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## Expert Testimony and Voice Spectrogram Analysis, United States v. Baller, 519 F.2d 463 (4th Cir. 1975)

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# COMMENTS

## EXPERT TESTIMONY AND VOICE SPECTROGRAM ANALYSIS

*United States v. Baller, 519 F.2d 463 (4th Cir. 1975)*

Petitioner was convicted by a jury on four counts of telephoning bomb threats in violation of the Federal Bomb Threat Statute.<sup>1</sup> He appealed, claiming prejudicial error from denial of his pretrial motion to suppress expert testimony identifying his voice by spectrogram analysis.<sup>2</sup> The Court of Appeals for the Fourth Circuit affirmed and *held*: Expert opinion based on scientific techniques is admissible provided the techniques involve a "demonstrable, objective procedure" that may be duplicated or criticized by other experts.<sup>3</sup>

Voice spectrogram<sup>4</sup> analysis is a recently developed<sup>5</sup> scientific tech-

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1. 18 U.S.C. § 844(e) (1970). During 1972 and early 1973 the Shoemaker Coal Mine in Benwood, West Virginia, received numerous telephoned bomb threats. To identify the party or parties making the phone calls, mine clerks tape-recorded four telephone calls with equipment provided by the Chesapeake & Potomac Telephone Company. After the fourth call was traced to the defendant's residence, federal agents arrested defendant and charged him with four counts of violating the Federal Bomb Threat Statute. Brief for Appellee at 1, *United States v. Baller, 519 F.2d 463 (4th Cir. 1975)*. Tapes of the bomb threats and a voice exemplar voluntarily provided by the defendant were sent to Lieutenant Ernest W. Nash of the Michigan State Police for spectrogram analysis. At the trial Lt. Nash, a recognized expert in voice spectrogram analysis, testified that "Baller's voice positively matched that of the person who made the first three calls," but he was unable to make a conclusive determination about the call traced to defendant's residence. *United States v. Baller, 519 F.2d 463, 464 (4th Cir. 1975)*. The defense presented no expert witnesses to rebut Lt. Nash's conclusions. Defendant was convicted and sentenced to four two-year concurrent terms on the four counts. Brief for Appellee at 2, *supra*.

2. Brief for Appellee at 1-2, *United States v. Baller, 519 F.2d 463 (4th Cir. 1975)*.

3. *United States v. Baller, 519 F.2d 463, 466 (4th Cir. 1975)*.

4. Voice spectrograms are occasionally called "voiceprints." The use of the word "voiceprint" implies a similarity to "fingerprint" and should be avoided because there is doubt whether voice spectrogram analysis is as reliable as fingerprint identification. *Id.* at 465 n.1; see 56 MINN. L. REV. 1235, 1236 n.2 (1972); notes 13-15 *infra* and accompanying text.

5. The spectrograph machine was invented in the 1940's at the Bell Telephone Laboratories in New Jersey. *State v. Cary, 99 N.J. Super. 323, 325, 239 A.2d 680, 681 (Super. Ct. 1968)*, *aff'd per curiam, 56 N.J. 16, 264 A.2d 209 (1970)*; Kamine, *The Voiceprint Technique: Its Structure and Reliability*, 6 SAN DIEGO L. REV. 213, 218

nique which can identify a person by analysis of his voice.<sup>6</sup> An exemplar of an individual's voice is tape-recorded.<sup>7</sup> The exemplar and the tape-recording containing the unknown voice are fed into the spectrograph machine which scans the two tapes and makes graphic representations of the two speech patterns.<sup>8</sup> An examiner then visually compares the graphs and listens to the tapes to determine whether one voice made both speech impressions.<sup>9</sup> The technique was considered unreliable<sup>10</sup> until, in 1972, Dr. Oscar Tosi<sup>11</sup> of Michigan State Universi-

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(1969). It was not until the 1960's, however, that Lawrence G. Kersta, an electrical engineer and physicist employed at the Bell Laboratories, developed the voice spectrogram technique. *State v. Cary*, *supra* at 328, 239 A.2d at 682.

6. There are two methods of voice identification: aural recognition and voice spectrogram analysis. The former has long been held admissible into evidence. *See, e.g., Mack v. State*, 54 Fla. 55, 44 So. 706 (1907) (rape victim identified accused attacker solely from having heard his voice). *See generally* 2 J. WIGMORE, A TREATISE ON THE ANGLO-AMERICAN SYSTEM OF EVIDENCE IN TRIALS AT COMMON LAW § 660 (3d ed. 1940) [hereinafter cited as WIGMORE]; Annot., 70 A.L.R.2d 995 (1960).

