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Evidentiary and Procedural Rules Governing Expert Testimony

REFERENCE: Giannelli, P. C., **"Evidentiary and Procedural Rules Governing Expert Testimony,"** *Journal of Forensic Sciences*, JFSCA, Vol. 34, No. 3, May 1989, pp. 730-748.

ABSTRACT: Expert testimony plays a critical role in criminal litigation. The legal system has developed both evidentiary and procedural rules to govern the use of experts. The rules of evidence specify the conditions under which expert testimony may be admitted at trial and thus considered by the trier of fact. The rules of procedure cover related issues, such as pretrial discovery of scientific reports and the appointment of defense experts. This article explains and critiques these legal rules. The concluding section recommends ways in which these rules can be improved.

KEYWORDS: jurisprudence, symposium, testimony, witnesses, expert testimony

A number of evidentiary rules affect the admissibility of expert testimony. Some of these rules, such as the oath requirement, are rules of general application. They apply to lay witnesses as well as to expert witnesses. Other rules are designed specifically for experts and govern such matters as proper subject matter and qualifications. In addition, some jurisdictions impose a special rule for the admissibility of novel scientific evidence. These rules are discussed in Part I of this paper.

Once admitted at trial, expert testimony is subject to challenge through the adversary process. Cross-examination is one means of testing expert testimony and is discussed in Part II. The effectiveness of cross-examination depends, at least in part, on pretrial discovery, which is examined in Part III. A second method of challenging expert testimony is through the use of opposing experts. This subject is considered in Part IV.

I. Admissibility of Expert Testimony

Oath Requirement

Every witness, including an expert, is subject to the oath requirement. Federal Rule 603 provides:

> Before testifying, every witness shall be required to declare that the witness will testify truthfully, by oath or affirmation administered in a form calculated to awaken the witness' conscience and impress the witness' mind with the duty to do so.

According to Wigmore, the "true purpose of the oath is not to exclude any competent witness, but merely to add a stimulus to truthfulness wherever such a stimulus is feasible" [*1*].

This material is based upon work supported by the National Science Foundation under Grant SES8611402.

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This view is supported by the cases. For example, the Federal Court of Appeals for the Fourth Circuit has written: "All that the common law requires is a form or statement which impresses upon the mind and conscience of a witness the necessity for telling the truth" [2].

The oath requirement is the only evidentiary rule that can be said to impose an ethical obligation on a witness. By emphasizing the importance of the proceedings, the oath may cause an expert to be more circumspect in his testimony. However, the obligation to tell "the whole truth" operates in an adversary system. The witness is obligated to answer truthfully only those questions asked of him. The witness does not have the right to answer questions that he thinks are needed to present his testimony more fully but are not asked. If the witness goes beyond the questions asked, his answers may be stricken as "unresponsive." In the adversary system, the opposing party has the responsibility of developing any weaknesses or limitations in the witness' testimony.

In practice, an expert who wanted to make additional comments could do so in most cases. By indicating that he had more to say than he had been permitted to say, the expert would alert the opposing party to raise the issue on cross-examination. In addition, such a signal would also alert the trial judge, who has the authority to ask questions of any witness [3]. Undoubtedly, many judges would pursue such an inquiry if they deemed it necessary to develop fully the expert's testimony. The point, however, is that the expert is not *legally* required to do more than answer the questions posed. Moreover, it would be difficult to formulate a legal standard requiring more. For each type of expert the courts would have to determine what testimony was *necessary* for a full presentation of the expert's findings, a task that courts are ill-equipped to perform.

One other point deserves comment. Testifying falsely under oath may result in a perjury prosecution. Thus, an expert who testified that he had a "Master's degree in science, whereas in fact he never attained a graduate degree" [4] or testified to the "results of lab tests that he did not in fact conduct" [5] could be charged with perjury. Indeed, a number of "experts" have been prosecuted for misrepresenting their credentials at trial [6]. Perjury, however, covers only intentional false statements of material facts:

> Perjury is a false oath in a judicial proceeding in regard to a material matter. A false oath is a wilful and corrupt sworn statement made without sincere belief in its truthfulness [7].

