH

The DOJ fully agrees with PCAST that the feature-comparison methods used by forensic experts must be scientifically valid and reliable. The

52. FORENSIC SCI. REGULATOR, CODES OF PRACTICE AND CONDUCT FOR FORENSIC SCIENCE PROVIDERS AND PRACTITIONERS IN THE CRIMINAL JUSTICE SYSTEM § 20.9.1 (2016).

53. *Id.*

54. *Id.*

55. *Id.* § 20.9.2.

56. NAT'L ASS'N OF TESTING AUTHS., TECHNICAL NOTE 17: GUIDELINES FOR THE VALIDATION AND VERIFICATION OF QUANTITATIVE AND QUALITATIVE TEST METHODS § 5 (2013).

57. *Id.* § 5.1.

58. *Id.* § 5.

59. CRESWELL, *supra* note 43, at 10 (noting that in a pragmatic approach, "[t]here is a concern with applications—what works—and solutions to problems. Instead of focusing on methods, researchers emphasize the research problems and use all approaches available to understand the problem").

60. *Id.* at 11 (noting that when using the pragmatic philosophical approach to research, "[i]ndividual researchers have a freedom of choice. In this way, researchers are free to choose the methods, techniques, and procedures of research that best meet their needs and purposes").

empirical demonstration of accuracy and precision is a critical part of scientific validation. However, the DOJ rejects PCAST's novel premise that the scientific validity of subjective forensic feature-comparison methods can only be established by strict adherence to its non-severable nine-part litmus test. The DOJ also disagrees with PCAST's assertion that rate of error for these methods can only be established through the use of black-box studies. PCAST's nine-part test and approach to error rates puts PCAST at odds with mainstream international scientific thought.

A. Erroneous Exclusivity of the PCAST's Litmus Test

Before the release of the Report in September 2016, the DOJ was unaware of any discipline-specific multipart litmus test claimed by any group—scientific or regulatory—to be the *only* way to establish scientific validity. PCAST not only failed to cite the origin of its test, but it also failed to identify when, where, or how its test had been previously described or if its test was ever fully used prior to publication. Thus, PCAST's targeted application of this test to forensic feature-comparison methods appears to be unprecedented.

It is important to note that PCAST's position on method validation, through the use of black-box studies, is not a scientific imperative. It merely represents one view—an extremely narrow view—of the appropriate means by which empirical data can be generated and used to assess scientific validity. Mainstream scientific thought, however, is not so narrow and prescriptive. Instead, it is consistent with the view that *all* available information, evidence, and data derived from a multitude of studies—diverse and varied in experimental design—can be appropriately considered when assessing method accuracy, precision, and fitness for an intended use.[61] "Only through replications, using *various designs and methods*, do scientists gain confidence that a hypothesis has been sufficiently corroborated."[62] PCAST's insistence on the use of a single inflexible experimental design and mandatory set of criteria is thus inconsistent with mainstream scientific thought.

B. Error Rates

One of the five "observations" made by the *Daubert* Court about whether a theory or technique has attained the status of "scientific knowledge" was its "known or potential rate of error."[63] Unfortunately, some commentators discuss error rates with a specious and superficial simplicity. They treat the concept as if it were self-defining and had a uniform meaning and

61. *See supra* Part I.B–C.
62. FAIGMAN ET AL., *supra* note 49, § 1:22 (emphasis added).
63. Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579, 594 (1993).

application to multiple different methods.[64] Many of these critiques are misleading and unhelpful.

An error rate is not a static concept. It has neither a uniform definition nor a fixed existence. Instead, error rates are highly dynamic and dependent upon a wide range of human choices, assumptions, and values that relate to the particular application, object, and variables chosen (or ignored) for measurement. Other factors that affect a given rate include the definition of "error," and the time, place, and manner in which measurements are made.[65]

These choices have a direct impact on both the data collected and the resulting rate. Different choices, assumptions, and values will lead to different rates. Moreover, established rates will constantly change based on new facts, applications, and human intervention after error detection and remediation. A rate derived from one application—given a series of choices—will not replicate in a separate but related context.[66] As a result, a calculated error rate is, at best, a highly generalized proxy for the true value at any given moment in time. Determining a reasonably accurate error rate is like to trying to hit a moving target.

C. PCAST's Views on Error Rates

In its discussion of foundational validity, PCAST emphasizes the importance of determining error rates for forensic feature-comparison methods. The Report correctly states that "all laboratory tests and feature comparison analyses have non-zero error rates."[67] However, it also purports to describe exactly *how* these rates must be calculated.

64. *See, e.g.*, NAT'L RESEARCH COUNCIL, NAT'L ACADS., STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD 122 (2009) (stating that the estimation of error rates requires "rigorously developed and conducted scientific studies" without explaining the appropriate experimental design, scope, or execution of such studies); Erin Murphy, *The New Forensics: Criminal Justice, False Certainty, and the Second Generation of Scientific Evidence*, 95 CALIF. L. REV. 721, 795–97 (2007) (calling for an unspecified error rate threshold for the admissibility of forensic evidence without explaining how error should be defined, determined, or how evidence-excluding rates should be applied to different forensic disciplines); Munia Jabbar, Note, *Overcoming* Daubert*'s Shortcomings in Criminal Trials: Making the Error Rate the Primary Factor in* Daubert*'s Validity Inquiry*, 85 N.Y.U. L. REV. 2034, 2037 (2010) (calling for an error rate to be the "primary factor in the validity inquiry under *Daubert*" for forensic evidence without explaining how error rates should be defined, determined, or applied to different forensic disciplines).

65. *See* MARCZYK ET AL, *supra* note 50, at 178–92 (discussing threats to the generalizability of research findings, including sample characteristics, experimental conditions and circumstances, as well as the timing of the assessment and measurement).

66. *Id.* at 180 ("Every study operates under a unique set of conditions and circumstances related to the experimental arrangement. The most commonly cited examples include the research setting and the researchers involved in the study. The major concern with this threat to external validity is that the findings from one study are influenced by a set of unique conditions, and thus may not necessarily generalize to another study, even if the other study uses a similar sample.").

67. PCAST REPORT, *supra* note 10, at 3, 29.

First, according to PCAST, a black-box study design is required if the method is "subjective."[68] Second, the calculation of false positive results must be based solely on the number of conclusive determinations, rather than the proportion of all examinations.[69] Third, only the percentage of false positives that occupy the upper bound of a 95 percent confidence interval should be reported. PCAST believes that even reporting accurate and empirically-derived lower bound false positive data would be an attempt at "obfuscation."[70] Fourth, forensic examiners, who took no part in these black-box studies, should testify that the box error rates are applicable to the case at hand.[71]

It is important to recognize that PCAST's views about *how* to calculate error rates are value laden and reflect PCAST's assumptions, choices, and attitudes about the relevant objects, variables, and methods of measurement.[72] As such, its opinions are not fixed, immutable, or even generally-accepted principles of science. Rather, PCAST's views represent one set of choices among a broader range of options. There is great diversity of scientific thought about both *whether* and *how* error rates should be determined for forensic methods.[73] In fact, ISO/IEC 17025 does

68. *Id.* at 46, 143.
69. *Id.* at 51–52.
70. *Id.* at 153.
71. *Id.* at 56, 66, 112, 147, 150.
72. KENNETH S. BORDENS & BRUCE B. ABBOTT, RESEARCH DESIGN & METHODS: A PROCESS APPROACH 93 (2005) ("Values . . . can creep into science when scientists go beyond describing and explaining relationships and begin to speculate on what ought to be. . . . On another level, this influence of values also is seen when researchers conduct research to influence the course of political and social events.").
73. *See, e.g.*, COLIN G.G. AITKEN & FRANCO TARONI, STATISTICS AND THE EVALUATION OF EVIDENCE FOR FORENSIC SCIENTISTS 424 (2004) (suggesting that proficiency tests should be used to determine error rates); JOHN S. BUCKLETON ET AL., FORENSIC DNA EVIDENCE INTERPRETATION 76–77 (2d ed. 2016) (noting that error and error rates should be examined on a per-case basis); NAT'L RESEARCH COUNCIL, NAT'L ACADS., DNA TECHNOLOGY IN FORENSIC SCIENCE 89 (1992) (suggesting that proficiency tests should be used to calculate error rates); NAT'L RESEARCH COUNCIL, NAT'L ACADS., THE EVALUATION OF FORENSIC DNA EVIDENCE 85–88 (1996) (suggesting that retesting/duplicate tests should be used to determine error rates); NAT'L RESEARCH COUNCIL, *supra* note 64, at 122 (noting that "rigorously developed and conducted scientific studies" of unspecified design and criteria are required to estimate error rates); BERNARD ROBERTSON ET AL., INTERPRETING EVIDENCE: EVALUATING FORENSIC SCIENCE IN THE COURTROOM 138 (2d ed. 2016) (noting that the possibility of lab error is a critical consideration in determining error rates for a particular study and rejecting use of past error rates in new studies); THOMPSON ET AL., *supra* note 44, at 47 (suggesting that blind test samples introduced into casework should be used); Simon A. Cole, *More Than Zero: Accounting for Error in Latent Fingerprint Identification*, 95 J. CRIM. L. & CRIMINOLOGY 985, 989 (2005) (noting that attempts to assess the error rate for latent fingerprint identification should not yield a single error rate, but many error rates showing the rate of error for different levels of latent print quantity and quality, and stating that "[o]ne key hindrance to generating this sort of information is the lack of an accepted metric for measuring either latent print quality and/or quantity or the difficulty of a comparison"); I.W. Evett et al., *Finding a Way Forward for Forensic Science in the US—A Commentary on the PCAST Report*, 278 FORENSIC SCI. INT'L 16, 22–23 (2017) (suggesting that proficiency tests should be used to determine error rates and rejecting the use of black-box studies in their calculation and courtroom presentation); Jonathan J. Koehler,

not even require that an "error rate" be calculated as part of method validation.[74] And the calculation of a single globally-applicable error rate for subjective forensic methods—determined by multiple black-box studies—is clearly not a generally-accepted scientific principle.

D. Concerns with PCAST's Views on Error Rates

PCAST's insistence on the exclusive use of black-box studies to determine error rates would severely limit opportunities to study a diverse range of questions during the validation process. It would also limit the opportunities for experimental replication. And the lack of replication is "one reason that researchers rarely place much faith in any single study, or even *any single type of study*."[75]

In addition, PCAST's exclusive reliance on black-box studies to determine error rates—and the purported need for examiners to embrace and profess those rates during testimony—raises serious questions about their external validity. External validity refers to "the representativeness of a study. If a study is externally valid, its findings can be generalized to other populations (of people, objects, organizations, times, places, etc.)."[76]

In its recent latent fingerprint report, the AAAS cautioned against extrapolating study-derived error rates to casework scenarios.[77] One concern was that study participants know that they are being tested, which may affect their performance.[78] This phenomenon is known as the "Hawthorne Effect."[79] Another concern was that the decision thresholds used by examiners in controlled studies may differ from those employed during actual casework.[80] Moreover, the AAAS noted that existing studies generally do not fully replicate the conditions that examiners face when performing casework.[81] As a result, the error rates observed in these studies do not necessarily reflect casework conditions.[82] Thus, according to

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Proficiency Tests to Estimate Error Rates in the Forensic Sciences, 12 LAW, PROBABILITY & RISK 89, 90–94 (2013) (suggesting that blind proficiency tests should be used).

74. *See ISO/IEC 17025:2017*, *supra* note 31, § 7.2.2–7.2.2.4.

75. FAIGMAN ET AL., *supra* note 49, § 5:39 (emphasis added).

76. *Id.*

77. THOMPSON ET AL., *supra* note 44, at 46.

78. *Id.*

79. The Hawthorne Effect is defined as a "tendency for subjects of research to change their behavior simply because they are being studied." W. PAUL VOGT, DICTIONARY OF STATISTICS AND METHODOLOGY 104 (1993).

80. THOMPSON ET AL., *supra* note 44, at 46.

81. *Id.*

82. *Id.*; *see also* BORDENS & ABBOTT, *supra* note 72, at 113 ("[I]t is a fallacy to assume 'that the purpose of collecting data in the laboratory is to *predict real-life behavior in the real world*.'" (quoting Douglas G. Mook, *In Defense of External Validity*, 38 AM. PSYCHOLOGIST 379, 381 (1983))). Bordens and Abbott also note that:

> [M]uch of the research conducted in the laboratory is designed to determine:
>
> 1. whether something *can* happen, rather than whether it typically *does* happen,

AAAS, "[t]his consideration provides further support for the conclusion that the error rates in black-box studies may not reflect the error rates in casework."[83]

Another concern is PCAST's belief that *only* black-box studies can validate a feature-comparison method.[84] However, black-box studies are merely "input-output research designs where *what happens in between is impossible to study or is ignored*."[85] As such, the inputs "to" and outputs "from" these studies—e.g., true positives, false positives, true negatives, false negatives, and inconclusive results—are what is examined, *not* the method by which those outputs were generated. Therefore, black-box studies—by definition—*cannot* be used to calculate the error rate for a method.

That said, black-box studies may provide some indication of how often a unique collection of examiners—assembled at a given time and place and under defined conditions and constraints—get it right, get it wrong, or simply cannot tell. However, black-box studies do not and cannot reflect the many factors at play in actual casework. This limitation directly and adversely affects the ability to extrapolate study-derived error rates to different times, places, and circumstances. In short, black-box error rates cannot travel. These error rates cannot be generalized to and adopted as the correct error rate across different circumstances. As such, black-box error rates have little relevance to the critical question posed in most litigation: What is the risk that an error occurred in the case at hand?

E. Other Approaches to Error Rates

The National Research Council's (NRC) report, *The Evaluation of Forensic DNA Evidence*,[86] recognized the critical importance of focusing on the risk of case-specific error. On this point, the NRC observed, "[t]he question to be decided is not the general error rate for a laboratory or laboratories over time but rather whether the laboratory doing DNA testing in this particular case made a critical error."[87]

> 2. whether something we specify *ought* to happen (according to some hypothesis) under specific conditions in the lab *does* happen there under those conditions, or
> 3. what happens under conditions not encountered in the real world.
>
> In each of these cases, the objective is to gain insight into the underlying mechanisms of behavior rather than to discover relationships that apply under normal conditions in the real world. It is this understanding that generalizes to everyday life, not the specific findings themselves.

BORDENS & ABBOTT, *supra* note 72, at 113.

83. THOMPSON ET AL., *supra* note 44, at 46; s*ee also* BORDENS & ABBOTT, *supra* note 72, at 114 ("Data obtained from a tightly controlled laboratory may not generalize to more naturalistic situations in which behavior occurs."). Bordens and Abbot define "laboratory" as "any research setting that is artificial relative to the setting in which the behavior naturally occurs." *Id.*

84. PCAST REPORT, *supra* note 10, at 49.

85. VOGT, *supra* note 79, at 24 (emphasis added).

86. *See* THE EVALUATION OF FORENSIC DNA EVIDENCE, *supra* note 73.

87. *Id.* at 85.

The NRC specifically rejected the proposal that laboratories use proficiency tests as the exclusive means for error rate determination, a proposal offered by a previous NRC committee on DNA co-chaired by PCAST Co-Chair, Dr. Eric Lander.

The NRC committee stated:

> Estimating rates at which nonmatching samples are declared to match from historical performance on proficiency tests is almost certain to yield wrong values. When errors are discovered, they are investigated thoroughly so that corrections can be made. A laboratory is not likely to make the same error again, so the error probability is correspondingly reduced.[88]

The NRC also observed, "[t]he risk of error is properly considered case by case, taking into account the record of the laboratory performing the tests, the extent of redundancy, and the overall quality of the results."[89] Moreover, the NRC found it unnecessary to debate differing estimates of false positive error when concerns about a false match can be easily resolved by retesting the evidence.[90]

The NRC's view that the focus should be on the *risk* of error, rather than the *rate* of error, is shared by many eminent scientists, statisticians, and forensic practitioners.[91] In their recent response to the Report, Dr. Ian Evett and colleagues wrote, "[t]he notion of an error rate to be presented to courts is misconceived because it fails to recognise that the science moves on as a result of proficiency tests. . . . [O]ur vision is not of the black-box/error rate but of continuous development through calibration and feedback of opinions."[92]

The "known or potential rate of error" [93] is one of many factors that may bear upon the scientific validity of a theory or technique. However, for forensic feature-comparison methods, there is no current scientific

88. *Id.* at 86.
89. *Id.* at 87.
90. *Id.*
91. *See, e.g.*, BUCKLETON ET AL., *supra* note 73, at 76–77 ("Our view is that the possibility of error should be examined on a per-case basis and is always a legitimate defence explanation for the DNA result. . . . The answer lies, in our mind, in a rational examination of errors and the constant search to eliminate them."); ROBERTSON ET AL., *supra* note 73, at 138 ("It is correct . . . to say that the possibility of error by a laboratory is a relevant consideration. It is wrong, however, to assume that the probability of error in a given case is measured by the past error rate. The question is what the chance of error was on this occasion."); Evett et al., *supra* note 73, at 22 ("The notion of an error rate to be presented to courts is misconceived because it fails to recognise that the science moves on as a result of proficiency tests. . . . To repeat then, our vision is not of the black-box/error rate but of continuous development through calibration and feedback of opinions.").
92. Evett et al., *supra* note 73, at 22.
93. Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579, 594 (1993).

consensus on how or whether these rates can—or should—be determined.[94] Each approach involves trade-offs with resulting strengths and weaknesses. Instead of choosing a single approach, a multifaceted parallel focus on rate estimation, error detection, and risk mitigation may be the best path forward.

In sum, error rates derived from studies of various size, scope, and experimental design can provide important information about the general decision-making thresholds of forensic examiners under defined experimental conditions. Intra- and inter-laboratory studies using known samples provide additional information about the ability of local systems to generate valid and reliable results. Competency and proficiency tests add to the body of knowledge by measuring how often forensic examiners get the right answer using known—ground truth—samples. The use of technical review, case controls, and other quality assurance measures are critical components of risk assessment and mitigation. Finally, as noted by the NRC, a wrongfully-accused person's best insurance against false incrimination is the opportunity to have the evidence retested.[95] The typically non-consumptive nature of feature-comparison testing readily facilitates the reanalysis of questioned evidence in most cases.

CONCLUSION

Twenty-five years ago, the U.S. Supreme Court declared that scientific evidence must be both valid and reliable to be admissible.[96] The Court offered a number of observations about the type of considerations that it thought were important in that determination.[97] However, it was quick to emphasize that pragmatic flexibility—rather than a normative and scientific rigidity—was the analytical disposition that should guide the trial court's inquiry.[98] To that end, the Court stated, "we do not presume to set out a definitive checklist or test."[99] Six years later, the Court further advised that "the law grants a district court the same broad latitude when it decides *how* to determine reliability as it enjoys in respect to its ultimate reliability determination."[100] In each case, the trial court has broad discretion to determine whether the *Daubert* factors are a reasonable measure of reliability.[101] These statements make it clear that a single litmus test, or an inflexible set of criteria, was not what the Court had in mind when it tasked trial judges with assessing scientific validity.

The Supreme Court's desire to infuse legal gatekeeping with pragmatic flexibility is consistent with that same general disposition in mainstream scientific thought. ISO/IEC 17025 contains a non-mandatory, non-

94. *See supra* note 73 and accompanying text.
95. THE EVALUATION OF FORENSIC DNA EVIDENCE, *supra* note 73, at 81.
96. *Daubert*, 509 U.S. at 590–94.
97. *Id.* at 593–94.
98. *Id.* at 593.
99. *Id.*
100. Kumho Tire Co. v. Carmichael, 526 U.S. 137, 142 (1999).
101. *Id.* at 152.

exclusive set of experimental options for validating scientific methods.[102] Scholars and commentators generally recognize that there is no one best way to study a phenomenon of interest.[103] However, it is clear that a convergent approach to evaluating scientific validity makes the best use of all available evidence bearing upon the fitness of a particular method for an intended use.[104]

The same holds true for assessing the rate and risk of error.[105] There is no consensus scientific view of how—or even whether—error rates can or should be determined.[106] Thus, a convergent, holistic path forward makes the most sense.[107] This approach considers a variety of published studies with a diversity of design, laboratory-based experiments, inter-laboratory studies, competency and proficiency tests, case-specific technical reviews, quality controls, and liberal re-examination of the evidence by defense experts.[108] All of these activities contribute to a general understanding of the various types and frequency of errors encountered during casework.

In conclusion, the DOJ strongly believes that pragmatic flexibility—the hallmark of both the Federal Rules of Evidence and mainstream scientific thought—must be maintained. Checklists and inflexible litmus tests are inconsistent with both legal and scientific standards and best practice.

102. *ISO/IEC 17025:2017*, *supra* note 31, § 7.2.2.
103. *See supra* Part I.C.
104. *See supra* Part I.C.
105. *See supra* Part II.
106. *See supra* Part II.
107. *See supra* Part II.
108. *See supra* Part II.

THE RELIABILITY OF THE ADVERSARIAL SYSTEM TO ASSESS THE SCIENTIFIC VALIDITY OF FORENSIC EVIDENCE

*Andrew D. Goldsmith**

INTRODUCTION

Last fall, the Advisory Committee on Evidence Rules began to consider whether to amend Federal Rule of Evidence 702 to create a separate and additional standard for forensic science expert witness testimony. Proponents of these amendments contend that: (1) judges are failing to apply Rule 702 and U.S. Supreme Court precedent for forensic expert testimony,[1] and (2) defense attorneys are incapable of adequately establishing the potential limitations of forensic science testimony through cross-examination.[2] They further claim that this causes juries to give inappropriate weight to forensic expert testimony. Although any proposed revision of Rule 702 is in a preliminary stage, amendment proponents

* Associate Deputy Attorney General and National Criminal Discovery Coordinator, U.S. Department of Justice. Mr. Goldsmith began his career in the Manhattan District Attorney's Office and has also served as an Assistant U.S. Attorney in the District of New Jersey. Mr. Goldsmith wishes to thank Kira Antell, Senior Counsel in the U.S. Department of Justice's Office of Legal Policy, for her invaluable assistance in the preparation of this Article.

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1. *See, e.g.*, David E. Bernstein, *The Misbegotten Judicial Resistance to the* Daubert *Revolution*, 89 NOTRE DAME L. REV. 27, 28–29 (2013) ("There has, however, been an extraordinary undercurrent of rebellion by a minority of federal judges . . . . These judges ignore the text of Rule 702, and instead rely on lenient precedents that predate (and conflict with) not only the text of amended Rule 702, but also with some or all of the *Daubert* trilogy."); M. Chris Fabricant & Tucker Carrington, *The Shifted Paradigm: Forensic Science's Overdue Evolution from Magic to Law*, 4 VA. J. CRIM. L. 1, 37 (2016) ("Courts fail to engage in a meaningful review of the proffered evidence through either a *Frye* or *Daubert* hearing."); Jonathan J. Koehler, *An Empirical Research Agenda for the Forensic Sciences*, 106 J. CRIM. L. & CRIMINOLOGY 1, 33 (2016) ("It is not enough for trial judges to hold occasional *Daubert* hearings to assess the reliability of proffered forensic science evidence if those judges continue to rely on the unsupported claims of forensic science supporters.").

2. *See* Erin Murphy, *No Room for Error: Clear-Eyed Justice in Forensic Science Oversight*, 130 HARV. L. REV. 145, 149 (2017) ("Indigent defense lawyers are notoriously overworked and underpaid, and many lack basic competencies, much less sophisticated scientific expertise.").

generally want a special rule targeted at forensic expert testimony that would make its admissibility more difficult.

While the Department of Justice (DOJ) shares the proponents' goal that conclusions offered by forensics experts should stay within the boundaries of scientific knowledge, it disagrees with the assertion that judges and federal defense attorneys are shirking their responsibilities in this area. The DOJ believes that proposals to amend Rule 702 rest on flawed scientific assumptions, incorrect opinions about the federal judiciary, and dubious statements about the quality of the criminal defense bar. Adoption of any such proposal would significantly undermine the pursuit of justice by causing courts to exclude relevant, highly probative, and reliable evidence that can assist finders of fact in their search for the truth.

I. FORENSIC SCIENCE BACKGROUND

Common forensic disciplines include molecular biology (such as DNA), chemistry, trace evidence examination (of, for example, hairs and fibers, paints and polymers, glass, and soil), latent fingerprint examination, firearm and toolmark examination, handwriting analysis, fire and explosive examinations, forensic toxicology, and digital evidence.[3] Experts conduct these analyses and report results that are used by investigators and attorneys to determine whether a suspect is responsible for a crime. When offered into evidence, forensic results help juries determine whether the prosecution has met its burden of proof. With some forensic disciplines, such as DNA, the results can be reported quantitatively with statistics. Other times, such as with handwriting evidence, an examiner can only indicate his or her opinion in a qualitative manner.