7. The United States Supreme Court has held that compelling an accused to repeat words for voice identification is not violative of the fifth amendment protection against self-incrimination. The Court reasoned that this procedure did not involve testimonial compulsion, but rather was an identification of physical characteristics. *United States v. Wade*, 388 U.S. 218, 222-23 (1967); *accord*, *United States v. Dionisio*, 410 U.S. 1 (1973); *see* *People v. Ellis*, 65 Cal. 2d 529, 533-34, 421 P.2d 393, 394-95, 55 Cal. Rptr. 385, 386-87 (1966). *See generally* *Schmerber v. California*, 384 U.S. 757 (1966).

8. The graph portrays three aspects of sound and their correlative components in human speech. The horizontal axis of the graph charts time, a constant that is particularized by the timing of the individual's speech. The vertical axis measures frequency, the number of sound vibrations in a specific time period, perceived by a listener as pitch. The plotting line of the graph varies in darkness, representing the intensity of the voice, recognized by a listener as loudness. *Kamine*, *supra* note 5, at 218-20; 56 MINN. L. REV. 1235, 1239 (1972), *citing* M. HECKER, SPEAKER RECOGNITION: AN INTERPRETIVE SURVEY OF THE LITERATURE 50-51 (Am. Speech & Hearing Ass'n Monograph No. 16, 1971).

9. The most extensive study found that the error rate using only visual inspection of the spectrograms was six percent. The study noted, however, that allowing the expert examiner both to listen to the tape and to analyze the spectrograms visually reduced the error rate to two percent. Tosi, Oyer, Lashbrook, Pedrey, Nicol & Nash, *Experiment on Voice Identification*, 51 J. ACOUST. SOC. AM. 2030, 2037, 2041 (1972) [hereinafter cited as Tosi].

10. The first scientific study of the technique claimed that voice spectrogram analysis was a perfectly reliable method of voice identification. Kersta, *Voiceprint Identification*, 196 NATURE 1253, 1253 (1962). Kersta, however, was criticized for failing to disclose the methodology of his experiments, thus preventing reproduction and verification of his results. In addition, he was attacked because his laboratory simulations did not reflect actual conditions. *See* Ladefoged & Van Derslice, *The "Voiceprint Mystique," WORKING PAPERS IN PHONETICS* 7 (1967). Kersta was further criticized for using only closed speaker groups, that is, the spectrogram of the unknown voice was always included in the group of spectrograms of test voices, and the examiner was aware

ty published a study claiming voice spectrogram analysis was 98 percent accurate,<sup>12</sup> a figure comparable to the reliability of other scientific techniques that are regularly used to develop admissible expert opinion.<sup>13</sup>

The admissibility of evidence is largely within the discretion of the trial judge.<sup>14</sup> Opinions of qualified experts<sup>15</sup> are admissible into evi-

of its presence. *United States v. Raymond*, 337 F. Supp. 641, 643 (D.D.C. 1972), *aff'd on other grounds sub nom. United States v. Addison*, 498 F.2d 741 (D.C. Cir. 1974). Since Kersta was not only the innovator of the process, but was producing and selling the spectrograph machine, self-interest may have biased his results. Cederbaums, *Voice-print Identification: A Scientific and Legal Dilemma*, 5 CRIM. L. BULL. 323, 328 (1969). As a result of these criticisms, the scientific community generally concluded that the reliability of voice spectrogram analysis had been insufficiently proven. Bolt, Cooper, David, Denes, Pickett & Stevens, *Speaker Identification by Speech Spectrograms: A Scientists' [sic] View of Its Reliability for Legal Purposes*, 47 J. ACOUST. SOC. AM. 597, 603 (1970).

11. Dr. Tosi, Professor of Acoustics at Michigan State University, has a Ph.D. in Audiology and Speech Sciences from Ohio State University and the equivalent of a Ph.D. in Physics and Engineering from Buenos Aires University. *People v. Law*, 40 Cal. App. 3d 69, 73 n.2, 114 Cal. Rptr. 708, 710 n.2 (1974).

12. Tosi 2041. The Law Enforcement Assistance Administration of the United States Department of Justice funded a \$300,000 grant to Dr. Tosi to study voice spectrogram analysis for forensic use. *State ex rel. Trimble v. Hedman*, 291 Minn. 442, 453, 192 N.W.2d 432, 438 (1972), *noted in* 56 MINN. L. REV. 1235 (1972).

The study, conducted over a period of two and one-half years, involved 250 speakers and 50,000 spectrograms. It corrected a major defect of Kersta's work, *see* note 10 *supra*, by using open groups, that is, the spectrogram of the unknown voice was not necessarily included in the spectrograms of all the test voices. Based on the results of these experiments, Dr. Tosi concluded that an experienced operator, such as Lt. Nash, could correctly identify a speaker 94 percent of the time, and suggested that with certain refinements, *see* note 9 *supra*, the percentage could be increased to 98 percent. Tosi 2041; *see* 56 MINN. L. REV. 1235, 1241-44 (1972).

