# Scientific Evidence

Paul Giannelli
Weatherhead Professor of Law
Case Western Reserve University

# Developments in the 1990s

- DNA Litigation
- Daubert v. Merrell Dow Pharmaceuticals
  - Supreme Court's "junk science" decision
- Abuse Cases
  - W. Virginia, Oklahoma City, FBI

# DNA Admissibility "Wars"

- University science, not forensic science
- "Science culture"
  - written protocols
  - quality assurance/quality control
  - proficiency testing
- Open science vs. adversarial science

# DNA Exonerations

- Scheck et al., Actual Innocence (2000)
  - 62 cases of DNA exonerations
  - Cardozo Law School Innocence Project
- Tainted or fraudulent science: 33 %

# Abuse Cases

- In re W.Va. State Police Crime Lab., Serology Div. , 438 S.E. 501 (W. Va. 1993) (Fred Zain) (perjured testimony, false lab reports)

- Mitchell v. Gibson, 262 F.3d 1036, 1044 (10th Cir. 2001) ("Ms. Gilchrist thus provided the jury with evidence implicating Mr. Mitchell in the sexual assault of the victim which she knew was rendered false and misleading by evidence withheld from the defense.")

# Ramirez v. State

- "In order to preserve the integrity of the criminal justice system in Florida, particularly in the face of rising nationwide criticism of forensic evidence in general, our state courts … must apply the *Frye* test in a prudent manner to cull scientific fiction and junk science from fact. Any doubt as to admissibility … should be resolved in a manner that minimizes the chance of a wrongful conviction, especially in a capital case." 810 So. 2d 836, 853 (Fla. 2001)

# *Daubert* Trilogy

- Daubert v. Merrell Dow Pharm., Inc.
  - 509 U.S. 579 (1993)
  - establishes reliability test; rejects *Frye* general acceptance test
- General Elec. Co. v. Joiner
  - 522 U.S. 136 (1997)
  - appellate review of *Daubert* issues: abuse of discretion
- Kumho Tire Co. v. Carmichael
  - 526 U.S. 137 (1999)
  - *Daubert* applies to "technical" evidence – i.e., all experts

# *Daubert* Factors

- (1) Testing ("falsifiability")
- (2) Peer review & publication
- (3) Known or potential error rate
- (4) Standards controlling use of technique
- (5) General acceptance (from *Frye* test)

# Federal Evidence Rule 702

- "If scientific, technical, or other specialized knowledge will assist the trier of fact [jury] to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise . . ."

# Rule 702: Amendment (2000)

- "if (1) the testimony is based on sufficient facts or data,
- (2) the testimony is the product of reliable principles and methods, and
- (3) the witness has applied the principles and methods reliably to the facts of the case."

# Rule 702 Requirements:

- (1) Subject matter requirement: Is this topic a proper subject for expert testimony?
- (2) Qualifications requirement: Is this witness qualified in this subject matter?

# Subject Matter Requirement

| Experimental | Expertise | Lay Knowledge |
| --- | --- | --- |
| | A B | |
| E.g., polygraph | E.g., DNA | E.g., x-rays |

# Subject Matter Tests

| Experimental | Expertise | Lay Knowledge |
| --- | --- | --- |
| 1. *Frye* test<br>2. *Daubert* test<br>3. Relevancy test<br>4. Other tests | A B | 1. "beyond ken" (common law)<br>2. "assist" jury (Rule 702) |

# *Daubert*: Initial Reviews

- "Astonishingly, all parties expressed satisfaction with the *Daubert* decision – the lawyers for the plaintiff and defense, and scientists who wrote amicus briefs."
  - Foster et al., Policy Forum: Science and the Toxic Tort, 261 Science 1509, 1614 (Sept. 17, 1993)

# Comparison of Tests (1993)

| Relevancy test | *Daubert* test | *Frye* test |
| --- | --- | --- |
| most permissive | intermediate standard | most restrictive |

# *Daubert*: Liberal v. Strict

- "Given the Rules' permissive backdrop and their inclusion of a specific rule on expert testimony that does not mention 'general acceptance,' the assertion that the Rules somehow assimilated *Frye* is unconvincing. *Frye* made 'general acceptance' the exclusive test for admitting expert scientific testimony. That austere standard, absent from, and incompatible with the Federal Rules of Evidence, should not be applied in federal trials." 509 U.S. at 589.