II. THE GATEKEEPING FUNCTION UNDER RULE 702 IS INTENDED TO BE FLEXIBLE

A bedrock principle of evidence law is that relevant evidence—evidence that has any tendency to make a fact or consequence more or less probable than it would be without the evidence—is generally admissible.[4] The Supreme Court has stated that where an expert's factual basis, data, principles, methods, or their application are called into question, the trial judge must determine whether the testimony has "a reliable basis in the knowledge and experience of [the relevant] discipline."[5] In *Daubert v. Merrell Dow Pharmaceuticals, Inc.*,[6] the Supreme Court offered a number of observations about the types of things trial courts might consider when determining the admissibility of scientific evidence. These observations have become known as the "*Daubert* factors." These factors consider

3. *See* MATTHEW R. DUROSE ET AL., U.S. DEP'T OF JUSTICE, PUBLICLY FUNDED FORENSIC CRIME LABORATORIES: RESOURCES AND SERVICES, 2014, at 2 tbl.1 (Nov. 2016), https://www.bjs.gov/content/pub/pdf/pffclrs14.pdf [https://perma.cc/XJ89-SZGZ].

4. FED. R. EVID. 401, 402.

5. Kumho Tire Co. v. Carmichael, 526 U.S. 137, 138 (1999) (citing Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 578, 592 (1993)).

6. 509 U.S. 578 (1993).

whether the methodology or technique in question: (1) can be or has been tested, (2) has been subject to peer review and publication, (3) has a known or potential rate of error, (4) is subject to standards, and (5) has general acceptance in the scientific community.[7]

Notably, neither Supreme Court decisions nor the Federal Rules of Evidence (including its accompanying Advisory Committee Notes) require any rigid application of these factors to assess scientific reliability. To the contrary, the various and nonexclusive *Daubert* factors to be considered by trial courts in determining admissibility are to be applied flexibly. The Court has also instructed that "a trial court *may* consider one or more of the more specific factors that *Daubert* mentioned when doing so will help determine that testimony's reliability."[8] In addition, the Court has emphasized that:

> [T]he test of reliability is "flexible," and *Daubert*'s list of specific factors neither necessarily nor exclusively applies to all experts or in every case. Rather, the law grants a district court the same broad latitude when it decides *how* to determine reliability as it enjoys in respect to its ultimate reliability determination.[9]

Rule 702 was amended in 2000 to embody the principles set out in *Daubert* and its progeny, including its flexibility as to the factors to consider in determining whether to admit expert testimony. The text of Rule 702 does not rigidly require a specific assessment in the gatekeeping function and the Committee Notes accompanying the rule make this clear.[10] This reflects the Court's instruction that "[t]he inquiry envisioned by Rule 702 is, we emphasize, a flexible one. Its overarching subject is the scientific validity," which the Court defined as "the evidentiary relevance and reliability [] of the principles that underlie a proposed submission."[11] As the Court summarized at the end of the *Daubert* opinion, "the Rules of Evidence—especially Rule 702—do assign to the trial judge the task of ensuring that an expert's testimony both rests on a reliable foundation and is relevant to the task at hand. Pertinent evidence based on scientifically valid principles will satisfy those demands."[12]

The proposed amendments to Rule 702 that would replace the flexible gatekeeping function with a more rigid and prescriptive admissibility standard are inconsistent with Supreme Court jurisprudence, the Federal Rules of Evidence, and the Committee Notes accompanying Rule 702. They would also be inconsistent with the intent of Congress, which reviewed and approved Rule 702 and its Committee Notes.

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7. *Id.* at 593–94.
8. *Kumho Tire*, 526 U.S. at 141.
9. *Id.* at 141–42.
10. *See, e.g.*, FED. R. EVID. 702 advisory committee's note to 2000 amendment ("*Daubert* set forth a non-exclusive checklist for trial courts to use in assessing the reliability of scientific expert testimony . . . . *Daubert* itself emphasized that the factors were neither exclusive nor dispositive. Other cases have recognized that not all of the specific *Daubert* factors can apply to every type of expert testimony.").
11. *Daubert*, 509 U.S. at 594–95.
12. *Id.* at 597.

III. RULE 702 IS WORKING AS INTENDED AND AMENDMENTS ARE UNNECESSARY

Amendments to the Federal Rules of Evidence are not appropriate without a genuine showing of need.[13] The former chair of the Advisory Committee on Evidence, Federal District Judge Fern Smith of the Northern District of California, explained that the Committee takes suggestions for amendment "very seriously" where they are predicated on "empirical evidence suggesting that a particular rule of evidence isn't working, that there are an increasing number of reversals based on a particular rule of evidence, that there is a serious conflict among the circuits about the way a rule of evidence is viewed."[14] Proponents of amending Rule 702 have failed to demonstrate that there are serious issues of concern regarding its application by trial courts.

As noted, proposals to amend Rule 702 are still under development and it is not clear that there is support from Advisory Committee members to amend the rule. Nevertheless, the Reporter to the Advisory Committee on Evidence circulated, for discussion, two options to amend Rule 702 in cases with forensic evidence.[15] The first option would add an extra section to Rule 702 to govern forensic expert testimony and would develop several additional requirements for that type of testimony.[16] The second option would create a separate standalone rule for forensic evidence experts.[17] Both are predicated on a belief that judges are not properly applying *Daubert* in cases with forensic evidence and have the purpose of limiting introduction of certain types of forensic evidence.

A. The Federal Judiciary Is Appropriately Applying Rule 702

While some observers have made vague claims that federal judges are not correctly applying Rule 702, no substantial evidence has been offered to support these allegations.[18] In addition, very few federal criminal appeals

13. *See, e.g.*, Symposium, *The Politics of [Evidence] Rulemaking*, 53 HASTINGS L.J. 733, 739 (2002).

14. *Id.*

15. *See Background Information on the Recent Challenges to the Reliability of Forensic Evidence and the Idea for this Symposium*, *in* ADVISORY COMMITTEE ON RULES OF EVIDENCE OCTOBER 2017 AGENDA BOOK 1, 379–83 (2017), http://www.uscourts.gov/sites/default/files/a3_0.pdf [https://perma.cc/R6FB-APZB].

16. *Id.* at 380.

17. *Id.* at 381.

18. *Id.* at 379 ("[T]he Committee had been receiving suggestions from some academics that Rule 702 was being applied incorrectly."). Nor is there an allegation that there are a number of wrongful convictions associated with wrongly-admitted forensic evidence in federal courts. The National Registry of Exonerations ("Registry") lists approximately 2200 individuals who were convicted of crimes in the United States between 1989 and the present and subsequently exonerated. *See Summary View*, NAT'L REGISTRY EXONERATIONS, https://www.law.umich.edu/special/exoneration/Pages/browse.aspx [https://perma.cc/FLF4-U4KD] (last visited Feb. 26, 2018). While the Registry is not complete or certain (i.e. there may be exonerations not included, not all exonerees were found to be factually innocent, and the researchers findings are not uncontested), it reflects the most comprehensive list of

cite improperly admitted forensic evidence as a reason for reversal.[19] And a search of recent district court case law reveals dozens of thoughtfully-considered opinions in which *Daubert* hearings were held to determine the admission of new and novel techniques.[20]

B. The Adversarial System Works

The DOJ believes that the adversarial system—where both sides are adequately prepared, have received the discovery to which they are entitled, and call their own experts and cross-examine their adversaries' witnesses—is the best way to determine the truth.

Federal prosecutors go further than required by Rule 16 of the Federal Rules of Criminal Procedure when providing forensic-related discovery. In January 2017, the Deputy Attorney General's Office issued *Supplemental Guidance for Prosecutors Regarding Criminal Discovery Involving Forensic Evidence and Experts* ("*Supplemental Guidance*").[21] The *Supplemental Guidance* specifically describes the four steps that prosecutors should take to meet their disclosure obligations for forensic evidence under the federal rules,[22] Supreme Court precedent,[23] and statutory obligations.[24] In 2017, these obligations were part of mandatory criminal discovery training for all 6000 federal prosecutors. Based on the information provided in discovery for forensics, defense counsel can decide whether to seek *Daubert* hearings, consider pursuing their own expert witnesses, and better prepare their defense in general.

The DOJ firmly supports the fundamental Wigmore axiom that cross-examination is "beyond any doubt the greatest legal engine ever invented for the discovery of truth."[25] The adversarial system is based on the

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exonerations. The Registry lists 521 cases in which a researcher determined that "false or misleading forensic evidence" played a part in the wrongful conviction. *Id.* Of those 521 convictions, six convictions were in federal court. *Id.* Three of the six federal convictions occurred in conjunction with researchers' determination of "inadequate legal defense." *Id.* The remaining three convictions occurred in conjunction with a researcher's determination of a "perjury or false accusation." *Id.* Although this does not prove that no wrongful convictions have occurred in federal court due to improperly-admitted forensic evidence, it does put the issue in context.

19. *See* D. Michael Risinger, *Navigating Expert Reliability: Are Criminal Standards of Certainty Being Left on the Dock?*, 64 ALB. L. REV. 99, 104–09 (2000) (reviewing appellate case law).

20. *See, e.g.*, United States v. Tuzman, No. 15 Cr. 536 (PGG), 2017 WL 6527261, at *9–19 (S.D.N.Y. Dec. 18, 2017) (considering and excluding defense expert witness who used non-validated methods after a *Daubert* hearing); United States v. Williams, No. 3:13-CR-00764-WHO-1, 2017 WL 3498694, at *1 (N.D. Cal. Aug. 15, 2017) (conducting a two-day *Daubert* hearing on DNA mixtures and excluding some evidence).

21. Memorandum from Sally Q. Yates, Deputy Att'y Gen., to Department Prosecutors, Dep't Forensic Sci. Pers. (Jan. 5, 2017), https://www.justice.gov/archives/ncfs/page/file/930411/download [https://perma.cc/4FWK-WKRY].

22. FED. R. CRIM. P. 16.

23. *See* Giglio v. United States, 405 U.S. 150 (1972); Brady v. Maryland, 373 U.S. 83 (1963).

24. Jencks Act, 18 U.S.C. § 3500 (2012).

25. JOHN HENRY WIGMORE, WIGMORE ON EVIDENCE: EVIDENCE IN TRIALS AT COMMON LAW § 1367 (4th ed. 2018).

principle that the truth emerges when opposing parties have the opportunity to call their own witnesses, confront opposing experts during cross-examination, and introduce competing evidence. The American legal system does not require that evidence be indisputable to be admissible. Rather, it asks that judges review the evidence, that juries evaluate the evidence, and then decide whether the government has met its burden of proof.

The proposed amendments to Rule 702 would likely lead to the exclusion of evidence and dilute the importance of cross-examination. This ignores the adversarial nature of the criminal justice system. Whether or not any type of scientific evidence has a well-grounded empirical basis, cross-examination is key. As Justice Blackmun wrote in *Daubert*, "[v]igorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence."[26]

The DOJ also disagrees with the notion that federally-funded public defenders, and private criminal defense attorneys,[27] are not capable of adequately representing their clients and that the solution is to reduce the requirements of defense counsel. Professor Erin Murphy, law professor and former federal public defender, has written that the adversarial process does not work in cases involving forensic science because of the quality of defense counsel.[28] While we respect Professor Murphy's point of view about her colleagues in the federal system, this has not been our experience.[29] Prosecutors and defense attorneys have a professional obligation to learn about the evidence offered by an opposing expert and its

26. Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579, 596 (1993) (citing Rock v. Arkansas, 483 U.S. 44, 61 (1987)).

27. Criminal Justice Act attorneys are appointed and paid for by the court to represent indigent criminal defendants consistent with the requirements of the Sixth Amendment. *See* 18 U.S.C. § 3006A.

28. Murphy, *supra* note 2, at 149 ("Indigent defense lawyers are notoriously overworked and underpaid, and many lack basic competencies, much less sophisticated scientific expertise.").

29. The DOJ recognizes that indigent defense may be a more significant issue in non-federal courts. It is generally acknowledged that federal defenders are better compensated and have lower caseloads than most state and local public defenders. *See Federal Versus State Work*, UNIV. MICH. LAW, https://www.law.umich.edu/mdefenders/students/Different-Types-of-Indigent-Defense/Pages/Federal-versus-State-Work.aspx [https://perma.cc/F4GP-6CCX] ("Federal defenders are paid more on average than state-level defenders . . . [and] [f]ederal defender caseloads also tend to be smaller than state defender caseloads . . . . That is not to say that federal defenders don't have heavy caseloads, because they do. But they are more manageable than those in many state offices.") At the same time, even in state and local jurisdictions, research has not established that the quality of legal defense is associated with whether it is provided by public defenders or private attorneys. *Compare* Richard D. Hartley et al., *Do You Get What You Pay For?: Type of Counsel and Its Effect on Criminal Court Outcomes*, 38 J. CRIM. JUST. 1063 (2010), *with* Michael A. Roach, *Indigent Defense Counsel, Attorney Quality, and Defendant Outcomes*, 16 AM. LAW & ECON. REV. 577 (2014) (finding that public defenders are sometimes associated with better outcomes than assigned defense attorneys).

application to the case at hand.[30] The DOJ does not agree that the federal defense bar lacks the requisite competence.[31] Proponents of amending Rule 702 claim that the adversarial system in federal court does not work, but rather than working to address the perceived deficiencies of defense counsel, they call for radical change.

IV. THE DOJ IS WORKING TO IMPROVE THE ADVERSARIAL SYSTEM

The DOJ remains committed to strengthening forensic science and its courtroom use by all stakeholders. The DOJ is advancing forensic research and development so that evidence can be compared to a known source with increasingly sensitive and precise means. The DOJ is also working to ensure that the conclusions offered by its forensic experts in reports and testimony do not exceed the limitations of the method or discipline in question.

The DOJ has also devoted substantial funding to forensic science research and development. The National Institute of Justice (NIJ), the Federal Bureau of Investigation, and the DOJ's other forensic laboratories have made significant efforts to engage in and support relevant research. NIJ also supports fellowships to improve the collaboration between researchers and practitioners. In addition, the DOJ, in partnership with the National Institute of Standards and Technology and other institutions, is developing a comprehensive research agenda to continually advance the state of forensic knowledge.

In August 2017, Deputy Attorney General Rod J. Rosenstein announced that the DOJ would continue with a project to develop guidance documents governing the DOJ's forensic testimony and reports.[32] These guidance documents, Uniform Language for Testimony and Reports, are designed to clarify the acceptable range of scientific conclusions that may be offered in laboratory reports and testimony.[33] The DOJ is also developing a program

30. *See, e.g.*, CRIMINAL JUSTICE STANDARDS: DEFENSE FUNCTION § 4-4.1 (AM. BAR ASS'N 2015), https://www.americanbar.org/groups/criminal_justice/standards/DefenseFunctionFourthEdition.html#4-1.1 [https://perma.cc/9LMV-VJUQ] ("Counsel's investigation should also include evaluation of the prosecution's evidence (including possible re-testing or re-evaluation of physical, forensic, and expert evidence) and consideration of inconsistencies, potential avenues of impeachment of prosecution witnesses, and other possible suspects and alternative theories that the evidence may raise.").

31. *See* Letter from Eric A. Vos, Chief Fed. Pub. Def., Dist. of P.R., to Judge Kathleen Cardone, Chair, Ad Hoc Comm. to Review the CJA (Jan. 1, 2016), https://cjastudy.fd.org/sites/default/files/hearing-archives/miami-florida/pdf/ericvosmiamiwritten-testimony.pdf [https://perma.cc/38EE-EYJT] (agreeing that funding is a challenge but stating "there may be no doubt that [Federal Defender Officers] are excellent stewards of [Office of Defender Services] funding and remain frugal while delivering the gold standard of federal criminal defense").

32. *Deputy Attorney General Rod Rosenstein Delivers Remarks at the International Association for Identification Annual Conference*, U.S. DEP'T JUST. (Aug. 7, 2017), https://www.justice.gov/opa/speech/deputy-attorney-general-rod-rosenstein-delivers-remarks-international-association [https://perma.cc/H6F4-6JK4].

33. *Id.*

to continually monitor the accuracy of courtroom testimony provided by DOJ forensic examiners. A new DOJ-wide program that monitors testimony will ensure that examiners provide testimony consistent with scientific principles. Implementation of this monitoring program will begin when the Uniform Language program is finalized. These and other ongoing initiatives demonstrate the DOJ's long-term commitment to continually strengthen forensic science through policy, practice, and research.

CONCLUSION

The DOJ depends on reliable and accurate forensic analysis to identify suspects and clear the innocent. The DOJ strives to set the global standard for excellence in forensic science and to advance the practice and use of forensic science by the broader forensic community. The DOJ is dedicated to the pursuit of justice and is keenly aware that the use of unreliable evidence may lead to more crime, not less.

Proponents of amending Rule 702 argue that judges are failing in their gatekeeping function and that the federal defense bar is incapable of adequately representing their clients. Their solution is to change Rule 702 to make it more difficult to admit forensic evidence. The DOJ is concerned that changes to Rule 702 would significantly undermine the pursuit of justice by leading courts to exclude relevant and highly probative evidence. The DOJ believes that the adversarial system works and is actively working to improve it for all stakeholders.

Talkers for Spring Advisory Committee Meeting

From: "Antell, Kira M. (OLP)" <(b) (6)>
To: "Shapiro, Elizabeth (CIV)" <(b) (6)>, "Hunt, Ted (ODAG)" <(b) (6)>, "Goldsmith, Andrew (ODAG)" <(b) (6)>
Date: Wed, 11 Apr 2018 09:53:58 -0400
Attachments: FRE Spring Meeting Talkers_04112018.docx (27.19 kB); agenda_book_advisory_committee_on_rules_of_evidence_EDITED FOR FORENSICS_COMMENTS.docx (111.43 kB)

Attached are proposed high level talkers for Rob for the Spring meeting. (b)(5) per CIV

(b)(5) per CIV . Most of it is included in the talkers but thought you might find it helpful.

I am happy to take your comments and edits – I am free this afternoon or tomorrow morning if anyone would like to provide them by phone. Otherwise, please email me edits and then I'll ask Betsy to share with Rob tomorrow.

Thanks,
K

Kira Antell
Senior Counsel
Office of Legal Policy
U.S. Department of Justice
950 Pennsylvania Avenue, NW
Washington, DC 20530
(b) (6)
(b) (6)

RE: Talkers for Spring Advisory Committee Meeting

From: "Antell, Kira M. (OLP)" <(b) (6)>
To: "Shapiro, Elizabeth (CIV)" <(b) (6)>
Cc: "Hunt, Ted (ODAG)" <(b) (6)>, "Goldsmith, Andrew (ODAG)" <(b) (6)>
Date: Thu, 12 Apr 2018 09:17:56 -0400
Attachments: agenda_book_advisory_committee_on_rules_of_evidence_EDITED FOR FORENSICS_COMMENTS.docx (111.43 kB); FRE Spring Meeting Talkers_04122018.docx (28.34 kB); Hunt's Additions-FRC Meeting Talkers.docx (15.82 kB)

Good morning,

(b)(5) per CIV

Please let me know how you'd like to proceed. (b)(5) per CIV

Thanks,
Kira

From: Antell, Kira M. (OLP)
Sent: Wednesday, April 11, 2
To: Shapiro, Elizabeth (CIV) <(b) (6)>; Hunt, Ted (ODAG) <(b) (6)>; Goldsmith, Andrew (ODAG) <(b) (6)>
Subject: Committee Meeting

Duplicative Information - See Document ID 20220314-05761

FRE Spring Meeting Talkers_04202018_v2

From: "Antell, Kira M. (OLP)" <(b) (6)>
To: "Shapiro, Elizabeth (CIV)" <(b) (6)>, "Goldsmith, Andrew (ODAG)" <(b) (6)>
Cc: "Hunt, Ted (ODAG)" <(b) (6)>
Date: Fri, 20 Apr 2018 12:25:06 -0400
Attachments: FRE Spring Meeting Talkers_04202018_v2.docx (30.9 kB)

Attached are revised talkers for 702. (b)(5) per CIV. Please let me know if you have thoughts or additions prio

Thanks,
Kira

RE: FRE Spring Meeting Talkers_04202018_v2

From: "Antell, Kira M. (OLP)" <(b) (6)>
To: "Goldsmith, Andrew (ODAG)" <(b) (6)>, "Shapiro, Elizabeth (CIV)" <(b) (6)>
Cc: "Hunt, Ted (ODAG)" <(b) (6)>
Date: Fri, 20 Apr 2018 16:43:20 -0400

Thanks

From: Goldsmith, Andrew (ODAG)
Sent: Friday, April 20, 2018 4:43 PM
To: Antell, Kira M. (OLP) <(b) (6)>; Shapiro, Elizabeth (CIV) <(b) (6)>
Cc: Hunt, Ted (ODAG) <(b) (6)>
Subject: RE: FRE Spring Meeting Talkers_04202018_v2

(b)(5) per CIV

From: Antell, Kira M. (OLP)
Sent: Friday, April 20, 2018 12:25 PM
To: Shapiro, Elizabeth (CIV) <(b) (6)>; Goldsmith, Andrew (ODAG) <(b) (6)>
Cc: Hunt, Ted (ODAG) <(b) (6)>
Subject: FRE Spring Meeting Talkers_04202018_v2

Duplicative Information - See Document ID 20220314-05835

Revised FRE 702 Talkers

From: "Antell, Kira M. (OLP)" <(b) (6) >
To: "Hur, Robert (USAMD)" <(b) (6) >
Cc: "Hunt, Ted (ODAG)" <(b) (6) >, "Goldsmith, Andrew (ODAG)" <(b) (6) >, "Shapiro, Elizabeth (CIV)" <(b) (6) >
Date: Fri, 20 Apr 2018 17:20:54 -0400
Attachments: FRE Spring Meeting Talkers_04202018__DISTRIBUTED.docx (31.18 kB)

Good evening Rob,

(b)(5) per CIV

Thanks,
Kira

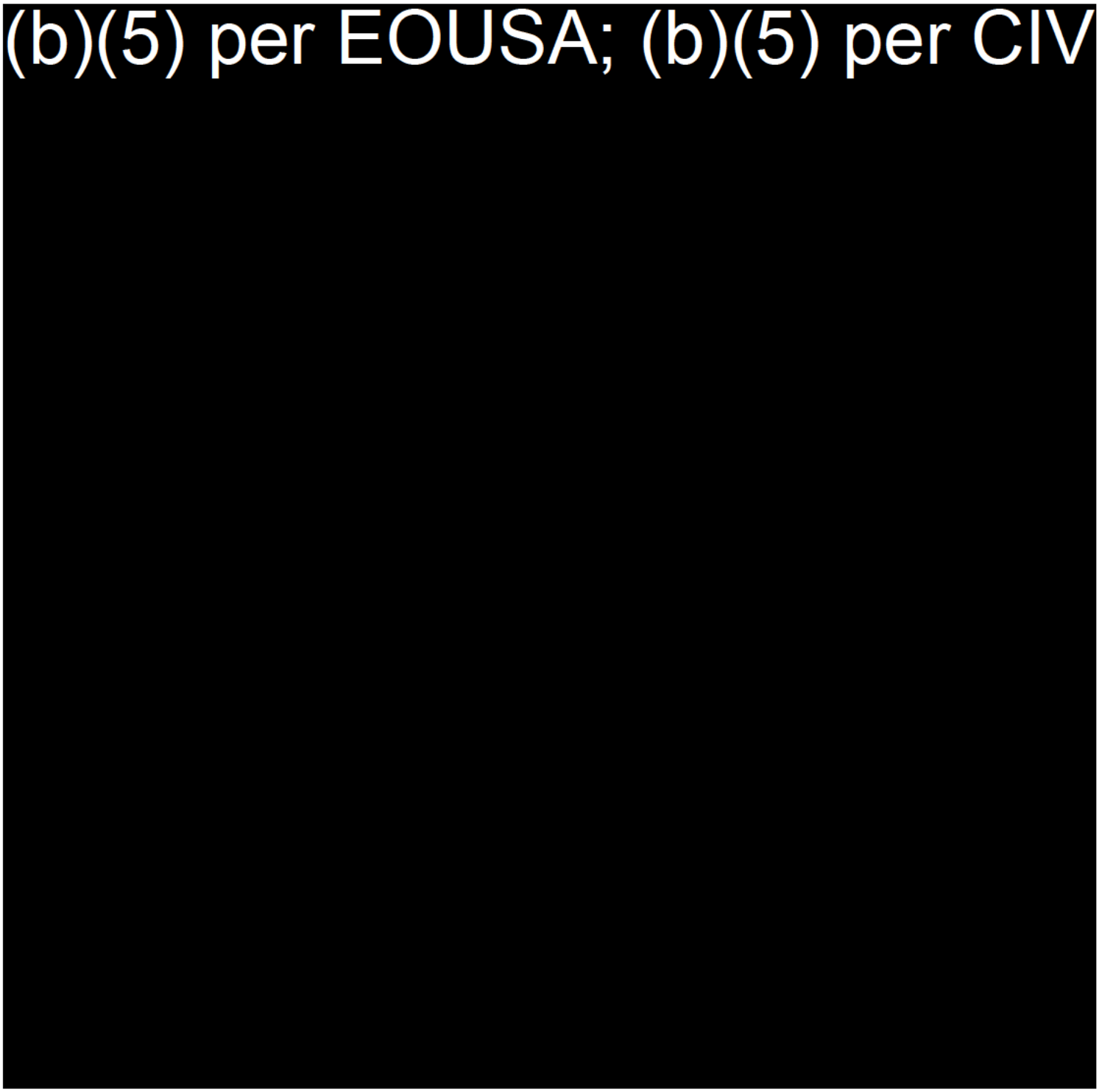
Kira Antell
Senior Counsel
Office of Legal Policy
U.S. Department of Justice
950 Pennsylvania Avenue, NW
Washington, DC 20530
(b) (6)
(b) (6)

