



National Environmental Monitoring Conference Ensuring Reliable Data

August 1, 2023

How Daubert Principles Ensure Reliable Data

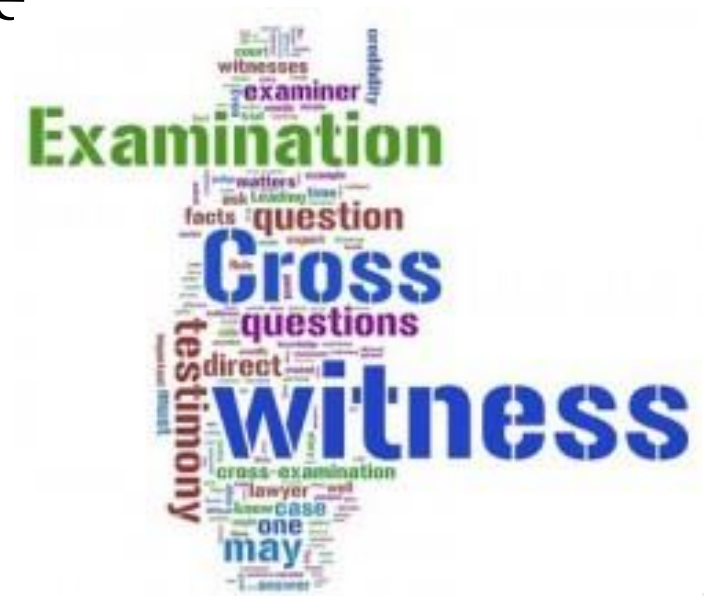
Jerry Parr, The NELAC Institute



The Legal Process

- Qualified expert may provide testimony.
- Judge may or may not allow testimony to be admitted as evidence (the Gatekeeper).
- Jury decides merits of evidence.
- Legally defensible is not a term used by the courts.

Jurors may be swayed by skill of lawyers or experts and thus Judges do not like expert evidence to be provided.





Legal Precedence for Scientific Data

- Federal Rules of Evidence
- Case Law Examples
- Four Supreme Court Decisions



Federal Rules of Evidence

Rule 702 Testimony by Experts (Reliable)

- If scientific knowledge will help understand a fact, a witness qualified as an expert may testify

Rule 703 Basis of Testimony (Defensible)

- Data is the type that may be reasonably relied upon by experts

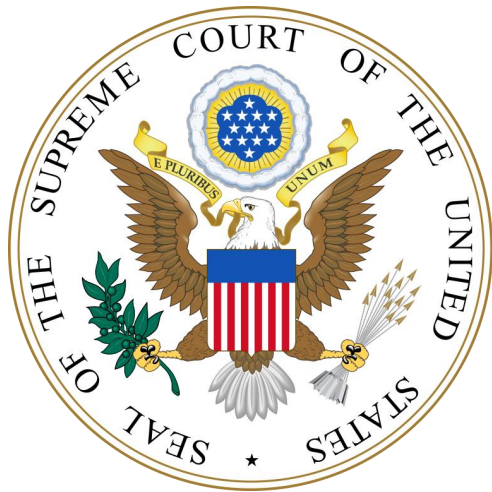
Rule 901 Authenticating Evidence

- Evidence sufficient to support a finding that the item is what the proponent claims it is.



Frye vs. United States (1923)

Scientific evidence “must be sufficiently established to have gained general acceptance in the particular field in which it belongs.”



“Unlike a jury verdict, scientific consensus is not arrived at by a vote.”



Paoli Railroad Yard PCB Litigation (1992)

- No written SOP
- Blank results > sample results
- MS 1000 X sample concentrations
- Sample results below low standard

“every reliable laboratory has a written protocol, particularly with regard to a test as complex as congener specific analysis so that a test is performed the same way each time and so that outside scientists can review the results.”