13. The science of personal identification by means of fingerprints is claimed to be 100 percent accurate since there has never been a reported case in which two separate fingerprints were identical in all respects. Inbau, *Scientific Evidence in Criminal Cases: III. Fingerprints and Palm-prints*, 25 J. CRIM. L. & C. 500, 502 (1934). Generally, absolute identification requires that there be 12 or more points of identity between the exemplar and the evidence print. Fewer points of identity create only a presumption whose strength is dependent on the number and clarity of the points. *Id.* at 502, 503.

Ballistics testing is also said to be 100 percent accurate. A bullet may contain as many as 100 individual characteristics that can be compared with the exemplar, so that there will be a sufficient number of points for matching. Inbau, *Scientific Evidence in Criminal Cases: I. Firearms Identification—"Ballistics"*, 24 J. CRIM. L. & C. 825, 827-28 (1933). On the other hand, "under the most favorable conditions" polygraph results, not generally admissible into evidence, are 95 percent accurate. F. INBAU & J. REID, *LIE DETECTION AND CRIMINAL INTERROGATION* 72 (3d ed. 1954). Even this figure has been attacked as exaggerated. *See* Levitt, *Scientific Evaluation of the "Lie Detector"*, 40 IOWA L. REV. 440, 450 (1955); Skolnick, *Scientific Theory and Scientific Evidence: An Analysis of Lie-Detection*, 70 YALE L.J. 694, 699 (1961).

14. *United States v. Stifel*, 433 F.2d 431, 437 (6th Cir. 1970), *cert. denied*, 401 U.S.

dence as an exception to the general rule prohibiting opinion testimony by witnesses.<sup>16</sup> When expert opinion is based upon a scientific technique, courts generally follow the standard of *Frye v. United States*<sup>17</sup>

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994 (1971); *United States v. Wainwright*, 413 F.2d 796, 800 (10th Cir. 1969), *cert. denied*, 396 U.S. 1009 (1970); *Fineberg v. United States*, 393 F.2d 417, 421 (9th Cir. 1968); *Leavitt v. Scott*, 338 F.2d 749, 751 (10th Cir. 1964); *Slough, Relevancy Unraveled*, 5 KAN. L. REV. 1, 1-4, 11, 12 (1956).

15. Dean McCormick described the considerations governing qualifying a witness as an expert:

An observer is qualified to testify because he has firsthand knowledge of the situation or transaction at issue. The expert has something different to contribute. This is a power to draw inferences from the facts which a jury would not be competent to draw. To warrant the use of expert testimony, then, two elements are required. First, the subject of the inference must be so distinctively related to some science, profession, business or occupation as to be beyond the ken of the average layman . . . . Second, the witness must have sufficient skill, knowledge or experience in that field or calling as to make it appear that *his opinion or inference will probably aid the trier in his search for truth*. The knowledge may in some fields be derived from reading alone, in some from practice alone, or as is more commonly the case, from both.

C. McCORMICK, *HANDBOOK OF THE LAW OF EVIDENCE* § 13 (2d ed. 1972) (footnotes omitted) (emphasis added) [hereinafter cited as McCORMICK]. See also 7 WIGMORE § 1923; Gair, *Selecting and Preparing Expert Witnesses*, 2 AM. JUR. TRIALS 585 (1964); Kirk, *Locating Scientific and Technical Experts*, 2 AM. JUR. TRIALS 293 (1964). A witness' qualification as an expert is an issue within the trial court's discretion which may be reviewed only for abuse. *Fineberg v. United States*, 393 F.2d 417, 421 (9th Cir. 1968); *Formhals v. United States*, 278 F.2d 43, 47 (9th Cir. 1960); *Lelles v. United States*, 241 F.2d 21, 26 (9th Cir.), *cert. denied*, 353 U.S. 974 (1957); McCORMICK § 13.

In federal courts and about 15 state courts the judge may comment and advise the jury on the probative value of the evidence. M. LADD & R. CARLSON, *CASES AND MATERIALS ON EVIDENCE* 101 n.2 (1972); see 9 WIGMORE §§ 2551, 2551a. Even though the trial court finds the witness to be qualified and admits his testimony, the jury may consider his qualifications in determining the weight to be given his testimony. *People v. King*, 266 Cal. App. 2d 437, 444, 72 Cal. Rptr. 478, 483 (1968); *Pfingsten v. Westenhaver*, 39 Cal. 2d 12, 20, 244 P.2d 395, 400 (1952). An expert's opinion, even if uncontradicted, does not bind the jury, which may give the evidence whatever weight it desires. *Sartor v. Arkansas Natural Gas Corp.*, 321 U.S. 620-27 (1944). See *Feguer v. United States*, 302 F.2d 214, 242 (8th Cir.), *cert. denied*, 371 U.S. 872 (1972); *United States v. Raymond*, 337 F. Supp. 641, 645 (D.D.C. 1972), *aff'd on other grounds sub nom. United States v. Addison*, 498 F.2d 741 (D.C. Cir. 1974); *State ex rel. Trimble v. Hedman*, 291 Minn. 442, 456, 192 N.W.2d 432, 440 (1972); *cf. Worley v. State*, 263 So. 2d 613, 615 (Fla. Dist. Ct. App. 1972) (Mager, J., concurring). See generally J. RICHARDSON, *MODERN SCIENTIFIC EVIDENCE* § 5.12 (1961). Since it is the jury's responsibility to evaluate the credibility of a witness, an appellate court will not review the jury's determination. *United States v. Sierra*, 452 F.2d 291, 293 (10th Cir. 1971); see *Chavez v. United States*, 258 F.2d 816, 819 (10th Cir. 1958).

