

Cognitive Bias in Forensic Science

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Lessons from the Innocent

- Eyewitness Error—76% of wrongful convictions
- False confessions—16%-24% of cases
- Erroneous forensic science—~60% of cases
- Jailhouse snitch testimony—18%+ of cases
- Prosecutorial or police misconduct
- Inadequate defense counsel

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Tunnel Vision

Tunnel Vision

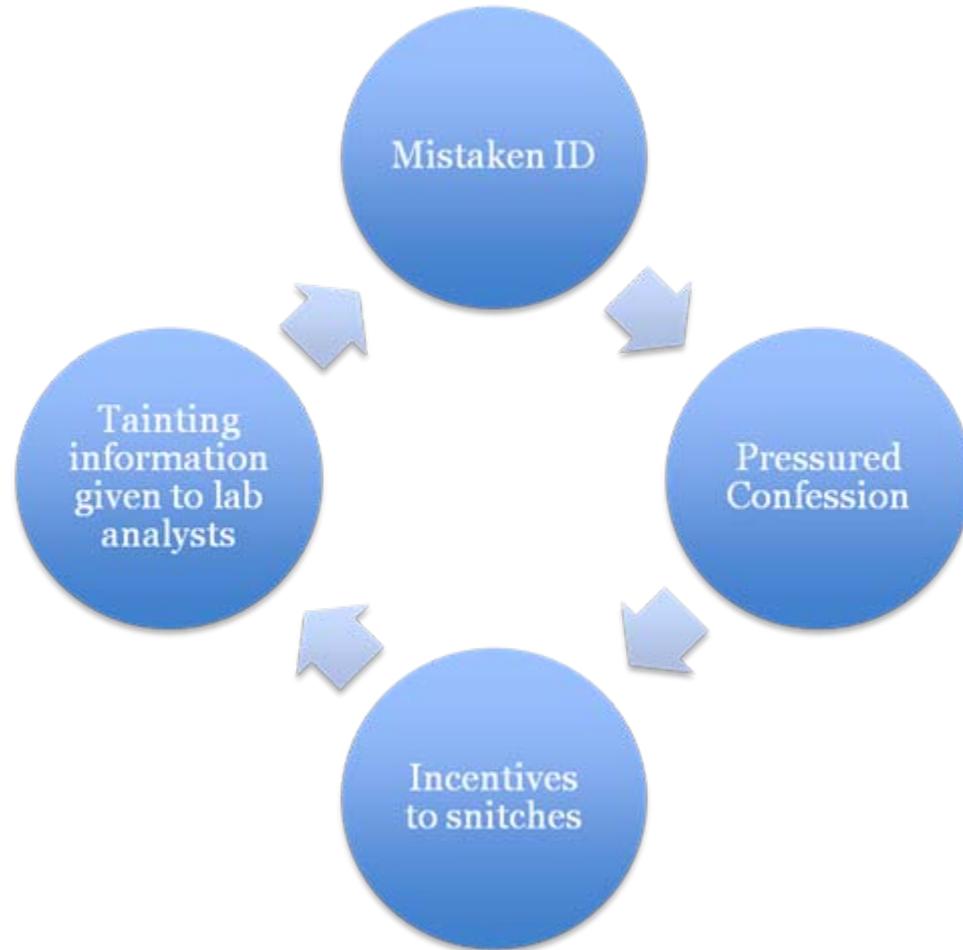
That compendium of common heuristics and logical fallacies, to which we are all susceptible, that lead actors in the criminal justice system to focus on a suspect, select and filter the evidence that will build a case for conviction, while ignoring or suppressing evidence that points away from guilt.

- Keith A. Findley & Michael S. Scott, *The Multiple Dimensions of Tunnel Vision in Criminal Cases*, 2006 WIS. L. REV. 291

Multiple Dimensions

- Sources:
 - **Cognitive Biases/Distortions**
 - Confirmation Bias
 - Belief Perseverance
 - Hindsight Bias
 - Outcome Bias
 - **Institutional Pressures**
 - **Normative Principles—Rules of the Game**
- Players
 - Affects everyone—Police, Lab Analysts, Prosecutors, Defense Attorneys, Jurors, Judges/Courts

The Echo Chamber in the Tunnel



Cognitive Biases

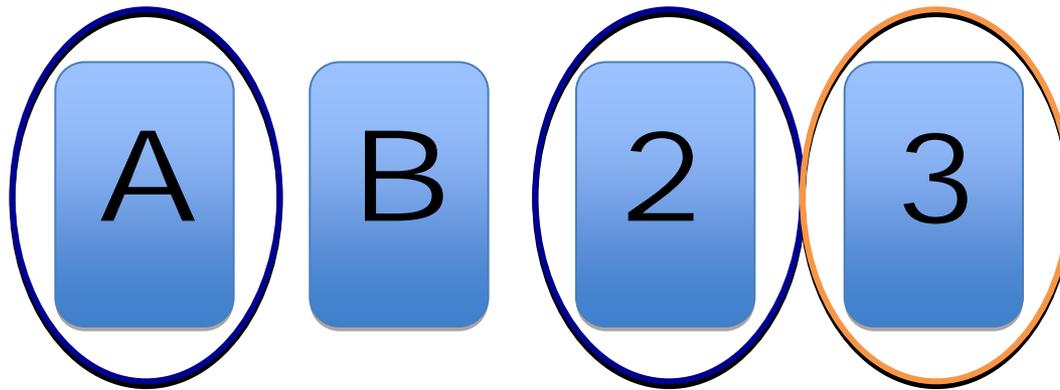
1 3 7 15 31 63 127 255

311 623 624

Confirmation Bias

- Tendency to *seek* confirming, rather than disconfirming evidence

Confirmation Bias



Hypothesis: any card with a vowel facing up has an even number on the reverse side

