

Using the NAS Reports in Firearm and Toolmark Challenges

Michael Burt

Kate Philpott

“I started the NAS project with no preconceived views about the forensic science community. Rather, I simply assumed, as I suspect many of my judicial colleagues did, that forensic science disciplines typically are well grounded in scientific methodology and that crime laboratories and forensic science practitioners follow proven practices that ensure the validity and reliability of forensic evidence offered in court. *I was surprisingly mistaken in what I assumed.*”

Judge Harry T. Edwards, Chief Judge Emeritus, D.C. Circuit and Co-Chair, NAS Committee on Identifying the Needs of the Forensic Science Community, Dec. 9, 2009

What does the public assume about Firearm and Toolmark (FATM) analysis?

- That every firearm imparts a unique signature of marks onto bullets and cartridge cases
- That FATM examiners can distinguish these marks, no matter how damaged the bullet or casing, and reliably call a match
- That “match” means there is zero (or practically zero) chance of a coincidental match

Where did they get this idea?

- CSI – YES



- Testimony of actual FATM examiners – YES (“This bullet was fired by this gun to the exclusion of all other guns”)
- Scientific studies and scientific methodology – **ABSOLUTELY NOT**

We need to educate the public

- Illustrate exactly what FATM comparison involves and what it is based upon
- Make them see that they too were “surprisingly mistaken” in what they assumed
- Break down their assumptions to pave the way for the NAS report to make a greater impact

What is the goal of FATM analysis?

To determine whether a particular firearm produced the markings on a bullet or cartridge case associated with a crime

What bullets and cartridge cases are compared?

Generally:

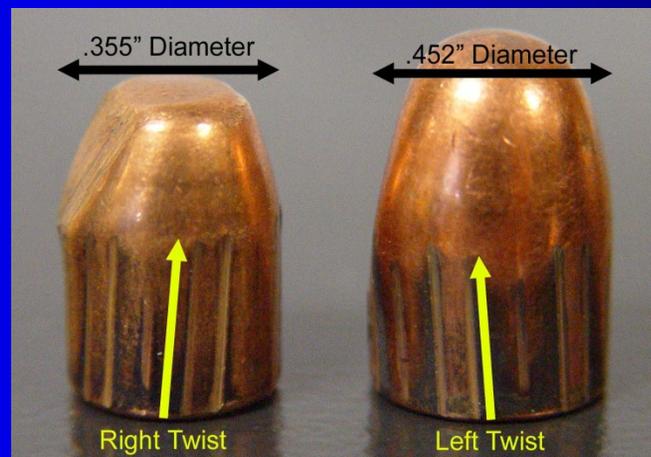
- Bullets and cartridge cases believed to be associated with a crime are compared against
- Bullets and cartridge cases test fired from a firearm believed to be associated with a crime
- Evidentiary “show up”

What markings are used for comparison?

- Scratches (“striae”) and impressions left by the interior surface of the firearm
- Markings fall into three categories:
 - Class
 - Individual
 - Subclass

Class Characteristics

- Characteristics that are shared by bullets and cartridge cases fired from the same make and model of firearm
- E.g. Direction of rifling, number of lands and grooves, shape of firing pin impression



Individual Characteristics

- Characteristics that firearms examiners believe are unique to a firearm, resulting from some combination of irregularities in the machining process and imperfections that emerge during the subsequent use of a firearm
- No definition of what makes a mark unique – subjective decision by the examiner

Subclass characteristics were not recognized until 1989

Until 1989, there was a binary system. All marks were deemed either:

- Class characteristics shared by all firearms of a given make and model, or
- Individual characteristics unique to a single firearm.

Misidentifications ensued

- Misidentifications resulted even though so-called “individual” marks lined up
- Historical note: the first time a FATM identification was introduced into evidence in a criminal trial – resulting in a death sentence for the defendant – the examiner’s declared match between several bullets and a revolver *turned out to be wrong*.

Courts rejected the testimony of firearms examiners

“We are being viewed less and less as Hi [sic] Priests. . . . We are putting the courts in an increasingly difficult position. We ask that they believe us when we testify about individualizations. They ask us to tell them why they should. We respond with the usual subjective and Art [sic] form answers. They reject them.”

-- Letter, John Murdock and Al Biasotti to
Lucien Haag, AFTE President
July 22, 1985

A committee is convened to address the problem

Murdock & Biasotti:

- “Is there a way that we can provide answers more acceptable to both our members and the courts?”
- “Many people are turned off by the need for th[e] sophisticated research [required to establish objective criteria]. Many of our members, including myself, don’t understand all of it.”

Haag:

- “[T]he problems are real. . . . Transcripts of diverse and confusing explanations of our ‘science’ (trade, skill, art – which is it?) will emerge.”

Four years later...

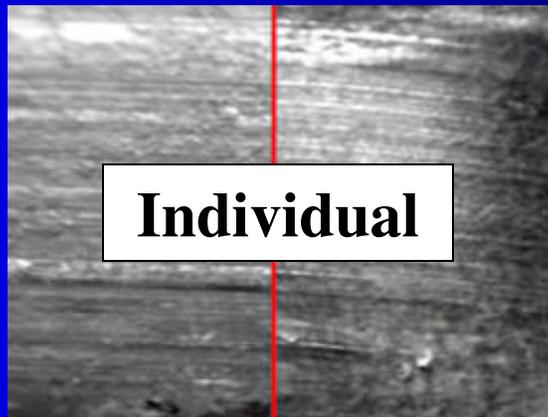
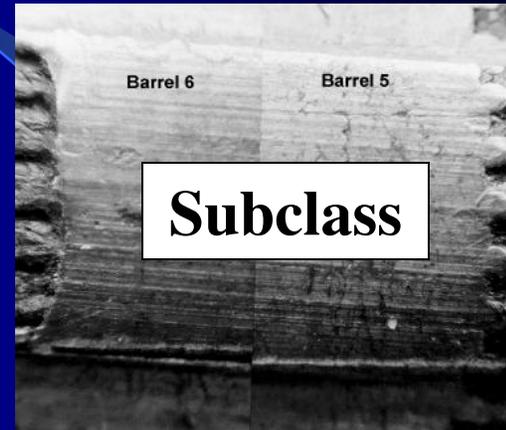
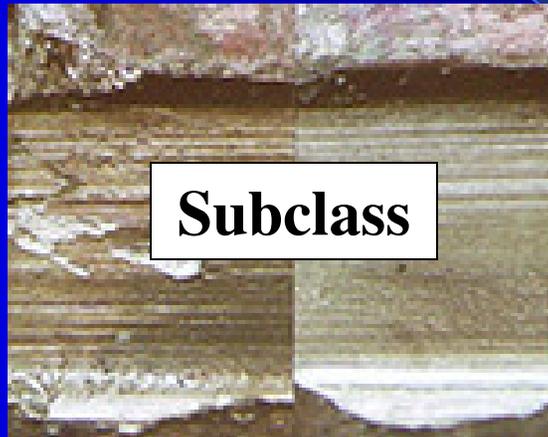
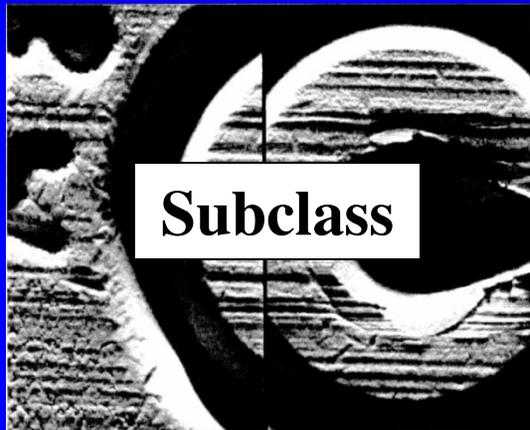
The results of the Criteria for Identification Committee's work are produced in 1989:

- Recognition of subclass marks
- AFTE Theory of Identification
- Range of conclusions

Subclass characteristics

- Marks shared by a subset of firearms of the same make and model
- Like “individual” marks, produced by irregularities in the machining process
- Nothing distinctive about subclass marks that allow them to be readily distinguished from “individual” marks

Subclass v. Individual



In other words...

