

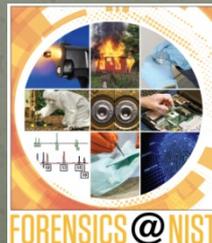
A QUALITATIVE PREDICTION ON THE ADMISSIBILITY OF QUANTITATIVE EVIDENCE IN HANDWRITING CASES

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THE 2009 NAS REPORT

CRITICISM OF PATTERN DISCIPLINES FOR WEAK SCIENTIFIC FOUNDATIONS AND FOR SUBJECTIVITY IN ANALYSES

IN RE: HANDWRITING ANALYSIS, THE REPORT STATED "... THE COMMITTEE AGREES THAT THERE MAY BE SOME VALUE IN HANDWRITING ANALYSIS."

INTERPRETIVE CONCLUSIONS

THERE MUST BE A QUALITATIVE OR QUANTITATIVE INTERPRETATION OF THE DATA IN ORDER TO GIVE THE ANALYSIS MEANING

TO SAY THAT “n” CHARACTERISTICS IN THE QUESTIONED AND KNOWN HANDWRITING SAMPLES MATCH DOES NOT GIVE MEANING TO THE ANALYSIS

SUCH TESTIMONY ALLOWS THE JURY TO ATTACH WHATEVER WEIGHT IT WANTS TO THE EVIDENCE – EVEN IF TOO MUCH WEIGHT

DNA AS THE “**GOLD** STANDARD”

TO MEET THE GOLD STANDARD, SOME COURTS, COMMITTEES, AND COMMENTATORS SAY:

1. THERE IS A NEED FOR GREATER SCIENTIFIC STUDIES ON THE UNDERLYING PRINCIPLES OF THE DISCIPLINE
2. THERE MUST BE MOVEMENT FROM THE SUBJECTIVE QUALITATIVE INTERPRETATION TO THE OBJECTIVE QUANTITATIVE ASSESSMENT

THE 2009 NAS REPORT

CITING BODZIAK, THE DETERMINATION OF [DEGREE OF] UNIQUENESS REQUIRES:

- MEASUREMENTS OF OBJECTIVE ATTRIBUTES
- DATA COLLECTED ON THE POPULATION FREQUENCY OF VARIATION IN THESE ATTRIBUTES
- TESTING OF ATTRIBUTE INDEPENDENCE, AND
- CALCULATIONS OF THE PROBABILITY THAT DIFFERENT OBJECTS SHARE A COMMON SET OF OBSERVABLE ATTRIBUTES

TRIAL BY MATHEMATICS

**COURTS HAVE VACILATED IN THEIR
OPINIONS REGARDING ADMISSIBILITY
OF QUANTITATIVE EXPRESSIONS OF
THE PROBATIVE VALUE OF FORENSIC
EXAMINATIONS**

USE OF STATISTICS IN EARLY QD CASES

- THE DREYFUS AFFAIR (1899): TO ESTABLISH THE AUTHORSHIP OF A DOCUMENT THE EXPERT COMPUTED AN “AMAZING” FREQUENCY IN WHICH LETTERS APPEARED IN A STRING OF THE LETTERS “*INTÉRÉT*”



ALPHONSE BERTILLON

USE OF STATISTICS IN EARLY QD CASES

- ***HOWLAND WILL CASE (1868):*** THE CHANCE OF THE GENUINE PRODUCTION OF SUCH COINCIDENCE AS THAT OF THE THREE SIGNATURES WAS THAT OF ONE TO TWO THOUSAND SIX HUNDRED AND SIXTY-SIX MILLION OF MILLIONS OF MILLIONS OF TIMES

USE OF STATISTICS IN EARLY QD CASES

- *PEOPLE v. RISLEY* (1915): COMPARING A TYPEWRITTEN DOCUMENT TO A SAMPLE FROM THE DEFENDANT'S TYPEWRITER.
- THE PROBABILITY OF THE DEFECTS APPARENT IN THE QUESTIONED DOCUMENT APPEARING IN ANOTHER TYPEWRITER WAS ONE IN FOUR THOUSAND MILLION.