16. See McCORMICK §§ 11, 13; 7 WIGMORE §§ 1917, 1925.

17. 293 F. 1013 (D.C. Cir. 1923). The court held inadmissible expert testimony based on the results of the Marston systolic blood pressure deception test (polygraph test) because the technique

that such testimony is admissible only if the method has achieved "general acceptance" in its field.<sup>18</sup> The *Frye* standard is intended to prevent

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ha[d] not yet gained such standing and scientific recognition among physiological and psychological authorities as would justify the courts in admitting expert testimony deduced from the discovery, development, and experiments thus far made.

*Id.* at 1014. See note 18 *infra*.

18. Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained *general acceptance in the particular field in which it belongs*.

293 F. at 1014 (emphasis added).

The *Frye* standard of "general acceptance" is "the guiding principle in the field of scientific evidence." E. CONRAD, MODERN TRIAL EVIDENCE § 711, at 697 (Supp. 1960). See *United States v. Stifel*, 433 F.2d 431 (6th Cir. 1970), *cert. denied*, 401 U.S. 994 (1971) (neutron activation analysis held admissible); *Marks v. United States*, 260 F.2d 377 (10th Cir. 1958), *cert. denied*, 358 U.S. 929 (1959) (lie detector test held inadmissible); *People v. Morse*, 325 Mich. 270, 38 N.W.2d 322 (1949) (Hauser breath test held inadmissible); *cf. Brooke v. People*, 139 Colo. 388, 339 P.2d 993 (1959) (no citation of *Frye*, but paraffin test held inadmissible under *Frye* standard of "general acceptance" in its field). See also Kleri, *Judicial Notice of Scientific Facts*, 15 CLEV.-MAR. L. REV. 140 (1966). But see *United States v. DeBetham*, 348 F. Supp. 1377 (S.D. Cal. 1972) (*Frye* standard criticized but followed); *Brooke v. People*, *supra* at 395, 339 P.2d at 997 (Knauss, C.J., dissenting).

While the *Frye* standard is "general acceptance in the field in which it belongs," *Frye v. United States*, 293 F. 1013, 1014 (D.C. Cir. 1923), courts generally incorrectly describe the test as "general scientific acceptance." See, e.g., *United States v. Sample*, 378 F. Supp. 44, 53 (1974); *State v. Cary*, 99 N.J. Super. 323, 332, 239 A.2d 680, 684 (Super. Ct. 1968), *aff'd per curiam*, 56 N.J. 16, 264 A.2d 209 (1970).

Some courts have liberalized the general acceptance rule. In ruling on the admissibility of the results of a Nalline test to determine narcotics addiction, a California court of appeals stated:

Each of the People's experts did admit on cross-examination that the medical profession generally is unfamiliar with the use of Nalline and therefore it cannot be truthfully said that the Nalline test has met with general acceptance by the medical profession as a whole . . . .

Should this fact render the testimony inadmissible? We believe not. . . . It has been *generally accepted by those who would be expected to be familiar with its use*. In this age of specialization more should not be required.

*People v. Williams*, 164 Cal. App. 2d 858, 861-62, 331 P.2d 251, 254 (1958) (emphasis added). Two commentators have espoused the less rigorous *Williams* approach. See J. REID & F. INBAU, TRUTH AND DECEPTION: THE POLYGRAPH ("LIE-DETECTOR") TECHNIQUE 3 (1966); O'Connor, "That's the Man": A Sobering Study of Eye-Witness Identification and the Polygraph, 49 ST. JOHN'S L. REV. 1, 19 (1975), cited in *United States v. Alexander*, 526 F.2d 161, 164 (8th Cir. 1975).

The *Frye* principle was significantly weakened in *Coppolino v. State*, 223 So. 2d 68 (Fla. Dist. Ct. App. 1968), *appeal dismissed*, 234 So. 2d 120 (1969), *cert. denied*, 399 U.S. 927 (1970). In upholding the admissibility of a new technique devised to detect

juries from being unduly influenced by expert testimony based on questionable scientific techniques<sup>19</sup> and to guarantee that there will be other experts available to judge the accuracy of the method.<sup>20</sup> Prior to 1972, two of the three appellate courts that considered the issue excluded testimony based on the results of voice spectrogram analysis because the technique had not achieved the acceptance required by *Frye*.<sup>21</sup> Since

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whether unusually high amounts of succinylcholine chloride, a poison, were present in the deceased's body, the court reversed the burden of the *Frye* test:

The problem presented to the trial judge was, were the scientific tests performed by Umberger [a toxicologist who performed the chemical analysis] so unreliable and scientifically unacceptable that their admission into evidence was error.