Subclass marks are by all appearances “individual” marks that turn out not to be individual after all

Changes in manufacturing are decreasing “individual” marks while increasing subclass marks

- “[M]ass production of guns has replaced hand-manufacturing” *US v. Mouzone*
- Manufacture under “precisely controlled” conditions imparts “recurring patterns” of marks. D. Baldwin, *Statistical Tools*
- Tools have become more durable, enabling their use in ever-larger production runs. P. Kirk, *Crime Investigation*

Even FATM examiners recognize a potential problem

“As techniques of firearms manufacture have evolved, following mostly commercial rather than forensic arguments, this hypothesis [of uniqueness] needs to be verified on a regular basis.” M.S. Bonfanti & J. De Kinder

Warning signs that the problem is real

- Studies show that bullets and cartridge cases fired from **different weapons** can and sometimes do have **more matching marks** than bullets fired from the same weapon.
- As federal databases have grown, known non-matches have appeared **closer** to the top of the candidate list than known matches

Anecdotes about “troubling” subclass marks abound

See, e.g., Patrick D. Ball, *Toolmarks Which May Lead to False Conclusions*, 32(3) AFTE J. 292 (2000); Robert H. Kennington, *'Ejector' Type Marks on Unfired Cartridges*, 19(4) AFTE J. 452 (1987); Evan Thompson & Rick Wyant, *9mm Smith & Wesson Ejectors*, 34(4) AFTE J. 406 (2002); Tsuneo Uchiyama, *Similarity among Breech Face Marks Fired from Guns with Close Serial Numbers*, 18(3) AFTE J. 15 (1986); Peter P. Lardizabal, *Cartridge Case Study of the Heckler & Koch USP*, 27(1) AFTE J. 49 (1995); Evan Thompson, *False Breech Face ID'S*, 28(2) AFTE J. 95 (1996); Vincent J. Lomoro, *32 SWL Caliber F.I.E. Corporation Titanic Revolver*, 6(2) AFTE J. 18 (1974); Laura L. López & Sally Grew, *Consecutively Machined Ruger Bolt Faces*, 32(1) AFTE J. 19 (2000); Richard K. Maruoka, *Guilty Before the Crime? The Potential for a Possible Misidentification or Elimination*, 26(3) AFTE J. 206 (1994); Richard K. Maruoka, *Guilty Before the Crime II?*, 27(1) AFTE J. 20 (1995); Chi King (Beta) Tam, *Overview of Manufacturing Marks on Center Fire Cartridges*, 33(2) AFTE J. 112 (2001); William Matty & Torrey Johnson, *A Comparison of Manufacturing Marks on Smith & Wesson Firing Pins*, 16(3) AFTE J. 51 (1984); Ronald Nies, *Anvil Marks of the Ruger MKII Target Pistol -- An Example of Subclass Characteristics*, 35(1) AFTE J. 75 (2003); *see also* M.S. Bonfanti & J. De Kinder, *The Influence of Manufacturing Processes on the Identification of Bullets and Cartridge Cases - A Review of the Literature*, 39 Sci. & Justice 3, 5 (1999) (reporting that for some handguns “a correct identification of the firearm on the basis of the breech face and firing pin impression, turned out to be hardly possible” and for different guns “it was impossible to identify the tool which generated the subclass characteristics”).

AFTE Theory of Identification

- Identification opinions can be rendered when there is “sufficient agreement” between toolmarks.
- “Agreement is sufficient when it 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.”
- When agreement is “sufficient”, the likelihood of a coincidental match is “so remote as to be considered a practical impossibility.”
- Whether agreement is “sufficient” is left entirely to the examiner’s subjective judgment

In other words...

The examiner is told to think back to the best matching non-match she can remember. If she can't remember a better match than what she is seeing now, then it's practically impossible the match is coincidental.

Think back to the comments
by the committee head . . .

Murdock:

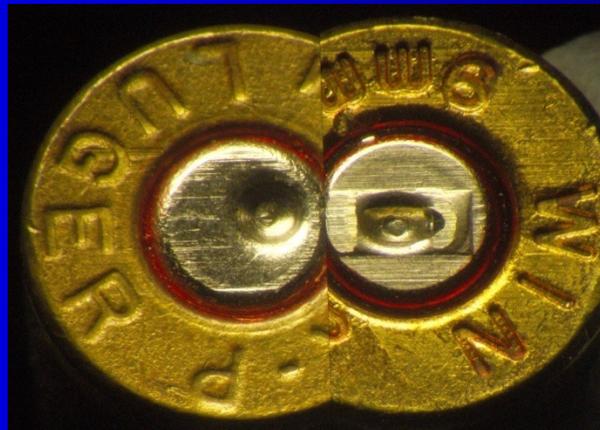
Is there some way we can come up with
answers without doing research?

No research; no protocols to limit subclass influence

- **NO** organized study of subclass marks associated with different firearms
- **NO** requirement that FATM examiner have familiarity with subclass marks created by the suspect firearm
- **NO** organized study of subclass marks associated with different manufacturing methods
- **NO** requirement that FATM examiner understand manufacturing processes used
- **NO** requirement that FATM examiner test fire other firearms of same make and model

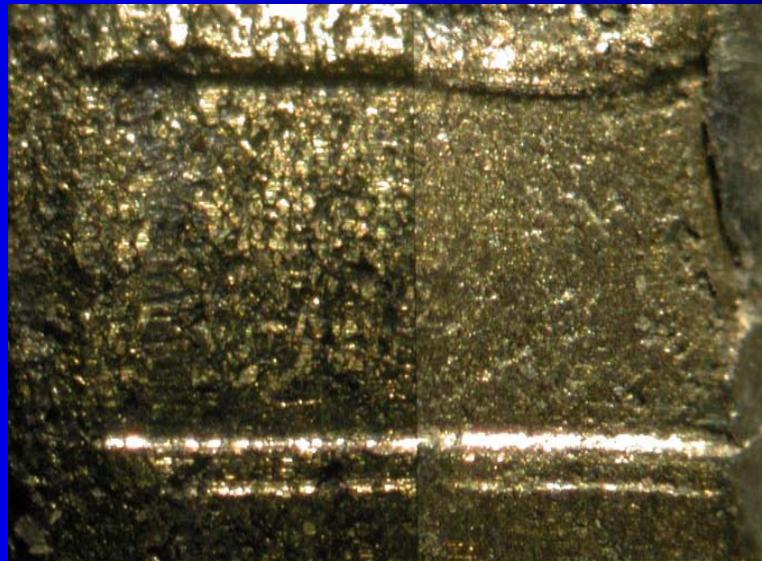
Range of conclusions

- Identification: “sufficient agreement” of individual characteristics; all class characteristics match
- Elimination: examiners are strongly encouraged to reserve for situations where it is evident the bullet or cartridge case was fired by a firearm of **different make and model** than the suspect firearm