It is not perjury for an expert to answer questions truthfully but fail to point out limitations or weaknesses in the scientific procedure used to arrive at his findings.

Federal Rule 403

Federal Rule of Evidence 403 recognizes a trial court's discretion to exclude relevant evidence when its probative value is substantially outweighed by other factors:

> Although relevant, evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of issues, or misleading the jury, or by considerations of undue delay, waste of time, or needless presentation of cumulative evidence.

Like the oath requirement, Rule 403 is a rule of general application. It applies to all evidence, including expert testimony. As one court has noted: "Expert testimony, like any other testimony, may be excluded if, compared to its probative worth, it would create a substantial danger of undue prejudice or confusion" [8].

The principal danger of scientific evidence is its potential to mislead the jury; that is, such evidence may "assume a posture of mystic infallibility in the eyes of a jury of laymen" [9]. Accordingly, "an exaggerated popular opinion of the accuracy of a particular technique [may make] its use prejudicial or likely to mislead the jury" [10]. Similarly, a technique may pose a danger because it requires total reliance on the expert's opinion, thus forcing the jury "to sacrifice its independence and common sense in evaluating [the evidence]" [11].

The use of Rule 403 to exclude misleading scientific evidence, however, presents significant difficulties. How does the trial judge know that "an exaggerated popular opinion of the accuracy of a particular technique" exists? The quoted language referred to polygraph evidence and would not seem applicable to other types of scientific evidence. Moreover, suppose an expert overstates his conclusions or fails to point out limitations in the procedures used, and thereby misleads the jury. How would the trial judge, who typically does not have a scientific background, know of these problems? On occasion, courts have expressed concern about expert testimony that appears overbroad. For example, one court has written:

> We are concerned . . . about the sweeping and unqualified manner in which [the NAA expert's] testimony was offered. . . . An expert witness could be permitted to testify that in his opinion the chemicals present on the defendant's hand may have resulted from the firing of a gun. He should not have been permitted to state, as he did, that this defendant had definitely fired a gun [*12*].

This passage, however, was written by an appellate court which had a complete record before it and the means to investigate the limitations of the scientific technique in issue. In contrast, trial courts are often required to make such determinations ad hoc in the heat of trial. Many courts would probably admit such testimony because they would be unaware of its misleading character. Again, the adversary system requires the opposing party to raise such issues.

Although the application of Rule 403 entrusts the trial court with broad discretion, this discretion is not unlimited. For example, in *United States v. Dwyer* [*13*] the accused's attempt to call a second expert to testify on an insanity defense was rejected by the trial court. The court, however, refused to explain the basis for its decision despite a defense request for an explanation. The Second Circuit reversed:

> Although Rule 403 has placed great discretion in the trial judge, discretion does not mean immunity from accountability. . . . Unfortunately, where the reasons for a discretionary ruling are not apparent to counsel, they will probably not be apparent to an appellate court. We therefore find it difficult to comprehend the district judge's adamant refusal to respond to defense counsel's inquiries. The spirit of Rule 403 would have been better served had the judge "confront[ed] the problem explicitly, acknowledging and weighing both the prejudice and the probative worth" of the proffered testimony [*14*].

Note, however, that the trial court was reversed because it *excluded* expert testimony, not because it admitted misleading testimony.

Subject Matter of Expert Testimony

An expert may testify only about a matter that is an appropriate subject for expert testimony [*15*]. Federal Rule of Evidence 702 provides that expert testimony is admissible if "scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue." According to the federal drafters:

> The rule is broadly phrased. The fields of knowledge which may be drawn upon are not limited merely to the "scientific" and "technical" but extend to all "specialized" knowledge. . . . Thus within the scope of the rule are not only experts in the strictest sense of the word, e.g., physicians, physicists, and architects, but also the large group sometimes called "skilled" witnesses, such as bankers or landowners testifying to land values [*16*].