USE OF STATISTICS IN EARLY QD CASES

- ***PEOPLE v. RISLEY* (1915) CONTINUED:**
 - TESTIMONY NOT BASED ON ACTUAL OBSERVED DATA
 - WITNESS WAS NOT AN EXPERT IN TYPEWRITING, BUT A PROFESSOR OF MATHEMATICS
 - TESTIMONY WAS SPECULATIVE

WHAT DO



AND



AND



HAVE TO DO WITH THIS PROGRAM?

PEOPLE v. COLLINS
(Cal. 1968)

DEFENDANTS'
CHARACTERISTICS

INDIVIDUAL
PROBABILITY

- ❖ PARTLY YELLOW AUTOMOBILE 1/10
- ❖ MAN WITH A MUSTACHE 1/4
- ❖ GIRL WITH PONTYAIL 1/10
- ❖ GIRL WITH BLONDE HAIR 1/3
- ❖ NEGRO MAN WITH BEARD 1/10
- ❖ INTERRACIAL COUPLE IN CAR 1/1000

PEOPLE v. COLLINS



X



X



=

**ONE CHANCE IN 12 MILLION THAT
ANY COUPLE POSSESSED THE
DISTINCTIVE CHARACTERISTICS
OF THE DEFENDANTS**

LESSONS FROM COLLINS:

- **THERE MUST BE AN ADEQUATE EVIDENTIARY FOUNDATION**
 - **RECORD WAS DEVOID OF ANY EVIDENCE RELATING TO ANY OF THE SIX INDIVIDUAL PROBABILITY FACTORS**
 - **CHARACTERISTICS WERE BASED ON FALLIBLE EYEWITNESS TESTIMONY**

LESSONS FROM COLLINS:

- THE SAMPLE FROM WHICH THE RELEVANT PROBABILITIES ARE DERIVED MUST BE DETERMINABLE
- WHAT IS THE SIZE OF THE RELEVANT POPULATION, HOW IS IT DETERMINED AND HOW IS A SAMPLE SIZE OF THAT POPULATION ESTABLISHED ?

LESSONS FROM *COLLINS*:

- THERE MUST BE AN ADEQUATE PROOF OF STATISTICAL INDEPENDENCE
- IN *COLLINS* THERE WERE OVERLAPPING CHARACTERISTICS

LESSONS FROM COLLINS:

- DO NOT BE ENVEIGLED BY A PROSECUTOR'S BASELESS HYPOTHETICAL QUESTIONS
- THE WITNESS' TESTIMONY WAS NEITHER MADE TO REST ON HIS OWN TESTIMONIAL KNOWLEDGE NOR PRESENTED BY PROPER HYPOTHEICAL QUESTIONS BASED UPON VALID DATA IN THE RECORD.

COLLINS:

“MATHEMATICS, A VERITABLE SORCERER IN OUR COMPUTERIZED SOCIETY, WHILE ASSISTING THE TRIER OF FACT IN THE SEARCH FOR TRUTH, MUST NOT CAST A SPELL OVER HIM.”

“WE CONCLUDE THAT ON THE RECORD BEFORE US DEFENDANT SHOULD NOT HAVE HAD HIS GUILT DETERMINED BY THE ODDS”

ADMISSIBILITY v. WEIGHT

- *STATE v. COOLIDGE* (N.H. 1968):
 - RELYING ON HIS OWN PREVIOUS STUDIES, WITNESS INDICATED THAT PROBABILITY OF FINDING SIMILAR PARTICLES IN SWEEPINGS FROM A SERIES OF CARS WAS ONE IN TEN
 - PROBABILITY OF FINDING 27 SIMILAR PARTICLES IN SWEEPING FROM INDEPENDENT SOURCES WOULD BE ONE IN TEN TO THE 27TH POWER