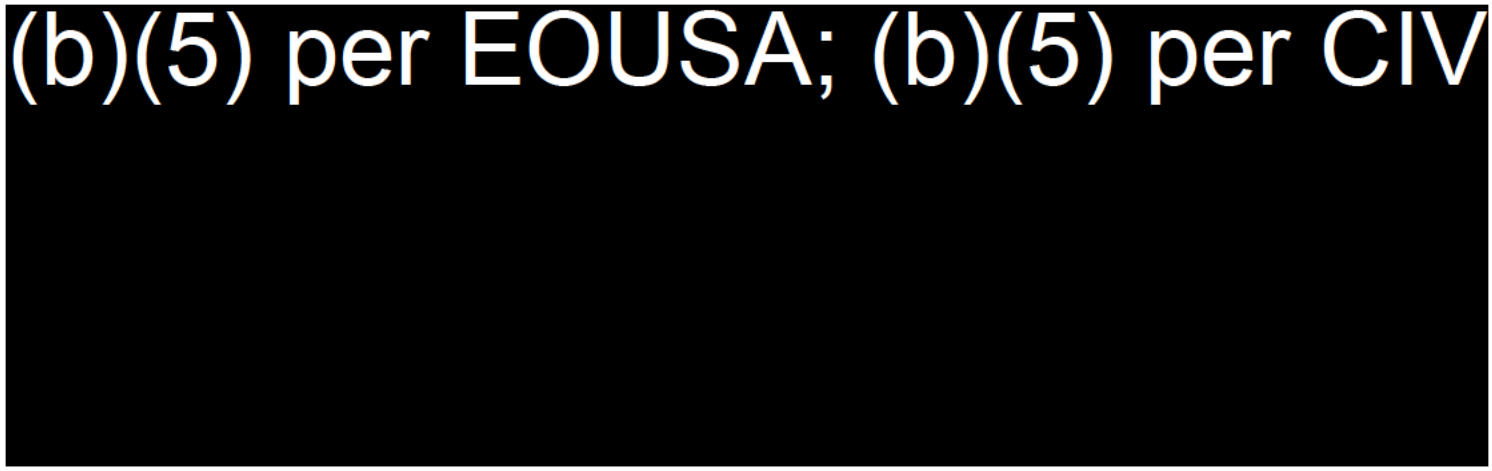
Forensics - follow-up Qs

From: "Hur, Robert (USAMD)" <(b) (6) >
To: "Shapiro, Elizabeth (CIV)" <(b) (6) >, "Goldsmith, Andrew (ODAG)" <(b) (6) >, "Hunt, Ted (ODAG)" <(b) (6) >, "Antell, Kira M. (OLP)" <(b) (6) >
Date: Mon, 23 Apr 2018 18:49:20 -0400

Gang,

I've started cramming. Some thoughts/questions:





Thanks,
Rob

Robert K. Hur
United States Attorney
District of Maryland
(b) (6)
(b)(6) per EOUSA

RE: Revised FRE 702 Talkers

From: "Hur, Robert (USAMD)" <(b) (6) >
To: "Antell, Kira M. (OLP) (JMD)" <(b) (6) >
Cc: "Hunt, Ted (ODAG) (JMD)" <(b) (6) >, "Goldsmith, Andrew (ODAG) (JMD)" <(b) (6) >, "Shapiro, Elizabeth (CIV)" <(b) (6) >
Date: Mon, 23 Apr 2018 19:14:30 -0400

Just saw these – these may address some of the points I made earlier. Will review tonight. Thanks!

From: Antell, Kira M. (OLP) <(b) (6) >
Sent: Friday, April 20, 2018 5:21 PM
To: Hur, Robert (USAMD) <(b) (6) >
C Hunt, Ted (ODAG) (JMD) <(b) (6) >; Goldsmith, Andrew (ODAG) (JMD) <(b) (6) >; Shapiro, Elizabeth (CIV) <(b) (6) >
Subject: Revised FRE 702 Talkers

Duplicative Information - See Document ID 20220314-05843

RE: Forensics - follow-up Qs

From: "Hunt, Ted (ODAG)" <(b) (6) >
To: "Hur, Robert (USAMD)" <(b) (6) >, "Shapiro, Elizabeth (CIV)" <(b) (6) >, "Goldsmith, Andrew (ODAG)" <(b) (6) >, "Antell, Kira M. (OLP)" <(b) (6) >
Date: Mon, 23 Apr 2018 19:42:20 -0400

Hi Rob,

(b)(5) per CIV

(b)(5); (b)(5) per EOUSA; (b)(5) per CIV

(b)(5) per CIV (b)(5); (b)(5) per EOUSA; (b)(5) per CIV

(b)(5) per CIV

(b)(5) per CIV

(b)(5) per CIV

(b)(5) per CIV

(b)(5) per CIV

(b)(5) per CIV
(b)(5); (b)(5) per EOUSA; (b)(5) per CIV

(b)(5) per CIV
(b)(5); (b)(5) per EOUSA; (b)(5) per CIV

(b)(5) per CIV (b)(5); (b)(5) per EOUSA; (b)(5) per CIV

From: Hur, Robert (USAMD) <(b) (6) >
Sent: Monday, April 23, 2018 6
To: Shapiro, Elizabet (b) (6) >; Goldsmi (b) (6) >; Hunt, Ted (ODAG) <(b) (6) M. (OLP) <(b) (6)
Subject: Forensics - follow-up Qs

Duplicative Information - See Document ID 20220314-05850

RE: Forensics - follow-up Qs

From: "Hunt, Ted (ODAG)" <(b) (6)>
To: "Hur, Robert (USAMD)" <(b) (6)>, "Shapiro, Elizabeth (CIV)" <(b) (6)>, "Goldsmith, Andrew (ODAG)" <(b) (6)>, "Antell, Kira M. (OLP)" <(b) (6)>
Date: Tue, 24 Apr 2018 09:39:50 -0400

Rob,

One additional point –

(b)(5); (b)(5) per CIV

(b)(5) per CIV

(b)(5); (b)(5) per CIV

From: Hur, Robert (USAMD) <(b) (6)>
Sent: Monday, April 23, 2018 6
To: Shapiro, Elizabet (b) (6) >; Goldsmi (b) (6) >; Hunt, Ted (ODAG) <(b) (6)> M. (OLP) <(b) (6)>
Subject: Forensics - follow-up Qs

Duplicative Information - See Document ID 20220314-05850

FW: Forensics - follow-up Qs

From: "Antell, Kira M. (OLP)" <(b) (6)>
To: "Shapiro, Elizabeth (CIV)" <(b) (6)>, "Hunt, Ted (ODAG)" <(b) (6)>, "Goldsmith, Andrew (ODAG)" <(b) (6)>
Date: Tue, 24 Apr 2018 09:51:21 -0400

(b)(5); (b)(5) per CIV

From: Hur, Robert (USAMD) <(b) (6)>
Sent: Monday, April 23, 2018 6:49 PM
To: Shapiro, Elizabeth (CIV) <(b) (6)>; Goldsmith, Andrew (ODAG) <(b) (6)>; Hunt, Ted (ODAG) <(b) (6)>; Antell, Kira M. (OLP) <(b) (6)>
Subject: Forensics - follow-up Qs

Duplicative Information - See Document ID 20220314-05850

FRE Post PCAST Cases

From: "Antell, Kira M. (OLP)" <(b) (6) >
To: "Goldsmith, Andrew (ODAG)" <(b) (6) >, "Shapiro, Elizabeth (CIV)" <(b) (6) >, "Hunt, Ted (ODAG)" <(b) (6) >
Date: Tue, 24 Apr 2018 12:49:48 -0400
Attachments: FRE Post PCAST Cases.docx (18.49 kB); Budowle Response to PCAST Report 06-17-2017 (002).pdf (521.58 kB)

All,

Attached are few post-PCAST case squibs (b)(5) per CIV I have also attached (b)(5) per CIV .

Let me know if you have thoughts. In the interest of trying to limit emails to Rob, once you've all looked, perhaps Betsy could include in Rob's binder.

Thanks,
K

RE: FRE Post PCAST Cases

From: "Antell, Kira M. (OLP)" <(b) (6)>
To: "Goldsmith, Andrew (ODAG)" <(b) (6)>
Cc: "Shapiro, Elizabeth (CIV)" <(b) (6)>, "Hunt, Ted (ODAG)" <(b) (6)>
Date: Tue, 24 Apr 2018 12:53:49 -0400

(b)(5) per CIV

From: Goldsmith, Andrew (ODAG)
Sent: Tuesday, April 24, 2018 12:53 PM
To: Antell, (b) (6)>; Shapiro, Elizabeth (CIV) <(b) (6)>; Hunt, Ted (ODAG) <(b) (6)>
Subject: RE: FRE Post PCAST Cases

These are fine – (b)(5) per CIV

From: Antell, Kira M. (OLP)
Sent: Tuesday, April 24, 2018 12:50 PM
To: Goldsmith, Andrew (ODAG) <(b) (6)>; Shapiro, Elizabeth (CIV) <(b) (6)>; Hunt, Ted (ODAG) <(b) (6)>
Subject: FRE Post PCAST Cases

Duplicative Information - See Document ID 20220314-05863

RE: FRE Post PCAST Cases

From: "Antell, Kira M. (OLP)" <(b) (6)>
To: "Goldsmith, Andrew (ODAG)" <(b) (6)>
Cc: "Shapiro, Elizabeth (CIV)" <(b) (6)>, "Hunt, Ted (ODAG)" <(b) (6)>
Date: Tue, 24 Apr 2018 12:56:49 -0400

(b)(5) per CIV

From: Antell, Kira M. (OLP)
Sent: Tuesday, April 24, 2018 12:54 PM
To: Goldsmith, Andrew (ODAG) <(b) (6)>
Cc: Shapiro, Elizabeth (CIV) <(b) (6)>; Hunt, Ted (ODAG) <(b) (6)>
Subject: RE: FRE Post PCAST Cases

Duplicative Information - See Document ID 20220314-05868

RE: Forensics - follow-up Qs

From: "Hunt, Ted (ODAG)" <(b) (6) >
To: "Goldsmith, Andrew (ODAG)" <(b) (6) >
Date: Tue, 24 Apr 2018 17:28:41 -0400

Indeed, Homer has a treasure trove of wise sayings and life lessons…

From: Goldsmith, Andrew (ODAG)
Sent: Tuesday, April 24, 2018 9:59 AM
To: Antell, Kira M. (OLP) <(b) (6) >; Shapiro, Elizabeth (CIV) <(b) (6) >; Hunt, Ted (ODAG) <(b) (6) >
Subject: RE: Forensics - follow-up Qs

(b)(5) per CIV

The Simpsons actually gave us one (not that we want to cite the Simpsons), but Homer tells his brilliant daughter Lisa she can go to any college she wants . . . in South Carolina. Lisa responds, "But I don't want to be a Gamecock!"

https://www.youtube.com/watch?v=6VBWqnBMQUU

From: Antell, Kira M. (OLP)
Sent: Tuesday, April 24, 2018 9:51 AM
To: Shapiro, Elizabeth (CIV) <(b) (6) >; Hunt, Ted (ODAG) <(b) (6) >; Goldsmith, Andrew (ODAG) <(b) (6) >
Subject: FW: Forensics - follow-up Qs

Duplicative Information - See Document ID 20220314-05861

RE: Forensics - follow-up Qs

From: "Hur, Robert (USAMD)" <(b) (6)>
To: "Hunt, Ted (ODAG)" <(b) (6)>, "Shapiro, Elizabeth (CIV)" <(b) (6)>, "Goldsmith, Andrew (ODAG)" <(b) (6)>, "Antell, Kira M. (OLP)" <(b) (6)>
Date: Wed, 25 Apr 2018 08:53:44 -0400

Very helpful thanks, Ted. You'd think I'd have picked this up by now I appreciate your crystallizing it effectively for me. See you later today.

From: Hunt, Ted (ODAG) <(b) (6)>
Sent: Monday, April 23, 20
To: Hur, Robert (USAMD (b) (6) o, Elizabeth (CIV) <(b) (6) mith, Andrew (ODAG) (JMD) <(b) (6)>; Antell, Kira M. (O (b) (6)>
Subject: RE: Forensics - follow-up Qs

Duplicative Information - See Document ID 20220314-05856

RE: FRE Post PCAST Cases

From: "Antell, Kira M. (OLP)" <(b) (6) >
To: "Shapiro, Elizabeth (CIV)" <(b) (6) >
Cc: "Hunt, Ted (ODAG)" <(b) (6) >, "Goldsmith, Andrew (ODAG)" <(b) (6) >
Date: Wed, 25 Apr 2018 09:46:12 -0400

Hi Betsy,

Did you send this to Rob or include in his binder? Do I need to? Do you have an electronic version of the binder that I can see?

Thanks,
K

From: Antell, Kira M. (OLP)
Sent: Tuesday, April 24, 2018 12:5
To: Goldsmith, Andrew (ODAG) <(b) (6) >; Shapiro, Elizabeth (CIV) <(b) (6) >; Hunt, Ted (ODAG) <(b) (6) >
Subject: FRE Post P

Duplicative Information - See Document ID 20220314-05863

RE: FRE Post PCAST Cases

From: "Shapiro, Elizabeth (CIV)" <(b) (6) >
To: "Antell, Kira M. (OLP)" <(b) (6) >
Cc: "Hunt, Ted (ODAG)" <(b) (6) >, "Goldsmith, Andrew (ODAG)" <(b) (6) >
Date: Wed, 25 Apr 2018 09:48:16 -0400

Going into binder. I don't really have an electronic version – I can send you electronic versions of all the summaries and TPs that will go into the binder; I sent all but 702 last night.

From: Antell, Kira M. (OLP)
Sent: Wednesday, April 25, 2018 9:46 AM
To: Shapiro, Elizabeth (CIV) <(b) (6) >
Cc: Hunt, Ted (ODAG) <(b) (6) >; Goldsmith, Andrew (ODAG) <(b) (6) >
Subject: RE: FRE Post PCAST Cases

Duplicative Information - See Document ID 20220314-05884

RE: Forensics cases

From: "Antell, Kira M. (OLP)" <(b) (6)>
To: "Hur, Robert (USAMD)" <(b) (6)>
Cc: "Shapiro, Elizabeth (CIV)" <(b) (6)>, "Goldsmith, Andrew (ODAG)" <(b) (6)>, "Hunt, Ted (ODAG)" <(b) (6)>
Date: Thu, 26 Apr 2018 13:01:31 -0400
Attachments: DN875_Order_10072016.pdf (47.21 kB); DN781_Order_09062016.pdf (55.38 kB); United States v Pitts.pdf (81.44 kB)

(b)(5) per CIV

From: Hur, Robert (USAMD) <(b) (6)>
Sent: Thursday, April 26, 2018
To: Antell, Kira M. (OLP) <(b) (6)>
Cc: Shapiro, Elizabeth (CIV) <(b) (6)>; Goldsmith, Andrew (ODAG) <(b) (6)>; Hunt, Ted (ODAG) <thunt@jmd.usdoj.gov>
Subject: Forensics cases

Kira,

(b)(5) per CIV

Thanks,
Rob

Robert K. Hur
United States Attorney
District of Maryland
(b) (6)
(b) (6)

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

UNITED STATES OF AMERICA,	)	
	)	
Plaintiff,	)	
	)	
v.	)	
	)	
GREGORY CHESTER,	)	No. 13 CR 00774
ARNOLD COUNCIL,	)	
PARIS POE,	)	Judge John J. Tharp, Jr.
GABRIEL BUSH,	)	
WILLIAM FORD, and	)	
DERRICK VAUGHN,	)	
	)	
Defendants.	)	

ORDER

For the reasons stated below, defendants' second joint renewed motion to exclude expert testimony regarding firearm toolmark analysis [838] is denied. The related motion in limine [837] is also denied.

STATEMENT

I. Renewed *Daubert* Motion [838]

Defendants renew their motions to exclude toolmark analysis[1] in light of the September 20, 2016 release of the President's Council of Advisors on Science and Technology's ("PCAST") report entitled "Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature Comparison Methods." Def. Mot. 2, ECF No. 838. The report "discusses the role of scientific validity within the legal system; explains the criteria by which the scientific validity of forensic feature-comparison methods can be judged; applies those criteria to six such methods in detail . . . and offers recommendations on Federal actions that could be taken to strengthen forensic science and promote its more rigorous use in the courtroom." Ex. A. at 2.[2] Firearm toolmark analysis, which the government's experts used, is one of the six methods discussed in the report. The report is clear that "[j]udges' decisions about the admissibility of scientific evidence rest solely on legal standards; they are exclusively the province of the courts and PCAST does not opine on them." *Id*. at 4. Rather, the report provides foundational scientific background and recommendations for further study.

[1] See Motions to Exclude, ECF Nos. 333, 699; Orders, ECF Nos. 464, 781.

[2] Page numbers refer to the internal numbering of the pages of the report, not ECF page numbers.

As such, the report does not dispute the accuracy or acceptance of firearm toolmark analysis within the courts. Rather, the report laments the lack of scientifically rigorous "black-box" studies needed to demonstrate the reproducibility of results, which is critical to cementing the accuracy of the method. *Id.* at 11. The report gives detailed explanations of how such studies should be conducted in the future, and the Court hopes researchers will in fact conduct such studies. *See id.* at 106. However, PCAST did find one scientific study that met its requirements (in addition to a number of other studies with less predictive power as a result of their designs). That study, the "Ames Laboratory study," found that toolmark analysis has a false positive rate between 1 in 66 and 1 in 46. *Id*. at 110. The next most reliable study, the "Miami-Dade Study" found a false positive rate between 1 in 49 and 1 in 21. Thus, the defendants' submission places the error rate at roughly 2%.[3] The Court finds that this is a sufficiently low error rate to weigh in favor of allowing expert testimony. *See Daubert v. Merrell Dow Pharms.*, 509 U.S. 579, 594 (1993) ("the court ordinarily should consider the known or potential rate of error"); *United States v. Ashburn*, 88 F. Supp. 3d 239, 246 (E.D.N.Y. 2015) (finding error rates between 0.9 and 1.5% to favor admission of expert testimony); *United States v. Otero*, 849 F. Supp. 2d 425, 434 (D.N.J. 2012) (error rate that "hovered around 1 to 2%" was "low" and supported admitting expert testimony). The other factors remain unchanged from this Court's earlier ruling on toolmark analysis. *See* ECF No. 781.

This order does not, of course, prevent the defendants from cross-examining the government's experts regarding the error rate of toolmark analysis, and the PCAST report may provide them with fodder for cross-examination. The defendants may, for example, inquire whether the government's experts have complied with other best practices for firearm and toolmark analysis described in the PCAST report, such as the expert having "undergone rigorous proficiency testing" and whether the examiner "was aware of any other facts of the case" when he or she performed the analysis. *See* Ex. A. at 113. For its part, the government may bring out other best practices its experts have engaged in, such as independent secondary review of the examiner's results. *See* Resp. at 2.

In short, the PCAST report does not undermine the general reliability of firearm toolmark analysis or require exclusion of the proffered opinions in this case. Questions about the strength of the inferences to be drawn from the analysis of the examiners presented by the government may be addressed on cross-examination. For these reasons, the defendants' renewed motion to exclude is denied.

II. Motion in Limine [837]

The ruling to allow expert testimony on firearm toolmark analysis necessitates consideration of the defendants' joint motion to exclude, pursuant to Fed. Rs. Evid. 402 and 403, evidence and testimony about a shooting that occurred on October 25, 2005. That shooting is not charged or referred to in the Superseding Indictment.

[3] Because the experts will testify as to the likelihood that rounds were fired from the same firearm, the relevant error rate in this case is the false positive rate (that is, the likelihood that an expert's testimony that two bullets were fired by the same source is in fact incorrect).

The government gave notice of its intent to introduce evidence that bullet casings recovered from the scene of the October 2005 shooting—both 9mm and .40 caliber—were fired from the same two guns as casings from shots fired during (1) the murder of Wilbert Moore in January 2006 (the .40 caliber); and (2) the shooting of Cordell Hampton and Antoine Brooks in April 2006 (the 9mm). In short, the government seeks to prove through expert testimony that one of the firearms from the October 25, 2005, shooting was used in the shooting of Moore and another was used in the shooting of Hampton and Brooks.

The defendants object that the October 25, 2005 shooting is not relevant because it is not probative of any fact needed to meet the government's burden, and further, that the probative value of the evidence is outweighed by a risk of juror confusion and unfair prejudice. As the to the relevance question, the defendants assert: "The government has never charged or otherwise alleged any of the defendants as being involved in the October 25, 2005." Mot. 2, ECF No. 837. They argue that the shooting is unrelated to "the government's larger case" in that it is apparently "a shooting unrelated to the Hobos." *Id*. Responding orally, the government argued that the evidence is relevant because it tends to show that firearms connected to two separate alleged Hobos shootings (those of Moore and of Hampton and Brooks) were used together in the same place just months earlier.

The evidence is relevant and the objection based on Rule 402 is not well-founded. The ballistics evidence establishes a connection between the separate shootings of Moore on the one hand and of Hampton and Brooks on the other. A connection between the two events is probative of the government's allegation that the Hobos enterprise operated with a purpose of "preserving and protecting the power, territory, operations, and proceeds of the enterprise through the use of threats, intimidation, destruction of property, and violence, including, but not limited to, acts of murder, attempted murder, assault with a dangerous weapon, and other acts of violence."[4] As the defendants have argued on numerous prior occasions, the government must prove an "agreement" and a "pattern" of racketeering activity; linking two murders by the weapons used is relevant evidence to meet that burden. It is also probative of an association-in-fact between the alleged perpetrators of the two 2006 shootings, whether or not the same individuals were also involved in the 2005 shooting.

The government does not offer this ballistics evidence to prove anything about who participated in the October 25 shooting, or that it was a "Hobos shooting." The ballistics testimony at issue will be used for the sole purpose of supporting the proposition that two 2006 shootings are connected to each other by means of firearms that had a common history. The jury will not hear any testimony regarding the events of October 2005, including about the alleged

[4] Count One of the Superseding Indictment also alleges that the Hobos, as part of their illegal agreement, "committed illegal acts, including murder, solicitation to commit murder, attempted murder, aggravated battery, and assault with a dangerous weapon"; that they "obtained, used, carried, possessed, brandished, and discharged firearms in connection with enterprise's illegal activities; and that they "managed the procurement, transfer, use, concealment, and disposal of firearms and dangerous weapons within the enterprise."

perpetrators and alleged victims,[5] and therefore there is a minimal risk that it will be confused or misled by the mere reference to a shooting.

That is also the reason that this evidence is not unduly prejudicial under Rule 403. The only specific prejudice the defendants identify is the risk that "the October 2005 shooting may well be viewed by the jury as a Hobos-related shooting when there is no evidence to support that proposition." Mot. 2, ECF No. 837. But it is precisely because of this dearth of evidence about the October 2005 shooting that reference to the firearms used is not unfairly prejudicial (in addition to not being confusing, as noted above). The jury would have no basis for making the inference that the defendants fear, and the government has disavowed any intent to argue that inference (and will not be permitted to do so). Moreover, the evidence does not pertain to any particular defendant. It is dry forensic evidence that attempts to prove that the same firearms used in separate murders in 2006 had been used together on a previous occasion, by some unknown individuals. Of the many fertile areas for potential cross examination and argument on this point will be the lack of evidence that the guns were owned or possessed by the same individual(s) in October 2005 and 2006. Indeed, the fact that the guns were used in different shootings in 2006 could support the inference that ownership had changed hands since 2005.