The trial judge decides this issue. As the Supreme Court has recognized, the trial court has "broad discretion in the matter of the admission or exclusion of expert evidence, and his action is to be sustained unless manifestly erroneous" [*17*].

The standard adopted by Rule 702—whether expert testimony will "assist the trier of fact"—is a more liberal formulation of the subject matter requirement than that found in

many common law opinions, which often phrased the test as whether the subject was beyond the comprehension of a layman [*18*]. Under Rule 702,

> the test is not whether the jury could reach some conclusion in the absence of the expert evidence, but whether the jury is qualified without such testimony "to determine intelligently and to the best possible degree the particular issue without enlightenment from those having a specialized understanding of the subject" [*19*].

This test is consistent with Wigmore's formulation of the test for expert testimony: "On *this subject* can a jury receive from *this person* appreciable help?" [*20*].

Two examples illustrate this rule. First, many courts have excluded expert testimony concerning the unreliability of eyewitness identifications because "the trustworthiness in general of eyewitness observations [is] not beyond the ken of the jurors" [*21*]. In *State v. Chapple* [*22*], however, the Arizona Supreme Court ruled that the trial court had abused its discretion in excluding such testimony in that case. According to the court,

> [e]ven assuming that jurors of ordinary education need no expert testimony to enlighten them to the danger of eyewitness identification, the offer of proof indicated that [the expert's] testimony would have informed the jury that there are many specific variables which affect the accuracy of identification and which apply to the facts of this case [*23*].

A second example involves expert testimony concerning the battered woman syndrome. The battered woman syndrome describes a pattern of violence inflicted on a woman by her mate. Typically, evidence of the syndrome is offered to support a self-defense claim in a homicide prosecution of the woman for her mate's death. Some courts have upheld the exclusion of expert testimony on this issue because "the subject of the expert testimony is within the understanding of the jury" [*24*]. In contrast, other courts have held this testimony admissible because it tends to explain two elements of a self-defense claim: (1) the woman's subjective fear of serious injury or death and (2) the reasonableness of that belief. The battered woman syndrome, for example, may explain why a battered woman has not left her mate [*25*]. According to these courts, the evidence supplies "an interpretation of the facts which differed from the ordinary lay perception" [*26*].

Qualifications of Experts

Federal Rule 702 also governs the qualifications of experts. According to the rule, a witness may qualify as an expert by reason of "knowledge, skill, experience, training, or education." The rule comports with Wigmore's view; he wrote that the witness's expertise "may have been attained, so far as legal rules go, in any way whatever; all the law requires is that it should have been attained" [*27*].

Determining whether a witness is properly qualified is a matter entrusted to the trial court's discretion and thus is reviewable on appeal only for an abuse of discretion [*28*]. Although the trial court is given wide latitude on this issue, there are certain recognized limitations on this discretion. For example, in reversing a trial court's ruling that a defense fingerprint expert was unqualified, the Sixth Circuit wrote:

> An expert need not have certificates of training, nor memberships in professional organizations. . . . Nor need he be, as the trial court apparently required, an outstanding practitioner in the field in which he professes expertise. Comparisons between his professional stature and the stature of witnesses for an opposing party may be made by the jury, if it becomes necessary to decide which of two conflicting opinions to believe. But the only question for the trial judge who must decide whether or not to allow the jury to consider a proffered expert's opinions is, "whether his knowledge of the subject matter is such that his opinion will most likely assist the trier of fact in arriving at the truth" [*29*].

Similarly, the D.C. Circuit reversed a trial court's ruling that psychologists were not qualified to testify on insanity because they lacked medical training [*30*]. The court, however, was careful to point out that a witness's qualifications must be based on the nature and extent of his knowledge and not on his title [*31*]. On one hand, many psychologists would not be qualified to express an opinion on insanity because their "training and experience may not provide an adequate basis for their testimony" [*32*]. On the other hand, other psychologists, because of their education and experience in the diagnosis and treatment of mental disorders, may be qualified [*33*].