Confirmation Bias in a Social Context

Task: Determine if person is an introvert or extrovert

- Subjects tasked with identifying if person was introvert consistently asked confirming questions,

e.g.:

- *What is it about large groups that makes you feel uncomfortable?*

- Subjects tasked with identifying if person was extrovert asked, e.g.:

- *What would you do if you wanted to liven things up at a party?*

Confirmation Bias

- Tendency to *seek* confirming, rather than disconfirming evidence
- Tendency to *recall* confirming evidence in a biased manner

Biased Recall

- Story about a person who acted in both introverted and extroverted ways
- Days later, asked to assess suitability of a person for a job that clearly required either extroversion or introversion
 - Those assessing suitability for extrovert's job recalled instances of extroversion
 - Those assessing suitability for introvert's job recalled introversion

Confirmation Bias

- Tendency to *seek* confirming, rather than disconfirming evidence
- Tendency to *recall* confirming evidence in a biased manner
- Tendency to *interpret* ambiguous evidence in manner that confirms preexisting beliefs

Biased Data Interpretation

- E.g., people told that a person has certain personality characteristics tend to then see those characteristics in a person, even if they are not objectively present
- Effect in criminal cases: individual is being judged—by police, prosecutors, defense lawyers, judges, and jurors—where the initial working hypothesis presented to each actor in the system is often that the defendant is guilty (despite the theoretical presumption of innocence).

Belief Perseverance

Subjects asked to distinguish between real and fake suicide notes. Participants were given random feedback on how they were doing—unrelated to actual performance

- Participants were then told the feedback was random and fake
- Yet those given positive feedback continued to rate their ability much higher than those given negative feedback

Belief Perseverance in Criminal Cases

- Confronted with disconfirming evidence, prosecutors sometimes work hard to rationalize it away:
 - The “unindicted co-ejaculator” theory

Confirmation Bias in Police Investigations

- Police officers rate disconfirming or exonerating evidence as less reliable or credible than guilt-confirming evidence that supports their initial hypotheses
 - Ask & Granhag (2007); Ask, Rebelius, & Granhag(2008)
- Investigators show marked confirmation bias when asked to form hypothesis of guilt early in the evaluation of evidence, as opposed to if they are not asked for a hypothesis until end of review of all evidence.
 - O'Brien (2009)

Role Effects

- People's perceptions of their role can influence their decisions
 - One of the risks of embedding forensic sciences within law enforcement