The defendants' motion in limine is, therefore, denied.

(b)(6) per EOUSA

Date: October 7, 2016

John J. Tharp, Jr.
United States District Judge

[5] To the extent the defendants seek to preclude any evidence or testimony about the October 25, 2005, shooting *other than* the ballistics match, which is relevant to linking two 2006 shootings, their motion is granted (or mooted because no such evidence is anticipated).

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

UNITED STATES OF AMERICA, Plaintiff, v. GREGORY CHESTER, et al. Defendants.	)	No. 13 CR 00774 Judge John J. Tharp, Jr.

ORDER

As explained further in the Statement below, the motion to exclude expert testimony regarding firearm toolmark analysis [699] is denied. The motion to exclude testimony of Nicholas Roti [721] is granted in part and denied in part.

STATEMENT

Defendant Paris Poe, on behalf of himself and codefendants Gregory Chester, Arnold Council, Gabriel Bush, Stanley Vaughn, William Ford, and Derrick Vaughn, moves to exclude expert testimony on firearm toolmarks and the expert testimony of Nicholas Roti pursuant to Federal Rule of Evidence 702, *Daubert v. Merrell Dow*, 509 U.S. 579 (1993), and *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999).

The first motion objects to the expert testimony of four government expert witnesses who will be called to describe firearm and toolmark comparisons they performed on bullets collected at the scenes of various crimes. Three of the experts are employed as forensic scientists for the Illinois State Police; the fourth is a forensic scientist for the Federal Bureau of Investigation. Three of the experts will be testifying as to similarities between bullets found at different crime scenes; the fourth will be testifying as to the similarity between the bullets found at a scene and test bullets fired from a recovered gun. All the findings to be presented were independently reviewed by a second examiner at the expert's laboratory.

The second motion concerns Nicholas Roti, the Chief of the Bureau of Organized Crime at the Chicago Police Department. Chief Roti is expected to testify about the history of Chicago gangs, particularly the Gangster Disciples and the Black Disciples, the causes and impacts of the decentralization of gangs, the operations of street gangs, and specifically certain behaviors of gang members. Much of this latter type of testimony concerns the support gang members provide each other in committing crimes and the movement of guns between gang members.

Rule 702 allows an expert who has specialized "knowledge, skill, experience, training, or education" to testify about an opinion assuming it will help the jury understand the evidence or

determine a fact in issue, is based on sufficient facts or data, is the product of reliable principles and methods, and the expert has reliably applied the principles and methods to the facts of the case. Factors a court may consider under *Daubert* include: (1) whether the theory or technique used by the expert can be, or has been, tested; (2) whether the theory or technique has been subjected to peer review or publication; (3) the known or potential rate of error of the method used; (4) whether there are standards controlling the technique's operation; and (5) whether the theory or method has been generally accepted within the relevant community. *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 150 (1999). The *Daubert* inquiry is a flexible one and does not require strict adherence to the *Daubert* factors to guide the analysis of reliability. *Id.* at 141-142. A *Daubert* hearing need not be held in all circumstances. *See United States v. Williams*, 506 F.3d 151, 161 (2d Cir. 2007).

I. Toolmark Analysis

The government has already stated that it will not elicit a number of statements (such as that firearm and toolmark analysis is a "science") that the defendants identified as problematic in their motion. *See* Resp. at 2. In their original motion [333], defendants also raised the arguments that toolmark analysis is unreliable and that this case is especially difficult because some of the bullets are only being matched to each other, rather than to a known gun (as is usually the case). Neither of these arguments carries the day.

The government's witnesses employ toolmark analysis using the Association of Firearms and Toolmark Examiners ("AFTE") methodology. That methodology has been almost uniformly accepted among the federal courts. *See United States v. Otero*, 849 F. Supp. 2d 425, 437-438 (D.N.J. 2012), *United States v. Ashburn*, 88 F. Supp. 3d 239, 245 (E.D.N.Y. 2015), *United States v. Cazares*, 788 F.3d 956, 989 (9th Cir. 2015). An extensive discussion of the details of the AFTE methodology can be found in *Commonwealth v. Meeks*, 2006 Mass. Super. LEXIS 474 (Mass. Super. Ct. Sept. 28, 2006).

The Court is persuaded by the detailed and reasoned opinions of the *Otero* and *Ashburn* courts as to the admissibility of toolmark opinion testimony. More briefly stated here, the Court concludes that the *Daubert* factors support the admission of the government's proposed opinion testimony. First, the AFTE method has been tested and subjected to peer review. There are three different peer-reviewed journals that study the AFTE method,[1] and a number of reliability studies have been conducted of the method. *See* Richard Grzybowski, et al., *Firearm/Toolmark Identification: Passing the Reliability Test Under Federal and State Evidentiary Standards*, AFTE Journal, Vol. 35, No. 2, Spring 2003, at 14-22 (Resp. Ex. 2). Although the error rate of the method has varied somewhat from study to study, AFTE examiners have been found to have an error rate in the single digits, sometimes better than algorithms developed by scientists. *See* L. Scott Chumbley et al., *Validation of Tool Mark Comparisons Obtained Using a Quantitative, Comparative, Statistical Algorithm*, 55 JOURNAL OF FORENSIC SCIENCES 953 (2010). Although they are not quantitative, the AFTE does provide qualitative standards and training in those standards. *See United States v. Diaz*, No. CR 05-00167 WHA, 2007 WL 485967, at *9 (N.D.

[1] These journals are not without their flaws, *see* Jennifer L. Mnookin et al., *The Need for a Research Culture in the Forensic Sciences*, 58 UCLA L. REV. 725, 754-755 (2011), but not every methodology must meet exacting scientific standards as long as it demonstrates reliability. *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 148-49 (1999).

Cal. Feb. 12, 2007). Firearm and toolmark analysis is also widely accepted even beyond the judicial system. One expert listed forty-two colleges and universities around the world that offer courses in toolmark identification. *United States v. Wrensford*, No. CR 2013-0003, 2014 WL 3715036, at *5 (D.V.I. July 28, 2014).

The defendants' criticism of the AFTE methodology is not persuasive. They rely on a 2008 National Research Council report that was highly critical of the AFTE method, primarily because it declared that the scientific underpinning of the theory "has not yet been fully demonstrated." Committee to Assess the Feasibility, Accuracy, and Technical Capability of a National Ballistics Database, National Research Council, Ballistics Imaging (National Academies Press 2008, available at http://books.nap.edu/catalog/12162.html) ("NRC Report") 3. However, the report was a call for further research, declaring on the same page that "we accept a minimal baseline standard regarding ballistic evidence" and on the following page that "in many situations a sufficient level of toolmark reproducibility" can be picked up by measurement as the method is currently used. *Id*. at 3-4. Perhaps an Ohio court of appeals best summarized the report when it wrote:

> Even a sympathetic reading of the [related] 2009 report, however, indicates its primary purpose was to serve as a catalyst for reassessing the scientific premises underlying the various fields of forensic science and to summarize the current state of the research in those fields relative to the challenges raised in the report. It was not its purpose to opine on the long-established admissibility of tool mark and firearms testimony in criminal prosecutions, and indeed the NRC authors made no recommendations in that regard.

State v. Langlois, 2013-Ohio-5177, P24 (Ohio Ct. App. 2013). Many courts have been confronted with the NRC's report, but none have concluded that its findings warranted the exclusion of expert toolmark opinion testimony outright. *See, e.g., Otero*, 849 F. Supp. 2d at 430, *United States v. Mouzone*, 696 F. Supp. 2d 536, 569-570 (D. Md. 2009), *United States v. Taylor*, 663 F. Supp. 2d 1170, 1176 (D.N.M. 2009). In fact, the defendants have cited no case in which a toolmark expert's testimony was not found admissible under Rule 702.

As for the defendants' argument that some of the experts will testify regarding the matches of bullets found at separate scenes without a test gun, that is of little moment. It appears experts often test bullets recovered from the same or different locations to determine whether they match before a weapon is recovered. *See, e.g., Commonwealth v. Meeks*, 2006 Mass. Super. LEXIS 474, *5 (Mass. Super. Ct. Sept. 28, 2006) ("Lydon examined under the comparison microscope the two shell casings recovered from the scene, Items # 2 and # 3. After conducting this side-by-side examination, he found that they 'shared sufficient ballistics characteristics to lead to the determination that both were fired from the same [unknown] weapon.'"). Although the conclusion is slightly different ('these bullets were likely fired from the same unknown gun' rather than 'these bullets were likely fired from this particular gun'), the act of analysis is identical and there is no reason to disqualify the experts' testimony on that basis.

For these reasons, the Court denies the defendants' motion to exclude firearm and toolmark evidence. Defendants may still raise issues regarding the NRC report, the actual error rate of toolmark analysis, and other arguments to test the limitations and potential weaknesses of the experts' methods on cross-examination.

II. Gang Expert Nicholas Roti

The defendants raise a number of concerns about Chief Roti's proposed expert testimony concerning gangs. First, they assert that Roti is not sufficiently qualified because in recent years he has served in command, has had many administrative duties over his career, has never been an expert witness before, and has not taken sufficient training courses. Next, they argue his testimony is unreliable because it goes beyond the scope of his experiences. The defendants also contest the relevance of Roti's opinions and their usefulness to the jury. And finally, they argue that Roti's historical testimony about Chicago gangs, even if were qualified to provide such testimony, should be excluded as unduly prejudicial under Rule 403.

As to Roti's qualifications and reliability, his credentials are impressive. In addition to serving as the Chief of the Organized Crime Bureau since 2010, his 29 year police career includes extensive work with gangs including as a street officer prior to working his way up the chain in gang-related divisions. *See* Ex. 4. It is true enough, as the defendants argue, that Chief Roti lacks extensive formal academic training relating to street gangs, but the absence of formal academic training does not disqualify him as an expert. Rule 702 says an expert may be qualified "by knowledge, skill, experience, training, ***or*** education." Fed. R. Evid. 702 (emphasis added). Roti's lack of formal courses in the subject does not preclude him from testifying as an expert based on his experience. *See Perez v. City of Austin*, No. A-07-CA-044 AWA, 2008 WL 1990670, at *9 (W.D. Tex. May 5, 2008) (qualifying psychologist who had "no academic training" in law enforcement psychology because "a lack of specialization within a particular field does not require the wholesale exclusion of an expert's testimony").

So, too, that Roti has never before served as an expert witness does not disqualify Roti from serving as an expert in this case. *See Martinez v. City of Chicago*, No. 07-CV-422, 2009 WL 3462052, at *3 (N.D. Ill. Oct. 23, 2009). Were it otherwise, of course, there would be no expert witnesses; there is a first time for everything. Beyond that fact, it bears noting that there may be more reason to be skeptical of experts with abundant experience testifying than there is for those with little such experience. *See, e.g., Samuel v. Ford Motor Co.*, 96 F. Supp. 2d 491, 495 (D. Md. 2000), *aff'd sub nom. Berger v. Ford Motor Co.*, 95 F. App'x 520 (4th Cir. 2004) ("Both Mr. Carr and Dr. Kaplan are experienced and articulate, but they clearly are advocates for their positions, and their advocacy has been polished and perfected through another rigorous test procedure-repeated testimony in contested cases, where Mr. Carr has taken the side of the auto manufacturer, and Dr. Kaplan that of the plaintiffs."). Based on his years of experience in the police department working on gang-related cases, Roti is qualified to give testimony as an expert witness. To begin disqualifying police officers, who frequently testify as expert witnesses, simply because they have been promoted away from strictly street duties would be to eliminate many of the best and the brightest of officers from testifying as expert witnesses.

That said, social science testimony, such as Roti's proposed testimony about the causes of gang decentralization, must be within the scope of his experience and the product of genuine expertise. *See Tyus v. Urban Search Mgmt.*, 102 F.3d 256, 263 (7th Cir. 1996) ("Social science testimony, like other expert testimony proffered under Fed. R. Evid. 104(a) for admission under Rule 702, must be tested to be sure that the person possesses genuine expertise in a field and that her court testimony 'adheres to the same standards of intellectual rigor that are demanded in [her] professional work.'"). "[E]ven a qualified individual may be barred under Rule 702 where

the opinion proffered calls for speculation or expertise in a field outside of the expert's purview." *Cage v. City of Chicago*, 979 F. Supp. 2d 787, 822 (N.D. Ill. 2013). And here, some of the proposed testimony falls outside Roti's experience. He has certainly had plenty of experience observing the trends and behaviors of gang members, such as what territory is controlled by certain gangs at given times, the hierarchy or lack thereof of certain gangs, and other historical events affecting gangs in Chicago (such as the teardown of public housing). Such testimony has been approved by other courts. *See, e.g., United States v. Archuleta*, 737 F.3d 1287, 1296 (10th Cir. 2013) (allowing testimony regarding the "the structure, purpose, and activities"), *United States v. Hankey*, 203 F.3d 1160, 1169 (9th Cir. 2000) (permitting testimony regarding gang colors, signs, and activities). However, as the defendants point out, Roti is not a sociologist or academic who studies how certain community factors impact gangs. *Compare, e.g.,* SUDHIR VENKATESH, GANG LEADER FOR A DAY (2008). It would be beyond the scope of Roti's experience as a police officer for him to testify that the destruction of public housing ***caused*** the decentralization of Chicago's gangs. However, Roti can testify that as a police officer he observed gangs decentralize, that public housing was destroyed in many of the neighborhoods controlled by the gangs around the same time, and that changes in territories associated with various gangs followed thereafter. That is all information within the scope of Roti's work and observations as a law enforcement officer specializing in gang-related crime.

Next the defendants argue that much of Roti's testimony fails the Rule 702 requirement that the testimony "help the trier of fact to understand the evidence or to determine a fact in issue." Expert testimony should not be admitted if it does "not aid the jury because it addresses an issue of which the jury already generally is aware, and it will not contribute to their understanding of the particular dispute." *United States v. Hudson*, 884 F.2d 1016, 1024 (7th Cir. 1989). This inquiry is often framed as whether the testimony is "well within the ken of most lay jurors." *United States v. Hall*, 165 F.3d 1095, 1105 (7th Cir. 1999). The Seventh Circuit has expressed its skepticism of certain types of gang expert testimony, noting that "[m]ost jurors are aware that gang members deal drugs, commit violent acts, and react unfavorably when their misdeeds are reported to authorities." *United States v. McGee*, 408 F.3d 966, 978 (7th Cir. 2005). *See also, e.g., United States v. Rios*, --- F.3d ---, No. 14-2495, 2016 WL 3923881, at *5 (6th Cir. July 21, 2016) (finding improper, because within the ken of the average juror, gang expert opinion testimony that gangs commonly engage in drug trafficking; share guns; commonly engage in violent disputes with other gangs; and use of violence against those who steal drugs from them); *United States v. Mejia*, 545 F.3d 179, 194-95 (2d Cir. 2008) (district court erred in admitting gang expert testimony concerning facts, such as gun possession, drug trafficking, and violence engaged in by gang because the jury needed no help in understanding facts relating to those subjects).

Some of Roti's testimony is undoubtedly helpful to jurors, such as the requirement that gang members are expected to "stand by while a fellow member confronts or is confronted by a rival" or the behavior of gang leadership in an "ongoing war situation." Ex. 1 at 5. This is the sort of testimony about how gangs operate about which a jury may not be aware. However, testimony that fellow members backing up a gang member perpetrating a crime gives the perpetrator "confidence" and "encourage[s] the commission of the offense" suggest no juror is aware of the concept of peer pressure or has had a group of friends offer encouragement. Such testimony is well within the ken of the average juror and is therefore fails to satisfy Rule 702's requirement that opinion testimony "help the trier of fact to understand the evidence or determine

a fact in issue." Similarly, much of the proposed testimony regarding the hiding of guns following shootings (items 6-10 on the government's list in defendants' Exhibit 1 attached to their motion) is well within the knowledge of any juror who has ever watched *Law & Order*. The proposed testimony can perhaps be summed up as "sometimes gang members temporarily hide guns that have been used in crimes, then retrieve them after suspicion has passed." Such testimony reveals nothing about the inner working of the Hobos or any other gang and is intuitive to the average juror. Similarly, the government's third proposed topic – that gang members "often work together and keep guard while fellow members commit criminal offenses" so that a perpetrator need not keep watch himself – is entirely intuitive to the average juror. As described, the government intends to have Roti testify about why a criminal might want to have a lookout. That testimony will not help jurors. Unless he will describe a method of being a lookout that is uncommon and unique to gangs, the mere concept does not warrant expert testimony.

The government has also proposed Roti testify that gang members "enjoy their notoriety, and how they 'throw' their hand signs as encouragement" or "to demonstrate their status." Ex 1 at 5. A juror may not be familiar with the specific hand signs or colors that indicate participation in a given gang. *See United States v. Martinez*, No. CR 13-00794 WHA, 2015 WL 269794, at *2 (N.D. Cal. Jan. 20, 2015) (allowing testimony regarding "different signs, numbers, graffiti, colors, etc. that link VSP with the Norteños"), *United States v. Wilson*, 634 F. App'x 718, 737 (11th Cir. 2015) (affirming allowance of gang expert that testified to "several gang identifiers" such as the color red and clothing bearing the letters "B" and "P"). To the extent that Roti will explain ***what*** the signs of various gangs were, that testimony may well be helpful. But he may not testify as to the mere fact that gang members of "throw" their hand sign or what they "enjoy." The sheer fact that gangs have signs and symbols is well-known.

Finally, the defendants argue that Roti's testimony fails the balancing of Rule 403. Under the rule, testimony may be excluded "if its probative value is substantially outweighed by a danger" of unfair prejudice, wasting time, or presenting needlessly cumulative evidence. Fed. R. Evid. 403. Defendants focus especially on Roti's historical testimony, which will touch on "state and federal prosecutions" of gang members. "Rule 403 balancing is a highly context-specific inquiry" in which level of dispute on the issue, the probativeness of the testimony, and the prejudice all must be weighed. *United States v. Gomez*, 763 F.3d 845, 857 (7th Cir. 2014). Here, the balancing will depend on the depth of Roti's discussion of these past gang prosecutions. Simply noting the prosecutions as a historical event may have some probative value to explain the formation or decentralization of various gangs and explain the origin of the Hobos. However, detailed discussion of the various charges and prison sentences of various gang members would imply the defendants may be guilty by association or otherwise unduly prejudice the jury.

For the reasons discussed above, the defendants' motion to exclude the testimony of Nicholas Roti is granted in part and denied in part. Mr. Roti may testify to his observations of Chicago gangs, including their history, decentralization, and specific episodes of violence, and other relevant historical events (such as the destruction of public housing or prosecutions of gangs). He may not, however, offer opinion testimony as to the causes of gang decentralization or gang violence. He may not go into great detail about past gang prosecutions. He may provide information regarding the obligations of gang membership, the behavior of gang leaders during shooting wars, and any specific identifying signs, colors, or terms used by the gangs in question. He may not, however, opine as to what gang members "enjoy" or the mere fact that gang

members publicly display their gang affiliation. He may not testify, without more information specific to the gangs at issue in this case, that gang members generally hide guns used in crimes and then recover them when suspicion has passed. Further objections to specific testimony may be raised as Chief Roti testifies. Defendant's motion to exclude firearm and toolmark analysis is denied in its entirety.

(b)(6) per EOUSA

Date: September 6, 2016

John J. Tharp, Jr.
United States District Judge

2018 WL 1169139
Only the Westlaw citation is currently available.
United States District Court, E.D. New York.

UNITED STATES of America,
v.
Lee Andrew PITTS, Defendant.

16-CR-550 (DLI)
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Signed 03/02/2018

Attorneys and Law Firms

Girish Karthik Srinivasan, U.S. Attorney's Office, Brooklyn, NY, for United States of America.

Michael L. Brown, II, Federal Defenders of New York, Inc., Brooklyn, NY, for Defendant.

SUMMARY ORDER

DORA L. IRIZARRY, Chief Judge

***1** Andrew Lee Pitts ("Defendant") is charged with attempted bank robbery pursuant to 18 U.S.C. § 2113(a). *See* Indictment, Dkt. Entry No. 11. On August 29, 2017, Defendant disclosed his intention to call at trial Dr. Simon Cole, Professor at the University of California, Irvine, Department of Criminology, as an expert in fingerprint methodologies. *See* Def.'s Ltr. dated Aug. 29, 2017, Dkt. Entry No. 30. On September 12, 2017, Defendant filed a revised expert disclosure that included additional information about Dr. Cole's proposed testimony and his *curriculum vitae*. *See* Def.'s Ltr. dated Sept. 12, 2017, Dkt. Entry No. 33. Defendant filed additional expert disclosures with respect to Dr. Cole on January 24, 2018. *See* Exhibit B to Resp. to Mot. to Suppress ("Jan. 24 Disclosure"), Dkt. Entry No. 43-2.

On February 23, 2018, the government moved to preclude Dr. Cole's testimony. Mot. to Exclude Expert Testimony of Simon A. Cole ("Mot."), Dkt. Entry No. 45. Defendant opposed the government's motion. Mem. in Opp'n to Mot. to Exclude Expert Testimony of Prof. Simon A. Cole ("Opp'n"), Dkt. Entry No. 47.

BACKGROUND

The Court assumes the parties' familiarity with the facts and procedural history of this motion. [1] The government contends that preclusion of Dr. Cole's testimony is necessary for three reasons: Dr. Cole (1) is "not a trained fingerprint examiner"; (2) "has not published peer-reviewed scientific articles on the topic of latent fingerprint evidence"; and (3) "has not conducted any validation research in the field." *See* Mot. at 1-2. As such, the government maintains that his testimony will not assist the trier of fact in understanding the evidence or determining a fact in issue. In opposition, Defendant argues that Dr. Cole's testimony is necessary "contrary evidence" that will assist the trier of fact, and that preclusion will violate Defendant's constitutional rights. *See generally*, Opp'n. [2] For the reasons set forth below, the government's motion is granted.

DISCUSSION

I. Legal Standard

Rule 702 of the Federal Rules of Evidence ("FRE") includes a threshold requirement that an expert's testimony "will help the trier of fact to understand the evidence or to determine a fact in issue." Fed. R. Evid. 702(a). In determining whether to admit expert testimony, courts also consider an expert's qualifications and whether the proposed testimony is based on reliable data and methods. *Karavitis v. Makita U.S.A., Inc.*, 2018 WL 627491, at *1 (2d Cir. Jan. 31, 2018) (summary order) (citing *Nimely v. City of New York*, 414 F.3d 381, 396-97 (2d Cir. 2005)). The proponent of proposed expert testimony bears the burden of proof in establishing admissibility by a preponderance of the evidence. *Id.* (citing *United States v. Williams*, 506 F.3d 151, 160 (2d Cir. 2007)).

II. Analysis

***2** The government urges the Court to adopt the reasoning of several other courts that have precluded Dr. Cole's testimony. Mot. at 1-2 & n.1 (collecting cases precluding Dr. Cole's testimony); *See, e.g.*, *People v. Caradine*, 2012 WL 599252, at *15-16 (Cal. Ct. App. Feb. 23, 2012) (precluding Dr. Cole's testimony based on a lack of "training [and] expertise" and describing

his testimony as merely "relating a bunch of things he has read"); *State v. Armstrong*, 920 So.2d 769, 770 (Fla. 2006) (noting that Dr. Cole's testimony was a "general critique of the predicate underlying fingerprinting as a method of identification" and would "not be probative as to whether the latent prints lifted from the scene match [the defendant's] fingerprints").

The government additionally contends that Dr. Cole's testimony will not assist the trier of fact. Mot. at 1-2. Specifically, the government points out that Dr. Cole's only disclosed opinion is that the government's expert's testimony " 'exaggerates the probative value of the evidence because such testimony improperly purports to eliminate the probability that someone else might be the source of the latent print.' " Mot. at 2-3 (quoting Jan. 24 Disclosure). "Professor Cole fails to provide any analysis of why latent fingerprint evidence [in general] is so unreliable that it should not be submitted to the jury or, if such evidence can be reliable in some circumstances, what precisely the NYPD examiners did incorrectly in this case." *Id.* at 3. Dr. Cole is not expected to testify that the identification made by the government's expert in this case is unreliable or that the examiners made a misidentification. *See Id.* [3] Therefore, the government argues Dr. Cole's opinion goes to the weight of the government's evidence, not its admissibility. *Id.* at 5. [4]

In opposition, Defendant contends that Dr. Cole's testimony is necessary "contrary evidence" that calls into question the reliability of fingerprint analysis. Opp'n at 1-2 (citing *Buie v. McAdory*, 341 F.3d 623, 625 (7th Cir. 2003)). He further argues that precluding Dr. Cole's testimony violates his due process and confrontation rights under the Fifth and Sixth Amendments to the United States Constitution. *Id.* at 2-3. (citing *Herrera v. Collins*, 506 U.S. 390, 398-99 (1993); *Coy v. Iowa*, 487 U.S. 1012, 1017-18 (1988); *Ake v. Okla.*, 470 U.S. 68 (1985); *Buie*, 341 F.3d at 625). Finally, Defendant argues that Rule 702's liberal standard for admissibility and Dr. Cole's status as a "skilled witness" who can assist the trier of fact weighs against preclusion. *Id.* at 2-5 (citing Fed. R. Evid. 702 Advisory Comm. Notes).