Data was **not** admissible



The Dumpster Sample

People vs Hale (1994)

- Dumpster filled with sawdust mixed with illegal waste disposal
- Samples contained 1,1,1-TCA in concentrations ranging from 2 to 15%
- Method 8015 used instead of 8010
- Failures were harmless.

“SW-846 is not the name of some new gasoline additive”



People vs Mobil Oil (1983)

Method Details Are Important



- ASTM Method D323-58 for Reid vapor pressure
- “Gross errors can be obtained ... if the prescribed procedure is not followed carefully.”
- Plaintiff had deviated from the procedure
- Judge ruled deviations were “substantial and meaningful”

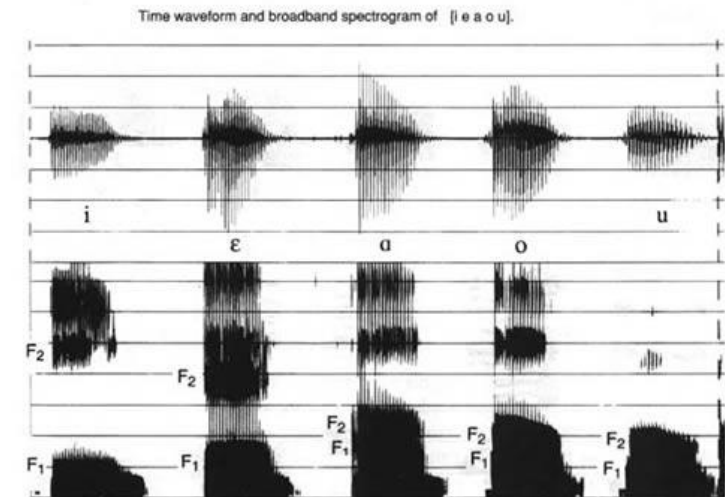
Data was **not** admissible and judge ruled for the defendant



United States vs. Isiah Williams (Biggie) (2nd Circuit, 1978)

Use of spectrograph as evidence for voice recognition

“Reliability cannot rely solely on counting scientific noses”



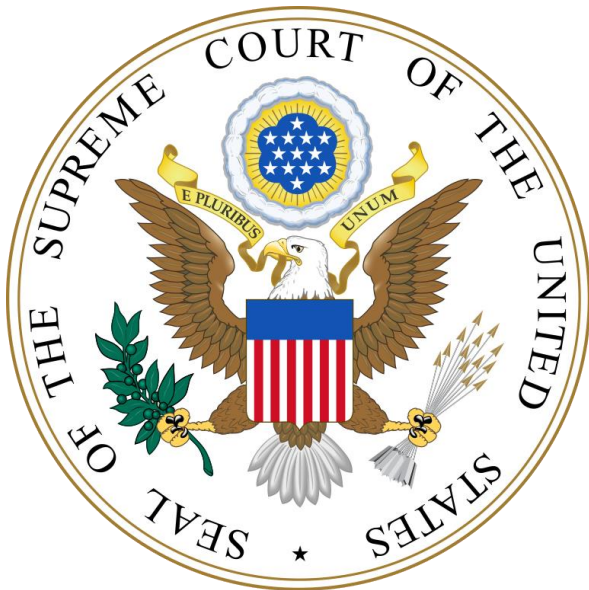
Williams Reliability Factors

- Potential rate of error
- Existence and maintenance of standards
- Accepted industry practice
- Certification
- Care and concern over use
- Potential for abuse
- Fail-safe characteristics

Results were admissible



Daubert vs. Merrell Dow Pharmaceuticals (1993)



Federal Rules of Evidence,
not Frye, provide the
standard for admitting
expert scientific testimony

“The most influential
Supreme Court case
you’ve never heard of.”