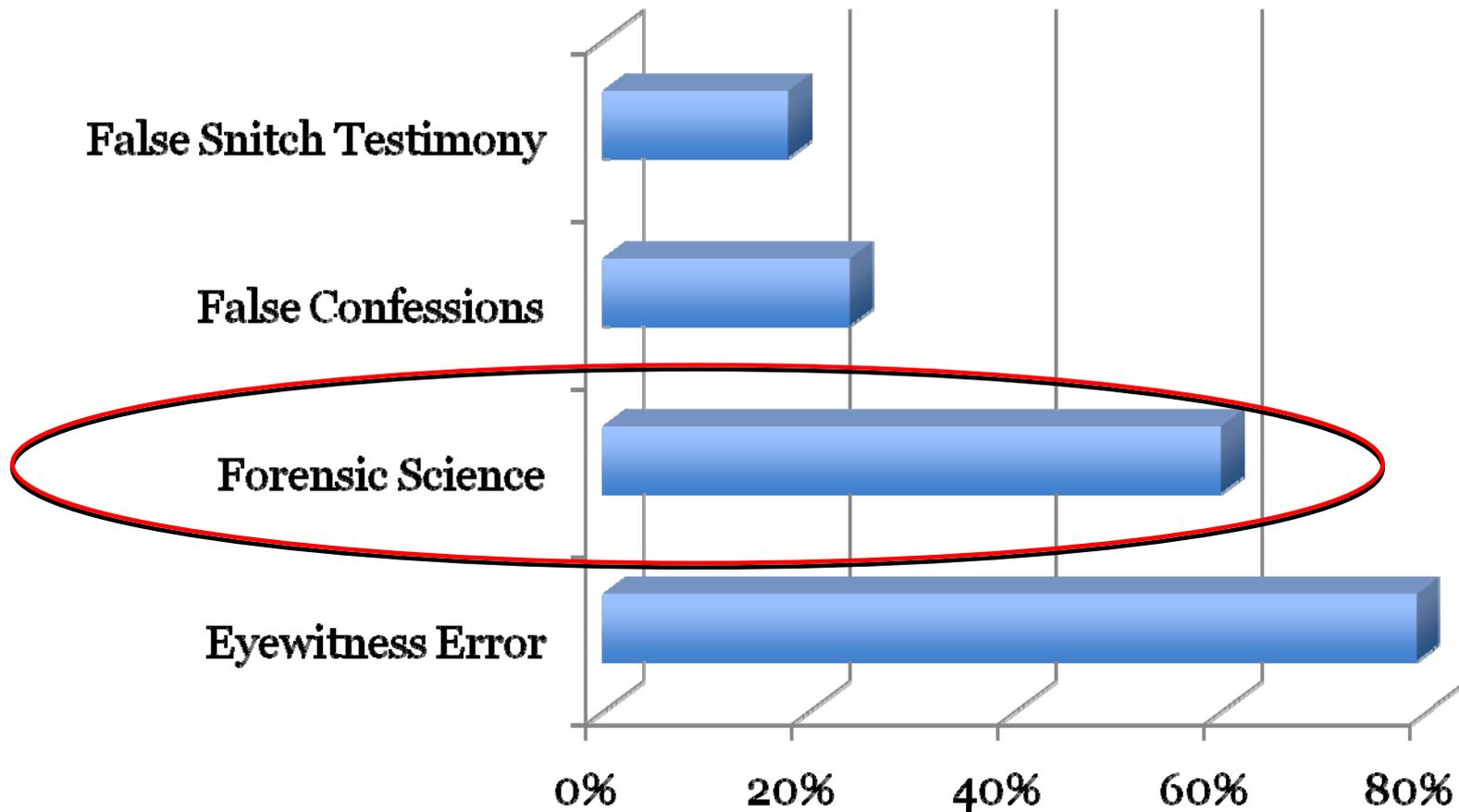
Contextual Bias

- When extraneous information influences a decision, typically in cases of ambiguity
 - “Observer effects”

Bias in Forensic Science

- NAS 2009
- The findings of forensic science experts are vulnerable to cognitive and contextual bias

Features of Wrongful Convictions



Flawed Forensics

Wrongful Convictions with Forensic Science Evidence



Source: Garrett & Neufeld, *Improper Forensic Science and Wrongful Convictions*, 95 Va. L. Rev. 1 (2009)

What Biases Might Affect Forensic Practitioners?



Organizing Knowledge

- At a higher level of information processing, cognition depends both on bottom-up and top-down information.
- Bottom-up refers to the incoming data, where as top-down relies on pre-existing knowledge.
- Top-down has many forms and manifestations, which include the context in which the data is presented, past experience and knowledge, expectations,

Organizing Knowledge

- Experts rely more on top-down information, which allows efficient and effective processing of the bottom-up data, but it can distort and bias how the data is processed.
- **Dror, 2010**

Top Down Processing

Dror, Peron, Hind, & Charlton, *When Emotions Get the Better of Us: The Effect of Contextual Top-down Processing on Matching Fingerprints*, 19 APP. COG. PSYCH. 799 (2005)

- Subjects given both easy and difficult fingerprint comparisons
- In some, they were also given emotionally biasing information, such as information about violent crimes with gruesome photos of injuries; in others, simple property crimes with photos of stolen items
- In some, given subliminal suggestions (e.g., “guilty” and “same”) flashed on screen
- Results: Top-down manipulations affected interpretation of ambiguous prints, but not clear ones

Robert Lee Stinson



1984 Murder in
Milwaukee
1985 Conviction & life
sentence

The Evidence

- Stinson lived next door; police focused on him because his teeth looked somewhat like odontologist's sketch of killer's teeth
- Two forensic odontologists examined the bite marks and Stinson's dentition.
 - The bite marks "had to have been made by teeth identical" to Stinson's.
 - There was "no margin for error in this."
 - The bite mark evidence was "overwhelming."
 - "[T]here was no question there was a match."



R84-2363 Bite #1 Abdomen Large



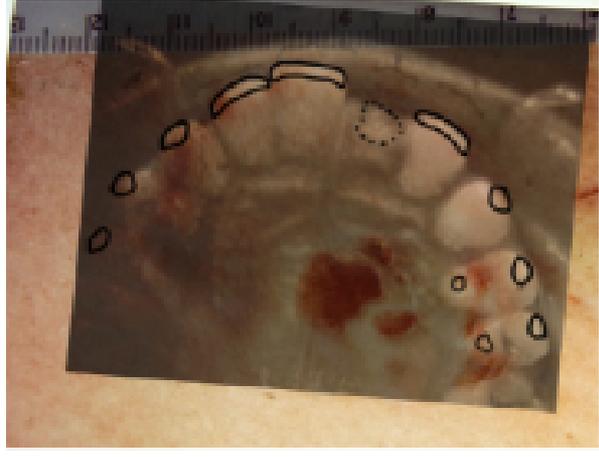
R84-2363 Bite #1 Abdomen Large

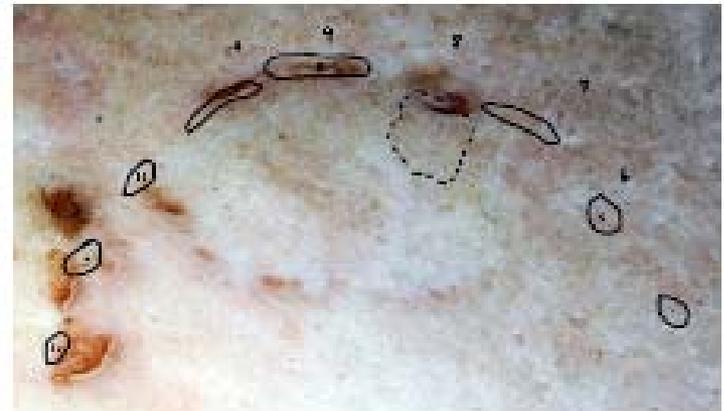
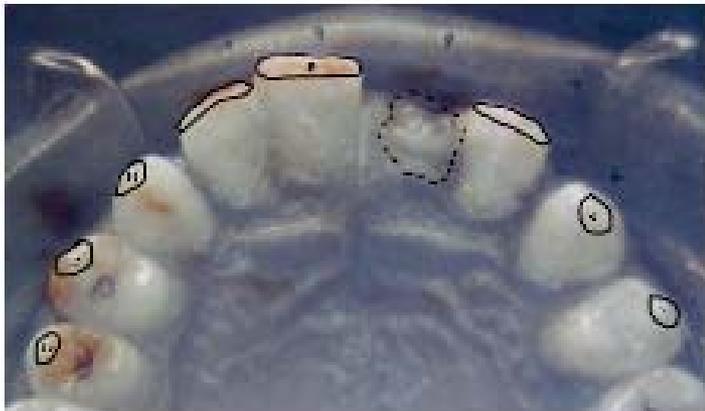