***3** The Court is not convinced that Dr. Cole's testimony would be helpful to the trier of fact. The only opinion Defendant seeks to introduce is that fingerprint examiners "exaggerate" their results to the exclusion of others. *See* Mot. at 3 (citing Jan 24. Disclosure). However, the government has indicated that its experts will not testify to absolutely certain identification nor that the identification was to the exclusion of all others. Mem. of Law in Opp'n to Def.'s Mot. to Suppress, Dkt. Entry No. 43 at 18 (emphasis original) ("[N]either the government nor the NYPD latent prints examiner intend to offer evidence to the jury that the identification ... has been made with *absolute (100%) certainty* or that the identification ... has been made *to the exclusion of all others.*"). Thus, Defendant seeks admit Dr. Cole's testimony for the sole purpose of rebutting testimony the government does not seek to elicit. Accordingly, Dr. Cole's testimony will not assist the trier of fact to understand the evidence or determine a fact in issue. *See* Fed. R. Evid. 702.

Moreover, the substance of Dr. Cole's opinion largely appears in the reports and attachments cited in Defendant's motion to suppress the government's experts' opinion testimony. *See* Exhibit D to Declaration of Michael L. Brown II ("Brown Decl."), President's Council of Advisors on Science and Technology, *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods* (2016) ("PCAST Report"), Dkt. Entry No. 29; Exhibit C to Brown Decl., National Research Council of the National Academies, *Strengthening Forensic Science in the United States: A Path Forward* (2009) ("NAS Report"), Dkt. Entry No. 28; Exhibit B to Brown Decl., More Than Zero, *supra* n.2, at 1034-49. For example, Dr. Cole's article More Than Zero contains a lengthy discussion about error rates in fingerprint analysis and the rhetoric in conveying those error rates (*See* More Than Zero at 1034-49), and the PCAST Report notes that jurors assume that error rates are much lower than studies reveal them to be (PCAST Report at 9-10 (noting that error rates can be as high as one in eighteen)). Defendant identifies no additional information or expertise that Dr. Cole's testimony provides beyond what is in these articles and does not explain why cross-examination of the government's experts using these reports would be insufficient.

The Court also finds Defendant's constitutional arguments unavailing. It is beyond question that the Defendant enjoys the constitutional rights of due process and the presentation of evidence on his behalf. However, he is not entitled to present evidence through an expert that the Court finds will not be helpful to the trier of fact. The instant decision in no way deprives Defendant

of the right to cross-examine the government's experts on error rates and the reliability of fingerprint analysis using any evidence that is admissible at trial, including the above-referenced reports. *See* Mot. at 5 ("The defendant is also free to use materials from the President's Council of Advisors on Science and Technology and the National Academy of Sciences, among other sources, to cross-examine the experts.").

Finally, while Defendant correctly notes that Rule 702 permits experts to testify based solely on their knowledge or experience (*Id.* at 3-4 (quoting Fed. R. Evid. 702, Advisory Comm. Note)), the Court need not address Dr. Cole's qualifications [5] as an expert, since his testimony is would not be helpful to the trier of fact. Accordingly, the government's motion to preclude Dr. Cole's testimony is granted.

CONCLUSION

For the reasons set forth above, the government's motion is granted.

***4** SO ORDERED.

All Citations

Slip Copy, 2018 WL 1169139

Footnotes

1 A more detailed recitation of the facts may be found in the Court's recent ruling on Defendant's motion to suppress the government's experts. *See* Memorandum & Order, Dkt. Entry No. 46.

2 Since Defendant's submission is not paginated, the page numbers referenced herein are those assigned by ECF.

3 Defendant's opposition brief asserts that "Mr. Pitts continues to challenge the identification made in this case as a possible misidentification." Opp'n at 1. However, Defendant's expert disclosures do not indicate that Dr. Cole will testify about a misidentification.

4 The government also insinuates that the Court should preclude Dr. Cole's testimony because he has not published peer-reviewed scientific articles in the area of latent fingerprint analysis. Mot. at 1. The Court finds this argument particularly weak given that one of the government's sources in its opposition to Defendant's motion to suppress cites Dr. Cole as an authority. *See* Exhibit C to Mem. in Resp. to Def.'s Mot. to Suppress, Dkt. Entry No. 43-3, Peter E. Peterson, *et al.*, *Latent Prints: A Perspective on the State of the Science*, 11 Forensic Science Commc'ns 86, 112 (2009) (citing Simon A. Cole, *More Than Zero: Accounting for Error in Latent Fingerprint Identification*, 95 J. Crim. L. & Criminology 985 (2005) (hereinafter "More Than Zero")).

5 It is unclear from Defendant's motion the extent of Dr. Cole's experience. *See* Mot. at 3 ("Dr. Cole and [*sic*] researched finger print [*sic*] evidence for the past X decades."). It is unknown what number of decades Defendant is referring to, or if he means to use a Roman numeral to indicate ten (10) decades.

RE: Forensics cases

From: "Shapiro, Elizabeth (CIV)" <(b) (6)>
To: "Antell, Kira M. (OLP)" <(b) (6)>, "Hur, Robert (USAMD)" <(b) (6)>
Cc: "Goldsmith, Andrew (ODAG)" <(b) (6)>, "Hunt, Ted (ODAG)" <(b) (6)>
Date: Thu, 26 Apr 2018 13:51:23 -0400

I am bringing copies as well.

From: Antell, Kira M. (OLP)
Sent: Thursday, April 26, 2018 1:20 PM
To: Hur, Robert (USAMD) <(b) (6)>
Cc: Shapiro, Elizabeth (CIV) <(b) (6)>; Goldsmith, Andrew (ODAG) <(b) (6)>; Hunt, Ted (ODAG) <(b) (6)>
Subject: RE: Forens

Thanks Rob. I'll have copies in the event you need them.

From: Hur, Robert (USAMD) <(b) (6)>
Sent: Thursday, April 26, 2018 1:05 PM
To: Antell, Kira M. (OLP) <(b) (6)>
Cc: Shapiro, Elizabeth (CIV) <(b) (6)>; Goldsmith, Andrew (ODAG) <(b) (6)>; Hunt, Ted (ODAG) <(b) (6)>
Subject: RE: Forensics cases

(b)(5) per CIV

(b)(5) per CIV (b)(5) per EOUSA; (b)(5) per CIV

From: Antell, Kira M. (OLP) <(b) (6)>
Sent: Thursday, April 26, 2018 1:02 PM
To: Hur, Robert (USAMD) <(b) (6)>
Cc: Shapiro, Elizabeth (CIV) <(b) (6)>; Goldsmith, Andrew (ODAG) (JMD) <(b) (6)>; Hunt, Ted (ODAG) (JMD) <(b) (6)>
Subject: RE: Forensics case

Duplicative Information - See Document ID 20220314-05886

Re: APPROVAL: Forensics Inquiry from The Nation

From: "Terwilliger, Zachary (ODAG)" <(b) (6) >
To: "Ehrsam, Lauren (OPA)" <(b) (6) >
Cc: "Prior, Ian (OPA)" <(b) (6) >, "Flores, Sarah Isgur (OPA)" <(b) (6) >, "Parker, Rachel (OASG)" <(b) (6) >
Date: Mon, 18 Dec 2017 17:15:49 -0500

Yes, thank you

On Dec 18, 2017, at 5:03 PM, Ehrsam, Lauren (OPA) <(b) (6) > wrote:

> Just got off the phone with Ted. He's working on (b) (5) , but to be safe, it may be best for that sentence to read: The Department is composed of many component agencies that have in-house forensic laboratories, capabilities, and experts, including forensic laboratory and digital analysis personnel at the FBI, DEA, and ATF.
>
> Does this work better for you?
>
> **From:** Terwilliger, Zachary (ODAG)
> **Sent:** Monday, December 18, 2017 4:25 PM
> **To:** Ehrsam, Lauren (OPA) <(b) (6) >
> **Cc:** Prior, Ian (OPA) <(b) (6) >; Flores, Sarah Isgur (OPA) <(b) (6) >; Parker, Rachel (OASG) <(b) (6) >
> **Subject:** R s Inquiry from The Nation
>
> Thanks- Lauren
>
> On Dec 18, 2017, at 4:22 PM, Ehrsam, Lauren (OPA) <(b) (6) > wrote:
>
> > Zach,
> >
> > Ted has reviewed and signed off. My apologies for not mentioning that. (b) (5) were his words, but I'm double checking with him just in case.
> >
> > Thank you,
> >
> > Lauren
> >
> > **From:** Terwilliger, Zachary (ODAG)
> > **Sent:** Monday, December 18, 2017 4:03 PM
> > **To:** Ehrsam, Lauren (OPA) <(b) (6) >
> > **Cc:** Prior, Ian (OPA) <(b) (6) , Sarah Isgur (OPA) <(b) (6) >; Parker, Rachel (OASG) <(b) (6) >
> > **Subject:** Re: APPROVAL: Forensics Inquiry from The Nation

Lauren,

Obviously this is extremely dense. Has Ted reviewed and signed off on all of this? If not, please run it all by him. Regarding the (b) (5) - just want to confirm (b) (5)

I trust those who put this together, but I want to make sure our subject matter experts have signed off and agree.

Zach

On Dec 18, 2017, at 3:45 PM, Ehrsam, Lauren (OPA) <(b) (6)> wrote:

> Zach,
>
> Below are answers to a forensics inquiry from the Nation. There is an on the record answer from Ted Hunt included, and the rest should be accepted per our negotiated terms on background attributable to a DOJ spokesperson. The deadline is today.
>
> Please let me know your thoughts.
>
> Lauren
>
> 1. In response to the 2016 PCAST report on forensic science, the DOJ said it would "not be adopting the recommendations related to the admissibility of forensic science evidence." As head of the new Forensic Science Working Group will you continue support this policy, and/or how will you address the fact that multiple scientific bodies (PCAST, NRC, AAAS), have concluded that many forensic methods -- including latent fingerprint, firearms/toolmarks, and bitemarks -- either lack scientific validity or have not yet been scientifically validated?
>
> Attribution: OPA
>
> The Department believes—and the law requires—that evidence be both relevant and reliable to be admissible in court. The Department practices a wide variety of forensic disciplines in its accredited laboratories and we are confident that each method we use is valid and reliable. The Department does not perform bitemark analysis, and we are unaware of bitemark analysis being performed inside any state, local, or federal forensic science laboratory.
>
> 2. The 2009 NAS report suggested that the DOJ should not be the home of forensic science reform, even if advised by outside stakeholders, citing a strong potential for bias, despite well-meaning intentions. How would you respond to this?
>
> Attribution: OPA
>
> The Department is composed of many component agencies that have in-house forensic laboratories, capabilities, and experts. (b) (5) oximately $100 million dollars each year directly to state, local, and tribal organizations to support forensic science research, testing, and backlog reduction needs.
>
> 3. A DOJ press release dated August 7, 2017 states: "The Department stands with the forensic science community and against efforts by some to reject reliable and admissible forensic evidence." What is the DOJ's definition of "reliable" and how is it determined?
>
> Attribution: OPA
>
> The Department believes—and the law requires—that evidence be both relevant and reliable to be admissible in court. The Department practices a wide variety of forensic disciplines in its accredited laboratories and we are confident that each method we use is valid and reliable.

4. Given the DOJ's statement that it "stands with the forensic science community" what steps will the Forensic Science Working Group take to ensure that it will consider potential criticisms of forensic theories or practices -- which may or may not undermine entire fields of forensic science (CBLA is one past example) -- in an unbiased manner?

   Attribution" OPA

   The Department has taken unprecedented steps to strengthen forensic science and responsibly report the results of expert analyses in the courtroom. We're committed to improving the science so that collected evidence can be reliably compared to known sources through increasingly reliable methods. The Department is equally committed to ensuring that our examiners only provide expert opinions and conclusions that are supported by available research and data, while not overstating the significance of their findings.

5. Given the adversarial nature of the American justice system and your experience as a prosecutor, what factors do you think might lead prosecutors to resist attempts to limit the types of forensic evidence admissible in court and/or attempts to soften the language of certainty allowed in forensic testimony? What factors might encourage prosecutors to support such reforms?

   Attribution: Hunt

   I can unequivocally say that I don't know of any prosecutor who would consciously choose to offer unreliable evidence or rely on faulty statements of probative value—whether forensic or not. The prosecutor's duty is to seek justice, not win convictions.

6. The NCFS proposed a "Statistical Statements in Forensic Testimony," which you ultimately voted against. At NCFS meeting #13 (April 2017), you remarked that you were concerned the statistical views document would suggest a fingerprint examiner or toolmark examiner should not be able to say "I have identified this known print to this questioned print...that a firearms examiner shouldn't be allowed to say that this shell casing was fire from this gun." Some forensic experts, along with respected scientists, have said that scientific evidence does not support such "absolute" or even "practical" claims of a match. Rather, they state that examiners giving testimony in court should present the chances that their assessment could be right/wrong, based on sources of potential error or uncertainty in their field. For fields where reliable numbers are not available, the suggestion is that forensic expert witnesses indicate an absence of studies. Why do you oppose adding that language to testimony?

   Attribution: OPA

   For this question, I'll refer you back to the source doc. If you visit this link, and go to "Voting Results", you will see that the views document you reference was voted down by the full Commission with 50% of the votes cast against passage, falling far short of the two-thirds majority needed to pass. It was one of only two documents, out of a total of 43 views and recommendations that did not pass when called to a vote before the full Commission.

7. The Jan 2017 issue of the United States Attorneys' Bulletin states: "In April 2015, FBI, IP, and NACDL issued a joint press release in which the FBI acknowledged that at least 90 percent of trial transcripts analyzed as part of the MHCA review contained erroneous statements. The FBI found that 26 of 28 FBI agent/analysts provided either testimony with erroneous statements or submitted laboratory reports with erroneous statements. The review found that the overstated forensic matches favored prosecutors in over 95 percent of the trials reviewed." How will the new Forensic Science Working Group in the DOJ improve forensic expert testimony and work to prevent biased and/or erroneous testimony that tends to favor prosecutors?

   Attribution: OPA

   This past August, the Deputy Attorney General announced that the Department would continue its work to finalize the ULTRs. These discipline-specific documents will direct Department examiners to use designated terminology and testimonial conclusions that will accurately convey the results of forensic tests and analyses.

   Original questions:

   Hi Lauren,

   Please find my questions below. First a little preamble: There have been a many recent criticisms from scientific groups and the mainstream media of forensic science methods, but the conversation around forensic science seems to be rife with misunderstandings. My purpose in reaching out to Mr. Hunt is to give him the opportunity to respond directly to those criticisms as head of the new Forensic Science Working Group. In the course of hearing how he would respond to some of these concerns, I'd like to better understand how he thinks about possible reforms.

The questions below reflect the criticisms I've read in recent scientific reports (NAS, PCAST, AAAS), seen reported of other media outlets, and heard repeated by forensic experts, lawyers, and scientists in the course of my own reporting.

Thank you again for taking the time to look over these, and for considering an interview with Mr. Hunt.

1. In response to the 2016 PCAST report on forensic science, the DOJ said it would “not be adopting the recommendations related to the admissibility of forensic science evidence.” As head of the new Forensic Science Working Group will you continue support this policy, and/or how will you address the fact that multiple scientific bodies (PCAST, NRC, AAAS), have concluded that many forensic methods -- including latent fingerprint, firearms/toolmarks, and bitemarks -- either lack scientific validity or have not yet been scientifically validated?
2. The 2009 NAS report suggested that the DOJ should not be the home of forensic science reform, even if advised by outside stakeholders, citing a strong potential for bias, despite well-meaning intentions. How would you respond to this?
3. A DOJ press release dated August 7, 2017 states: “The Department stands with the forensic science community and against efforts by some to reject reliable and admissible forensic evidence.” What is the DOJ’s definition of “reliable” and how is it determined?
4. Given the DOJ’s statement that it “stands with the forensic science community” what steps will the Forensic Science Working Group take to ensure that it will consider potential criticisms of forensic theories or practices -- which may or may not undermine entire fields of forensic science (CBLA is one past example) -- in an unbiased manner?
5. Given the adversarial nature of the American justice system and your experience as a prosecutor, what factors do you think might lead prosecutors to resist attempts to limit the types of forensic evidence admissible in court and/or attempts to soften the language of certainty allowed in forensic testimony? What factors might encourage prosecutors to support such reforms?
6. The NCFS proposed a “Statistical Statements in Forensic Testimony,” which you ultimately voted against. At NCFS meeting #13 (April 2017), you remarked that you were concerned the statistical views document would suggest a fingerprint examiner or toolmark examiner should not be able to say “I have identified this known print to this questioned print...that a firearms examiner shouldn’t be allowed to say that this shell casing was fire from this gun.” Some forensic experts, along with respected scientists, have said that scientific evidence does not support such “absolute” or even “practical” claims of a match. Rather, they state that examiners giving testimony in court should present the chances that their assessment could be right/wrong, based on sources of potential error or uncertainty in their field. For fields where reliable numbers are not available, the suggestion is that forensic expert witnesses indicate an absence of studies. Why do you oppose adding that language to testimony?
7. The Jan 2017 issue of the United States Attorneys’ Bulletin states: “In April 2015, FBI, IP, and NACDL issued a joint press release in which the FBI acknowledged that at least 90 percent of trial transcripts analyzed as part of the MHCA review contained erroneous statements. The FBI found that 26 of 28 FBI agent/analysts provided either testimony with erroneous statements or submitted laboratory reports with erroneous statements. The review found that the overstated forensic matches favored prosecutors in over 95 percent of the trials reviewed.” How will the new Forensic Science Working Group in the DOJ improve forensic expert testimony and work to prevent biased and/or erroneous testimony that tends to favor prosecutors?

Re: APPROVAL: Forensics Inquiry from The Nation Follow-up

From: "Morrissey, Brian (OAG)" <(b) (6)>
To: "Terwilliger, Zachary (ODAG)" <(b) (6)>
Cc: "Ehrsam, Lauren (OPA)" <(b) (6)>, "Prior, Ian (OPA)" <(b) (6)>, "Flores, Sarah Isgur (OPA)" <(b) (6)>, "Parker, Rachel (OASG)" <(b) (6)>
Date: Wed, 24 Jan 2018 21:04:22 -0500

Thanks. Looks good.

On Jan 24, 2018, at 6:40 PM, Terwilliger, Zachary (ODAG) <(b) (6)> wrote:

> Looping in OAG on this as well. Defer to Ted on this- so I am good
> On Jan 24, 2018, at 4:34 PM, Ehrsam, Lauren (OPA) <(b) (6)> wrote:

Zach,

We received a few follow up questions to an article on forensics that the Nation sent before Christmas. Please let me know if you approve of the below answers. Ted Hunt has approved.

Lauren

1. At NCFS Meeting #9 [NCFS meeting #9, page 11], Ted Hunt lodged one of two "no" votes against dropping the phrase "reasonable degree of scientific certainty" from forensic testimony, which was passed by NCFS and later adopted by DOJ. Why did he vote against dropping phrase "reasonable degree of scientific certainty"? Are forensic experts working for the DOJ using that phrase now?

   (b) (5)

2. Previously, you stated (attributable to OPA): "This past August, the Deputy Attorney General announced that the Department would continue its work to finalize the ULTRs. These discipline-specific documents will direct Department examiners to use designated terminology and testimonial conclusions that will accurately convey the results of forensic tests and analyses." Does Ted Hunt currently support ULTRs dropping the phrase "reasonable degree of scientific certainty" from forensic testimony? Will the DOJ encourage/support language in ULTRs dropping that phrase?

   (b) (5)

3. When we asked about bitemarks previously, the response (attributable to OPA) was: "The Department does not perform bitemark analysis, and we are unaware of bitemark analysis being performed inside any state, local, or federal forensic science laboratory." Regardless of whether the DOJ hires forensic examiners to examine bitemarks, Ted Hunt recently made comments to effect that he believes the technique is potentially valid. We have heard from multiple sources that at the Oct 10, 2017 meeting of the NAS Committee on Science, Technology & the Law, Mr. Hunt said with regards to bitemarks that the "jury was still out." Given

that there have been multiple exonerations in cases that relied on bitemark testimony, the Texas Forensic Science Commission has called for a moratorium on the technique, the ABFO has told its dentists not to testify they can make a match, and many studies show examiners can't reliably use bitemarks for identification. It seems uncontroversial to say that the technique for specific identifications is not valid. What led Ted Hunt to draw the conclusion that "the jury is still out"? Would Mr. Hunt confirm that he made remarks along those lines? Would he like to offer any response?

Background: (b) (5) [redacted]

4. We have also heard from multiple sources that at that same Oct 10 NAS meeting a scientist in the audience, Dr. Susan Silbey challenged Mr. Hunt's comment that what constitutes scientific validation of a method is a "difference of opinion," and she suggested Mr. Hunt did not appear have a firm understanding of scientific methodology. We are going to report this exchange. Would Mr. Hunt like to respond?

Attributable to Hunt: (b) (5) [redacted]

5. At a meeting of the Judicial Conference of the United States Committee on Rules of Evidence on Oct 27, 2017, Mr. Hunt described PCAST's approach to scientific validity as "wrong and ill-advised," and at the Oct 10 meeting, described PCAST's definition of science as "narrow." This suggests that Mr. Hunt either does not understand basic scientific methodology or disagrees that the standards of basic scientific methodology that would apply to empirically validating subjective methods in any other scientific field do not apply to the forensic pattern-matching disciplines. Could he clarify his statement and/or position?

(b) (5) [redacted]

Ted has a law review article coming out soon that will explain our position in detail on a couple key aspects of the PCAST Report, so we should probably (b) (5) [redacted]. It's currently in ODAG for clearance.

From: Ehrsam, Lauren (OPA)
Sent: Monday, December 18, 2017 3:46 PM
To: Terwilliger, Zachary (ODAG) <(b) (6) [redacted]>
Cc: Prior, Ian (OPA) <(b) (6) [redacted]>; Flores, Sarah Isgur (OPA) <(b) (6) [redacted]>
Subject: APPROVAL: Forensics Inquiry from The Nation

RE: Email to Solicit Updates for Feb/Mar

From: "Hunt, Ted (ODAG)" <(b) (6)>
To: "Terwilliger, Zachary (ODAG)" <(b) (6)>
Date: Thu, 15 Feb 2018 18:07:45 -0500

Deliverables – Feb/March
February
Feb 1: Meeting of the National Science and Technology Council (federal interagency collaboration)
Feb 1: Submission of law review article to Fordham responding to PCAST Report (Federal Advisory Rules Committee/702 amendment)
(b) (5)

Feb 21: DAG speech at AAFS 70th Annual Scientific Meeting (ULTR, TM, CFFLD, Needs Assessment, Posting of SOPs)
(b) (5)

March
FBI Rapid DNA meeting – OJP
(b) (5)

I'll have more to fill in for March from NIJ in the morning.

Ted

From: Terwilliger, Zachary (ODAG)
Sent: Tuesday, February 13
To: Atwell, Tonya (ODAG) <(b) (6)>; Bacon, Antoinette T. (ODAG) <(b) (6)>; Bolitho, Zachary (O(b) (6)>; Brinkley, Winnie (ODA(b) (6)>; Brown, Angela M. (ODAG) <(b) (6)dwell, Christine (ODAG) <(b) (6)ook, Steven H. (ODAG) <(b) (6)>; Daly(b) (6)>; Ellis, Core(b) (6)>; Fe DAG) <(b) (6)el (ODAG) <(b) (6)> Nathaniel (ODAG) (b) (6)>; Gauhar, Tashina (ODAG) <(b) (6)oldsmith, Andrew (ODAG) <(b) (6)>; Groves, Brendan M. (ODA(b) (6)>; Hill, John L. (ODAG) <(b) (6)ted (ODAG) <(b) (6)G) <(b) (6)>; Lan, Iris (O(b) (6)>; Loveland, D(b) (6)>; M (O(b) (6)>; Medina, Amelia (O(b) (6)>; Michalic, Mark (ODAG) <(b) (6)phy, Marcia (ODAG) <(b) (6)ay, Michael (ODAG) <(b) (6)>; Powell, SeLena Y (ODA(b) (6)>; Raman, Sujit (ODAG) <(b) (6)>; Schools, Scott (ODAG) <(b) (6)heehan, Matthew (ODAG) <(b) (6)>; Simms, Donna Y. (ODAG) (b) (6)>; Spolar, Ellen S. (ODAG) <(b) (6)Swanson, James (ODAG) <(b) (6)>; Terwilliger, Zachary (ODAG) <(b) (6)>; Thiemann, Robyn (ODAG) <(b) (6)>; Watson, Theresa J. (ODAG) <(b) (6)Wetmore, David H. (ODAG) <(b) (6)>
Subject: FW: Email to Solicit Updates for Feb/Mar

Team ODAG,
As part of our strategic planning process, we are providing updates regarding deliverables for the upcoming month. If you (or your components) have deliverables (events, policy pronouncements, enforcement actions, etc) can you please shoot Zac B and me an email with those items by COB tomorrow (Thursday)?