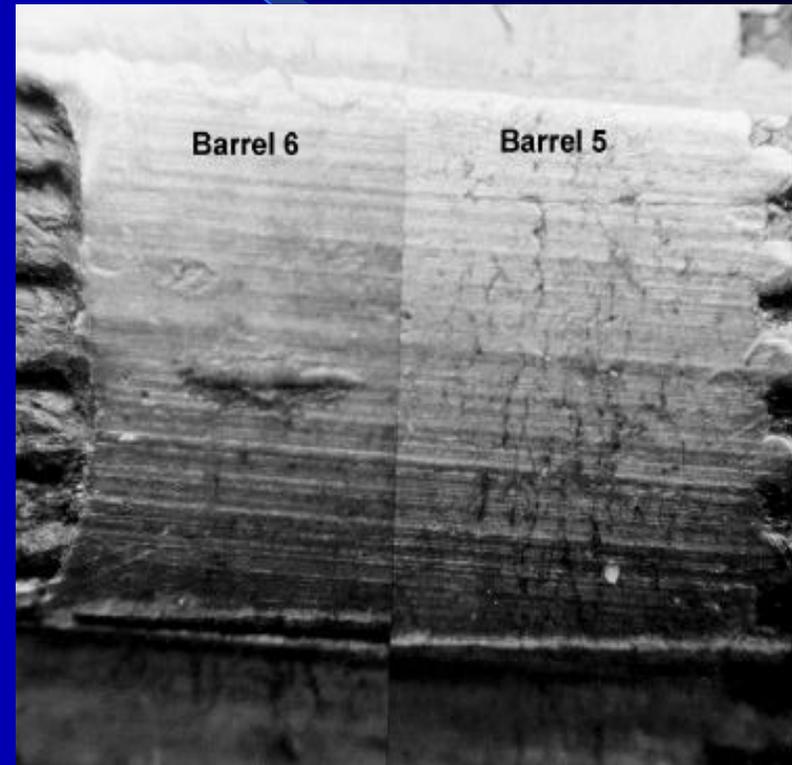
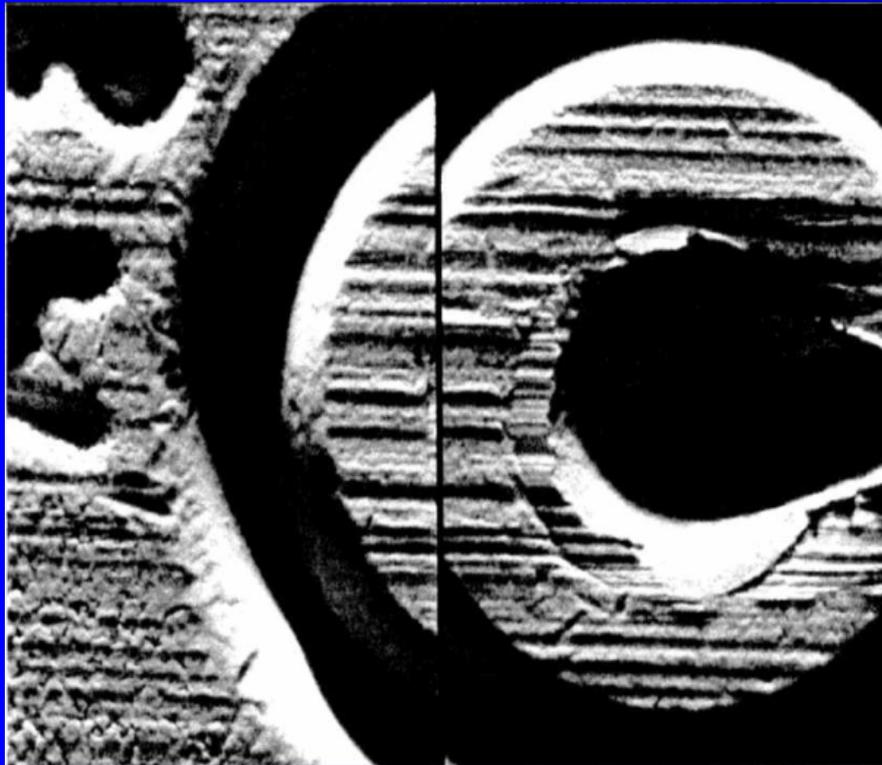


Range of conclusions (cont'd)

- Inconclusive: “quality and character of the toolmark are lacking”



Identification, Elimination or Inconclusive?



Hamby and Brundage Ten Gun Study

- FATM examiners and the government frequently cite this study as evidence that FATM examiners can accurately match bullet/cartridge case to gun under the worst possible conditions
- The worst possible conditions are approximated by bullets fired from consecutively manufactured firearms

Many problems have been identified with this study

- Number of guns studied (10) is too small to be meaningful
- Only one type of firearm was studied, and one type of ammunition – and that one firearm was manufactured in 1985, before updates to the manufacturing process.
- Bullets were fired into a water tank, so they were not damaged as they often are in casework
- The study is a “subjective evaluation” without documentation, such as photography, and thus is “only of value to the examiner who conducted the study.” Biasotti and Murdock
- The study’s author – James Hamby – is a far cry from the objective scientist, having been fired from his role as director of a forensic laboratory for influencing forensic technicians to withhold information regarding testing irregularities and for concealing improper testing protocol.

More problems with 10 gun study

- Most importantly, testing was unblind, meaning that test takers knew the exact nature of the test – a consecutive barrel study with no “extra” non-matching bullets.
- Adding participants to the study – the original study included 67 participants, and now the number of participants exceeds 600 – does nothing to fix the problems with its validity

Enter the NRC Forensic Science Report

- The court “must consider . . . the *current* state of generally-accepted scientific research” underpinning the proposed expert testimony. *Benn v. United States*, 978 A.2d 1257, 1278 (D.C. 2009)
- “[T]here is a *substantial debate* within the scientific community, as well as the Courts, regarding the degree to which firearms toolmark identification evidence passes muster,” and “in this debate . . . *the latest scientific consensus is as expressed in the NRC Forensic Science Report.*” *United States v. Mouzone*, Crim. No. WDQ-08-086, 2009 WL 3617748 at *17, *28 (D. Md. Oct. 29, 2009)(emphasis added).