# *Daubert* continued:

- "The Rule's basic standard of relevance ... is a liberal one." *Id.* at 587.

- "[A] rigid 'general acceptance' requirement would be at odds with the 'liberal thrust' of the Federal Rules and their 'general approach of relaxing the traditional barriers to 'opinion' testimony." *Id.* at 588.

# But: "Gatekeeper" role

- "[I]n order to qualify as 'scientific knowledge,' an inference or assertion must be derived by the scientific method. Proposed testimony must be supported by appropriate validation – *i.e.*, 'good grounds,' based on what is known. In short, the requirement that an expert's testimony pertain to 'scientific knowledge' establishes a standard of evidentiary reliability." *Id.* at 588.

# United States v. Bonds

- DNA admitted at trial under Frye test
- "We find that the DNA testimony easily meets the more liberal test set out by the Supreme Court in *Daubert*."
  - 12 F.3d 540, 568 (6th Cir. 1993)

# Borawick v. Shay

- Repressed memory evidence
- "by loosening the strictures on scientific evidence set by *Frye*, *Daubert* reinforces the idea that there should be a presumption of admissibility of evidence"
  - 68 F.3d 597, 610 (2d Cir. 1995)

# Later Supreme Court Cases

- *Joiner* (1997):
  - *Daubert* "somewhat broader" than Frye
- *Kumho* (1999):
  - *Daubert* extends to nonscientific evidence
- Wisegram v. Marley Co., 528 U.S. 440 (2000)
  - *Daubert* sets an "exacting standard"

# U.S. v. Horn

- "Under *Daubert*, ... it was expected that it would be easier to admit evidence that was the product of new science or technology. In practice, however, it often seems as though the opposite has occurred – application of *Daubert/Kumho Tire* analysis results in the exclusion of evidence that might otherwise have been admitted under *Frye*."
  - 185 F. Supp. 2d 530 (D. Md. 2002)

# Admissibility Challenges

- Supreme Court in *Daubert* and *Kumho* "is plainly inviting a reexamination even of 'generally accepted' venerable, technical fields."
  - U.S. v. Hines, 55 F. Supp. 2d 62, 67 (D. Mass. 1999)

- "Courts are now confronting challenges to testimony … whose admissibility had long been settled."
  - U.S. v. Hidalgo, 229 F. Supp. 2d 961, 966 (D. Ariz. 2002)

# Civil Cases

- "In the *Daubert* case ... the Supreme Court rejected the deferential standard of the *Frye* Rule in favor of a more assertive standard that required courts to determine that expert testimony was well grounded in the methods and procedures of science."
  - Kassierer & Cecil, Inconsistency in Evidentiary Standards for Medical Testimony: Disorder in the Courts, 288 J. Am. Med. Ass'n 1382, 1383 (2002)

# Rand Institute: Civil Cases

- "[S]ince *Daubert*, judges have examined the reliability of expert evidence more closely and have found more evidence unreliable as a result."
  - Dixon & Gill, Changes in the Standards of Admitting Expert Evidence in Federal Civil Cases Since the Daubert Decision, 8 Psychol., Pub. Pol'y & L. 251 (2002)

# Criminal Cases

- "The *Daubert* Standard goes a step further than *Frye* and requires the forensic scientists to prove that the evidence is fundamentally scientifically reliable, not just generally accepted by his/her peers in the discipline."
  - Jones, President's Editorial – The Changing Practice of Forensic Science, 47 J. Forensic Sci. 437, 437 (2002)

# Study of Criminal Cases

- "*Daubert* decision did not impact on the admission rates of expert testimony at either the trial or appellate court levels."