R84-2363 Bite #1 Abdomen Large



R84-2363 Bite #1 Abdomen Large





DNA Testing in the Stinson Case

- From cuttings from the victim's shirt
- YSTR
 - Multiple profiles
 - All excluded Stinson
- STR
 - Partial, mixed profiles
 - All excluded Stinson
- Subsequent STR analysis
 - Full male STR profile developed, not Stinson
 - Database hit on Moses Price
 - Price confessed and explained how he committed the crime



Madrid Train Bombing



Madrid Train Bombing

- March 11, 2004: terrorists kill 191 people by placing bombs on several trains
- In car outside train station, Spanish police find a bag containing detonation materials; latent fingerprints on bag
- At least one latent sent to FBI lab, run through computer

Madrid Train Bombing

- FBI computer returns 20 potential matches
- FBI print examiner finds “100%” match to the 4th ranked potential match, Oregon lawyer Brandon Mayfield
- Two other FBI examiners (3 total), and one independent (court-appointed) examiner, confirm the match to Mayfield



Madrid Train Bombing

- After FBI match, Spanish authorities compare Mayfield's print to latent and conclude that alleged match was “conclusively negative”
- Spanish authorities then match print to Ouhmane Daoud an Algerian with terrorist ties



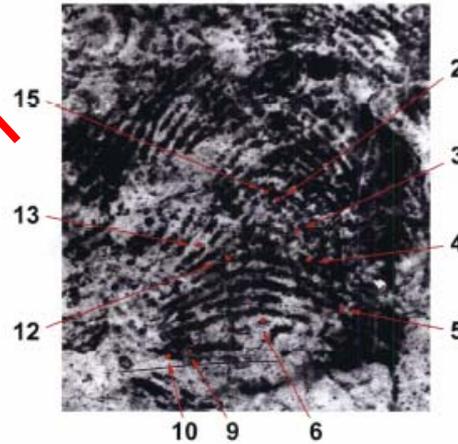


The Fingerprint

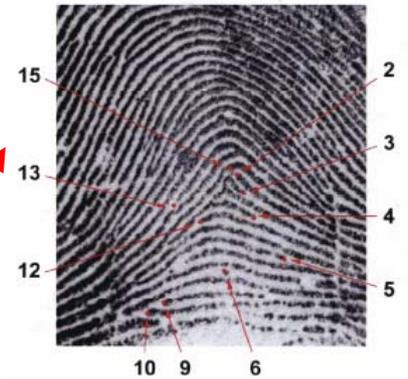
Daoud record print



Ouhnane Daoud



Madrid latent



Mayfield record print



Brandon Mayfield

Madrid Train Bombing

- U.S. immediately releases Mayfield, but does not explicitly acknowledge mistake



- After meeting with Spanish examiners, FBI examiners state that latent print has “no value” for identification

OIG Report on Mayfield

“Circular reasoning is the use of data from the known fingerprint to influence the characteristics observed in the latent fingerprint. It is a form of **confirmation bias** or “mindset” that can lead to unintentional false identifications. In the Mayfield error, for example, **the original examiner encoded seven Level 2 details in the latent fingerprint before being exposed to any candidate fingerprints. After running an IAFIS search and viewing Mayfield’s fingerprint, the examiner changed his interpretation of five of these seven points.** Additionally, similarities between the Madrid latent fingerprint and Mayfield’s known fingerprint **led the examiner to see other similarities that were not actually present.”** P.27, fn.28

Bias and Mayfield: Independent Consultants

- The power of the IAFIS match
- the pressure of working on a high profile case
- influenced Green's initial judgment and
- created a mind-set in which his examination became biased by an **expectation** that the prints were a match

Bias and Mayfield

- The subsequent examinations by Massey and Wieners were “tainted” by knowledge of Green’s conclusion
 - No “blind” verification

Fingerprint Study

Itiel Dror, et al., *Contextual Information Renders Experts Vulnerable to Making Erroneous Identifications*, 156 *Forens. Sci. Intl* 74 (2006)

- 5 of world's top fingerprint experts
- Each examiner sent a latent print and a suspect print from a case in which examiner *had previously pronounced a match*
- But examiners *told* they were being given latent print from Madrid and Mayfield's print (which were not a match)
- 4 out of 5 now said no match

Itiel Dror et al.