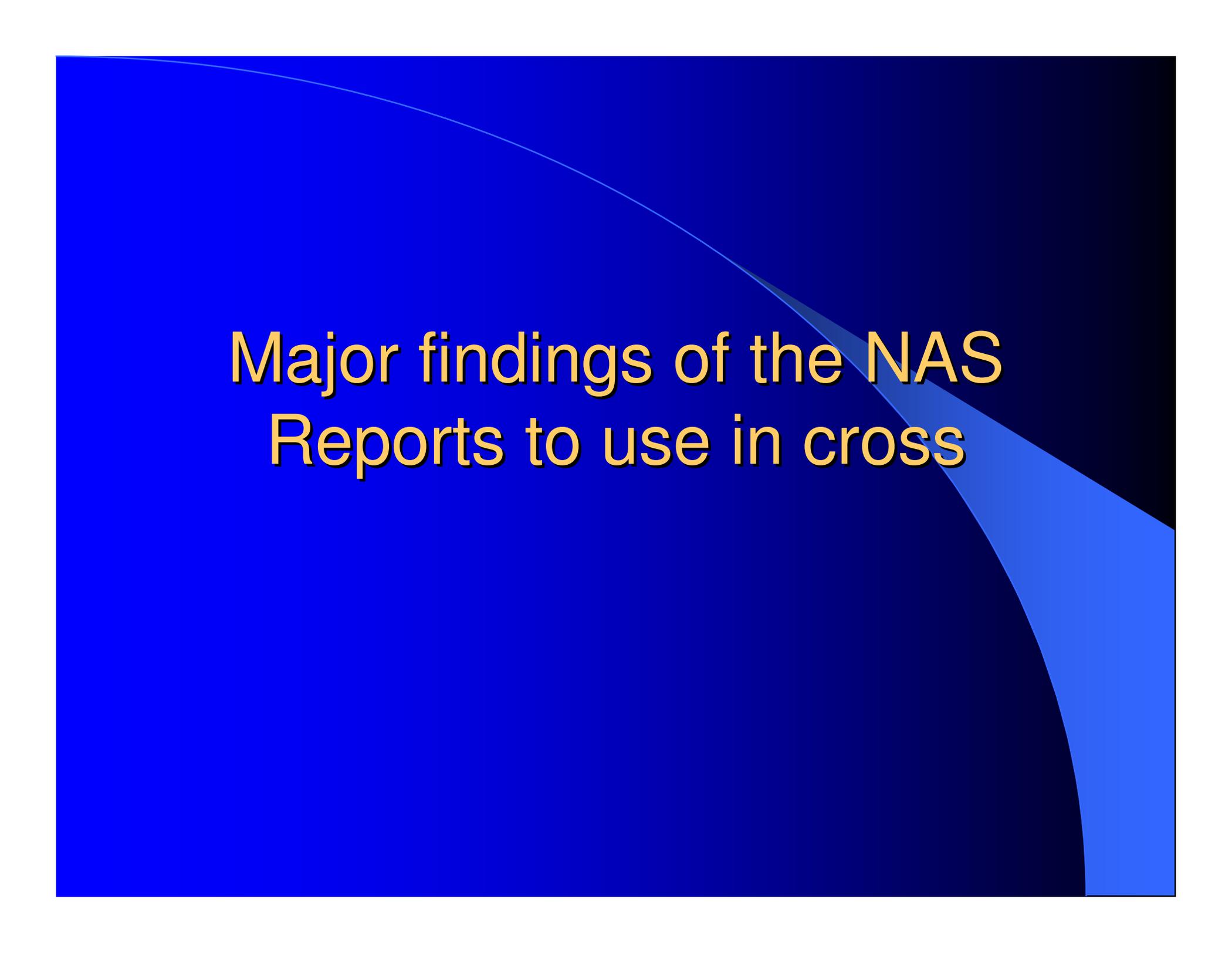
What consensus is expressed by the NRC Forensic Science Report?

“The committee agree[d] that class characteristics are helpful in narrowing the pool of tools that may have left a distinctive mark,” but concluded that FATM has yet to establish “the capacity to consistently and with a high degree of certainty support conclusions about ‘individualization.’”

Report at 87; 154

Outline

- Major findings of the NAS Reports to use in cross
- General considerations in using the NAS Reports
- Legal landscape
- Case study: lessons learned

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Major findings of the NAS Reports to use in cross

People v. Greenwood (LA Sp Ct., 2/10/10)

“Defendant is free to vigorously cross-examine the LPE on the shortcomings of the ACE-V method raised in the 2009 National Academy of Science Report....See also Evid. Code Section 721.”

Two NAS Reports

Ballistic Imaging

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BALLISTIC IMAGING (Nat'l Academies Press 2008)

- “The validity of the fundamental assumptions of uniqueness and reproducibility of firearms-related toolmarks has not yet been fully demonstrated” (p. 3)
- Characterizing firearm/ toolmark identification as “part science and part art form” (p. 55)

BALLISTIC IMAGING (Nat'l Academies Press 2008)

- “Conclusions drawn in firearms identification should not be made to imply the presence of a firm statistical basis when none has been demonstrated.” (p. 82)
- “[A]dditional general research on the uniqueness and reproducibility of firearms-related toolmarks would have to be done if the basic premises of firearms identifications are to be put on a more solid scientific footing.” (*Id.*)

NAS 2009

- Other than 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.” (p 8)
- Toolmark identification tests “have never been exposed to stringent scientific scrutiny.” (p. 42)

NAS 2009

- It is “challenging” for an examiner to determine “the extent of agreement in marks made by different tools, and the extent of variation in marks made by the same tool.” (p. 153)
- “[T]hese decisions involve subjective qualitative judgments by examiners” (p. 153)
- The examiner makes “a subjective decision based on unarticulated standards and no statistical foundation for estimation of error rates.” (p. 154)