Experience alone may qualify a witness to express an opinion. On this basis, courts have accepted the testimony of a witness that a substance is a particular drug [*34*], as well as testimony by police experts on the modus operandi of various types of crimes [*35*].

A witness may be an expert on one aspect of a scientific technique but not on other aspects. Accordingly, courts must "differentiate between ability to operate an instrument or perform a test and the ability to make an interpretation drawn from use of the instrument" [*36*]. For example, a police officer may be qualified to operate a breathalyzer but not qualified to interpret the results [*37*]. The training and experience needed to perform these two distinct functions are very different [*38*].

In sum, Rule 702 provides only a minimum legal standard for qualifying expert witnesses. A laboratory examiner who was thought to be unqualified by his peers might easily satisfy this standard; he would know much more than a lay jury. Nevertheless, legal scholars are in agreement that the qualification standard should not be formulated in any other way. The legal standard must be applied, in both civil and criminal cases, to many witnesses who do not have scientific backgrounds—for example, a bricklayer could be an expert in the appropriate case. In addition, courts are in no position to specify qualification standards for the many different fields covered by the forensic sciences. Even if the profession developed standards, they would probably affect the weight to be accorded the expert's testimony and not its admissibility.

In contrast, a legislature could specify more rigorous qualification standards. A legislature would have the time and capability to investigate the problem as well as the means to prescribe detailed standards. Illustrative examples are polygraph licensing standards [*39*] and intoxication test operator standards [*40*]. A legislature could also delegate the authority to promulgate standards to an agency or official, such as the director of a forensic science laboratory.

Novel Scientific Evidence

The validity of a novel scientific technique is typically established through the introduction of evidence, including expert testimony. Courts have relied principally on two different tests to determine the admissibility of innovative scientific evidence. One approach treats the validity of a new technique as an aspect of relevancy. The other approach, which requires the proponent of a novel technique to establish its general acceptance in the scientific community, is based on *Frye v. United States* [*41*], decided in 1923.

In *Frye* the D.C. Circuit considered the admissibility of polygraph evidence as a case of first impression. The court wrote:

> 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 the 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 [*42*].

The court went on to hold that the polygraph had "not yet gained such standing and scientific recognition among physiological and psychological authorities" [*43*]. Thus, under the

Frye standard, it is not enough that a qualified expert or even several experts testify that a particular technique is valid; *Frye* imposes a special burden: The technique must be *generally accepted by the relevant scientific community.*

The *Frye* general acceptance test has been recognized as the controlling standard by a majority [*44*] of the federal [*45*] and state courts [*46*] that have considered the issue. In addition to polygraph evidence, it has been used to determine the admissibility of evidence derived from voiceprint analysis [*47*], neutron activation analysis [*48*], gunshot residue tests [*49*], bite mark comparisons [*50*], psycholinguistics [*51*], truth serum [*52*], scanning electron microscopic analysis [*53*], hypnosis [*54*], blood analysis [*55*], hair analysis [*56*], and numerous other forensic science techniques [*57*].

An example of the application of *Frye* is *People v. Young* [*58*], which involved the admissibility of the results of serological electrophoresis of dried bloodstains. The Michigan Supreme Court wrote:

> We conclude that the scientific community's general acceptance of the reliability of electrophoresis of evidentiary bloodstains has not been established in the instant case. Reliability remains in dispute and unresolved because of the questions unanswered. The questions are not likely to be answered and the reliability of electrophoresis of evidentiary bloodstains established until independently conducted validation studies on the thin-gel multisystem analysis are undertaken and comprehensive control tests evaluating the effects of different contaminants are run, and the results have been subjected to the scrutiny of the scientific community [*59*].

The principal justification for the general acceptance standard is that it tends to ensure the reliability of scientific evidence. The D.C. Circuit has stated: "The requirement of general acceptance in the scientific community assures that those most qualified to assess the general validity of a scientific method will have the determinative voice" [*60*].