Time 1: In Court	Time 2: In Study
x Positive Ident	Not a Match
x Positive Ident	Not a Match
x Positive Ident	Not a Match
x Positive Ident	Undecided
✓Positive Ident	Positive Ident

Fingerprint Study II

Itiel Dror & David Charlton, *Why Experts Make Errors*, 56 J. of Forensic Identification 600 (2006)

- 6 experienced fingerprint examiners
- Each shown 8 pairs of fingerprints
 - 4 that the examiner had called a match in the past
 - 4 that the examiner had called an exclusion in the past
 - 4 were difficult to judge, two were not difficult
 - In 4, contextual information provided (subtle, day-to-day biasing information)
 - In 4 control groups, no contextual information

Fingerprint Study II

- Experts changed opinions in 6 of 48 cases (12%)
 - 4 of 24 (16.6%) changed opinions in cases with contextual information
 - 2 of 24 (8.3%) changed opinions in cases w/no contextual information
 - 4 of the 6 experts changed opinions at least once
 - 5 of 6 changes were in difficult cases

Bias in DNA Analysis

Itiel Dror & Greg Hampikian, *Subjectivity and bias in forensic DNA mixture interpretation*, Science & Justice (2011)

- Mixture DNA analysis
- DNA analysts from Georgia concluded defendant could not be excluded
 - Subject to considerable contextual information
- 17 independent analysts, not subject to contextual information, reviewed the DNA evidence
 - Only 1 of 17 reach the “cannot be excluded” conclusion
 - 4 concluded there was insufficient information
 - 12 found defendant “excluded”

NAS Report

- In response to such problems, in 2006 Congress charged National Academy of Sciences with conducting study on forensic sciences
- NAS: premier national scientific organization
 - group of 2,100 pre-eminent scientists, including over 200 Nobel Prize winners

NAS: History

- NAS established in 1863 by Lincoln
- Mandate is to "investigate, examine, experiment, and report upon any subject of science or art" when called upon by the government
- Members are scholars engaged in scientific research

NAS and Forensic Science

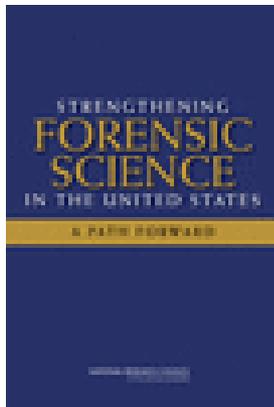
- NAS has addressed forensics in the past:
 - ❑ 1979 report critical of sound spectrography, or “voiceprint”
 - ❑ 1990s, 2 reports on DNA evidence
 - ❑ 2003 report urging exclusion of polygraph
 - ❑ 2004 report critical of comparative bullet lead analysis (CBLA); FBI discontinued next year

Is Bias a True Concern?

- The 1996 National Academy of Sciences report on DNA testing recommended that laboratory procedures
- "be designed with safeguards to detect bias and to identify cases of true ambiguity. Potential ambiguities should be documented. . . ."

NAS Report

- “a watershed moment for the forensic sciences”
- National Academy of Science, National Research Council, “Strengthening Forensic Science in the United States: A Path Forward” (2009)



NAS Report

“With the exception of nuclear DNA analysis,...no forensic method has been rigorously shown to have the capacity to consistently, and with a high degree of certainty, demonstrate a connection between evidence and a specific individual or source.” Page 7

NAS Report

“In most areas of forensic science, no well-defined system exists for determining error rates, and proficiency testing shows that some examiners perform poorly....

In most forensic science disciplines, no studies have been conducted of large populations to establish the uniqueness of marks or features. Yet ... examiners make probabilistic claims based on their experience....

Little rigorous research has been done to validate the basic premises and techniques in a number of forensic science disciplines.”

Pages 188-89.

NAS Report

- The comparison to DNA
- DNA is an academic science
- Methods, theories, and protocols are scientifically validated
- Loci for examination are validated and standardized
- Based upon statistical population genetics
 - The significance of a “match” is known

Recommendation 1

Create a National Institute of Forensic Science

To promote the development of forensic science into a mature field of multidisciplinary research and practice,... Congress should **establish ... an independent federal entity, the National Institute of Forensic Science (NIFS).**

All of the remaining recommendations are tied to this initial provision.

Recommendation 2

Establish Standard Terminology

NIFS should establish standard terminology to be used in reporting on and testifying about the results of forensic science investigations.

ABFO Terminology

Testimony

Reasonable
scientific certainty

Probable

Consistent (with)

Match

ABFO Terminology

Testimony	Official Definition	
Reasonable scientific certainty	Highest order of certainty; no reasonable probability of error.	
Probable	More likely than not; most people could not leave such a mark.	
Consistent (with)	Similarity, but no degree of specificity, like match; may or may not be.	
Match	Some concordance, some similarity, but no expression of specificity intended; generally similar but true for large percentage of population.	

ABFO Terminology

Testimony	Official Definition	Rating
Reasonable scientific certainty	Highest order of certainty; no reasonable probability of error.	70.7
Probable	More likely than not; most people could not leave such a mark.	57.4
Consistent (with)	Similarity, but no degree of specificity, like match; may or may not be.	75.6
Match	Some concordance, some similarity, but no expression of specificity intended; generally similar but true for large percentage of population.	86.0

Recommendation 3

Support scientific research on forensic practices

NIFS should **competitively fund peer-reviewed research** on the accuracy, reliability and validity of forensic science disciplines and quantify the uncertainty of disciplines.

Recommendation 4

Ensure independence of forensic labs

To improve the scientific bases of forensic science examinations and to maximize independence from or autonomy within the law enforcement community, Congress should authorize funds to NIFS for allocation to local jurisdictions for the purpose of removing all public forensic laboratories and facilities from the administrative control of law enforcement agencies or prosecutors' offices.