NAS 2009

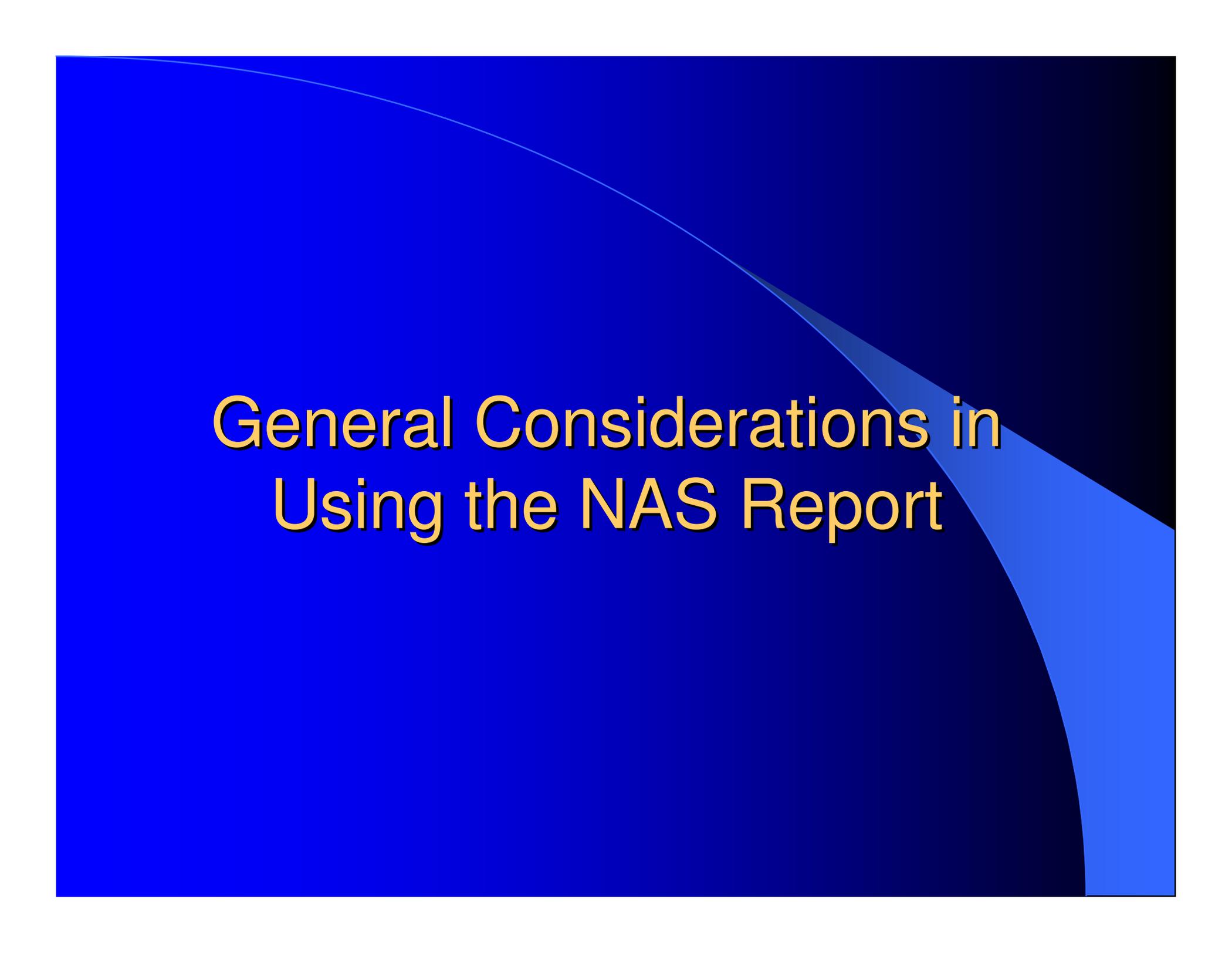
- “Because not enough is known about the variabilities among individual tools and guns, we are not able to specify how many points of similarity are necessary for a given level of confidence in the result. Sufficient studies have not been done to understand the reliability and repeatability of the methods.” (p. 154).

NAS 2009

- “The committee agrees that class characteristics are helpful in narrowing the pool of tools that may have left a distinctive mark. Individual patterns from manufacture or from wear might, in some cases, be distinctive enough to suggest one particular source, but additional studies should be performed to make the process of individualization more precise and repeatable.”

NAS 2009

- The lack of a specific protocol for toolmark analysis is a “fundamental problem,” and the toolmark analysis guidance provided by the AFTE lacks specificity because it allows an examiner to identify a match based on “sufficient agreement”. (p. 155)

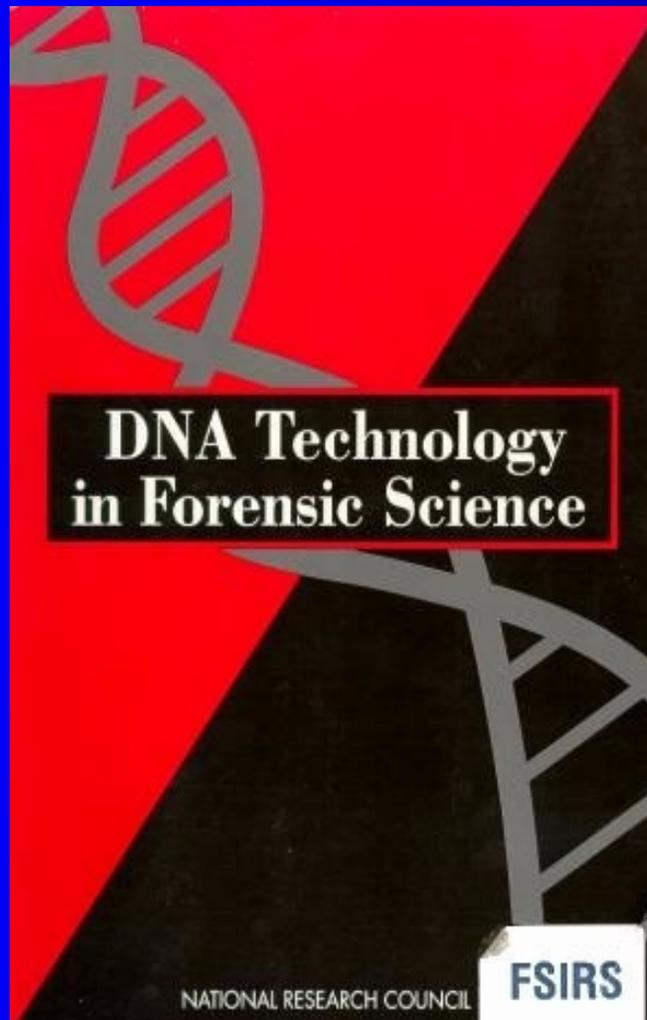
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General Considerations in Using the NAS Report

When, if ever, have judges excluded forensic science?

- DNA in the early 1990's
- Key factors:
 - Prominent critics (including an NRC panel)
 - Skillful litigators
 - Relative new method?

NRC I



**First Report Issued by
National Academy of
Sciences in 1992**

Importance of the NRC

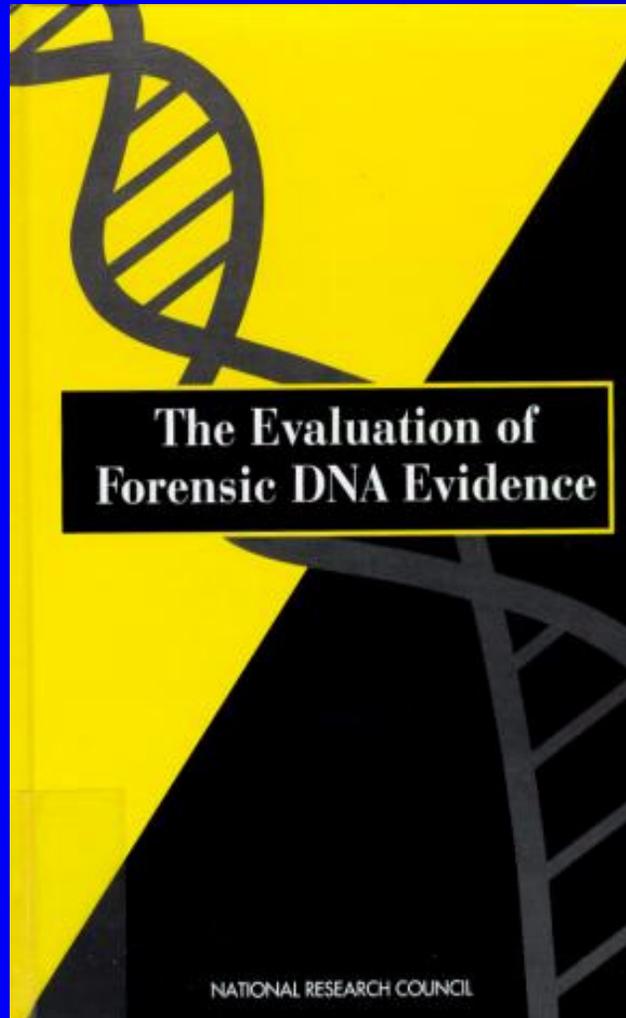
- *Hayes v. State*, 660 So.2d 257, 264 (Fla. 1995) (“When a major voice in the scientific community, such as the National Research Council, recommends that corrections made due to band-shifting be declared “inconclusive,” we must conclude that the test on the tank top is unreliable.”).
- *State v. Johnson*, 186 Ariz. 329, 334, 922 P.2d 294 (Ariz.,1996) (“We, too, believe that endorsement by the NRC of the modified ceiling method is strong evidence of general acceptance within the relevant scientific community.”)

