Forensic Science in the Criminal Courts: Ensuring Scientific Validity Of Feature-Comparison Methods

PCAST

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PCAST Report

Timeline:

Begun	**Sept 2015**
Unanimously Approved	**Sept 1 2016**
Publically Released	**Sept 20, 2016**
Addendum Approved	**January 6, 2017**

Process: Interviews and input from:

- **~85 experts (mostly forensic scientists (8 from FBI Lab), statisticians, judges, etc.)**
- **~70 extensive public comments**
- **~2100 scientific papers suggested and reviewed by PCAST**

Report:

173 pages with 399 footnotes (plus 9-page addendum)

Recommendations to NIST, OSTP, FBI Lab, DOJ, Federal Judges

PCAST Report: Main Message

1. Report considers only (i) forensic feature-comparison methods and (ii) expert testimony in court.

   Does not pertain to investigations

2. **Federal Law imposes a threshold requirement**: Expert testimony may only be admitted in court if it is based on methods that are **"reliable" and "scientifically valid"** (*F.R.E., Daubert*).

   Requirement is not "flexible"

3. A forensic feature-comparison method cannot be established as "reliable" **unless the method itself has been empirically tested** to assess its degree of reliability.

4. *Some* important forensic feature-comparison methods have **never been subjected to meaningful empirical testing** to assess their reliability.

Good practices can't establish reliability of methods

Many practices are **valuable and important** in forensic disciplines

- professional organizations, certification, accreditation
- training programs
- best practices manuals
- extensive experience by examiners
- papers in peer-reviewed journals

However, *none* of these practices can establish in any way that a method is reliable or scientifically valid

-- **because they don't actually test the method**

Seven feature-comparison methods evaluated

1. **DNA analysis of single-source and simple-mixture samples**
2. **DNA analysis of complex-mixture samples**
3. **Bitemark analysis**
4. **Latent fingerprint analysis**
5. **Firearms analysis**
6. **Footwear impression analysis**
7. **Microscopic hair comparison**

Key issues

- In 2 cases, clear empirical tests establish reliability and validity
- In 3 cases, no empirical tests *whatsoever*
- In 1 case, only *one* empirical test properly designed to assess reliability
- In 1 case, issue is the *range* within which reliability has been established

What is needed

Threshold issue of admissibility: Establish Reliability

- **Black-box tests** for subjective methods not yet established as reliable and scientifically valid

Major improvement

- **White-box studies,** to understand and improve the methods
- **Technology development,** to convert subjective method to objective methods

Additional

- **Research aimed at incremental improvements**
- **Development of standards and best practices**

PCAST Recommendations

1. **NIST should conduct ongoing evaluations** of validity and reliability of forensic science methods.

2. **NIST (in partnership with others) should help move methods from subjective to objective** (e.g., fingerprints, firearms).

3. **NIST should improve OSAC standards-development process** (forensic working groups) by adding a committee of independent scientists and statisticians.

4. **OSTP should lead development of a national research strategy**.

5. **FBI should undertake various scientific studies and receive increased funding**.

6. **Attorney General should ensure that DOJ uses scientifically valid evidence**.

7. **DOJ should withdraw and reissue its guidelines on testimony** (which forbid examiners from providing empirical evidence about accuracy).

8. **Judges should "take account" of the scientific criteria for scientific validity**.

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