Recommendation 5

Research ways to minimize bias

NIFS should encourage research programs on human observer bias as sources of human error in forensic examinations.

Recommendation 6

Set standards for forensic practice

NIFS should coordinate the National Institute of Standards and Technology (NIST) and the Scientific Working Groups at the FBI in efforts to **develop tools for measurement, validation, reliability, information sharing and proficiency testing in forensic science; and also to establish protocols for forensic examinations, methods and practices.**

Recommendation 7

Require accreditation and certification

Laboratory accreditation and individual certification of forensic science professionals should be mandatory and all forensic science professionals should have access to a certification process.

Specific Discipline Findings:

Hair comparison

- “No scientifically accepted statistics exist about the frequency with which particular characteristics of hair are distributed in the population. There appear to be **no uniform standards** on the number of features on which hairs must agree before an examiner may declare a “match.” (p. 5-25)
- “The committee found **no scientific support for the use of hair comparisons for individualization** in the absence of nuclear DNA. Microscopy and mtDNA analysis can be used in tandem and may add to one another’s value for classifying a common source, but no studies have been performed specifically to quantify the reliability of their joint use.” (p. 5-26)

Specific Discipline Findings: Handwriting Comparisons

“The scientific basis for handwriting comparisons needs to be strengthened.... Although there has been only limited research to quantify the reliability and replicability of the practices used by trained document examiners, the committee agrees that there may be some value in handwriting analysis.” Page 167

Specific Discipline Findings: Fire Causation

- [M]any...rules of thumb... typically assumed to indicate that an accelerant was used (e.g., “alligatoring” of wood, specific char patterns) **have been shown not to be true.**

Specific Discipline Findings: Fiber comparisons

“Fiber examiners agree, however, that **none of these characteristics is suitable for individualizing fibers** (associating a fiber from a crime scene with one, and only one, source) and that fiber evidence can be used only to associate a given fiber with a class of fibers.” (p. 5-26)

Specific Discipline Findings: Bitemark comparisons

- “Although the methods of collection of bite mark evidence are relatively noncontroversial, there is **considerable dispute about the value and reliability of the collected data** for interpretation. Some of the key areas of dispute include the accuracy of human skin as a reliable registration material for bite marks, the uniqueness of human dentition, the techniques used for analysis, and the role of examiner bias.”
- “Although the majority of forensic odontologists are satisfied that bite marks can demonstrate sufficient detail for positive identification, **no scientific studies support this assessment**, and no large population studies have been conducted. In numerous instances, **experts diverge widely in their evaluations of the same bite mark evidence**, which has led to questioning of the value and scientific objectivity of such evidence.”

Specific Discipline Findings: Bitemark comparisons

“Bite mark testimony has been criticized basically on the same grounds as testimony by questioned document examiners and microscopic hair examiners. The committee received **no evidence of an existing scientific basis for identifying an individual to the exclusion of all others.**” (p. 5-37)

Specific Discipline Findings: Shoeprint comparisons

- “...it is difficult to avoid biases in experience-based judgments, especially in the absence of a feedback mechanism to correct an erroneous judgment.” (p. 5-17)
- “...critical questions that should be addressed include the persistence of individual characteristics, the rarity of certain characteristic types, and the appropriate statistical standards to apply to the significance of individual characteristics.” (p. 5-18)

Specific Discipline Findings: Friction ridge analysis

- “ACE-V provides a broadly stated framework for conducting friction ridge analyses. However, this framework is not specific enough to qualify as a validated method for this type of analysis. **ACE-V does not guard against bias; is too broad** to ensure repeatability and transparency; and does not guarantee that two analysts following it will obtain the same results.” (p. 5-12)
- “**Errors can occur** with any judgment-based method, especially when the factors that lead to the ultimate judgment are not documented. Some in the latent print community argue that the method itself, if followed correctly (i.e., by well-trained examiners properly using the method), has a **zero error rate**. **Clearly, this assertion is unrealistic...**” (p. 5-13)

Specific Discipline Findings: Friction ridge analysis

- “Uniqueness does not guarantee that prints from two different people are always sufficiently different that they **cannot be confused** or that two impressions made by the same finger will also be sufficiently similar to be discerned as coming from the same source.” (p. 5-13)
- “None of these variabilities—of features across a population of fingers or of repeated impressions left by the same finger—**has been characterized, quantified, or compared.**” (p. 5-13)

Specific Discipline Findings: Friction ridge analysis

“ Claims that these analyses have zero error rates are not scientifically plausible.”

Page 142

“The method and the performance of those who use it, are inextricably linked, and both involve multiple sources of error.”

Page 143

Other Pattern Impression

“There is no consensus regarding the number of individual characteristics needed to make a positive identification, and the committee is **not aware of any data** about the variability of class or individual characteristics or about the validity or reliability of the method.” Page 149

Specific Discipline Findings: Toolmarks and Firearms

“Toolmark and Firearms analysis suffers from the same limitations discussed above for impression evidence.” Page 154

Specific Discipline Findings: Toolmarks and Firearms

- Although some studies have been performed on the degree of similarity that can be found between marks made by different tools and the variability in marks made by an individual tool, **the scientific knowledge base for toolmark and firearms analysis is fairly limited.**
- “The validity of the fundamental assumptions of uniqueness and reproducibility of firearms-related toolmarks has not yet been fully demonstrated.”

Does all of this mean forensic science evidence is useful and always inadmissible?