Importance of the NRC

People v. Venegas, 18 Cal.4th 47, 89 (1998) (“Indeed, courts have recognized that the [NRC] is a distinguished cross section of the scientific community... Thus, that committee's conclusion regarding the reliability of forensic DNA typing, specifically RFLP analysis, and the proffer of a conservative method for calculating probability estimates can easily be equated with general acceptance of those methodologies in the relevant scientific community.”)

NRC II

**Second report issued in
May of 1996**



Importance of the NRC

People v. Reeves, 91 Cal.App.4th 14 (2001) (“Though the NRC’s recommendation has changed [from use of a ceiling principle to the unmodified product rule], the respect courts afford conclusions of this esteemed scientific body has not.”)

Importance of the NRC

- *People v. Soto*, 21 Cal.4th 512, 539 (1999) (“[P]ublished appellate affirmation of general scientific acceptance controls subsequent trials. In a context of rapidly changing technology, every effort should be made to base that controlling effect on the very latest scientific opinions, including those published during the appellate phase of the case.”)

Importance of the NRC

- *Brim v. State, 695 So.2d 268, 274 (Fla., 1997)* (“[A]n abuse-of-discretion standard... would prohibit an appellate court from considering any scientific material that was not part of the trial record in its determination of whether there was general acceptance within the relevant scientific community. We find that the abuse-of-discretion standard is incorrect.”)

Importance of the NRC

- *Brim v. State, 695 So.2d 268, 274 (Fla., 1997)* (“We recognize...that there may be times at which new scientific revelations may actually prove older methods unreliable, as opposed to simply unnecessary. In those isolated contexts, the older methods would not satisfy a Frye test.”)



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PRESIDENT'S EDITORIAL

Thomas L. Bohan, Ph.D., J.D.

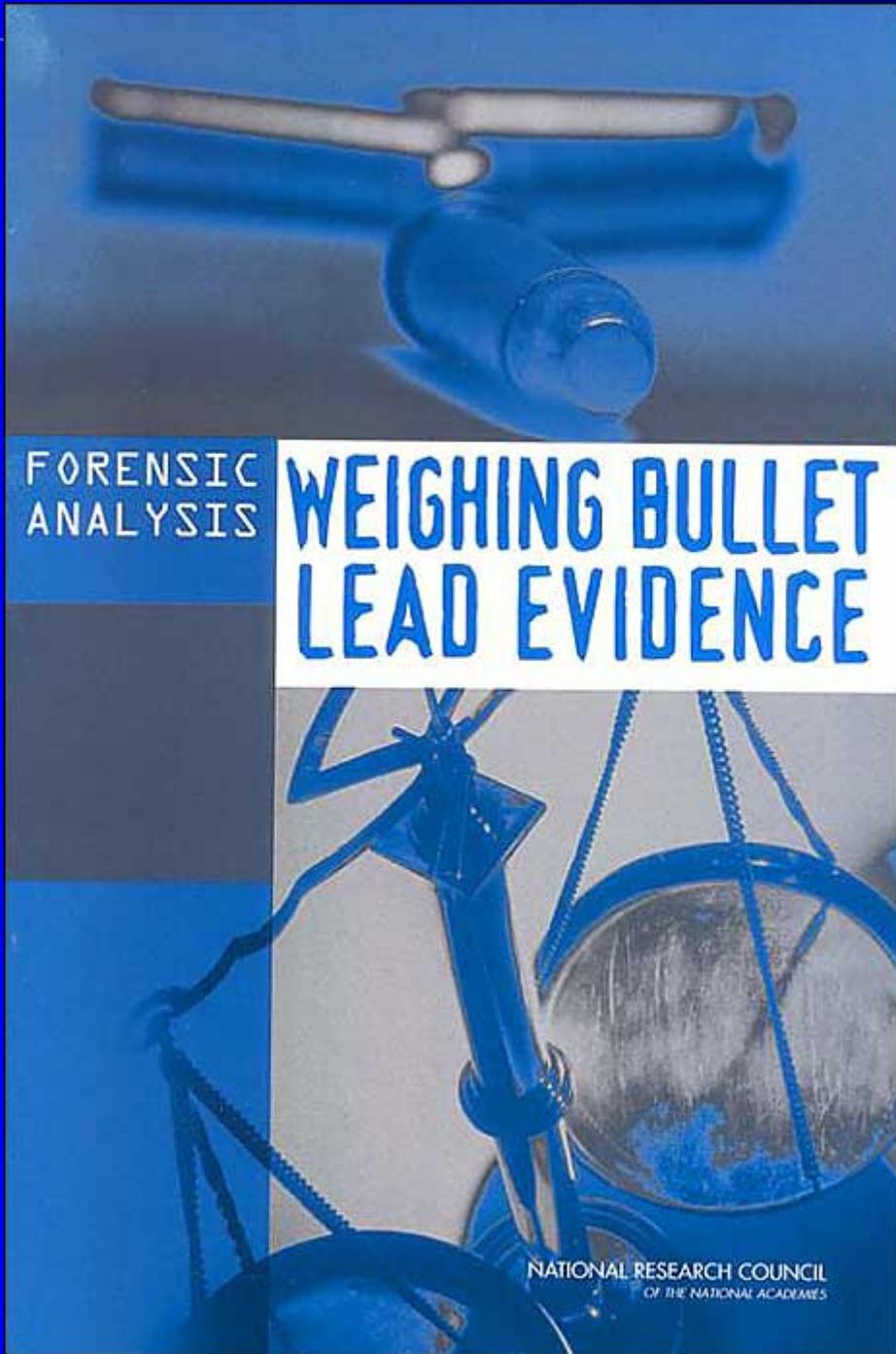
Strengthening Forensic Science: A Way Station on the Journey to Justice

Bohan's main points

- The NAS report has not yet had a significant impact on criminal trials
- This lack of immediate response may be due to the conclusory manner in which the criticisms were framed
- Earlier NAS reports (polygraph and bullet lead) carefully reviewed all the studies claimed to have validated the practice in question before concluding that the practice had not been validated

Bohan's main points

- With respect to the pattern-based techniques that the latest report criticized, the tabulation of prior studies needs to be done.
- The report's conclusions about lack of validation have not been accepted by the practitioners of the questioned practices, most of whom continue to cite studies that they claim constitute validation.
- This contrasts with the response to the NAS report on bullet lead. Once that report issued there was an immediate cessation of attempts to proffer bullet lead testimony.