For example, the following might be such a deliverable:

- DAG Speech to the National Conference of American Indians;
- Cyber Security Executive Order;
- Nomination of 5 U.S. Marshals;
- Summit on Human Trafficking;
- Report to the President on the Violent Crime Task Force;
- Briefing to members of Congress on Elder Justice.

Happy to answer any questions.

Thanks,
Zach

From: Whitaker, Matthew (OAG)
Sent: Tuesday, February 13, 2018 3:16 PM
To: Boyd, Stephen E. (OLA) <[redacted]>; Hankey, Mary Blanche (OLA) <[redacted]>; Flores, Sarah Isgur (OPA) <[redacted]>; Hur, Robert (ODAG) <[redacted]>; Terwilliger, Zachary (ODAG) <[redacted]>; Champ Mark (OLP) <[redacted]>; Williams, Beth A (OLP) <[redacted]>; Parker, Rachel (OASG) <[redacted]>; Panuccio, Jesse (OASG) <[redacted]>
Cc: Cutrona, Danielle (OAG) <[redacted]>; Freeman, Lindsey (OLP) <[redacted]>; Yeager, Demi (OAG) <[redacted]>
Subject: Email to Solicit Updates for Feb/Mar

All,

In anticipation of our Tuesday (2/20) Strategic Planning meeting, please send to OLP (Lindsey Freeman and Mark Champoux):
1. All updates on deliverables and events for February;
2. Current plan for deliverables and events in March, either using the attached March document or by email with a categorized list.

Please try to get these in by 10 am Friday.

Thanks. MW

FW: Forensics Law Review Articles

From: "Terwilliger, Zachary (ODAG)" <(b) (6) >
To: "Morrissey, Brian (OAG)" <(b) (6) >
Date: Fri, 26 Jan 2018 18:17:19 -0500
Attachments: ADG Article_01192018_DISTRIBUTED.DOCX (57.12 kB); FBI Lab Article_01192018_DISTRIBUTED.DOCX (34.65 kB); Hunt Fordham Law Review Article_DISTRIBUTED.DOCX (58.85 kB)

FYSA

From: Antell, Kira M. (OLP)
Sent: Friday, January 26, 2018
To: Bolitho, Zachary (ODAG) <(b) (6) >; Terwilliger, Zachary (ODAG) <(b) (6) >
Cc: Hunt, Ted (O (b) (6) >; Goldsmith, Andrew (b) (6) >; Shapiro, Elizabeth (CIV) <(b) (6) Hur, Robert (ODAG) <(b) (6)
Subject: Forensics Law Review Articles

Duplicative Information - See Document ID 20220314-06126

RE: Forensics Law Review Articles

From: "Terwilliger, Zachary (ODAG)" <(b) (6)>
To: "Antell, Kira M. (OLP)" <(b) (6)>
Date: Mon, 29 Jan 2018 17:51:45 -0500

Fine here. Thanks, Kira.

From: Antell, Kira M. (OLP)
Sent: Monday, January 29, 2018 4:44 PM
To: Bolitho, Zachary (ODAG) <(b) (6)>; Terwilliger, Zachary (ODAG) <(b) (6)>
Cc: Hunt, Ted (ODAG) <(b) (6)>; Goldsmith, Andrew (ODAG) <(b) (6)>; Shapiro, Elizabeth (CIV) <(b) (6)>; Hur, Robert (ODAG) <(b) (6)>
Subject: RE: Forensics Law Review Articles

Good afternoon,

Circling back on this. (b)(5) per CIV

Thanks,
Kira

From: Antell, Kira M. (OLP)
Sent: Friday, January 26, 2018 11:58 AM
To: Bolitho, Zachary (ODAG) <(b) (6)>; Terwilliger, Zachary (ODAG) <(b) (6)>
Cc: Hunt, Ted (ODAG) <(b) (6)>; Goldsmith, Andrew (ODAG) <(b) (6)>; Shapiro, Elizabeth (CIV) <(b) (6)>; Hur, Robert (ODAG) <(b) (6)>
Subject: Forensics Law Review Articles

Good afternoon,

In October, the Department presented at a forensics evidence symposium at Boston College. The purpose of the symposium was to discuss whether it was appropriate to amend Rule 702 for cases involving forensic evidence. The transcript of the symposium will be published in an upcoming issue of the *Fordham Law Review*. Department speakers were invited to provide short articles to the *Fordham Law Review Online* for March publication. Ted, Andrew, and Alice Isenberg from FBI lab have written articles.

We expect to submit these articles to Fordham on Monday by COB. Rob attended the symposium and hoped to have a chance to review the articles but has asked us to proceed with clearance given our relatively tight timeline. The ethics office indicates there are no issues on their end.

(b)(5) per CIV

(b)(5) per CIV

Please do let me know if you have questions or concerns prior to submission.

Thanks,
Kira

Kira Antell
Senior Counsel
Office of Legal Policy
U.S. Department of Justice
950 Pennsylvania Avenue, NW
Washington, DC 20530
(b) (6)
(b) (6)

702 Memo

From: "Shapiro, Elizabeth (CIV)" <(b) (6) >
To: "Goldsmith, Andrew (ODAG)" <(b) (6) >, "Hunt, Ted (ODAG)" <(b) (6) >
Date: Sat, 27 Apr 2019 20:00:22 -0400
Attachments: 702 Memo.docx (49.57 kB)

Andrew/Ted,
Attached is an edited draft of Ted's memo. (b)(5) per CIV

Thanks, and sorry to intrude on the weekend!
Betsy

Hunt Revision to 702 Memo

From: "Hunt, Ted (ODAG)" <(b) (6) >
To: "Goldsmith, Andrew (ODAG)" <(b) (6) >, "Shapiro, Elizabeth (CIV)" <(b) (6) >
Date: Sun, 28 Apr 2019 20:26:29 -0400
Attachments: Hunt Revision-702 Memo.docx (53.68 kB)

Andrew and Betsy,

(b)(5) per CIV

(b)(5) per CIV

Thanks,

Ted

Senior Advisor on Forensic Science
Office of the Deputy Attorney General
United States Department of Justice
950 Pennsylvania Ave. NW
Washington, DC 20530
(b) (6)
(b) (6)

Fwd: New-arriving reading material for Friday's meeting

From: "Shapiro, Elizabeth (CIV)" <(b) (6)>
To: "Hunt, Ted (ODAG)" <(b) (6)>, "Goldsmith, Andrew (ODAG)" <(b) (6)>
Cc: "Wroblewski, Jonathan (CRM)" <(b)(6); (b)(7)(C) per CRM>
Date: Mon, 29 Apr 2019 21:44:18 -0400
Attachments: DOJ Rule 702 Memo Spring 2019.pdf (644.2 kB); ATT00001.htm (236 bytes); DOJ rebuttal of Rule 702 Case Digest spring 2019.pdf (422.46 kB); ATT00002.htm (236 bytes); Judge Edwards on NAS report.pdf (26.07 kB); ATT00003.htm (178 bytes)

All, (b)(5) per CIV

Sent from my iPhone

Begin forwarded message:

From: Daniel Capra <(b) (6)>
Date: April 29, 2019 at 7:23:09 PM EDT
To: Debra Livingston <(b) (6)>, <(b)(6) Daniel Capra>, <(b)(6) James Bassett>, (b)(6) Daniel Collins, (b)(6) Daniel Collins, nelly Dick <(b) (6)>, <(b)(6) Edward O'Callaghan>, Kathy Nester <(b) (6)>, <(b)(6) Traci Lovitt>, John Thomas Marten <(b) (6)>, Thomas Schroeder <(b) (6)>, "Cc:" <(b)(6) Carolyn Kuhl>, <(b)(6) Liesa Richter>, James Dever <(b) (6)>, oi <(b) (6)>, <(b) (6)>, Nancy Oulley <(b) (6)>, <(b)(6) Daniel Coquillette>, <(b)(6) Daniel Coquillette>
C <(b)(6) Catherine Struve>, <(b)(6) Elizabeth Shapiro>, <(b)(6) Lisa Merrill>, Barbara Alcon <(b) (6)>, (b) (6), Jeanette Santos <(b) (6)>, Lyndsay Hayes <(b) (6)>, Kristen Wheeler <(b) (6)>, <(b)(6) Angela Brown>, Timothy Lau <(b) (6)>, Melissa Whitney <(b) (6)>, Rebecca Womeldorf <(b) (6)>
Subject: New-arriving reading material for Friday's meeting

Members of the Advisory Committee on Evidence Rules, and others,

I am attaching three files to provide more good reading for Friday's meeting. These came to me today. The documents are: 1. The DOJ position on the proposed amendment to Rule 702; 2. The DOJ response to the case digest on forensic evidence; and 3. A short speech by Judge Harry Edwards (co-chair of the National Academies group that wrote the report on forensic testimony in 2009). Happy reading. See you Thursday night.

To: **Judge Debra A. Livingston, Chair**
Advisory Committee on the Federal Rules of Evidence

Judge Thomas D. Schroeder, Chair
Subcommittee on Rule 702

Daniel J. Capra, Reporter
Advisory Committee on the Federal Rules of Evidence

From: **Ted R. Hunt, Senior Advisor on Forensic Science**
U.S. Department of Justice

Elizabeth J. Shapiro
U.S. Department of Justice

Date: **April 29, 2019**

Re: **Agenda Materials on 'Overstatement' in Forensic Science**

At the outset, we thank you and the Committee for the substantial work you have performed gathering case materials and seeking out a wide range of diverse views — including those of the Department — in connection with the proposed amendment to Rule 702 to address perceived 'overstatement' by forensic examiners. We hope that the addition of our written perspective on these matters will be helpful to the Committee in its forthcoming deliberations.

After careful consideration of all the materials, including the proposed amendment and the accompanying Note, the Department believes that the current proposal on 'overstatements' should be postponed in order to permit the Department's initiatives on Uniform Language for Testimony and Reports ('ULTRs') and testimony monitoring to take full effect. The issue can be monitored in future meetings, and an amendment re-visited in the future if deemed necessary. This memorandum explains why we believe that the current materials do not demonstrate the need for an amendment at this juncture, and explains in greater detail why opinion testimony regarding 'source identification' is not a testimonial overstatement.

We also respond to Joe Cecil's views that the Department's ULTRs are insufficient to address the perceived problem, as well as Professor's Garrett's comments on error rates included in the agenda book. In addition, we address the basis on which experts in two commonly-used pattern matching disciplines, latent print and firearms/toolmarks examinations, form their opinions. Finally, attached to this memorandum is some analysis

of the facts underlying the cases included in the case digest identified as instances of testimonial 'overstatement.'

Memorandum Summary

- A 'source identification' conclusion is not a testimonial 'overstatement.' When a pattern comparison examiner offers a 'source identification' conclusion, he or she is not making an empirical or statistically-based claim about nature. A 'source identification' inference makes no claim about any *other* impressions or marks that may or may not exist. Furthermore, when offering this conclusion, an examiner is *not* claiming that the questioned mark or impression is unique, or that he or she can individualize it to the exclusion of all other marks or impressions.

- Instead, an examiner's 'source identification' conclusion is a knowledge, skill, and experience-based decision that the evidence provides sufficiently strong support to conclude that, in his or her expert opinion, the questioned mark or impression came from the same source as the known mark or impression. That opinion is a logical inference that inductively proceeds from the observed facts and data to the 'source identification' conclusion. Inferences such as these are based on technical and specialized knowledge, skill, and experience – *not* statistical methods or empirical measurements.

- The logical warrant for the inference to a 'source identification' conclusion is that qualified forensic examiners authorized to perform casework in accredited laboratories have consistently demonstrated their ability to accurately make these determinations. Throughout a typical training program, examiner trainees compare hundreds to thousands of questioned (but known ground truth) impressions to known source exemplars. These comparisons increase in difficulty as examiner trainees learn how to reliably identify and exclude questioned marks and patterns. In short, before pattern comparison examiners are deemed competent and authorized to perform casework, they must demonstrate that they *can, and consistently do*, make correct 'source identification' conclusions.

- An expert's opinion may — but need not — be empirically derived, verified by measurement, or statistical in nature. However, as the Supreme Court made clear in *Daubert* and *Kumho Tire*, experience — either operating alone or in conjunction with knowledge, skill, training, or education — provides an equally legitimate legal foundation for expert testimony. As such, although an expert's opinion must be based on "sufficient facts or data" and supported by "reliable principles and methods," those facts/data and principles/methods need not be empirical or statistical in nature or based on measurement of the phenomena under consideration. Rather, an expert may provide a knowledge-skill-and-experience-based opinion. That opinion, although necessarily inductive — and thereby potentially fallible — may be stated in categorical form as an expert opinion on an ultimate issue in the case.

- The spring 2019 meeting materials suggest that testimony by forensic examiners include 'black box' study-derived error rates for the method used. The current consensus of scientific thought does not support this view. The American Association for the Advancement of Science (AAAS) recently cautioned against extrapolating study-derived error rates to case-specific scenarios. It found that error rates cannot be reduced to a single number or set of numbers. Instead, the AAAS found that error rates derived from 'black box' studies do not necessarily reflect the rate of error in actual forensic practice.

- Rather than study-derived error *rates*, the focus should be on the *risk* of error in an individual case. In its recent draft document, *Validation and Performance Testing in Forensic Science: Perspectives of the OSAC Human Factors Committee*, the Human Factors Committee of the Organization of Scientific Area Committees (OSAC) (a group composed of non-forensic scientists and academics) stated: "Lawyers often want to know 'the error rate' of a forensic method or procedure. It is a naïve question because the error rate of a given procedure is likely to vary based on a variety of factors that affect the difficulty of the analysis in a particular case."

- We do not believe that the case digest that accompanies the agenda materials supports the need for the proposed amendment or the draft committee Note. Most of the cases included in the digest are five or more years old and prior to the Department's work on uniform language and testimony monitoring. In addition, many of the cases either involve instances where the court — not the witness — used the term 'match,' or the court ordered the witness to use a term or phrase described as an 'overstatement.'

I. '<u>Source Identification' and Claims of 'Overstatement</u>'

The meeting materials include a response from Joe Cecil to a question posed by the Reporter regarding the Department's Uniform Language for Testimony and Reports (ULTRs).[1] Specifically, the Reporter asked Mr. Cecil, "If the DOJ standards on what forensic experts say is perfectly executed, are there still concerns about overstatement?" Mr. Cecil answered "yes," arguing that — in his opinion — concerns remain about the latent print and firearms/toolmarks disciplines.

Mr. Cecil acknowledged that the Department's ULTRs "will resolve some of the most important problems that arise in forensic science testimony."[2] These include improving practice by eliminating the use of the phrase "reasonable degree of scientific certainty" and similar expressions; prohibiting claims that forensic techniques are error-free; disallowing forensic examiners from citing the number of examinations they have performed as a direct measure for the accuracy of the examination in question; and not offering statistical estimates without relevant and appropriate data. Mr. Cecil also

[1] Federal Advisory Committee Fall 2018 Meeting Materials, *memo to subcommittee on forensics and overstatement September 2018*, correspondence of Joe Cecil to Federal Rules Advisory Committee Reporter, Professor Dan Capra, pp. 5-9.
[2] *Id*. at 5.

acknowledged that the Department's testimony monitoring program will "bring about greater consistency and allow early identification of emerging problems."[3] In his view, "These are important steps in strengthening the accuracy of forensic science testimony."[4]

Mr. Cecil was nevertheless concerned that "overstatement" of findings will persist because "distinguished members of the scientific community will conclude that current research does not provide a sufficient factual foundation to support a forensic examiner's conclusion that 'two or more specific patterns indicate that they originated from the same source' --- a conclusion that is permitted under the DOJ standards."[5] Focusing on the provisions of the Department's Uniform Language for Latent Print Examinations, Mr. Cecil observed that "forensic examiners may testify two prints originated from the same source, but not to the exclusion of all other sources since that would imply a scientific basis for the opinion."[6] He argued that a "[f]orensic examiner's untethered opinion testimony that declares a match with no empirical basis is exactly what raised the ire of the scientific community," noting that "PCAST questioned whether a subjective conclusion would meet the FRE 702(c) standard of reliable principles and methods." Mr. Cecil concluded his critique by claiming that the "core of the problem is the decision to allow forensic examiners in some areas to testify that he or she can determine that the defendant is the source of the crime scene evidence (i.e. source identification)."

Mr. Cecil's critique, however, is based on a flawed premise. He incorrectly assumes that 'source identification' opinions must be necessarily based on "empirical research" and "scientific" methodology. That is simply not the case, as the Supreme Court made abundantly clear in *Daubert* and *Kumho Tire*. Those cases stressed that judges "cannot administer evidentiary rules under which a gatekeeping obligation depend[s] upon a distinction between 'scientific' knowledge and 'technical' or 'other specialized' knowledge' . . . ." *See Kumho Tire*, 526 U.S. 137, 148 (1999). Rather than endorsing impractical efforts at 'binning' separate categories of knowledge, the Court made clear that the touchstone for the admissibility of expert knowledge under FRE 702 — whatever its epistemic underpinning — is relevance and reliability.[7]

Reliable evidence must be grounded in *knowledge*, whether scientific, technical, or specialized in nature.[8] The term knowledge "'applies to any body of known facts or to any body of ideas inferred from such facts or accepted as truths on good grounds.'"[9] The Court was quick to stress that no body of knowledge — including scientific knowledge — can or must be "known" to a certainty.[10] In addition, the *Kumho* Court made clear that the

[3] *Id.*
[4] *Id.*
[5] *Id.*
[6] *Id.*
[7] *Daubert v. Merrell Dow Pharms., Inc*., 509 U.S. 579, 589 (1993).
[8] *Id*. at 590.
[9] *Id*. (citing Webster's Third New International Dictionary 1252 (1986)) (emphasis added).
[10] *Daubert*, 509 U.S. at 590.

assessment of reliability may appropriately focus on the personal knowledge, skill, or experience of the expert witness.[11] That fact is reflected in the current Comment to FRE 702, which states:

> Nothing in this amendment is intended to suggest that *experience alone*—or experience in conjunction with other knowledge, skill, training, or education—may not provide a *sufficient foundation* for expert testimony. To the contrary, the text of Rule 702 expressly contemplates that an expert may be qualified on the basis of experience. *In certain fields, experience is the predominant, if not sole, basis for a great deal of reliable expert testimony*.[12]

Thus, when a fingerprint or toolmark examiner provides a 'source identification' conclusion, he or she is not making an empirical or statistically-based claim about nature. In other words, a 'source identification' inference makes no claim about any *other* marks or impressions that may, or may not, exist. Furthermore, an examiner is not claiming that the questioned mark or impression is unique or that he or she can individualize it to the exclusion of all *other* questioned marks or impressions. Instead, an examiner's 'source identification' conclusion is a knowledge, skill, and experience-based decision[13] that the evidence provides sufficiently strong support[14] in favor of the same-source proposition to conclude that, in his or her expert opinion, the questioned mark or impression came from the same source as the known mark or impression.[15] That opinion is an inference that

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[11] 526 U.S. at 150 ("[T]he relevant reliability concerns may focus upon personal knowledge or experience.")
[12] Advisory Committee Comment to FRE 702 (emphasis added).
[13] "Probability can be 'objective' (a logical measure of chance, where everyone would be expected to agree to the value of the relevant probability) or 'subjective,' in the sense that it measures the strength of a person's belief in a particular proposition." Colin Aitken, Paul Roberts, Graham Jackson, *Communicating and Interpreting Statistical Evidence in the Administration of Criminal Justice, 1. Fundamentals of Probability and Statistical Evidence in Criminal Proceedings, Guidance for Judges, Lawyers, Forensic Scientists and Expert Witnesses*, Royal Statistical Society, at 14 (November 2010) available at: http://www.rss.org.uk/Images/PDF/influencing-change/rss-fundamentals-probability-statistical-evidence.Pdf.
[14]

> Because ridge features have been demonstrated to be highly variable, an examiner may well be justified in asserting that a particular feature set is rare, even though there is no basis for determining exactly how rare. And an examiner may well be justified in saying that a comparison provides "strong evidence" that the prints have a common source, even though there is no basis for determining exactly how strong.

WILLIAM THOMPSON ET AL., FORENSIC SCIENCE ASSESSMENTS: A QUALITY AND GAP ANALYSIS (2017), at 66 (2017) available at: https://mcmprodaaas.s3.amazonaws.com/s3fs public/reports/Latent%20Fingerprint%20Report%20FINAL%209_14.pdf?i9xGS_EyMHnIPLG6INIUyZb66L 5cLdlb.
[15]

> Events or parameters of interest, in a wide range of academic fields (such as history, theology, law, forensic science), are usually not the result of repetitive or replicable processes. These events are singular, unique, or one of a kind. It is not possible to repeat the events under identical conditions and tabulate the number of occasions on which some past event actually occurred. The use of subjective probabilities allows us to consider probability for events in situations such as these.

inductively proceeds from the observed facts and data to a 'source identification' conclusion.[16] Inferences such as these are based on technical and specialized knowledge, training, skill, and experience — *not* statistical methods or empirical measurements.

II. The Factual Basis and Logical Warrant for a Forensic Examiner's Knowledge, Skill, and Experience-Based 'Source Identification' Opinion

a. Latent Print Examination

FBI friction ridge examiners must demonstrate their ability to accurately make 'source identifications' and 'source exclusions' before they are deemed competent and authorized to perform casework. To establish competency, latent print examiners who work in accredited laboratories must satisfy minimum education requirements, complete comparison skills exercises, and successfully pass a final qualification exam.

Throughout a typical 12 to 18 month training program, examiner trainees conduct thousands of comparisons of latent (but known source) impressions to known source exemplars. These comparisons increase in difficulty as trainees learn how to identify and exclude latent and known prints.

Throughout their training, examiners learn to apply their knowledge of the biological basis of friction ridge skin, studies measuring the frequency of friction ridge features, and statistical models attempting to quantify the rarity of feature configurations to their comparisons. Once qualified, examiners continue to use a combination of education, training, experience, and skill to inform their expert decisions on the discriminability and source of friction ridge impressions.

At the completion of their training program, examiner trainees must successfully complete a final qualification exam that tests both foundational knowledge (through a written exam) as well as technical skill (through a comparison skills test). Only then may an accredited laboratory authorize an examiner to conduct casework. Once qualified, examiner

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COLIN AITKEN & FRANCO TARONI, STATISTICS AND THE EVALUATION OF EVIDENCE FOR FORENSIC SCIENTISTS 22-23 (Wiley 2nd Ed. 2004).

[16]

> Most inferential reasoning in forensic contexts is inductive. It relies on evidential propositions in the form of empirical generalisations . . . and it gives rise to inferential conclusions that are ampliative, probabilistic and inherently defeasible. This is, roughly, what legal tests referring to "logic and common sense" presuppose to be the lay fact-finder's characteristic mode of reasoning. Defeasible, ampliative induction typifies the eternal human epistemic predicament, of reasoning under uncertainty to conclusions that are never entirely free from rational doubt.

Paul Roberts & Colin Aitken, *Communicating and Interpreting Statistical Evidence in the Administration of Criminal Justice, 3. The Logic of Forensic Proof – Inferential Reasoning in Criminal Evidence and Forensic Science, Guidance for Judges, Lawyers, Forensic Scientists and Expert Witnesses*, Royal Statistical Society, at 43 (March 2014) available at: https://www.maths.ed.ac.uk/~cgga/Guide-3-WEB.pdf.

competence is continually assessed through proficiency testing, latent print verifications, technical reviews, and case file audits. In short, examiners must demonstrate that they can, and consistently do, form accurate 'source identification' conclusions before being authorized to perform casework.

A qualified examiner's skill and ability to correctly source identify questioned prints to known exemplars is not empirical speculation — it is a demonstrable fact. Latent print examiners must correctly source identify thousands of questioned impressions before they are cleared to begin forensic casework.