223 So. 2d at 70 (emphasis added).

19. "[S]cientific proof may in some instances assume a posture of mystic infallibility in the eyes of a jury of laymen . . ." *United States v. Addison*, 498 F.2d 741, 744 (1974). Courts and commentators fear that juries will accept without question the technique, and therefore the result, thus attributing absolute veracity to the testimony when there is possibility of error. See *United States v. Alexander*, 526 F.2d 161, 168 (8th Cir. 1975) (polygraph evidence "likely to be shrouded with an aura of near infallibility, akin to the ancient oracle of Delphi"); *People v. King*, 266 Cal. App. 2d 437, 461, 72 Cal. Rptr. 478, 493 (1968); George, *Scientific Investigation and Defendants' Rights*, 57 MICH. L. REV. 37, 39 (1958). One writer has stated: "[T]he vulnerability of the scientist's testimony increases in proportion to the paucity of measurements and unproved reliability of his analytical technique." Kramer, *Scientific Evidence in the Law*, 53 A.B.A.J. 165, 166 (1967).

20. *Commonwealth v. Lykus*, — Mass. —, 327 N.E.2d 671, 677 (1975). FED. R. EVID. 706(a) recognizes the need of having expert rebuttal witnesses available by providing:

The court may on its own motion or on the motion of any party enter an order to show cause why expert witnesses should not be appointed, and may request the parties to submit nominations. The court may appoint any expert witnesses agreed upon by the parties, and may appoint expert witnesses of its own selection.

Rule 706(a) merely implements the court's well-established inherent powers to appoint expert witnesses when necessary. *Ex parte Peterson*, 253 U.S. 300 (1920); 9 WIGMORE § 2484.

21. The first forensic use of voice spectrogram analysis involved the perjury of a New York policeman. See Note, *Voiceprint Method of Identification—Reluctance of the Courts Toward Acceptance of Evidence*, 12 N.Y.L.F. 501 (1966), citing *People v. Straehle* (index 9323/64 Sup. Ct., Westchester County 1966) (unpublished decision).

*State v. Cary*, 99 N.J. Super. 323, 239 A.2d 680 (Super. Ct. 1968), *aff'd per curiam*, 56 N.J. 16, 264 A.2d 209 (1970), was the leading appellate decision on the issue before Prof. Tosi published the results of his experiments. The New Jersey Superior Court held that "[t]his technique [voice spectrogram analysis] has not . . . as of this date attained such degree of scientific acceptance and reliability as to be acceptable as evidence." 99 N.J. Super. at 333, 239 A.2d at 685. In *People v. King*, 266 Cal. App. 2d 437, 72 Cal. Rptr. 478 (1968), the court in a limited holding stated that the process "has not reached a sufficient level of scientific certainty to be accepted as identification evidence in cases where the life or liberty of a defendant may be at stake." *Id.* at 460, 72 Cal. Rptr.

publication of Dr. Tosi's study, nine of eleven courts have admitted such testimony into evidence, finding that it met the *Frye* standard.<sup>22</sup>

Commentators have criticized the *Frye* test for unduly limiting the admissibility of testimony based upon scientific techniques.<sup>23</sup> Dean McCormick suggested a less restrictive test that would admit "relevant conclusions" by an expert<sup>24</sup> unless there were strong reasons for exclud-

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at 493. *Contra*, United States v. Wright, 17 U.S.C.M.A. 183, 37 C.M.R. 447 (1967) (voice spectrogram analysis held admissible on theory that complete agreement among experts not necessary).

22. Before *Baller* three federal courts had held the testimony to be admissible, stating that the technique had achieved general scientific acceptance: United States v. Franks, 511 F.2d 25 (6th Cir.), *cert. denied*, 96 S. Ct. 1042 (1975); United States v. Sample, 378 F. Supp. 44 (E.D. Pa. 1974) (evidence held admissible at a parole revocation hearing); United States v. Raymond, 337 F. Supp. 641 (D.D.C. 1972), *aff'd on other grounds sub nom.* United States v. Addison, 498 F.2d 741 (D.C. Cir. 1974).