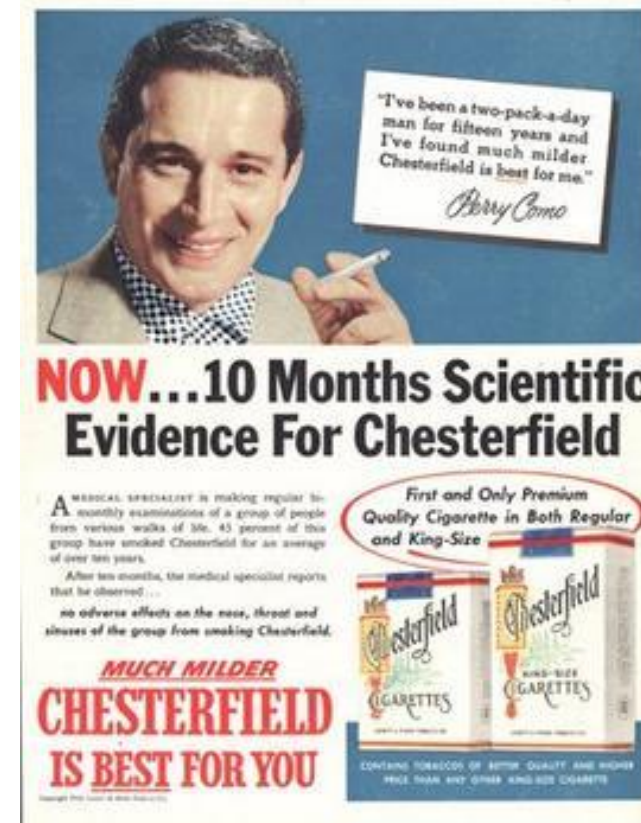
Daubert Foundation Principles

- Whether a theory or technique can be (and has been) tested.
- Whether it has been subjected to peer review and publication.
- Whether there is a high known or potential rate of error.
- Whether there are professional standards controlling the technique's operation.
- Whether the technique has been accepted within the scientific community.



Principle 1: Reliability of the Technique

- Proponent must bear the burden of demonstrating the technique's capacity to produce a reliable result.
 - Published method performance data
 - Method validation studies
 - Initial and On-going DOC



Principle 2: Peer Review

1. Reference Methods
 - Standard Methods
 - ASTM
 - EPA
2. Scientific Literature
3. Conference Presentations
4. Vendor Applications