ADMISSIBILITY v. WEIGHT

- *STATE v. COOLIDGE* (N.H. 1968):
 - EVIDENCE PROPERLY RECEIVED
 - FACT THAT WITNESS CONCEDED THAT ALL 27 SETS OF PARTICLES MAY NOT HAVE BEEN WHOLLY INDEPENDENT OF EACH OTHER WENT TO WEIGHT OF THE EVIDENCE

IMPACT OF ADMITTING QUANTITATIVE INTERPRETATIONS

- ***STATE v. CARLSON (MINN. 1978)***
 - **MICROSCOPIC HAIR COMPARISON**
 - **GAUDETTE TESTIFIED THAT BASED ON HIS STUDIES:**
 - **1 IN 800 CHANCE THAT THE QUESTIONED PUBIC HAIRS WERE NOT THE DEFENDANT'S**
 - **1 IN 4,500 THAT THE QUESTIONED HEAD HAIRS WERE NOT THE DEFENDANT'S**

IMPACT OF ADMITTING QUANTITATIVE INTERPRETATIONS

- ***STATE v. CARLSON***
 - TESTIMONY OF HAIR COMPARISON ANALYSIS PROPERLY ADMITTED, BUT NOT THE STATISTICAL ANALYSIS
 - FOUNDATION FOR STATISTICS PROPERLY LAID UPON “EMPIRICAL SCIENTIFIC DATA OF UNQUESTIONED VALIDITY.”

IMPACT OF ADMITTING QUANTITATIVE INTERPRETATIONS

- **STATE v. CARLSON:**
 - **CONCERN IS WITH THE POTENTIALLY EXAGGERATED IMPACT ON THE TRIER OF FACT. WHY DISCARD QUALITATIVE ASSESSMENT? (U.S. v. MORNAN (3rd CIR. 2005))**
 - **EXPRESSING CONCLUSIONS IN TERMS OF STATISTICAL PROBABILITIES CAN MAKE THE UNCERTAIN SEEM ALL BUT PROVEN**
 - **STATISTICS MAY SUGGEST, BY QUANTIFICATION, SATISFACTION OF PROOF BEYOND A REASONABLE DOUBT**

IMPACT OF ADMITTING QUANTITATIVE INTERPRETATIONS

- *STATE v. BLOOM* (MINN. 1994):
 - DNA CASE
 - CONCERNED WITH MISUSE OF STATISTICS BY SUCCUMBING TO “PROSECUTOR’S FALLACY”
 - THE FALLACIOUS EQUATION OF RANDOM MATCH PROBABILITY WITH THE PROBABILITY THAT THE DEFENDANT IS THE PERPETRATOR OF THE CRIME, OR THAT THE DEFENDANT WAS THE SOURCE OF THE DNA

IMPACT OF ADMITTING QUANTITATIVE INTERPRETATIONS

U.S. v. WADE (2nd CIR. 2013):

- DEFENDANT OBJECTED ON GROUND OF PROSECUTOR'S FALLACY TO DNA STATISTICS
- APPELLATE COURT FOUND NO ERROR:
 - NO ASSERTION THAT THE RMP EQUALED THE PROBABILITY THAT DEFENDANT WAS THE SOURCE OF THE DNA
 - DID NOT SUGGEST THAT IT EQUALED THE PROBABILITY OF GUILT
 - PROPERLY ARGUED THAT POPULATION STATISTIC EXCLUDES 99.998% OF THE POPULATION

FEDERAL RULE OF EVID. 403

- PROBATIVE VALUE OF EVIDENCE IS OUTWEIGHED BY ITS UNFAIR PREDJUDICE
- MAY DEPEND ON THE UNDERLYING SCIENTIFIC VALIDATION OF THE COMPARISON ITSELF.
- IF UNDERLYING ASSUMPTIONS OF HANDWRITING ANALYSIS CANNOT BE STRONGLY SUBSTANTIATED, QUANTITAVE ANALYSIS MAY BE TOO PREJUDICIAL