Other rationales have also been offered in support of *Frye*. First, this test guarantees that "a minimal reserve of experts exists who can critically examine the validity of a scientific determination in a particular case" [*61*]. Second, the *Frye* test "may well promote a degree of uniformity of decision. Individual judges whose particular conclusions may differ regarding the reliability of particular scientific evidence, may discover substantial agreement and consensus in the scientific community" [*62*]. Third,

> [w]ithout the *Frye* test or something similar, the reliability of an experimental scientific technique is likely to become a central issue in each trial in which it is introduced, as long as there remains serious disagreement in the scientific community over its reliability. Again and again, the examination and cross-examination of expert witnesses will be . . . protracted and time-consuming . . . and proceedings may well degenerate into trials of the technique itself [*63*].

Notwithstanding its widespread judicial adoption, the general acceptance test is being rejected by an increasing number of courts [*64*]. The principal alternative approach to the *Frye* test is to treat scientific evidence in the same way as other evidence, weighing its probative value against countervailing dangers and considerations. Professor McCormick advocated this position. In his 1954 text, he wrote:

> "General scientific acceptance" is a proper condition upon the court's 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. Particularly, its probative value may be overborne by the familiar dangers of prejudicing or misleading the jury, unfair surprise and undue consumption of time [*65*].

This approach requires a three-step analysis: first, ascertaining the probative value of the evidence; second, identifying any countervailing dangers or considerations; and third, balancing the probative value against the identified dangers.

The first step of the relevancy approach is to assess the probative value of the proffered

evidence. Federal Rule 401 defines relevant evidence as "evidence having any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence." The probative value of scientific evidence depends on its reliability [*66*], and since most judges do not possess the scientific background to determine reliability, the trial judge is often forced to depend on expert testimony to ascertain probative value [*67*]. Therefore, unlike the *Frye* test, one expert's testimony may suffice to establish the validity of a novel technique and thus its probative value. Of course, a technique's acceptance in the scientific community may be considered as circumstantial proof of its validity. In addition, the "expert's qualifications and stature, the use which has been made of the new technique, the potential rate of error, the existence of specialized literature, and the novelty of the new invention, may all enter into the court's assessment" [*68*].

The second step of the relevancy approach is to identify any countervailing dangers or considerations. Federal Rule 403 provides: "Although relevant, evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of issues, or misleading the jury, or by considerations of undue delay, waste of time, or needless presentation of cumulative evidence." As noted earlier, the principal danger of scientific evidence is its potential to mislead the jury. As one court has noted, "jurors must not be mislead by an 'aura of certainty which often envelops a new scientific process, obscuring its currently experimental nature' " [*69*].

The final step of the relevancy approach requires balancing the probative value against the identified dangers or other considerations. Under Federal Rule 403, the balance tips in favor of exclusion only when probative value is substantially outweighed by the identified dangers. Moreover, on appeal the standard of review is whether the trial court abused its discretion [*70*]. As a result, not only is it easier for the evidence to gain admission under this approach; but once admitted, it is very difficult to challenge successfully on appeal.

Some cases emphasize that an instruction alerting the jury to the potential dangers of misuse may be helpful if the trial court admits the evidence [*71*]. Moreover, one court has pointed out that the most efficient procedure for determining admissibility under this approach is an *in limine* hearing, at which time the trial court may consider offers of proof, affidavits, stipulations, or learned treatises [*72*].

Unlike the *Frye* test, the relevancy approach does not attempt to assure the reliability of novel scientific evidence before admission. Although some evidence will be screened out by a court applying the relevancy approach, most innovative techniques will gain admissibility, and any deficiencies in the technique should be exposed through traditional adversary trial procedures. For example, in admitting voiceprint evidence, the Fourth Circuit commented: "Unless an exaggerated popular opinion of the accuracy of a particular technique makes its use prejudicial or likely to mislead the jury, it is better to admit relevant scientific evidence in the same manner as other expert testimony and allow its weight to be attacked by cross-examination and refutation" [*73*].

Thus, the adequacy of the relevancy approach depends, in large measure, on full discovery, the opportunity to reexamine evidence, and the appointment of defense experts. Without these safeguards, cross-examination and refutation are difficult, if not impossible. Even with these safeguards, the adequacy of the relevancy approach has been questioned [*74*].