Principle 3: Known Error Rate

- Results from PT samples
- QC samples
- Reliable LOD and LOQ



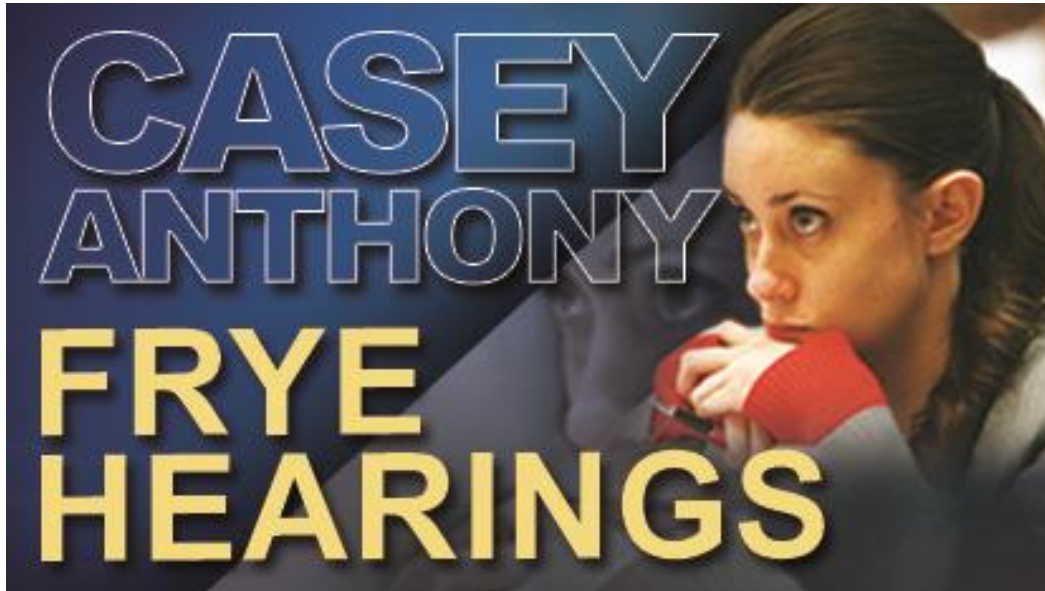


Principle 4: Professional Standards

- The TNI Laboratory Standard



Principle 5: General Acceptance



Important but not dispositive.



Daubert: Validity vs. Reliability

- Validity (does the principle support what it purports to show?)
- Reliability (does application of the principle produce consistent results?)
 - ❑ “In a case involving scientific evidence, evidentiary reliability will be based upon scientific validity.”

Affirms importance of method validation as prerequisite for reliability





General Electric vs. Joiner (1997)

- Affirmed gatekeeper role of the judge in screening evidence
- Affirmed that judge is to decide if evidence is reliable



Kumho Tire vs. Carmichael (1999)

- Daubert factors apply to engineers and other experts/
- Judge may consider one or more of the specific Daubert factors.
- Daubert factors do not constitute a definitive checklist/
- **Highest weight to Daubert factors that are reasonable measures of reliability.**



Impact of Daubert

- Less scientific testimony being admitted
- Some sciences now considered less reliable
 - Many forensic tests, e.g.,
 - Metals in ammunition
 - Voice recognition
 - Expert handwriting
 - Hair analysis
 - Bite marks
 - Social sciences, e.g.,
 - Battered woman syndrome
 - Psychological profiling



FBI examiners gave flawed forensic testimony
in **257 of those 268 trials**, or more than **95 percent**.

268 trials in which hair evidence was used against criminal defendants.



257 trials with flawed forensic testimony.

32 death-penalty cases with flawed forensic testimony.

NOTE: The FBI is completing reviews of about 900 lab reports.

Source: National Association of Criminal Defense Lawyers and Innocence Project
analysis of FBI and Justice Department data as of March 2015



What is our “Hair” Test?

- Correlation coefficient
- Statistic that is widely recognized as meaningless for instrument calibration
- Then why do we still use this check?
- Would the data be admissible?

The old MDL
procedure a close
second



Other Contenders for “Junk Science”

- Method 5030 (volatiles in soil)
- Matrix Spikes (unless done on every sample)
- Holding times
- GC/ECD methods
- Methods with very wide acceptance limits, e.g. D-441 for isopropanol in Method 1666
- ???

For 40 years or more, many laboratory practices met the Frye definition of reliability...general acceptance





Admissibility of DNA Results

- Documented quality system
- Minimum education and experience
- Validated procedure
- PT sample analysis
- Sample handled properly
- Analysis conducted properly

As established in *Quality Assurance Standards for Forensic DNA Testing*



What Does This Mean For Laboratories?

1. Validate method and document in SOP before use.
2. Know and document data quality.
 - Appropriate and relevant QC
 - Corrective action and data qualifiers
 - PT samples
3. Use professional standards of the industry.
 - The TNI accreditation standards





What Does This Mean For Laboratories?

4. Use generally recognized techniques.
 - EPA validated methods
 - Peer review
 - Journal publication
 - Conference presentation
5. Maintain complete documentation.



Conclusions

- The right answer, “scientific validity”, should always be admissible.
- Everything does not have to be perfect for data to be admissible.
- Methods used within a sound quality systems framework should have strong legal standing.



Finally, What Is A “Defensible” Result?

- Method used was appropriate for the measurement need
- Method performance validated
- Laboratory QC demonstrated control
- Quality was known and documented
- Laboratory has a quality system
- Quality system was independently verified
- Documentation is sufficient to reconstruct result





THANK YOU!

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