DNA RANDOM MATCH PROBABILITY

- COURTS HELD THAT RESULTS OF DNA ANALYSES WERE NOT ADMISSIBLE WITHOUT QUANTITATIVE ANALYSIS TO GIVE MEANING TO THE MATCH
- OTHER COURTS FOUND THAT, AT THE TIME, THE METHODOLOGY FOR DETERMINING THE RMP WAS NOT GENERALLY ACCEPTED IN THE COMMUNITY
- SOME COURTS RECOMMENDED USING QUALITATIVE ANALYSES

LABORATORY/EXAMINER ERROR RATE

PEOPLE v. REEVES (CAL. APP. 2001)

STATE v. TESTER (VT. 2009):

DEFENDANT ARGUES THAT MATCH PROBABILITY SHOULD BE ADJUSTED TO REFLECT THE ERROR RATE. "... THE JURY CANNOT MEANINGFULLY EVALUATE THE EVIDENCE WITHOUT SOME NUMERICAL ASSESSMENT OF THE LAB'S PERFORMANCE."

LABORATORY/EXAMINER ERROR RATE

“[C]OINCIDENTAL IDENTITY AND LABORATORY ERROR ARE DIFFERENT PHENOMENA, SO THE TWO CANNOT AND SHOULD NOT BE COMBINED IN A SINGLE ESTIMATE.” NRC Report (1992)

BOTH COURTS HELD THAT COMBINING ERROR RATES WITH MATCH PROBABILITIES IS INAPPROPRIATE. ERROR RATE GOES TO THE WEIGHT OF THE STATISTICAL MATCH EVIDENCE.

ADMISSIBILITY TESTS

FRYE: GENERAL ACCEPTANCE IN THE RELEVANT SCIENTIFIC COMMUNITY

DAUBERT:

- **CAN IT BE TESTED?**
- **HAS IT BEEN SUBJECTED TO PEER REVIEW?**
- **WHAT IS THE ERROR RATE?**
- **ARE THERE STANDARDS CONTROLLING THE TECHNIQUE'S OPERATION?**
- **IS THERE GENERAL ACCEPTANCE IN THE RELEVANT SCIENTIFIC COMMUNITY?**

FRE 702

- **TESTIMONY MUST BE BASED UPON SUFFICIENT FACTS OR DATA**
- **THE TESTIMONY MUST BE THE PRODUCT OF RELIABLE PRINCIPLES AND METHODS**
- **THE WITNESS MUST HAVE APPLIED THE PRINCIPLES AND METHODS RELIABLY TO THE FACTS OF THE CASE**

ADMISSIBILITY CHALLENGES FOR QUANTITATIVE ASSESSMENT OF HANDWRITING

- FOUNDATIONAL VALIDITY OF HANDWRITING
- DETERMINABLE AND SCIENTIFICALLY DEFENSIBLE SOURCE POPULATION
 - POPULATION SUBSTRUCTURE
- VALIDITY OF INDIVIDUAL CHARACTERISTIC SELECTION AND MEASUREMENTS
- VALIDITY OF CHARACTERISTIC INDEPENDENCE

ADMISSIBILITY CHALLENGES

- **VALIDITY OF FREQUENCY DETERMINATIONS FOR INDIVIDUAL CHARACTERISTICS**
- **CAPABILITY OF COMPUTERIZED HANDWRITING RECOGNITION AND IDENTIFICATION (SEE ENDNOTE)**
- **PROPER CALCULATION OF THE PROBABILITY THAT HANDWRITING FROM DIFFERENT SOURCES SHARE A COMMON SET OF OBSERVABLE AND MEASURABLE ATTRIBUTES**

ADMISSIBILITY CHALLENGES

- EXISTENCE AND MAINTENANCE OF STANDARDS AND PROTOCOLS FOR THE ANALYSES AND PROBABILITY DETERMINATIONS
- WORKING KNOWLEDGE BY DOCUMENT EXAMINER OF THE DATABASE AND STATISTICS
 - WITHOUT EVIDENCE OF METHODOLOGY USED, COURT HAD NO BASIS TO FIND EXPERT QUALIFIED TO TESTIFY ABOUT THE STATISTICS

CASIAS v. STATE (FLA. CT. APP. 2012)

BUT WAIT! THERE'S MORE . . .