  - Groscup et al., The Effects of Daubert on the Admissibility of Expert Testimony in State and Federal Criminal Cases, 8 Pyschol., Pub. Pol'y & L. 339, 364 (2002)

# Comparison of Tests (2005)

- No reliability test
  - E.g., Relevancy test
- Reliability tests
  - E.g., *Frye* general acceptance test
  - E.g., *Daubert* test
  - E.g., Other reliability tests

# *Daubert* in the States

- *Frye* jurisdictions – populous states
- *Daubert* jurisdictions
  - But not necessarily *Joiner* & *Kumho*
- Relevancy test – e.g., Wisconsin
- Other reliability tests – e.g., N.C.

# Strict v. Lax Approaches

- "The choice is not between easy *Frye* and difficult *Daubert*; it is between strict and lax scrutiny."
  - Redmayne, Expert Evidence and Criminal Justice 113 (2001)

# Lee v. Martinez

- Admitting polygraph evidence under *Daubert*
- "This liberal approach [*Daubert*] to the admission of evidence is consistent with the intent of the drafters of the Federal Rules of Evidence."
  - 96 P.3d 291, 297 (N.M. 2004)

# Hair Comparisons

- "This court has been unsuccessful in its attempts to locate *any* indication that expert hair comparison testimony meets any of the requirements of *Daubert*."
  - Williamson v. Reynolds, 904 F. Supp. 1529, 1558 (E.D. Okl. 1995) *rev'd on this issue*, Williamson v. Ward, 110 F.3d 1508, 1522-23 (10th Cir. 1997) (due process, not *Daubert*, standard applies in habeas proceedings)

# Hair Comparison continued

- Most courts still admit this evidence
- DNA evidence compared: Microscopic analysis wrong 12% of time
  - Mouch & Budowle, 47 J. Forensic Sci. 964 (2002)

# Handwriting Comparisons

- "Because the principle of uniqueness is without empirical support, we conclude that a document examiner will not be permitted to testify that the maker of a known document is the maker of the questioned document. Nor will a document examiner be able to testify as to identity in terms of probabilities."
  - U.S. v. Hidalgo, 229 F. Supp. 2d 961, 967 (D. Ariz. 2002)

# Handwriting continued

- U.S. v. Prime, 363 F.3d 1028, 1033 (9th Cir. 2004) (admitting)
- U.S. v. Crisp, 324 F.3d 261 (4th Cir. 2003) (same)

# Fingerprints

- U.S. v. Llera Plaza, 188 F. Supp. 2d 549, 558 (E.D. Pa. 2002) (excluding and then admitting)
- U.S. v. Mitchell, 365 F.3d 215, 247 (3d Cir. 2004) (admitting)
- U.S. v. Abreu, 406 F.3d 1304 (11th Cir. 2005) (same)

# U.S. v. Havvard

- Error rate is "zero." ???
- "Peer review" is a second examiner reviewing the analysis. ???
- Adversarial testing = scientific testing ???
  - 117 F. Supp. 2d 848 (S.D. Ind. 2000)

# Fingerprints: Stephan Cowans

- Released after serving 6 years (Massachusetts) for nonfatal shooting of a police officer. First conviction overturned on DNA evidence in which fingerprint evidence was crucial in securing the wrongful conviction.
  - Loftus & Cole, Contaminated Evidence, 304 Science 673, 959, May 14, 2004

# Riki Jackson

- Convicted of murder in 1997 based on bloody fingerprints discovered on a window fan.

- 2 defense experts, retired FBI examiners, testified that there was "no match."

  - McRoberts et al., Forensics Under the Microscope: Unproven Techniques Sway Courts, Erode Justice, Chi. Trib., Oct. 17, 2004

# Brandon Mayfield

- Although F.B.I. found fingerprint match, Spanish officials matched the fingerprints to an Algerian national.