Appellate courts in three states admitted testimony based upon the results of voice spectrogram analysis. *Worley v. State*, 263 So. 2d 613 (Fla. Dist. Ct. App. 1972) (admissible for corroborative purposes and to establish probable cause); *Alea v. State*, 265 So. 2d 96 (Fla. Dist. Ct. App. 1972) (admissible, but court specifically noted that the judgment of the trial court did not rest solely on voice spectrogram evidence); *Commonwealth v. Lykus*, — Mass. —, 327 N.E.2d 671 (1975) (admissible, but subject to closest judicial scrutiny when no corroborative evidence introduced); *State ex rel. Trimble v. Hedman*, 291 Minn. 442, 192 N.W.2d 432 (1971) (admissible to corroborate voice identification by ear). In *State v. Andretta*, 61 N.J. 544, 296 A.2d 644 (1972), the New Jersey Supreme Court indicated that it was willing to review its previous rejection of the technique, *State v. Cary*, 99 N.J. Super. 323, 239 A.2d 680 (Super. Ct. 1968), *aff'd per curiam*, 56 N.J. 16, 264 A.2d 209 (1970), and returned the matter to the trial court. The California courts of appeals are divided. *Compare Hodo v. Superior Court*, 30 Cal. App. 3d 778, 106 Cal. Rptr. 547 (Ct. App. 1973) (voice spectrogram analysis has received general scientific acceptance by recognized experts in the field), *with People v. Law*, 40 Cal. App. 3d 69, 114 Cal. Rptr. 708 (Ct. App. 1974) (evidence held inadmissible to prove identity of disguised voice).

The testimony of Dr. Tosi and Lt. Nash has been influential in the courts' decisions to admit into evidence expert testimony based upon the results of voice spectrogram analysis. In the following cases both Dr. Tosi and Lt. Nash testified: *United States v. Raymond*, 337 F. Supp. 641 (D.D.C. 1972); *Alea v. State*, 265 So. 2d 96 (Fla. Dist. Ct. App. 1972); *Worley v. State*, 263 So. 2d 613 (Fla. Dist. Ct. App. 1972); *Commonwealth v. Lykus*, — Mass. —, 327 N.E.2d 671 (1975); *State v. Andretta*, 61 N.J. 544, 296 A.2d 644 (1972). Lieutenant Nash was the prosecution's expert witness in *United States v. Baller*, 519 F.2d 463 (4th Cir. 1975); *United States v. Sample*, 378 F. Supp. 44 (E.D. Pa. 1974), and *State ex rel. Trimble v. Hedman*, 291 Minn. 442, 192 N.W.2d 432 (1971).

23. See MCCORMICK § 203; J. RICHARDSON, *supra* note 15, at § 6.18; Dabrowski, *The Polygraph Revisited: An Argument for Admissibility*, 6 CRIM. L. BULL. 63, 71 (1970).

24. "General scientific acceptance" is a proper condition for taking judicial notice of scientific facts, but not a criterion for the admissibility of scientific evidence. Any relevant conclusions which are supported by a qualified expert witness should be received unless there are other reasons for exclusion. . . .



ing the testimony.<sup>25</sup> Under the McCormick standard the trier of fact is given the sole responsibility of determining the reliability of the scientific technique.<sup>26</sup> Rule 702 of the new Federal Rules of Evidence adopts the McCormick standard.<sup>27</sup>

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McCORMICK § 203, at 491.

Dean McCormick argued that this less restrictive standard would allow into evidence expert opinion based upon the results of newly discovered scientific methods that would otherwise be excluded under *Frye*:

If the courts used this approach, instead of repeating a supposed requirement of 'general acceptance' not elsewhere imposed, [referring to the standard applied to all other expert opinion] they would arrive at a *practical way of utilizing the results of scientific advances*.

*Id.* (emphasis added).

25. "Probative value may be overborne by the familiar dangers of prejudicing or misleading the jury, and undue consumption of time." *Id.* See E. FISCH, NEW YORK EVIDENCE 3-5 (1959); 1 E. MORGAN, BASIC PROBLEMS OF EVIDENCE 183-88 (1961); J. THAYER, PRELIMINARY TREATISE ON THE LAW OF EVIDENCE 264-65, 530 (1898); Slough, *supra* note 14, at 15.

26. Since the McCormick standard dispenses with the requirement that the court find the technique has achieved general scientific acceptance, once a witness is qualified as an expert the reliability of his technique becomes an issue to be decided by the jury. See McCORMICK § 53; 9 WIGMORE § 2549.

27. The federal rule, which took effect on July 1, 1975, adopted a liberal approach:

If scientific, technical, or other specialized knowledge will *assist the trier of fact* 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 norm of an opinion or otherwise.

FED. R. EVID. 702 (emphasis added).

The Advisory Committee's Note to the Federal Rules of Evidence stated that "[w]hether the situation is a proper one for the use of expert testimony is to be determined on the basis of assisting the trier" of fact. Advisory Committee's Note, FED. R. EVID. 702, 28 U.S.C.A. Federal Rules of Evidence, at 463. In testimony before the House Judiciary Committee on rule 702, Mr. Edward Cleary, the reporter for the Advisory Committee, stated that the "test is phrased in terms of helpfulness in understanding the evidence and determining facts in issue." *Hearings on H.R. 5463 Before the Special Subcommittee on Reform of Federal Criminal Laws of the House Committee on the Judiciary*, 93d Cong., 2d Sess. 256 (1973). The new Federal Rules of Evidence, then, adopt a much less rigorous standard of "assisting the trier of fact" to replace the *Frye* requirement of "general scientific acceptance."