The cover features a blue and white color scheme. At the top, there is a photograph of a handgun. Below it, a white horizontal band contains the title. The bottom half of the cover shows a close-up of a mechanical scale. The entire cover is framed by a blue border with curved corners.

FORENSIC
ANALYSIS

WEIGHING BULLET LEAD EVIDENCE

NATIONAL RESEARCH COUNCIL
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Following NRC Report in 2004

Federal Bureau of Investigation - Press Release September 1, 2005



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Press Release

For Immediate Release
September 1, 2005

Washington D.C.
FBI National Press Office
(202) 324-3691

FBI LABORATORY ANNOUNCES DISCONTINUATION OF BULLET LEAD EXAMINATIONS

Washington, D.C. -- The FBI Laboratory today announced that, after extensive study and consideration, it will no longer conduct the examination of bullet lead. Bullet lead examinations have historically been performed in limited circumstances, typically when a firearm has not been recovered or when a fired bullet is too mutilated for comparison of physical markings. Bullet lead examinations use analytical chemistry to determine the amounts of trace elements (such as copper, arsenic, antimony, tin, etc.) found within bullets. The result of that analysis allows crime-scene bullets to be compared to bullets associated with a suspect. Since the early 1980's the FBI Laboratory has conducted bullet lead examinations in approximately 2,500 cases submitted by federal, state, local, and foreign law enforcement agencies. In less than 20% of those cases was the result introduced into evidence at trial.

Following NBC Report in 2004

One factor significantly influenced the Laboratory's decision to no longer conduct the examination of bullet lead: neither scientists nor bullet manufacturers are able to definitively attest to the significance of an association made between bullets in the course of a bullet lead examination. While the FBI Laboratory still firmly supports the scientific foundation of bullet lead analysis, given the costs of maintaining the equipment, the resources necessary to do the examination, and its relative probative value, the FBI Laboratory has decided that it will no longer conduct this exam.

Letters outlining the FBI Laboratory's decision to discontinue these examinations are being sent to approximately 300 agencies that received laboratory reports indicating positive results since 1986. The letters are being sent so that these agencies may take whatever steps they deem appropriate, if any, given the facts of their particular case. It is important to note that the FBI Laboratory has not determined that previously issued bullet lead reports were in error.

Effect of FBI's actions

“ If the FBI Laboratory that produced the CBLA evidence now considers such evidence to be of insufficient reliability to justify continuing to produce it, a finding by the trial court that the evidence is both scientifically reliable and relevant would be clearly erroneous, and a finding that the evidence would be helpful to the jury would be an abuse of discretion.”

Ragland v. Commonwealth, 191 S.W.3d 569, 580
(Ky. 2006)

Bullet lead analysis cases

- *State v. Behn*, 375 N.J.Super. 409, 868 A.2d 329(N.J.Super.A.D., Mar. 7, 2005)(overturning conviction based on bullet lead composition testimony)
- *Ragland v. Commonwealth*, 191 S.W.3d 569, 580 (Ky. Mar. 2006)(overturning conviction based on bullet lead composition testimony)
- *Clemons v. State*, 392 Md. 339 (Md. April 2006) (overturning conviction based on bullet lead composition testimony)
- *Murphy v. State*, 2009 WL 5125159 (Fla.App. 2009)(NAS report is newly discovered evidence)

Bruce Budowle,¹ Ph.D.; Maureen C. Bottrell,¹ M.S.; Stephen G. Bunch,¹ Ph.D.; Robert Fram,¹ M.A.; Diana Harrison,¹ B.S.; Stephen Meagher¹; Cary T. Oien,¹ M.S.; Peter E. Peterson,¹ Ph.D.; Danielle P. Seiger,¹ M.F.S.; Michael B. Smith,¹ B.A.; Melissa A. Smrz,¹ M.S.; Greg L. Soltis,¹ M.S.; and Robert B. Stacey,¹ M.A.

A Perspective on Errors, Bias, and Interpretation in the Forensic Sciences and Direction for Continuing Advancement*

ABSTRACT: The forensic sciences are under review more so than ever before. Such review is necessary and healthy and should be a continuous process. It identifies areas for improvement in quality practices and services. The issues surrounding error, i.e., measurement error, human error, contextual bias, and confirmatory bias, and interpretation are discussed. Infrastructure is already in place to support reliability. However, more definition and clarity of terms and interpretation would facilitate communication and understanding. Material improvement across the disciplines should be sought through national programs in education and training, focused on science, the scientific method, statistics, and ethics. To provide direction for advancing the forensic sciences a list of recommendations ranging from further documentation to new research and validation to education and accreditation is provided for consideration. The list is a starting point for discussion that could foster further thought and input in developing an overarching strategic plan for enhancing the forensic sciences.

Budowle's main points

- “[E]xperiential inferences and foundational research have ...helped build robust fields.”
- The need to make the process better does not necessarily call into question the reliability of current or past practices.
- Errors can occur, but understanding how errors can arise and employing a sound QA program, that emphasizes peer review, can minimize them.

Budowle's main points

- A lack of a specific statistic does not mean a method is unreliable.
- “We strongly recommend that anyone interested in constructively critiquing a forensic discipline become intimately familiar with the foundations and practices of that discipline.”

“ The results showed that fingerprint experts were influenced by contextual information during fingerprint comparisons, but not toward making errors. Instead, fingerprint experts under the biasing conditions provided significantly fewer definitive and erroneous conclusions than the control groups.”

contextual information was given in the form of a report prompting conclusions), and a high bias group (an internationally recognized fingerprint expert provided conclusions and case information to deceive this group into believing that it was his case and conclusions). A similar experiment was later conducted with laypersons. The results showed that fingerprint experts were influenced by contextual information during fingerprint comparisons, but not towards making errors. Instead, fingerprint experts under the biasing conditions provided significantly fewer definitive and erroneous conclusions than the control group. In contrast, the novice participants were more influenced by the bias conditions and did tend to make incorrect judgments, especially when prompted towards an incorrect response by the bias prompt.

Legal Landscape

The background is a solid blue gradient. A thin, light blue curved line starts from the top left and arcs towards the right. On the right side, there is a dark blue triangular shape that points towards the center, overlapping the main blue area.