  - Kershaw, Spain and U.S. at Odds on Mistaken Terror Arrest, N.Y. Times, Jun. 5, 2004 at A1

# Independent Report (2004)

- "[D]issimilarities … were easily observed when a detailed analysis of the latent print was conducted."
- "inherent pressure of high-profile case"
- "confirmation bias"

- "To disagree was not an expected response."
- "Verifiers should be given challenging exclusions during blind proficiency tests to ensure that they are independently applying ACE-V methodology correctly …"
  - Stacey, A Report on the Erroneous Fingerprint Individualization in the Madrid Train Bombing Case, 54 J. Forensic Identification 707 (2004)

# Fingerprints

- Commonwealth v. Patterson (June 13, 2005) soliciting amicus briefs re Daubert on reliability of latent fingerprint individualization applying ACE-V methodology to simultaneous impressions
  - (adding together the consistent ridge detail from latent impressions to come up with enough consistent ridge detail to warrant a conclusion of individualization, if the examiner is confident that the impressions were deposited simultaneously)

# Firearms Identification

- U.S. v. Foster, 300 F. Supp. 2d 375, 376 (D. Md. 2004) (admitting)
- U.S. v. Santiago, 199 F. Supp. 2d 101 (S.D.N.Y. 2002) (same)
- But see Schwartz, A Systemic Challenge to the Reliability and Admissibility of Firearms and Toolmark Identification, 6 Colum. Science & Tech. L. Rev. (2005)

# Toolmarks

- "This record qualifies Crumley as a firearms identification expert, but does not support his capacity to identify cartridge cases on the basis of magazine marks only."
  - Sexton v. State, 93 S.W.3d 96, 101 (Tex. Crim. App. 2002)

# Gunshot Residue Tests

- Analyst used two (instead of three) elements for GSR examination
  - Bykowicz, Lawyers Call City Analysis of Gunshot Residue Flawed, Baltimore Sun, Mar. 5, 2005
  - Nethercott & Thompson, Lessons from Baltimore's GSR Debacle, The Champion 36 (June 2005)

# Bullet Lead Comparison

- "Could have come from the same box."
  - State v. Earhart, 823 S.W.2d 607, 614 (Tex. Crim. App. 1991)

- Melt "can range from the equivalent of as few as 12,000 to as many as 35 million 40grain, .22 caliber longrifle bullets)
  - National Research Council, Forensic Analysis: Weighing Bullet Lead Evidence (2004)

# Bullet Lead Comparison cont.

- State v. Behn, 868 A.2d 329 (N.J. Super. 2005) ("based on erroneous scientific foundations")
- U.S. v. Mikos, 2003 WL 22922197 (N.D. Ill. 2003) (excluding under *Daubert*)

# Bitemark Comparison

- "Despite the continued acceptance of bitemark evidence in European, Oceanic and North American Courts, the fundamental scientific basis for bitemark analysis has never been established."

  - Pretty & Sweet, The Scientific Basis for Human Bitemark Analyses – A Critical Review, 41 Sci. & Just. 85, 86 (2001)

# Bitemark continued

- State v. Krone, 897 P.2d 621 (Ariz. 1995) ("The bite marks were crucial to the State's case because there was very little other evidence to suggest Krone's guilt.")

- Krone exonerated through DNA profiling
  - Hansen, The Uncertain Science of Evidence, ABA J. 49 (July 2005)

# Forensic Science: Oxymoron?

- Donald Kennedy, Editor-in-Chief, Editorial, Forensic Science: Oxymoron?, 302 Science 1625 (2003) (discussing the cancellation of a National Academy of Sciences project designed to examine various forensic science techniques because the Departments of Justice and Defense insisted on a right of review that the Academy has refused to other grant sponsors)

# Conclusion

- "To put the point more bluntly: if the state does not test the scientific evidence with which it seeks to convict defendants, it should forfeit the right to use it."
  - Redmayne, Expert Evidence and Criminal Justice 139 (2001)

- "The government has had ten years to comply with *Daubert*. It should not be given a pass in this case."
  - U.S. v. Crisp, 324 F.3d 261, 272 (4th Cir. 2003) (Michael, J., dissenting)