II. Cross-Examination

Part I examined the rules relating to the admissibility of expert testimony. These rules, as applied by the trial judge, will exclude testimony that does not satisfy the minimum standards of admissibility. Once admitted, however, the weight to be accorded expert testimony is determined by the jury, and the responsibility for challenging and limiting this testimony falls on the opposing party. Cross-examination is one of the principal methods of testing such evidence.

The right to cross-examine adverse witnesses, including experts, is well established. In criminal cases, it is an essential aspect of the right of confrontation [*75*]. In theory, cross-examination should expose deficiencies in an expert's qualifications, weaknesses in laboratory procedures, and unsupported opinions. If effective, cross-examination could force an expert to limit the testimony that he has given on direct examination. Overstatements and unclear testimony can be rectified. As one court has commented: "The evidence is admitted for its worth, and the expert who attempts to make more from it than he should seldom survives a good cross-examination" [*76*]. Similarly, the Fourth Circuit has written: "[I]t is better to admit relevant scientific evidence in the same manner as other expert testimony and allow its weight to be attacked by cross-examination and refutation" [*77*].

Other courts, however, have questioned the efficacy of cross-examination in this context. The "cross-examination of an expert poses a formidable task; it is the rare attorney who knows as much as the expert" [*78*]. Similarly, another court has written: "[C]ross-examination . . . may not in all situations provide a sufficient basis for the jury to assess the competence of the [expert] witness and the merits of the test" [*79*].

The efficacy of cross-examination depends in large part on the competence of the trial attorney. An accused in a criminal case is guaranteed the right to effective assistance of counsel as part of the Sixth Amendment right to counsel [*80*]. Comprehensive pretrial discovery and access to expert assistance will facilitate cross-examination but will not assure competent counsel. Whether trial attorneys generally handle scientific evidence competently is difficult to determine. Some counsel undoubtedly do very well in this regard. Others no doubt fail in their responsibilities; they shy away from challenging expert testimony because they know the expert is more knowledgeable.

Impeachment

Like any other witness, an expert may be impeached. This is one of the central purposes of cross-examination. For example, evidence of bias or a prior inconsistent statement could be introduced. The fact that crime laboratory personnel are part of the police apparatus and thus aligned with the prosecution could be developed on cross-examination as a type of bias. This factor, however, affects the weight of the expert's testimony, not its admissibility.

Learned Treatises

One method of impeachment, the use of a learned treatise, is directed specifically at experts. In all jurisdictions an expert may be impeached with a learned treatise. There is, however, disagreement as to the conditions under which a treatise may be used for this purpose. Some jurisdictions allow this method of impeachment only when the expert *relies* on the treatise in reaching his opinion. Other jurisdictions permit impeachment if the expert *recognizes* the treatise as an authoritative work. Still other jurisdictions permit impeachment if the treatise is established as a recognized authority *by any means*, including the testimony of other experts or by judicial notice [*81*].

Under the traditional view, a learned treatise is admissible only for impeachment. Accordingly, the jury's use of a treatise as substantive evidence violates the hearsay rule. In contrast, Federal Evidence Rule 803(18) recognizes a hearsay exception for learned treatises [*82*], thus permitting their substantive use. According to the federal drafters, the "hearsay objection must be regarded as unimpressive when directed against treatises since a high standard of accuracy is engendered by various factors: the treatise is written primarily and impartially for professionals, subject to scrutiny and exposure for inaccuracy, with the reputation of the writer at stake" [*83*].

There are two limitations recognized by the federal rule. First, a treatise may be used substantively only when an expert is on the stand. This requirement provides an important

safeguard because it ensures that a knowledgeable person is available "to explain and assist in the application of the treatise if desired" [*84*]. Second, the treatise may be read to the jury but not received as an exhibit, thus precluding its misuse in the jury room [*85*].