Six (really 4) reported cases citing the NRC Report

- Melendez-Diaz v Mass., 129 S.Ct. 2527 (2009) (confrontation of lab analysis)
- U.S. v. Rose (D.Md. 12/8/09) (fingerprints)
- U.S. v. Taylor (D. N.Mex. 10/9/09)(firearms)
- U.S. v. Mouzone (D. Md. 10/29/09) (firearms)

- U.S. v. Prokupek (D. Neb. 8/14/09)(dog sniff) (report of “little value”)
- Thomas v. Allen (NDAL 4/21/09) (MR) (just quotes)

Important firearm/toolmark cases

- *Ramirez v. State*, 810 So. 2d 2d 836 (Fla. 2001)
- *Sexton v. State*, 93 S.W. 3d 96 (Tex.Crim. App. 2002)
- *United States v. Green*, 405 F.Supp.2d 104 (D.Mass.2005)
- *United States. v. Monteiro*, 407 F.Supp.2d 351 (D.Mass.,2006)

Important firearm/toolmark cases

- *Commonwealth v. Meeks*, 2006 WL 281 9423 (Mass. Super. Ct. 2006)
- *United States v. Diaz*, 2007 WL 2007 WL 485967 (N.D. Ca. 2007)
- *United States v. Williams*, 506 F. 3d 151 (2d. Cir. 2007)

Important firearm/toolmark cases

- *United States v. Glynn*, 578 F. Supp. 2d 567 (S.D.N.Y. 2008)
- *United States v. Taylor*, 663 F.Supp.2d 1170 (D.N.M. 2009)
- *United States v. Mouzone*, 2009 WL 3617748 (D.Md. 2009)
- *United States v. Willock*, 2010 WL 118371 (D.Md.2010)
- *People v. Covarrubias*, 2010 WL 405019 (Cal.App. 2010)

Case study: lessons learned

USA v. Taylor, 663 F.Supp.2d 1170 (D.N.M. 2009)

Discovery demand:

- Case file, including all bench notes of the analyst and any reviewer
- Documents and/or photographs relied upon in performing comparisons or rendering opinions, including SOPs, match criteria, photographs documenting the comparison

USA v. Taylor, 663 F.Supp.2d 1170 (D.N.M. 2009)

Discovery demand:

- Documentation of the exact points of comparison being relied upon for any firearm/toolmark comparison (*USA v. Robinson*, 44 F. Supp. 2d 1345)
- Documentation for any points of dissimilarity in any firearm/toolmark comparison conducted in this case and if the dissimilarity did not result in an exclusion an explanation as to why these points of dissimilarity do not lead to an exclusion.

USA v. Taylor, 663 F.Supp.2d 1170 (D.N.M. 2009)

Discovery demand:

- The results of any computer searches seeking a match with questioned evidence
- Calibration and maintenance records for all instruments and equipment used in the comparison
- Internal validation
- Proficiency tests of analyst and peer reviewer
- Accreditation documents
- Audit documents

USA v. Taylor, 663 F.Supp.2d 1170 (D.N.M. 2009)

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Department of Public Safety Crime Laboratory Firearms Identification Unit Worksheet

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by Special Agent Oscar B. Flores. He had inquired about the FBI's result in reference to this rifle (Item #7). I explained that there had not been any associations. He continued to explain that he had information that this rifle (Item #7) had been used in the 05-1268 homicide. I advised him that I would check into this case and also requested that the evidence (bullet- Item 7, case # 05-1268) be returned for comparison.

USA v. Taylor, 663 F.Supp.2d 1170 (D.N.M. 2009)

- Form over substance (page limits)
- Begins admissibility analysis with review of defendant's confession
- Emphasizes the expert's qualifications
- “[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.”

Cross/contrary evidence myth

“[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.”

But, a prominent critic, cited in the NRC report will not be permitted to testify before the jury because she is not a firearm examiner.

The novelty issue

“The use of firearm identification evidence in criminal trials is hardly novel.”

Daubert, fn 11:
“Although the *Frye* decision itself focused exclusively on ‘novel’ scientific techniques, we do not read the requirements of Rule 702 to apply specially or exclusively to unconventional evidence.”

General acceptance by courts

“ [N]o federal court has yet deemed it inadmissible.”

People v. Reilly, 196 Cal.App.3d 1127, 1135:
“ Of course, a court should examine relevant decisions from other jurisdictions on the question of consensus, bearing in mind that the needed consensus is that of scientists, not courts.”

Whether the particular theory can be and has been tested

“[I]ndustry standards generally require an examiner to document in detail, through note-taking and photographs, the basis for his findings [and] require confirmation by at least one other examiner. These factors... indicate at least some significant level of testability and reproducibility.”

Whether the theory has been subjected to peer review and publication

“ The Association of Firearm and Toolmark Examiners (AFTE), the principle professional organization for firearms and toolmark examiners, publishes a peer-reviewed journal, the *AFTE Journal*. Furthermore, the Government cites two articles in the *Journal of Forensic Science*, another peer-reviewed publication, on the subject of firearm and toolmark identification. . Therefore, this factor clearly weighs in favor of admissibility.”

The known or potential rate of error

“Data from CTS testing done between 1978 and 1991 suggest that the rate of false identification is less than 1%. However, both Mr. Nichols and the Grzybowski article acknowledge that uneven test administration, make-up, and level of difficulty significantly limit the usefulness of this result. Nonetheless, this number at least suggests that the error rate is quite low.”

Existence and maintenance of standards

- “ ‘[T]he decision of the toolmark examiner remains a subjective decision based on unarticulated standards.’ ” (quoting the 2009 NAS Report)

General acceptance “in the relevant scientific or expert community”

“The AFTE Theory appears to be widely accepted by trained firearms examiners, although it is not universally followed... In any case, it does appear that the use of ‘pattern matching’ to determine whether or not there is a match, an approach which, in one form or another, underlies both AFTE and CMS, is generally accepted among firearms examiners in the field.”

Defining the relevant scientific community

- NAS Report, p. 15: “The forensic science system is underresourced ... in the sense that it has only thin ties to an academic research base that could support the forensic science disciplines and fill knowledge gaps.”
- Bohan article: “It seems obvious that a broad swath of scientists should be engaged in examining each forensic technique about which serious questions have been raised.”

United States v. Baines, 573 F. 3d 979 (10th Cir. 2009)

“[W]hile we acknowledge that acceptance by a community of unbiased experts would carry greater weight, we believe that acceptance by other experts in the field should also be considered. And when we consider that factor with respect to fingerprint analysis, what we observe is overwhelming acceptance.”

Positive aspects of Taylor

“Because of the seriousness of the criticisms launched against the methodology underlying firearms identification, both by various commentators and by Defendant in this case, the Court will carefully assess the reliability of this methodology, using *Daubert* as a guide.”

Positive aspects of Taylor

“[B]ecause of the limitations on the reliability of firearms identification evidence... Mr. Nichols will not be permitted to testify that his methodology allows him to reach this conclusion as a matter of scientific certainty.”

Positive aspects of Taylor

“ Mr. Nichols also will not be allowed to testify that he can conclude that there is a match to the exclusion, either practical or absolute, of all other guns. He may only testify that, in his opinion, the bullet came from the suspect rifle to within a reasonable degree of certainty in the firearms examination field.”

Positive aspects of Taylor

“ One additional problem with firearms examination, not necessarily neatly encapsulated by any one of the Daubert factors, bears mentioning. Generally, as was done in this case, the examiner is handed only one suspect weapon and the recovered projectile or projectiles.”

Positive aspects of Taylor

“The problem with this practice is the same kind of problem that has troubled courts with respect to show-up identifications of people: it creates a potentially significant ‘observer effect’ whereby the examiner knows that he is testing a suspect weapon and may be predisposed to find a match.”

Take home message

- “[W]hen liberty hangs in the balance...the standards should be higher than... have been imposed across the country. The more courts admit this type of toolmark evidence without requiring documentation, proficiency testing, or evidence of reliability, the more sloppy practices will endure; we should require more.”

United States v. Green, 405 F.Supp.2d 104 (D.Mass.2005)