- No, not necessarily. Just that it is not infallible, and has limits that should not be exceeded.
- Most courts continue to admit most prosecution-proffered forensic pattern evidence—but often with limitations.
- Both admissibility and scope of the testimony will have to be evaluated under *Daubert* standards on a case-by-case basis.

The Supreme Court on the NAS Report and Forensic Science Evidence

- *Melendez-Diaz v. Mass.*, 129 S.Ct. 2527 (2009)
- Justice Scalia cites the NAS report: “Nor is it evident that what respondent calls ‘neutral scientific testing’ is as neutral or as reliable as respondent suggests. Forensic evidence is not uniquely immune from the risk of manipulation.”
- Justice Scalia quotes the NAS report: “The forensic science system, encompassing both research and practice, has serious problems that can only be addressed by a national commitment to overhaul the current structure that supports the forensic science community.”

Overcoming Tunnel Vision & Cognitive Biases

Overcoming Cognitive Biases

- Awareness & Education
 - But people cannot will away such biases
- Asking individuals to consider and articulate the opposite can mitigate hindsight bias
- Asking people to articulate reasons that counter their own position can minimize the “illusion of validity” underlying confirmation bias
- Asking people to discuss both the evidence for and against their hypotheses can reduce bias
- Asking people to delay hypothesis formation until all evidence is in can reduce bias

Overcoming Cognitive Biases

- Institutional Devil's Advocates
- Greater Transparency
 - Research shows those who know they are being observed and they will be publicly accountable tend to exhibit less bias
- Fuller Discovery
- Open file policies

Overcoming Bias in Forensic Science

- Independent laboratories—NAS Recommendation
- Making crime laboratories available to both prosecution and defense
- Full disclosure of crime laboratory files
 - Alter the privilege rules relating to crime laboratory files
- Screening analysts from unnecessary contextual information

Overcoming Bias in Forensic Science

- Blind Testing
 - The evidence is presented to analyst with no domain irrelevant information (context)
 - No knowledge of case
 - No knowledge if another analyst has reached a conclusion
 - In fingerprints: “blind verification”

When to do Blind Test?

- Complex comparisons
- High profile cases
- “Contaminated” (bias)
- Single evidence/conclusion*
- Suspect resulting from a database
- *Note: as a result of Mayfield, the FBI routinely uses blind verification in cases of single conclusions.

How to Conduct a Blind Test

- Sanitize the case/evidence/images
 - Identity of analyst, conclusion of analyst
- Should include exclusions
- Evidence “line-up” (foils)
- Case coordinator
 - “Domain relevant” v. “Non-domain relevant” info

Sequential Unmasking

- Krane, D.E., Ford, S., Gilder, J.R., Inman, K., Jamieson, A., et al. Sequential Unmasking: A Means of Minimizing Observer Effects in Forensic DNA Interpretation. *Journal of Forensic Sciences* (2008), 53 (4), 1006-1007.
- UNmasking
- Mask domain irrelevant information initially, slowly unmasking more information

Three Possible Judicial Responses

- Admit the evidence as is—change nothing
- Totally exclude evidence until the scientific validity and reliability are established
- The Solomonic Compromise: Admit the evidence part way, with limitations
- Notes:
 - There are problems with all three approaches
 - No one decision will govern all cases

Forensics under *Daubert*

U.S. v. Willock, 696 F.Supp.2d 536, 572 (D.Md. 2010)
Referencing NAS report and concluding: “I find that firearms toolmark identification evidence is only relevant, reliable, and helpful to a jury if it is offered with the proper qualifications regarding its accuracy. ... [I]t appears that the best [the examiner can say is] that the matches between the bullets or cartridges at issue exceed the number of matches between bullets or cartridges known to have been fired from different firearms, and that the matches are ‘consistent with’ ... matches between bullets or cartridges known to have been fired from the same firearm.”

U.S. v. Council, --- F.Supp.2d ----, 2011 WL 1305247, E.D.Va., April 4, 2011 (noting NAS concerns about fingerprints but admitting fingerprint evidence)

Forensics under *Daubert*

- *U.S. v. Green*, 405 F.Supp.2d 104 (D. Mass. 2005)
 - “The examiner has to exercise his judgment as to which marks are unique to the weapon in question, and which are not.”
 - The examiner “conceded, over and over again, that he relied mainly on his subjective judgment. There were no reference materials of any specificity, no national or even local database on which he relied. And although he relied on his past experience with these weapons, he had no notes or pictures memorializing his past observations.”
 - Analyst may only describe and explain the ways in which the casings from the compared guns “are similar” and may not “conclude that the shell casings came from a specific ... pistol ‘to the exclusion of every other firearm in the world.’”

Forensics under *Daubert*

- *U.S. v. Glynn*, 578 F.Supp.2d 567 (S.D.N.Y. 2008)
 - Because firearms analysis requires subjective judgments under vague standards about whether items “match,” “it could not fairly be called ‘science.’”
 - Ballistics testimony is admissible, but **analyst may not say more than “that a firearms match was ‘more likely than not.’”**

Forensics under *Daubert*

- *U.S. v. Monteiro*, 407 F.Supp.2d 351 (D.Mass. 2006)
- Firearm testimony is admissible, if conducted properly, BUT:
 - "the interpretation of individualization/identification is subjective in nature"
 - "during the testimony at the hearing, the examiners testified to the effect that they could be 100 percent sure of a match." Yet "an examiner's bottom line opinion as to an identification is largely a subjective one, there is no reliable statistical or scientific methodology..."
 - "there is no reliable ... scientific methodology which will currently permit the expert to testify that [a casing and a particular firearm are] a 'match' to an absolute certainty, or to an arbitrary degree of statistical certainty."