In adopting the standard advocated by Dean McCormick, the new Federal Rules of Evidence are following the broad test suggested in 1949 by the Model Code of Evidence: "In testifying to what he has perceived [an expert] witness . . . may give his testimony in terms which include inferences and *may state all relevant inferences . . .*" Model Code of Evidence rule 402 (1949) (emphasis added).

Uniform Rule 56 is not as broadly stated, and instead grants the judge a broad discretionary power to exclude expert testimony:

If the witness is testifying as an expert, testimony of the witness in the form of opinions or inferences *is limited to such opinions as the Judge finds* are (a) based on facts or data perceived by or personally made known to the witness at the hearing. . . .

Uniform Rules of Evidence rule 56(2), (1953), (emphasis added).

In *United States v. Baller*,<sup>28</sup> the Fourth Circuit acknowledged that not every scientific technique should be recognized as the basis for an expert's testimony since opinions based on scientific techniques often carry "undue weight with the trier of fact"<sup>29</sup> and are difficult to rebut without the use of testimony of other experts.<sup>30</sup> The court, however, rejected the *Frye* test, stating that the standard of admissibility should not require a general consensus in the scientific community.<sup>31</sup> Instead, the court adopted the McCormick standard, adding two protective conditions: there must be "a demonstrable, objective procedure for reaching the opinion"<sup>32</sup> and "qualified persons who can either duplicate the result or criticize the means by which it was reached."<sup>33</sup> The court explained that these additional requirements were devised "to prevent deception or mistake and to allow the possibility of effective response."<sup>34</sup> Since "[e]very useful new development must have its first day in court,"<sup>35</sup> the court concluded that testimony based upon relevant scientific evidence should be admitted in the same manner as other expert testimony, and its weight attacked by cross-examination and refutation.<sup>36</sup>

The *Baller* opinion is commendable for balancing the great impact that scientifically grounded testimony may have on the jury<sup>37</sup> against the need for admitting into evidence testimony based on the results of newly developed scientific techniques.<sup>38</sup> The standard of admissibility devised by the court, however, was insufficient to protect against the probative dangers of expert testimony based on voice spectrogram analysis. First, by leaving the jury the task of assessing the weight of

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28. 519 F.2d 463 (4th Cir. 1975).

29. *Id.* at 466. See note 21 *supra*.

30. 519 F.2d at 466.

31. *Id.* See *United States v. Wright*, 17 U.S.C.M.A. 183, 37 C.M.R. 447 (1967).

32. 519 F.2d at 466.

33. *Id.* The court felt that even though the defense presented no expert rebuttal witnesses this requirement was met because "[c]ompetent witnesses were available to expose its limitations, and the defense was furnished with the names of other experts who could conduct their own analyses of the tapes." *Id.*

34. *Id.*, citing *United States v. Addison*, 498 F.2d 741 (D.C. Cir. 1974); *United States v. Amaral*, 488 F.2d 1148 (9th Cir. 1973); *United States v. Stifel*, 433 F.2d 431 (6th Cir. 1970), *cert. denied*, 401 U.S. 994 (1971). Although these cases discussed the *Frye* test extensively, they applied the standard without any additional requirements.

35. 519 F.2d at 466, quoting *United States v. Stifel*, 433 F.2d 431, 438 (6th Cir. 1970), *cert. denied*, 401 U.S. 994 (1971).

36. 519 F.2d at 466.

37. See note 19 *supra*.

38. See note 24 *supra*.

the evidence the court assumed a sophistication that juries may not possess.<sup>39</sup> Second, voice spectrogram analysis, a relatively new field,<sup>40</sup> has a very limited number of experts<sup>41</sup> so that the court's requirement that there be qualified persons available to challenge expert opinion may not be satisfied.<sup>42</sup> Finally, Dr. Tosi's study of the reliability of voice spectrogram analysis significantly influenced the court.<sup>43</sup> The study has been strongly criticized and should not have been considered conclusive without independent verification.<sup>44</sup>

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39. The jury evolved because of the public's hesitance "to entrust plenary powers over the life and property of the citizen to one judge or to a group of judges." *United States v. Alexander*, 526 F.2d 161, 168 (8th Cir. 1975), quoting *Duncan v. Louisiana*, 391 U.S. 145, 156 (1968). Nevertheless,

[t]he jury's potential for inaccuracy surpasses that of any other legal institution assigned a decision-making task. Since it is convened on an ad-hoc basis to sit in one or a few cases, it lacks even the kind of general competence in weighing evidence and deliberation that judges acquire by training and continuity of service.

Korn, *Law, Fact, and Science in the Courts*, 66 COLUM. L. REV. 1080, 1104 (1966).