In May 2011, the results of a large-scale independent 'black box' study of latent print examiners was published. It evaluated the accuracy of conclusions offered by those examiners.[17] In the study, 169 examiners were each presented with approximately 100 pairs of prints. The study found that the 'source identification' conclusions offered by these examiners were correct 99.8% of the time. The study also found that their 'source exclusion' decisions were correct 88.9% of the time. These results demonstrate that trained examiners can produce largely accurate and reliable 'source identification' conclusions.

In 2014, the results of a second large-scale 'black box' study of latent print examiners conducted by the Miami-Dade County Crime Laboratory were released.[18] The study consisted of three phases. In Phase I, examiner performance regarding Analysis, Comparison, and Evaluation (ACE) accuracy was evaluated. A total of 4,536 ACE examinations were reported by the participants. There were 42 erroneous identifications reported during these examinations. Although many of the errors appear to have been clerical rather than interpretive in nature, the authors could not determine this fact with certainty. The false positive rate in the study was 3.0%, and the false negative rate was 7.5% for all examinations.

In Phase II, participant performance for Analysis, Comparison, Evaluation, and Verification by a second examiner (ACE-V), which is how latent print casework examinations in accredited laboratories are *actually performed*, was evaluated. The results were informative. A total of 532 ACE-V examinations were reported by the participants, with ***a false positive rate of 0%*** and a false negative rate of 2.9%. With the added step of Verification — which always occurs during actual casework — there were *no* false positive conclusions.

In Phase III of the study, 17 of the 42 erroneous identifications reported during ACE examinations were sent for verification to 14 participants. None of the participants who acted as verifiers reported agreement with the prior erroneous identifications. During the verification stage, the 14 participants either reported findings that disagreed with, or were inconclusive regarding, the original incorrect conclusion.

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[17] Ulery, B.T., Hicklin, R.A., Buscaglia, J., and M.A. Roberts. *Accuracy and Reliability of Forensic Latent Fingerprint Decisions - Proceedings of the National Academy of Sciences*, Vol. 108, No. 19 (2011).
[18] Pacheco, I., Cerchiai, B., and S. Stoiloff. *Miami-Dade Research Study for the Reliability of the ACE-V Process: Accuracy & Precision in Latent Fingerprint Examinations*. (2014) available at: www.ncjrs.gov/pdffiles1/nij/grants/248534.pdf.

Collectively, this research suggests that latent print examinations performed by trained and qualified examiners result in exceedingly few false positive conclusions. Importantly, these studies demonstrate the ability of qualified examiners to make correct 'source identification' conclusions with a high degree of accuracy.

b. Firearms/Toolmarks Examination

Training in the firearms/toolmarks discipline at the FBI Crime Laboratory lasts approximately 3 years. A trainee will spend nearly 1,000 hours learning how to recognize similar and dissimilar microscopic characteristics and patterns. The trainee learns how tools produce and reproduce patterns composed of individual characteristics, and develops the basis for determining sufficient agreement when comparing toolmark patterns for similarity.

A trainee must perform several thousand microscopic comparisons using tool and tool-marked items, including fired bullets and cartridge cases. The trainee is required to produce known corresponding and known non-corresponding samples for comparison. Additionally, the trainee is required to conduct multiple microscopic comparison exercises involving best known non-match comparisons for toolmarks produced by consecutively manufactured tools (the worst case scenario).

Because of the potential for microscopic similarities between patterns that originated from best known non-match sources, the trainee develops an understanding of the level of similarity found in both microscopic patterns known to have come from different sources and microscopic patterns known to have come from the same source.

Competency testing is used to determine whether a trainee has acquired the expertise needed to conduct casework examinations. The trainee must demonstrate that he or she can consistently make correct 'source identification' decisions during a training program that involves *hundreds* of microscopic comparisons in the following areas: firearms, toolmarks, bullets, and cartridge casings. Once qualified, an examiner's competence is continually evaluated through verifications, technical reviews, proficiency testing, and case file audits.

A firearms/toolmarks examiner's skill and ability to correctly source identify questioned marks to known exemplars is not empirical speculation — it is a demonstrable fact. Firearms/toolmarks examiners must make correct 'source identification' conclusions regarding hundreds of questioned marks before they are authorized to begin forensic casework.

In 2011, a large-scale independent 'black box' study of firearms/toolmarks examiners was performed.[19] This study involved 218 examiners who were presented with 15 separate comparison problems. Each problem consisted of one questioned sample and three known test fires that originated from the same gun. Unbeknownst to the examiners, there were 5 same-source and 10 different-source comparisons. Among the 2,178 different-

[19] Baldwin, D.P., Bajic, S.J., Morris, M., and D. Zamzow. *A study of false-positive and false-negative error rates in cartridge case comparisons*. Ames Laboratory, USDOE, Technical Report #IS-5207 (2014) available at: afte.org/uploads/documents/swggun-false-postive-false-negative-usdoe.pdf.

source comparisons, there were 1,421 eliminations, 735 inconclusive results, and 22 false positives. The false positive rate was only 1.5%. In addition, 20 of the 22 false positives were made by *only 5* of the 218 examiners.

This research shows that firearms/toolmarks examinations performed by trained and qualified examiners result in very few false positive conclusions. Importantly, it establishes the ability of qualified examiners to make correct 'source identification' conclusions with a high degree of accuracy.

III. Contemporary Forensic Documents That Describe the Basis for 'Source Identification' Conclusions

a. DOJ Uniform Language for Testimony and Reports (ULTRs)

The Department's ULTRs for latent print and firearms/toolmarks pattern examinations clearly state that a 'source identification' conclusion is an examiner's *decision* that the evidence provides extremely strong support for the same-source proposition such that the examiner has come to the *opinion* that the two impressions or marks came from the same source.[20] These documents also make clear that a 'source identification' conclusion is an examiner's inference that inductively proceeds from observed facts and data to his or her conclusion about those facts and data regarding the origin of a questioned mark.[21] Induction involves "predictions about new situations that are inferred or induced from the existing body of knowledge."[22]

The ULTRs make clear that "[a] source identification is not based upon a statistically-derived or verified measurement or an actual comparison of all [impressions/marks] in the world."[23] Moreover, both documents clearly state that "an examiner shall not assert that two [marks or impressions] originated from the same source to the exclusion of all other sources."[24]

The Qualifications and Limitations section of the Latent Print ULTR states:

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[20] *Department of Justice Uniform Language for Testimony and Reports for the Forensic Latent Print Discipline*, at 2; and *Uniform Language for Testimony and Reports for the Firearms and Toolmarks Discipline – Pattern Match Examination*, at 2. Available at: https://www.justice.gov/olp/forensic-science#ultr.
[21] *Id.* at 2 (both).
[22] *Id.* at 2, n.2:

> Inductive reasoning (inferential reasoning): A mode or process of thinking that is part of the scientific method and complements deductive reasoning and logic. Inductive reasoning starts with a large body of evidence or data obtained by experiment or observation and extrapolates it to new situations. By the process of induction or inference, predictions about new situations are inferred or induced from the existing body of knowledge. In other words, an inference is a generalization, but one that is made in a logical and scientifically defensible manner.

OXFORD DICTIONARY OF FORENSIC SCIENCE 130 (Oxford Univ. Press 2012).
[23] *Id.* at 3 (both).
[24] DOJ Latent Print and Firearms/Toolmarks-Pattern ULTRs, *supra*, note 20 at 3.

> An examiner shall not assert that two friction ridge skin impressions originated from the same source to the exclusion of all other sources or use the terms 'individualize' or 'individualization.' This may wrongly imply that a 'source identification' conclusion is based upon a statistically-derived or verified measurement or actual comparison to all other friction ridge skin impression in the world's population, rather than an examiner's expert opinion.[25]
>
> Similarly, the Department's Firearms/Toolmarks Pattern Match ULTR states:
>
> An examiner shall not assert that two toolmarks originated from the same source to the exclusion of all other sources. This may wrongly imply that a 'source identification' conclusion is based upon a statistically-derived or verified measurement or an actual comparison of all other toolmarks in the world, rather than an examiner's expert opinion.[26]

These qualifications and limitations clearly state that an examiner's 'source identification' conclusion is not a scientific, empirical, or statistical claim about the individuality of a print, mark or pattern in nature, and makes no claim to exclude all other prints, marks, or patterns. These limitations also make it clear that a 'source identification' conclusion is not an empirical or statistical claim about the uniqueness of print, mark, or pattern. The concept of uniqueness is both irrelevant and unnecessary to the formation of a 'source identification' conclusion, which is grounded in the examiner's technical and specialized knowledge, skill, and experience.

b. The Organization of Scientific Area Committees (OSAC)

The Organization of Scientific Area Committees (OSAC) is a forensic science standards organization administered by the National Institute of Standards and Technology (NIST).[27] OSAC has over 550 members from government agencies, academic institutions, and the private sector. In addition to forensic scientists, it includes judges, prosecutors, defense attorneys, innocence advocates, and law professors. OSAC members work in a collaborative manner to develop and evaluate forensic science standards through a transparent, consensus-based process that allows for participation and comment by all stakeholders.

The OSAC Friction Ridge Subcommittee is one of the 25 subject matter-specific groups in the organization.[28] It is composed of 20 members who represent academia, private industry, crime laboratories, and the scientific community. The subcommittee is a diverse group of experts and stakeholders that have a variety of interests and perspectives.

To date, the OSAC Friction Ridge Subcommittee has approved two draft standards for latent print examination. These documents are currently under consideration as national

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[25] DOJ Latent Print ULTR, *supra*, note 20 at 3.
[26] DOJ Firearms/Toolmarks-Pattern ULTR, *supra*, note 20 at 3.
[27] *See generally*, https://www.nist.gov/topics/organization-scientific-area-committees-forensic-science.
[28] *See https://www.nist.gov/topics/forensic-science/friction-ridge-subcommittee.*

standards by the American Standards Board.[29] They are the *Guideline for the Articulation of the Decision-Making Process Leading to an Expert Opinion of Source Identification in Friction Ridge Examinations*[30] ('Articulation document') and the *Standard for Friction Ridge Examination Conclusions.*[31]

The Articulation document "explains the process leading to the expert opinion of source identification and provides guidance on articulating the process, the conclusion, and the limitations of that conclusion in testimony or discussion with relevant stakeholders."[32] Regarding the uniqueness of latent prints, the document states:

> While the highly discriminating nature of friction ridge skin is often expressed as "uniqueness," this claim has not been empirically proven. Additionally, it has been suggested that the concept of uniqueness is neither a guarantee of an examiner's ability to make an accurate source identification, nor a necessary precondition to reaching a reliable forensic conclusion.[33]

The document further notes, "Uniqueness is unproven and unnecessary."[34]

Similar to the Latent Print ULTR, the Articulation document states, "Use of the term 'individualization' implies the global exclusion of all others. To individualize is to attribute a friction ridge skin impression to a single source. This determination de facto excludes all other possibilities."[35] Consistent with language included in the Latent Print ULTR, the Articulation document cautions that "exclusion of all others," "individualization," "100% certainty," and "zero error rate/infallible method" are problematic phrases to be avoided.[36]

Finally, the document states, "Reported conclusions shall be expressed as the opinion of the examiner. The examiner has a level of personal confidence associated with the accuracy and reliability of this conclusion. However, this personal level of confidence cannot be objectively measured. For this reason, certainty shall not be reported in absolute terms and should not be reported numerically."[37]

The second OSAC document is the Standard for Friction Ridge Examination Conclusions.[38] It also endorses "source identification" conclusions, which it defines as follows:

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[29] *See https://www.asbstandardsboard.org/.*
[30] *See* https://www.nist.gov/sites/default/files/documents/2017/10/17/guideline_for_the_articulation_of_the_decision_making_process_leading_to_an_expert_opinion_of_source_identification_in_friction_ridge_examinations.pdf. (Unpublished).
[31] *See*https://www.nist.gov/sites/default/files/documents/2018/07/17/standard_for_friction_ridge_examination_conclusions.pdf. (Unpublished).
[32] Articulation document, at 1.
[33] *Id.* at 5, § 3.1.2.3.
[34] *Id.* at 6, § 3.1.3.5.
[35] *Id.* at 10, § 3.8.2.2 b.
[36] *Id.* at 10, § 3.8.2.2.
[37] *Id.* at 10, § 3.8.2.1.
[38] *Supra,* note 20.

> ***Source identification*** is the strongest degree of association between two friction ridge impressions. It is the conclusion that the observations provide extremely strong support for the proposition that the impressions originated from the same source and extremely weak support for the proposition that the impressions originated from different sources.
>
> Source identification is reached when the friction ridge impressions have corresponding ridge detail and the examiner would not expect to see the same arrangement of details repeated in an impression that came from a different source.[39]

This document cautions, "A conclusion shall not be communicated as a fact. It is an interpretation of observations made by the examiner and shall be expressed as an expert opinion."[40] The Qualifications and Limitations section of this document contains nearly identical language to that set forth in the Department's Latent Print ULTR.[41]

Neither the Latent Print ULTR nor the OSAC document claim that a 'source identification' is an individualization of a latent print impression to the exclusion of all other latent prints in the world, or is based on the uniqueness of either the known or the latent print.

IV. Error Rates

The Advisory Committee's spring 2019 meeting materials address the topic of forensic science error rates. The comments submitted by Professor Brandon Garrett include a discussion of this topic (pp. 10-13), as does the Draft Committee Note (pp. 26, 28).

In his comments, Professor Garrett opined, "Perhaps most important is what the Committee Note says regarding failure to mention error rates. No conclusion can be reached about a method without qualification or discussion of error rates, because there is no type of expertise that does not have some kind of error." (p. 11). He also writes, "Not only should experts be barred from claiming infallibility, but they must disclose the actual error rates, if they have been adequately measured. If error rates for a method have not been adequately measured using sound 'black box' studies under realistic conditions, then the experts must disclose that their technique is of unknown validity and reliability. . . ." (p. 11). Moreover, Professor Garrett asserts that "[e]xpert evidence should never be presented in court without evidence of its error rates and of the proficiency or reliability of not just the method, but the particular examiner using the method." (p. 11).

Similarly, the Draft Committee Note states, "Accurate testimony will ordinarily include a fair assessment of the rate of error of the methodology employed, based where appropriate on empirical studies of how often the method produces correct results, as well as other relevant limits inherent in the methodology." (pp. 26, 29-30). These views — which

[39] *Standard for Friction Ridge Source Conclusions*, at 5.
[40] *Id.*
[41] *Id.* at 6.

seem to advocate for testimonial disclosure of 'black box' study-based error rates as a relevant measure of case-specific rates — are out of step with the current consensus of scientific thought.

a. American Association for the Advancement of Science

In its recent report, *Forensic Science Assessments: A Quality and Gap Analysis – Latent Fingerprint Examination*,[42] the American Association for the Advancement of Science (AAAS) cautioned against extrapolating composite error rate figures derived from empirical studies to case-specific scenarios. The report stated, "[I]t is unreasonable to think that the 'error rate' of latent fingerprint examination can meaningfully be reduced to a single number or even a single set of numbers."[43] The AAAS found that "[t]he probability of error in a particular case may vary considerably depending on the difficulty of the comparison. Factors such as the quality of the prints, the amount of detail present, and whether the known print was selected based on its similarity to the latent will all be important."[44]

The AAAS also noted that 'black box' studies "can in principle determine the relative strength of different analysts and the relative difficulty of different comparisons, however the relationship of such findings to the error rate in a specific case is problematic."[45] One concern was that study participants know they are being tested, which may affect their performance. Another concern was that decision thresholds used by examiners in controlled studies may differ from those employed during actual casework. As a result, the report concluded that "the existing studies generally do not fully replicate the conditions that examiners face when performing casework."[46] Consequently, 'the error rates observed in these studies *do not necessarily reflect the rate of error in actual practice*' (citing Haber and Haber, 2014; Koehler, 2017; Thompson et al., 2014)."[47]

b. Other Scientific Authorities on Forensic Error Rates

The 1996 National Research Council (NRC) report, *The Evaluation of Forensic DNA Evidence*,[48] recognized the importance of focusing on the case-specific *risk* of error, rather than an overall *rate* of error. On this point, the NRC observed, "The question to be decided is not the general error rate for a laboratory or laboratories over time but rather whether the laboratory doing DNA testing in this particular case made a critical error."[49]

The NRC specifically rejected the proposal that laboratories use proficiency tests as the exclusive means for error rate determination — a proposal offered by a prior NRC

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[42] THOMPSON ET AL., FORENSIC SCIENCE ASSESSMENTS: A QUALITY AND GAP ANALYSIS (2017), *supra* note 14 at 45.
[43] *Id.* at 45.
[44] *Id.* at 58.
[45] *Id.*
[46] *Id.* at 46.
[47] *Id.* (Emphasis added).
[48] NAT'L RESEARCH COUNCIL, NAT'L ACADS., THE EVALUATION OF FORENSIC DNA EVIDENCE 85–88 (1996) (suggesting that retesting/duplicate tests should be used to determine error rates).
[49] *Id.* at 85.

committee on DNA (NRC I, 1992), co-chaired by PCAST Co-Chair, Dr. Eric Lander. The NRC committee stated:

> Estimating rates at which nonmatching samples are declared to match from *historical performance* on proficiency tests *is almost certain to yield wrong values*. When errors are discovered, they are investigated thoroughly so that corrections can be made. A laboratory is not likely to make the same error again, so the error probability is correspondingly reduced.[50]

The NRC also observed, "The risk of error is properly considered case by case, taking into account the record of the laboratory performing the tests, the extent of redundancy, and the overall quality of the results."[51] Moreover, the NRC found it unnecessary to debate differing estimates of false positive error when concerns about a false match can be easily resolved by retesting the evidence.[52] The NRC's view that the focus should be on the case-specific *risk* of error, rather than the *rate* of error, is shared by many eminent scientists, statisticians, and forensic practitioners.[53]

In their recent response to the PCAST Report, Dr. Ian Evett and colleagues wrote, "The notion of an error rate to be presented to courts is misconceived because it fails to recognise that the science moves on as a result of proficiency tests. . . . [O]ur vision is not of the black-box/error rate but of continuous development through calibration and feedback of opinions."[54]

There is no current scientific consensus on how, or whether, error rates can, or should, be determined for forensic pattern comparison methods. The notion of a single 'rate' wrongly assumes the existence of a consensus set of assumptions, choices, and criteria that can be used to measure and generate a valid and generally-applicable metric. The absence of external validity for 'black box' study-derived error rates, a scientific necessity, — and a factor that necessarily limits the applicability of those rates to case-specific circumstances — cautions against their application to casework scenarios.[55]

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[50] *Id.* at 86 (emphasis added).
[51] *Id.* at 87.
[52] *Id.*
[53] *See, e.g.*, JOHN S. BUCKLETON ET AL., FORENSIC DNA EVIDENCE INTERPRETATION 76–77 (2d ed. 2016) (noting that error and error rates should be examined on a per-case basis) ("Our view is that the possibility of error should be examined on a per-case basis and is always a legitimate defence explanation for the DNA result. . . . The answer lies, in our mind, in a rational examination of errors and the constant search to eliminate them."); BERNARD ROBERTSON ET AL., INTERPRETING EVIDENCE: EVALUATING FORENSIC SCIENCE IN THE COURTROOM 138 (2d ed. 2016) ("It is correct . . . to say that the possibility of error by a laboratory is a relevant consideration. It is wrong, however, to assume that the probability of error in a given case is measured by the past error rate. The question is what the chance of error was on this occasion."); I.W. Evett et al., *Finding a Way Forward for Forensic Science in the US—A Commentary on the PCAST Report*, 278 FORENSIC SCI. INT'L 16, 22–23 (2017) (suggesting that proficiency tests should be used to determine error rates and rejecting the use of 'black box' studies in their calculation and courtroom presentation).
[54] Evett et al., *supra* note 53 at 22.
[55] GEOFFREY MARCZYK ET AL., ESSENTIALS OF RESEARCH DESIGN AND METHODOLOGY 180 (2005) ("Every study operates under a unique set of conditions and circumstances related to the experimental arrangement. The most commonly cited examples include the research setting and the researchers involved in the study. The major concern with this threat to external validity is that the findings from one study are influenced by a set of

In addition, 'black box' studies (PCAST's proposed solution to measuring pattern comparison error rates) are merely "input-output research designs where *what happens in between is impossible to study or is ignored*."[56] As such, the inputs "to" and outputs "from" these studies — e.g., true positives, false positives, true negatives, false negatives — are what is measured, *not* the *method* by which those outputs were generated. Therefore, black-box studies — by definition — *cannot* be used to calculate a valid error rate for a forensic method.

Finally, the Human Factors Committee of the Organization of Scientific Area Committees (a group composed of non-forensic scientists and academics) in its recent draft document, *Validation and Performance Testing in Forensic Science: Perspectives of the OSAC Human Factors Committee*, bluntly stated: "Lawyers often want to know 'the error rate' of a forensic method or procedure. It is a naïve question because the error rate of a given procedure is likely to vary based on a variety of factors that affect the difficulty of the analysis in a particular case."[57]

Ironically, as the foregoing authorities make clear, if forensic examiners were required to provide general, 'black box' study-derived error rates during case-specific testimonial presentations, this would actually *increase* the risk of injecting erroneous information into the case, rather than providing the factfinder with a valid estimate of the *relevant* question — the case-specific *risk* of error.

V. Conclusion

The ULTRs and the draft OSAC standards explain that a 'source identification' conclusion is an expert's opinion that the observed features are in sufficient correspondence to provide extremely strong support for the same-source proposition and extremely weak support for the different source proposition.[58] This correspondence is such that the examiner would not expect to see the same arrangement of features or marks that originated from a different source.

A 'source identification' opinion is a knowledge-skill- and experience-based inductive inference grounded in the examiner's technical and specialized knowledge. The logical warrant for that inference is the examiner's skill, experience, established competency, and ongoing proficiency at accurately identifying latent, but *known source* (ground truth) prints, marks, or patterns to *known source* exemplars. In other words, the examiner has an established history of making accurate 'source identification' conclusions. As with *all* inductive inferences — whether grounded in science, statistical methods, measurement, or human skill and experience — there is *always* a non-zero chance that the

unique conditions, and thus may not necessarily generalize to another study, even if the other study uses a similar sample.").

[56] W. PAUL VOGT, DICTIONARY OF STATISTICS AND METHODOLOGY 24 (1993) (emphasis added).

[57] ORGANIZATION OF SCIENTIFIC AREA COMMITTEES, HUMAN FACTORS COMMITTEE, VALIDATION AND PERFORMANCE TESTING IN FORENSIC SCIENCE: PERSPECTIVES OF THE OSAC HUMAN FACTORS COMMITTEE 10 (unpublished technical paper) (2018).

[58] *See* THOMPSON ET AL, *supra*, note 14 at 66.

answer provided might be wrong. Both the ULTRs and the OSAC documents explicitly recognize and acknowledge that fact.[59]

Perfection, however, is neither claimed nor legally required of an expert witness.[60] The Advisory Committee Note to Rule 702, which quotes *In re Paoli*, states that "proponents 'do not have to demonstrate to the judge by a preponderance of the evidence that the assessments of their experts are correct, they only have to demonstrate by a preponderance of the evidence that their opinions are reliable. . . . The evidentiary requirement of reliability is lower than the merits standard of correctness.'"[61]

In sum, a 'source identification' conclusion is not an *overstated* claim. Both its logical and legal bases fall squarely within the requirements of *Daubert*, *Kumho Tire*, the plain language of Rule 702, and the Advisory Committee Note. Therefore, with an adequate foundational showing, a 'source identification' conclusion is a relevant and reliable inductive inference that stems from knowledge that has "'good grounds,' based on what is known"[62] — an expert's technical and specialized knowledge, skill, and experience.

It is the Department's position that the Committee should postpone the proposed 'overstatement' amendment to Rule 702. This will allow the Department's ULTRs, testimony monitoring, and other work in the field of forensic science to take effect and gain acceptance in state and local jurisdictions. The Committee can re-visit this subject in the future and then evaluate whether it believes an amendment is warranted.

[59] *See* DOJ Latent Print ULTR, *supra*, note 20 at 3; OSAC Standard for Friction Ridge Examination Conclusions, *supra*, note 31 at 5; OSAC Articulation Standard, *supra*, note 30 at 10.
[60] This is true for any type of knowledge, whether scientific, technical, or specialized. "[I]t would be unreasonable to conclude that the subject of scientific testimony must be 'known' to a certainty; arguably, there are no certainties in science." *Daubert*, 509 U.S. at 590.
[61] Federal Rules Advisory Committee Note on Rule 702—2000 Amendment.
[62] *Daubert*, 509 U.S. at 590.