CONSTITUTIONAL CONSIDERATIONS

IS AN EXPERT'S TESTIMONIAL REPORT ON
LIKELIHOOD RATIOS OR OTHER STATISTICS
DERIVED FROM A DATABASE AND COMPUTER
GENERATED FORMULA MAINTAINED BY
OTHERS BARRED UNDER THE 6TH AMENDMENT
RIGHT TO CONFRONTATION?

TAYLOR v. STATE (INDIANA 2013)

BRUCE v. WARDEN (USDC, S.D. OHIO 2013)

ENDNOTES PER SLIDE NUMBER

2. National Academies of Science, National Research Council, *Strengthening Forensic Science in the United States: A Path Forward*, The National Academies Press (Washington, D.C. 2009) p. 167.
5. Id., p. 44 citing W.J. Bodziak, 1999, *Footwear Impression Evidence – Detection, Recovery, and Examination*, 2nd ed. Boca Raton, FL: CRC Press.
7. L.H. Tribe, *Trial by Mathematics, Precision and Ritual in the Legal Process*, 84 Harv. L. Rev. 1329, 1332-1334 (1971); <https://sites.google.com/site/bayeslegal/legal-cases-relevant-to-bayes/dreyfus>.
8. Howland Will Case described in *People v. Risley*, 108 N.E. 200 (N.Y. Ct. App. 1915).
9. *Risley*, supra.
11. *People v. Collins*, 438 P.2d 33 (Cal. 1968).
13. Also see *People v. Truillo*, 194 P.2d 681 ,684 (Cal. 1948) (matching of 27 sets of fibers lead to the conclusion that the chances were one in a hundred billion that this number of matches would be coincidental. Testimony challenged only on 5th Amendment grounds).
19. *State v. Coolidge*, 260 A.2d 547 (N.H. 1968).

ENDNOTES PER SLIDE NUMBER

21. *State v. Carlson*, 267 N.W.2d 170 (Mn. 1978).
23. *United States v. Mornan*, 413 F.3d 372 (3rd Cir. 2005) and cases cited therein.
24. *State v. Bloom*, 516 N.W.2d 159 (Mn. 1994).
25. *United States v. Wade*, 2013 WL 599544 (2^d Cir. 2013).
28. *People v. Reeves*, 91 Cal.App.4th 14 , 36 (2001); *State v. Tester*, 968 A.2d 895 (Vt. 2009).
29. National Research Council, *DNA Technology in Forensic Science*, National Academy Press (Washington, DC 1992) p. 88.
30. *Frye v. United States*, 293 F. 1013 (D.C. 1923); *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993).
33. *United States v. Prime*, 220 F.Supp.2d 1203 (W.D.Wash. 2002) (computerized research by Srihari at CEDAR and databases [FISH and USSS] considered in *Daubert* hearing); *Pettus v. United States*, 37 A.3d 213 (DC Ct. App. 2012) (*Frye* hearing on handwriting admissibility. “. . . [I]n recent years the [QDE] method’s adherence to objective, replicable standards and its capacity to reach accurate conclusions of identification have been tested outside the forensic science community . . . “ e.g. Dr. Srihari’s computer experiments show that multiple features of handwriting regularly used by examiners can be converted to quantitative measurements and employed by computers to make highly accurate handwriting comparisons and identification).
34. *Casias v State*, 94 So.3d 611 (Fla. Ct. App. 2012).
35. *Taylor v. State*, 985 N.E.2d 821 (Ct. App. Ind. 2013) ; *Bruce v. Warden*, 2013 WL 796562 (S.D.Ohio 2013).