40. See note 5 *supra*.

41. The number of voice spectrogram experts who have testified in the reported cases is small: L. Gerstman, C.U.N.Y.; L. Kersta, Voiceprint Laboratories, Somerville, New Jersey; P. Ladefoged, U.C.L.A.; E. Nash, Michigan State Police; and O. Tosi, Michigan State University.

42. With such a small number of voice spectrogram experts it is not surprising that in approximately 80 percent of the reported cases in which such testimony was admitted there was no expert witness called by the defense to rebut or contradict the government's witnesses. *People v. Chapter*, 13 CRIM. LAW RPTR. 2479 (Marin County, Cal., Super. Ct. July 23, 1973). But see *People v. King*, 266 Cal. App. 2d 437, 72 Cal. Rptr. 478 (1968) (seven defense witnesses, experts in the general field of acoustics, questioned the reliability of spectrogram analysis).

43. The court approvingly cited Dr. Tosi's results published in 1972, and took special notice of his claim of 98 percent accuracy for the technique:

[E]xtensive experiments on voice spectrography has [sic] been conducted at Michigan State University by Dr. Oscar Tosi . . . . It appears . . . that an experienced operator would incorrectly identify a speaker approximately six percent of the time. Subsequently, Dr. Tosi suggested refinements, employed by Lt. Nash, which reduce the percentage of mistaken identifications to about two percent.

519 F.2d at 465.

44. See Hazen, *Effects of Differing Phonetic Contexts on Spectrographic Speaker Identification*, 54 J. ACOUST. SOC. AM. 650, 658, 659 (1973). Hazen concluded that "the forensic value of voice spectrograms for speaker identification purposes is quite limited." *Id.* at 659. He specifically criticized Dr. Tosi's preparation of speech samples and the substantial repetition of the known speaker contexts. *Id.* Other acoustical experts found fault with Dr. Tosi's selection of speaker population and the experiment's background noise conditions, and concluded: "Our interpretations of the new data lead us to reiterate our previous conclusion: that the degree of reliability of identification under practical conditions has not been scientifically established." Bolt, Cooper, David, Denes, Pickett & Stevens, *Speaker Identification by Speech Spectro-*

Despite these problems in the court's reasoning, the *Baller* opinion is important in two respects. First, the court's adoption of the McCormick test is a significant departure from precedent, and opens the door of the Fourth Circuit to the admission of testimony based upon other scientific techniques. Second, since rule 702 of the new Federal Rules of Evidence adopts the McCormick standard,<sup>45</sup> *Baller* may indicate how other courts will apply the rule. Other scientific techniques, such as polygraph testing, that in the past have been excluded under the *Frye* test,<sup>46</sup> may be ruled admissible when freshly reviewed under the McCormick standard and rule 702.

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*grams: Some Further Observations*, 54 J. ACOUST. SOC. AM. 531, 535 (1973). For a listing of a number of scientists who have criticized the reliability of the technique, see Jones, *Danger—Voiceprints Ahead*, 11 AM. CRIM. L. REV. 549, 569 n.120 (1973).

45. See note 27 *supra*.

46. The most obvious example of a scientific technique that in the past has not been admitted in evidence under the *Frye* standard is polygraph testing. For an excellent summary of recent decisions that have held inadmissible the results of a polygraph examination, see *United States v. Alexander*, 526 F.2d 161 (8th Cir. 1975). The polygraph machine is actually a combination of devices that measure fluctuations in a person's blood pressure, breathing, perspiration, and pulse. See J. REID & F. INBAU, *supra* note 18, at 3; J. RICHARDSON, *supra* note 15, at § 10.1; Skolnick, *supra* note 13, at 696. The theory of polygraph testing is that a person's physiological state will reflect the emotional state inherent in giving a wrong response to a question. Skolnick, *supra* note 13, at 699-700. Even though the theory underlying the technique, the qualification and methodology of the operator, and the reliability of the procedure have been the subject of the closest scrutiny, see MCCORMICK § 207, the most common justification for the uniform rejection of expert testimony based on the results of a polygraph examination is that the technique is unreliable. H.R. REP. NO. 198, 89th Cong., 1st Sess. 13 (1965). An accuracy rate of 95 percent has been reported for polygraph testing, see F. INBAU & J. REID, *supra* note 13, at 72, a figure courts might find comparable to the 98 percent rate claimed for voice spectrogram analysis in the experiment done by Dr. Tosi, see note 12 *supra*. Under the McCormick standard, then, expert opinion based on the results of a polygraph test may, like expert testimony based on the results of voice spectrogram analysis, be admissible in evidence. Since rule 702 of the Federal Rules of Evidence has adopted the McCormick standard, see note 27 *supra*, federal courts might admit the results of a polygraph examination. Accord, Rothstein, *Some Themes in the Proposed Federal Rules of Evidence*, 33 FED. B.J. 16, 25 (1974).