Observations on the Case Digest

The materials provided to the Federal Advisory Committee on the Rules of Evidence for the fall 2018 meeting provided a summary of 15 appellate cases and 26 district court decisions as examples of testimonial 'overstatements' by forensic examiners. The spring 2019 materials include one additional district court example of alleged 'overstatement.'[1] We make a number of observations regarding these cases:

(1) Forensic examiners employed by the Department of Justice testified in only 9 of these cases. The balance of the challenged testimony was provided by state or local examiners or those engaged in private practice.

(2) The majority of the cited decisions predate recent work that has improved and advanced forensic science at the national level. Eleven of the 15 appellate decisions were 5 or more years old. Seventeen of the 26 district court decisions were 5 or more years old, and one was 10 years old. In many of cited cases, the underlying testimony would not be permitted under current Departmental policy.

(3) The cases are often described as involving overstatements because a forensic examiner used the term "match" to describe a concordance between a known and a questioned sample. The term "match," however, is not a recognized forensic conclusion in any of the disciplines discussed in the summarized decisions[2], and the word "match" only rarely appears in quotation marks in these opinions. In many cases, the court appears to be using the word "match" as a colloquial way of referring to a source identification. But the actual words used by the witness matter, and in the majority of the cited cases it is unknown from the face of the opinion what those words are.

(4) In some cases the court ordered the examiner to use the term or phrase that the materials characterize as an 'overstatement.' Other cases do not involve particular testimony, but were instead challenges to the reliability of the feature comparison discipline overall.

We have no doubt there are numerous examples of examiners who in prior years testified in a fashion inconsistent with today's standards. As a whole, however, collecting samples of these prior cases does not justify an immediate amendment to Rule 702, before the Department's testimony guidelines have been given an opportunity to take effect.

Appellate Cases

Ballistics --- Overstatement Problem—testimony to a match: *United States v. Williams,* 506 F.3d 151 (2nd Cir. 2007)

This case is eleven years old, and comes from the Allegheny County Coroner's Office in Pennsylvania. The firearms/toolmarks expert testified that there was a "match" between shell

[1] *United States v. Hylton*, 2018 WL 5795799 (D. Nev. Nov. 5, 2018).
[2] The forensic term is "identification"

casings, bullets, and a recovered gun. Under current guidelines, however, that testimony would not be permitted, as "match" is not a word used in this discipline.

Ballistics --- some limitation on overstatement: *United States v. Parker*, 871 F.3d 590 (8th Cir. 2017)

This case is described as an example where the court placed "some limitation on overstatement" on a toolmarks examiner from the Hennepin County Sheriff's Office. Before trial, the district court judge had prohibited the witness from testifying that she was '100% sure' or 'certain' that the relevant guns matched the relevant shell casings. On appeal, the defendant claimed that the witness violated that restriction. The court, however, found that "Reynolds testimony stayed within the bounds set by the district court."

The opinion provides no indication that the witness actually planned to testify to 100% certainty in her conclusion. Rather, the discussion appears to have been prompted by a preemptive defense motion seeking exclusion of such testimony should it be offered. In any event, testimony to a 100% certainty is not permitted under current Departmental policy.

Ballistics --- Overstatement--- reasonable degree of ballistics certainty: *United States v. Johnson,* 875 F.3d 1265 (9th Cir. 2017)

This case is an example of a municipal toolmarks expert from the San Francisco Police Department testifying to "a reasonable degree of ballistics certainty."

Use of the phrase "reasonable degree of scientific certainty" is now prohibited by DOJ policy, unless required by a Court.

Drug identification: Overstatement, infinitesimal error rate --- *United States v. Mire,* 725 F.3d 665 (7th Cir. 2013)

In this case, a DEA chemist, described the rate of error for GC-MS testing as "infinitesimal." In a recent scientific paper titled, *Assessing the Quality and Reliability of the DEA Drug Identification Process*, published in the peer reviewed journal, 'Forensic Chemistry,' authors Rodriguez-Cruz and Montreuil report that a historical study of the DEA's drug identification process found it to be extremely accurate and reliable. The paper described 'an assessment of laboratory error rates within the DEA laboratory system . . . using historical proficiency test laboratory data generated during the years 2003-2016.'

Results of that study indicate that the DEA drug identification process is characterized by high sensitivity (99.90%) and specificity (99.12%) with very low type I (false positive 0.87%) and type II (false negative 0.092%) error rates. Given this study, the expert's testimony may well be supported by empirical evidence. Nevertheless, using words to express a zero error rate is not permitted under current Departmental policy.

Fingerprint identification: Overstatement --- zero rate of error --- *United States v. Straker,* 800 F.3d 570 (D.C. Cir. 2015)

In this case, an FBI fingerprint examiner testified that her methodology, ACE-V, did not have an inherent rate of error. The witness did, however, acknowledge the potential for human error during the performance of that methodology.

In any event, such claims (whether related to a methodology or its execution) are not permitted by the Department's Uniform Language for Testimony and Reports (ULTRs) for the Latent Print Discipline. Thus, fine distinctions like these are no longer made by Department examiners.

Fingerprint Identification: Overstatement – infinitesimal error rate --- *United States v. Casanova*, 886 F.3d 55 (1st Cir. 2018)

The witness in this case, a fingerprint examiner from the Boston Police Department, is said to have 'overstated' his testimony by claiming an 'infinitesimal error rate.'

The questioned testimony occurred during cross-examination. The opinion provides the following description of the relevant exchange:

> "On cross-examination, Truta testified, '[a]s far as I know, in the United States the[re] are not more than maybe 50 erroneous identification[s], which comparing with identification[s] that are made daily, thousands of identification[s], the error rate will be very small.' Truta had previously cautioned that it would be inappropriate to claim that the rate of false positive identifications is zero. * * * But Casanova's argument mischaracterizes what happened. Truta never testified that the error rate for fingerprint examinations was 'effectively zero,' 'virtually zero,' or 'functionally indistinguishable from zero.' Rather, Truta testified that in light of the number of recorded errors he knew of from his own review of the literature, and the number of fingerprint identifications made daily, he expected the error rate to be 'very small.' He did not calculate or assert any particular error rate and he specifically cautioned that whatever the rate may be, it would not be zero. On redirect he acknowledged that there was no statistical method generally accepted in the field for determining actual statistical probabilities of erroneous identifications." (pp. 61-62)

The court held that this witness did not overstate his opinion, nor testify to an infinitesimal error rate. When the witness was challenged on cross-examination, he recounted the number of false identifications with which he was familiar.

Fingerprint identification: Overstatement --- testimony of a match --- *United States v. Pena,* 586 F.3d 105 (1st Cir. 2009)

The digest describes the witness in this case, a fingerprint examiner from the Massachusetts Highway Patrol, as having overstated his opinion by testifying that his comparison revealed a match between the questioned mark and the defendant's left thumb.

But there is no indication in the opinion that the witness used the term "match" during his testimony. The exact terminology used by the witness is not described. Because the term "match" is not a recognized conclusion in the latent print discipline, it is likely that different language was sued by the examiner, not recounted in the opinion.

Fingerprint identification: Overstatement --- testimony of a match ---*United States v. John,* 597 F.3d 263 (5th Cir. 2010)

The fingerprint examiner in this case allegedly overstated his or her conclusion by testifying to a "match."

But when the term 'match' is used in this opinion, it appears to be the court's characterization of the witness' testimony – rather than what the witness said. In fact, the court recounts the witness' description of the "identification methodology" that he used.

Fingerprint testimony: Overstatement --- testimony that the methodology was error-free: *United States v. Watkins*, 450 Fed. Appx. 511 (6th Cir. 2011)

In this case, a fingerprint examiner from an unidentified agency claimed that "the methodology was error free." The witness apparently testified that the ACE-V method, when "used properly by a competent examiner," had a zero error rate. The witness did not claim that any use of this methodology by latent print examiners was error free. Nevertheless, claims such as this are not permitted by the Department's ULTRs.

Fingerprint identification: Overstatement, testimony of a match and an infinitesimal error rate: *United States v. Herrera*, 704 F.3d 480 (7th Cir. 2013)

The court in this case stated (pp. 486-87) that "errors in fingerprint matching by expert examiners appear to be very rare." There is no evidence that the witness made such a statement.

Fingerprint identification: Overstatement, testimony of a match: *United States v. Scott,* 403 Fed. Appx. 392 (11th Cir. 2010)

The witness in this case is described as overstating her opinion by testifying to a "match." The opinion states that the witness "had matched five of those latent prints to Scott's known fingerprints." The word "match," however, appears to be the court's characterization of what the witness said, rather than direct quotation from the witness' testimony. There is no indication that the witness used the term "match, however, and as previously noted, "match" is not a conclusion used in the latent print community.

Footwear-impression testimony allowed --- Overstatement, zero error rate: *United States v. Mahone,* 453 F.3d 68 (1st Cir. 2006)

In this case from the Maine State Police Crime Laboratory, the witness overstated her testimony when she offered "a potential rate of error of zero for the method, stating that any error is attributable to the examiners."

This case is dated (more than twelve years old), and claims such as this (error free methodology) are not permitted by Department policy.

Footwear-impression testimony --- Overstatement---testimony of a match: *United States v. Smith*, 697 F.3d 625 (7th Cir. 2012)

The digest describes the witness in this case as overstating his conclusion by testifying to a footwear impression "match." The opinion states:

> "FBI Examiner Smith then testified that based on his examination, the left Nike shoe worn by defendant Smith at the time of the robbery made the partial impression on the piece of paper recovered from the tellers' counter at the bank and that the impressions left on the bank carpet were consistent with the shoes worn by defendant Smith at the time of his arrest." (pp. 633-34)

The witness here did not testify to a match. Rather, he testified to *correspondence* and *consistency* between the questioned and known patterns.

District Court Cases

Ballistics: Overstatement --- reasonable degree of ballistics certainty: *United States v. Cerna*, 2010 WL 3448528 (N.D. Cal.)

The digest states that the witness in this case, a firearms and toolmarks examiner from the San Francisco Police Crime Laboratory, overstated his opinion by testifying (or proposing to testify) to a "reasonable degree of ballistics certainty." The relevant passage from the opinion states:

"Instead, the standard previously used in *Diaz* — that a bullet or casing came from a particular firearm to a 'reasonable degree of certainty in the ballistics field' — will be used in this case." (p. 15).

Accordingly, it was the court (not the witness) that ordered the witness to use the offending phrase, one that is not permitted under current Departmental policy, unless ordered by a court.

Ballistics – NAS Report – Overstatement – testimony of a match: *Jackson v. Vannoy*, 2018 U.S. Dist. LEXIS 46297 (E.D. La.)

This case referenced is likely *Jackson v. Vannoy*, 2018 U.S. Dist. LEXIS 47331 (E.D. La.), a §2254 claim of ineffective assistance of trial counsel.

There was no testimony of a match offered by the firearms and toolmarks examiner who testified in the underlying criminal case. The examiner from the New Orleans Police Department Crime Lab concluded that the casings and bullets were each fired from the same weapon – a justifiable (but not statistically derived or verified) statement of source identification (an inductive inference).

Ballistics: Overstatement---testimony of a match: *United States v. Pugh,* 2009 WL 2928757 (S.D. Miss.)

The digest describes the witness in this case as having provided testimony of a "match." But the court is not actually quoting the examiner, but instead describing firearms and toolmarks examinations in general: "matching shell casings to a weapon that fired them is a recognized method of ballistics testing," (pp. 26-27), and "Pugh contends that there is no reliable statistical or

scientific methodology which would permit an expert to testify that a match is certain or scientifically certain." (p. 25).

Ballistics: Overstatement --- reasonable degree of ballistics certainty: *United States v. Ashburn*, 88 F. Supp. 3d 239 (E.D.N.Y. 2015)

In this case, the court required the witness to use the offending term, "a reasonably degree of ballistics certainty." It was not the choice of the testifying witness.

Ballistics --- Overstatement --- 100% Certainty: *United States v. Casey*, 928 F. Supp. 2d 397 (D.P.R. 2013)

It is unclear from the underlying facts in this case whether the firearms/toolmarks witness in this case overstated his testimony by claiming 100% certainty in his conclusion. In any event, such testimony is not permitted under current Department guidelines.

Ballistics*:* Overstatement --- testimony of a match: *United States v. Wrensford,* 2014 WL 3715036 (D.V.I.)

This case address the testimony of a firearms/toolmarks examiner with the Virgin Islands Police Department, described in the digest as having overstated his conclusion by testifying to a "match." The witness, however, did not use the word "match." Rather, the witness testified that "the three conclusions a firearms examiner may reach are: identification, inconclusive, and elimination." (p. 11).

Fingerprints: Overstatement --- testimony of a match --- *United States v. Love,* 2011 WL 2173644 (S.D. Cal.)

In this case an FBI fingerprint examiner is said to have overstated her conclusion by testifying to a "match." That term, however, was used by the court, not the witness. The court had borrowed the term "match" from a 2004 Third Circuit Court of Appeals case, *U.S. v. Mitchell*.

Fingerprints: Overstatement --- testimony of a match --- *United States v. Campbell*, 2012 WL 2373037 (N.D. Ga.)

In this case, the court – not the witness used the word "match" to describe the witness' conclusion.

Fingerprints – Overstatement --- Testimony of a Match; PCAST and NAS Reports: *United States v. Kimble*, 2018 U.S. Dist. LEXIS 138988 (S.D. Ga.)

In this case, a fingerprint examiner is described as having overstated his or her conclusion by "testimony of a match." It appears, however, the court used this term. The word match appears in the opinion in the following passage:

"After nabbing Robert Kimble on suspicion of bank robbery, police investigators determined that a latent fingerprint lifted from the getaway vehicle matched Kimble's right middle fingerprint." (p. 3).

It is unknown from the opinion what words the witness actually used.

Fingerprints --- after PCAST --- Overstatement --- testimony to a match: *United States v. Bonds,* 2017 WL 4511061 (N.D. Ill.)

This case, involving an FBI fingerprint examiner, is described as the witness testifying to a match. The only reference to a match, however, was a follows:

"She [the examiner] is expected to testify that four latent prints recovered from the Joliet demand note and two latent prints recovered from the Carpentersville demand note match the known print standard for Bonds."

This appears to be the court's paraphrased characterization of what it believes the witness would say, rather than a description of her actual testimony. In any event, the focus of the court's opinion was on a motion to prevent any fingerprint testimony based on it being an allegedly unreliable discipline.

Fingerprints—Overstatement --- testimony to a match: *United States v. Rose*, 672 F. Supp. 2d. 723 (D. Md. 2009)

The word "match" does not appear in this opinion. Rather, there is a source identification made from two latent prints recovered from one car, and another latent print recovered from another car. The words used by the examiner matter, and here there is no evidence that the examiner testified to a "match."

Fingerprints: Overstatement --- testimony to a match --- *United States v. Stone,* 848 F. Supp. 2d 714 (E.D. Mich. 2012)

This case does not involve specific testimony, and the word "match" does not appear in the decision. Rather, the defense in this case brought a motion in limine to challenge the admissibility of fingerprint identification in general as unreliable under *Daubert*. In the decision, the court described in the factual background that the prints "belonged to" the defendants. But the motion was filed prior to the testimony and the challenge was to the fingerprint discipline overall.

Fingerprints: Overstatement --- error rate of 30 out of a zillion --- *United States v. Gutierrez-Castro*, 805 F. Supp. 2d 1218 (D.N.M. 2011)

This case pertains to testimony from a fingerprint examiner with the Southwest Regional Science Center in Texas, who is said to have overstated his testimony when he claimed a latent print discipline "error rate of 30 out of a zillion." The witness' actual testimony was different:

> "McNutt testified that error rates for fingerprint analysis exist, but it is hard to determine an error rate; he testified, however, that the general consensus is that the error rate is very low. See Aug. 11, 2011 Tr. at 149:19-150:1 (Sapien, McNutt). He stated that there have been approximately thirty documented misidentifications in the last thirty or forty years out of millions of fingerprints. See Aug. 11, 2011 Tr. at 150:3-10 (McNutt)."

This witness here was not offering an error rate for latent print examinations; to the contrary, he said an error rate was "hard to determine." The latest fingerprint study to date confirms the

witness' testimony that the general error rate for latent print comparison is very low. In May 2011, a large-scale ('black box') study testing friction ridge examiners' accuracy was published. In the study, 169 latent print examiners were each presented with approximately 100 pairs of prints. When examiners reached an identification decision in the study, they were correct 99.8% of the time. When examiners reached an exclusion decision for prints determined to be of value for identification, they were correct 88.9% of the time. These results demonstrate that trained examiners can produce largely accurate and reliable source identification conclusions.

Footprint identification --- Overstatement --- testimony to a match: ***United States v. Pugh,*** 2009 WL 2928757 (S.D. Miss.)

This case is described as a shoeprint pattern examiner overstating testimony by testifying to a match. But the opinion says nothing about testifying to a match:

> "Footprint analysis is not a new concept and expert testimony on footwear comparisons has been admitted in courts in the United States. Reid established that the theory and technique of footwear comparisons have been tested; that the techniques for shoe-print identification are generally accepted in the forensic community, and that the science of footwear analysis has by now been generally accepted. The Court found that the expert shoe print testimony was based on specialized knowledge and would aid the jury in making comparisons between the soles of shoes found on or with the Defendant and the imprints of soles found on surfaces at the crime scene. The Court finds no reason to grant a new trial based on the *Daubert* challenge to Reid's testimony."

Handwriting: Overstatement --- testimony to a match --- ***United States v. Yass,*** 2008 WL 5377827 (D. Kan.)

In this case, a handwriting expert is said to have overstated her testimony by testifying to a "match." But the opinion does not say how the witness testified. The following came from the defendants' motion in limine:

"Blechman moves to exclude from evidence the anticipated testimony of Debra Campbell, the government's forensic document examiner, identifying certain handwriting as having been made by him."

Handwriting: Overstatement --- testimony of no match --- ***Boomj.com v. Pursglove****,* 2011 WL 2174966 (D. Nev.)

The word match does not appear in this decision. Here is what the witness said: "After examining the above documents I have reached the professional opinion the signature on the ... Executive Agreement, was not signed by ... George Pursglove. Using the principles of questioned document examination the evidence is strong and compelling as to this determination as there are 6 major dissimilarities between the questioned signature and the known samples."

Handwriting: Overstatement – testimony to a match --- *United States v. Brooks,* 2010 WL 291769 (E.D.N.Y.)

This case appears to have been included by mistake. It does not involve expert witness testimony, but rather addresses a habeas petition based on conditions of confinement.

Paint Identification: Overstatement --- testimony to a match --- *United States v. Pugh,* 2009 WL 2928757 (S.D. Miss.)

This case involves an expert who had worked at the FBI chemistry unit for over 10 years, and who is said to have overstated his opinion by testifying to a match. But the only time the term 'match' is used in reference to the court's description of witness' anticipated testimony:

"All of Bradley's proposed testimony relates to the facts at issue in the case regarding the matching of paint chips found in an area off LaRue Road and connecting those paint chips to the SUV containing McCoy's body. The Court finds that Bradley qualifies to render expert testimony in the area of forensic chemistry."

Ballistics – generally accepted, testimony to a reasonable degree of certainty: *United States v. Hylton*, 2018 WL 5795799 (D. Nev. Nov. 5, 2018):

This case involves a firearms expert from the Las Vegas Metropolitan Police Department who testified to a "reasonable degree of certainty phrase." This testimony would not be permitted under current Departmental policy, unless ordered by a court.

Ten Years After the National Academy of Sciences' Landmark Report on *Strengthening Forensic Science in the United States: A Path Forward* – Where are We?

Remarks by

Hon. Harry T. Edwards

at the

Innocence Network Annual Conference

Atlanta, Georgia
April 12, 2019

I had the privilege, along with Dr. Constantine Gatsonis, of co-chairing the Committee on Identifying the Needs of the Forensic Science Community. Our 15 colleagues on the Committee included smart and dedicated scientists, lawyers, doctors, and several individuals with extensive experience in forensic practice. We spent 26 months studying the forensic science community, and then published a unanimous report on February 18, 2009. Our key finding was that, *"[w]ith 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."* The Committee found that, too often, practitioners offered evidence based on forensic methods that had not been shown to be scientifically valid or reliable. And we concluded that many forensic practitioners *did not know what they did not know*, causing them to exaggerate their testimony and falsely claim that their methods were "infallible." Our conclusions were disheartening, to say the least.

One of the most telling moments for me during the Committee's hearings occurred when I listened to a forensic expert testify about microscopic hair analysis. The flaws in the forensic method seemed obvious to me. So, I asked the expert, "If your daughter was falsely accused of a felony and the only evidence against her was a microscopic hair sample, how would you feel?" He said something like, "I would be very concerned," essentially conceding that his daughter might be wrongfully convicted if the forensic evidence was admitted.

Wrongful convictions result in unspeakably horrible personal tragedies, and they reflect horrendous failures in our system of justice. The exonerees who are here today can attest to this. I recently read a statement by Keith Harward, who was wrongfully convicted of rape and murder based on faulty bitemark evidence. He served 33 years in prison before being exonerated by DNA testing. When he testified before the National Commission on Forensic Science, Mr. Harward talked about the faulty bitemark evidence that had been introduced against him during his criminal trial. He expressed unsurprising anger with the forensic odontologists who testified at his trial, saying: "They were willing to have me murdered by the state of Virginia behind what they said, which in all actuality has no basis in truth." And Mr. Harward astutely pointed out that "[w]hen you present an

expert to a jury of people, of course, whatever they say is true because the judge allows it, the prosecutor presents it. It has to be true."

Not too long ago, I saw a letter written by the National District Attorneys Association claiming that, under Supreme Court case law, forensic evidence need not be scientifically valid so long as it can be characterized as "technical or specialized evidence." Even if this reflects a plausible interpretation of federal law, why should our aspirations be so low? We should all ask, "Why would any prosecutor be comfortable in relying on forensic evidence that has not been shown to be valid and reliable?"

I have heard some naysayers argue that forensic practices should not be disturbed because they have been in existence for many years. This is a ridiculous argument. Merely because a practice has existed for a long time does not make it right. Likewise, I have heard it said that so long as crime labs are accredited and adhere to uniform standards, this should relieve any concerns over the validity and reliability of forensic evidence. This, too, is a specious argument. Standards that guide the work of forensic technicians tell us nothing about whether a forensic method is valid and reliable. Indeed, standards cannot be meaningfully developed until after a forensic method has been shown to be valid and reliable.

We are still struggling with the inability of courts to assess the efficacy of forensic evidence. When a forensic expert testifies about a method that has not been found to be valid and reliable, *the expert does not know what he does not know and cannot explain the limits of the evidence*. This is unacceptable. Judges and juries must understand the levels of uncertainty that are associated with forensic evidence so that they can determine whether the prosecution has met its burden of proving that the defendant is guilty beyond a reasonable doubt.

Sadly, as a number of thoughtful commentators have pointed out, we are still facing serious problems in the forensic science community. The good news, however, is that since the publication of the Committee's Report, many scholars and journalists have taken notice and pressed for reforms. The National Institute of Science and Technology is supporting more serious scientific research. Efforts have been made to improve standards in crime labs. Some judges have barred forensic experts from testifying in exaggerated terms about the reliability of their methods or the strength of their evidence. And, overall, popular opinion has gradually shifted toward a more nuanced view of forensic evidence. There is still considerable work to be done, however. We still need a national, independent agency to oversee forensic research and practices. This was the most important recommendation of our Committee. We also need more top *scientists* engaged in serious research to determine the validity and reliability of forensic methods. And we need these individuals to appear in court to explain the limits of the evidence.

I would like to end my remarks with three brief points. First, to the exonerees who are here today: I am deeply pained by the indignities and personal suffering that you have endured at the hands of injustice. Most of us cannot begin to comprehend the ordeals that you have faced. It is beyond our understanding. Our system of justice failed you, and

you can never get back what you lost. You have my most sincere apologies. Second, I thank everyone associated with the Innocence Project for your extraordinary efforts in helping to bring justice to those who have been wrongfully convicted. And, finally, on behalf of the members of my Committee, I humbly thank you for the recognition that we have been given today. Our Report undoubtedly has given support to those of you who have challenged unreliable forensic evidence. But much of the credit for the progress that has been made goes to all of you who have continued to press for reforms – it has been your sterling advocacy and unflagging commitment to justice that has made our report impactful.

Let me leave you with one final thought. In his 1963 Letter from Birmingham Jail, the Rev. Martin Luther King, Jr., reminded us that "[i]njustice anywhere is a threat to justice everywhere." Isn't this the point? We are not talking about good science merely for its own sake. We are talking about the need for good science in order to serve justice. And we are talking about good science that will help us to avoid wrongful convictions like those suffered by the exonerees who are with us today. Goodness, commitment, resources, and intelligent effort can get it done. And when justice is done, our society as a whole is better for it.