Forensics under *Daubert*

- *U.S. v. Hines*, 55 F.Supp.2d 62 (D.Mass. 1999)
 - A handwriting expert could legitimately testify to similarities and dissimilarities between handwriting samples, but the expert could not testify to an exact match to the exclusion of all other samples.

Forensics under *Daubert*

U.S. v. Diaz, 2007 WL 485967 (N.D.Cal. 2007)

“The methods used are reliable. The record, however, **does not support the conclusion that identifications can be made to the exclusion of all other firearms in the world.** Thus, the examiners who testify in this case may only testify that a match has been made to a “reasonable degree of certainty in the ballistics field.”

Forensics under *Daubert*

U.S. v. Gerard (2010) US Army Judicial Trial Court

- Accordingly, the defense motion to exclude the testimony of Mrs. Sevigny that it would be a practical impossibility for the cartridge case to have been fired by any weapon other than the seized AK-47 is GRANTED. This ruling is limited solely to testimony concerning the level of certainty of the origin of the marks.

Forensics under *Daubert*

- *U.S. v. Zajac*, No. 2:06-cr—00811 CW (D. Utah Sept. 16, 2010)
 - The analyst “may state that in his opinion the latent fingerprint from the Salt Lake City bombing is consistent with the known print of Zajac. He may state that in his opinion the fingerprints match closely. He may identify the specific characteristics and markers in the prints that formed the basis of his opinion. He may not represent or otherwise indicate, however, that there is an objective basis for his opinion or that it is supported by scientific methods or scientific principles. Nor may [the analyst] represent or otherwise indicate the degree of probability that the fingerprints match.”

Judge Gertner's Procedural Order

Case 1:08-cr-10104-NG Document 45 Filed 03/10/2010 Page 1 of 3

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MASSACHUSETTS

GERTNER, D.J.

PROCEDURAL ORDER: TRACE EVIDENCE

March 8, 2010

In the light of the 2009 report to Congress of a Committee of the National Academy of Sciences', NATIONAL RESEARCH COUNCIL COMMITTEE ON IDENTIFYING THE NEEDS OF THE FORENSIC SCIENCE COMMUNITY, STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD (2009) [hereinafter cited as NRC 2009], this Court orders the following:

At or prior to the pretrial conference, parties are **ORDERED** to:

- a) identify whether or not they seek to introduce trace evidence;
- b) state whether or not either party seeks a Daubert/Kumho hearing prior to trial;

and,

- c) state the witnesses required for the Daubert/Kumho hearing and the exhibits that the parties seek to admit.

No later than two months before the pretrial conference, counsel must also indicate:

- a) if counsel is appointed, whether expert funds are sought to deal with the trace evidence;
- b) whether all discovery obligations under the Local Rules have been met or whether additional discovery required.

The NRC 2009 report, building on the writing of academic commentators, called for sweeping changes in the presentation and production of evidence of identification involving fingerprints, bullets, handwriting, and other trace evidence. The report noted

that the forensic science disciplines exhibit wide variability with regard to techniques, methodologies, reliability, level of error, research, general acceptability, and published material . . . Many

Judge Gertner's Procedural Order

“In the past, the admissibility of this kind of evidence was effectively presumed, largely because of its pedigree—the fact that it had been admitted for decades. As such, counsel rarely challenged it, and if it were challenged, it was rarely excluded or limited....

The NAS report suggests a different calculus—that admissibility of such evidence ought not to be presumed; that it has to be carefully examined in each case, and tested in the light of the NAS concerns, the concerns of Daubert/Kumho case law, and Rule 702 of the Federal Rules of Evidence. This order is entered to accomplish that end.”

Prior to the pretrial conference the parties must...

- identify whether or not they seek to introduce trace evidence;
- state whether or not either party seeks a *Daubert/Kumho* hearing prior to trial; and,
- state the witnesses required for the *Daubert/Kumho* hearing and the exhibits that the parties seek to admit.

No later than two months before the pretrial conference, counsel must also indicate:

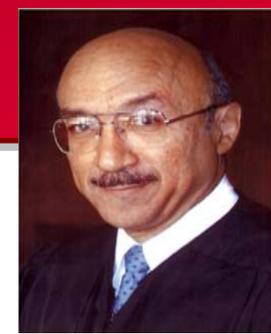
- if counsel is appointed, whether expert funds are sought to deal with the trace evidence;
- whether all discovery obligations under the Local Rules have been met or whether additional discovery required.

Judge Harry Edwards

Co-Chair, NAS Committee

Judge, U.S. Court of Appeals for the D.C. Circuit

The NAS Report on Forensic Sciences: What It means for the Bench and Bar, presentation at Conference on The Role of the Court in an Age of Developing Science & Technology, Wash. D.C., May 6, 2010



“I recently had an opportunity to read several briefs filed by various U.S. Attorneys’ offices in which my name has been invoked in support of the Government’s assertion that the Committee’s findings should not be taken into account in judicial assessments of the admissibility of certain forensic evidence.... This is a blatant misstatement of the truth. I have never said that the Committee’s Report is “not intended to affect the admissibility of forensic evidence.” To the degree that I have commented on the effect of the Report on admissibility determinations, I have said something quite close to the opposite of what these briefs assert.

... Claims to the contrary are without basis in fact and utterly absurd.”