III. Pretrial Discovery

Effective cross-examination depends on pretrial preparation, which, in turn, depends on advance knowledge that expert testimony will be presented. This information is provided, at least to some extent, through discovery. Pretrial discovery is critical when scientific evidence is admitted at trial. As the American Bar Association (ABA) Standards note:

> The need for full and fair disclosure is especially apparent with respect to scientific proof and the testimony of experts. This sort of evidence is practically impossible for the adversary to test or rebut at trial without an advance opportunity to examine it closely [*86*].

The traditional arguments for limiting criminal discovery simply do not apply in this context. "The opponents of discovery have stated three principal reasons why they believed it undesirable: (1) it will encourage perjury; (2) it will encourage intimidation of prosecution witnesses; and (3) it would, because of the defendant's privilege against self-incrimination, be a one-way street" [*87*]. Even if one assumes that these reasons generally are valid, none of them seems compelling when applied to scientific evidence. The ABA Standards continue, "[I]t is virtually impossible for evidence or information of this kind to be distorted or misused because of its advance disclosure" [*88*]. Nevertheless, pretrial discovery in criminal cases is not as extensive as it should be.

Scientific Reports

Virtually all jurisdictions provide for the disclosure of scientific reports in the possession of the prosecution. Although this type of discovery is well accepted, a number of problems remain. First, unlike Federal Rule of Criminal Procedure 16, which makes the discovery of scientific reports mandatory, discovery of those reports is discretionary in a number of jurisdictions [*89*]. There seems little justification for this rule; automatic disclosure should be required.

Second, the typical laboratory report does not provide sufficient information, usually revealing only the results of the examination [*90*]. Other critical information, such as the nature of the tests performed and the qualifications of the examiner, is not disclosed. For example, a laboratory report that an examined substance is marijuana might not specify whether this conclusion is based upon a visual examination, the Duquenois-Levine test, or thin-layer chromatography. Without this information, it is difficult for counsel to prepare adequately for trial. One scientist has stated:

> For a report from a crime laboratory to be deemed competent, I think most scientists would require it to contain a minimum of three elements: (a) a description of the analytical techniques used in the test requested by the government or other party, (b) the quantitative or qualitative results with any appropriate qualifications concerning the degree of certainty surrounding them, and (c) an explanation of any necessary presumptions or inferences that were needed to reach the conclusions [*91*].

Unfortunately, most forensic science laboratory reports do not meet these standards. Indeed, "[m]any criminal defense attorneys suspect that the unusual brevity of reports by FBI fingerprint or handwriting experts (*e.g.*, often one or two short sentences) may be partially explained by the fact that defense counsel is entitled to copies of them prior to trial" [*92*].

Witness Lists

In many jurisdictions the defendant does not have a right to discover a list of prosecution witnesses. This is the rule in federal practice. Thus, if no scientific report is prepared, the defense may have no notice that an expert will testify for the prosecution at trial [*93*]. The prosecution of Wayne Williams for the murder of 2 of the 30 killings of young black males in Atlanta is illustrative [*94*]. Fiber evidence played a crucial role in the case. One of the fiber experts was employed by the Royal Canadian Mounted Police. He, however, had not prepared a report and thus the prosecution, according to the Georgia Supreme Court, had nothing to disclose [*95*]. This result cannot be justified.

Inspection and Retesting

A number of jurisdictions provide for defense inspection of documents and other tangible objects. As with scientific reports, the right to inspect is not automatic in all jurisdictions, and the defendant must make a preliminary showing of the materiality and reasonableness of the request. No sound reason supports these requirements. In addition, the right to inspect does not necessarily include the right to retest. Some jurisdictions specifically provide for the right to retest evidence [*96*], while others have interpreted their discovery rules to include such a right [*97*]. For example, although Federal Rule 16 provides only for inspection of tangible objects, the federal courts have held that the rule includes the right to retest [*98*]. Moreover, some courts have held that the right to retest is constitutionally required [*99*], but other courts have rejected this view with the finding that the right to cross-examine the prosecution's expert witnesses is sufficient [*100*]. There is, however, a significant difference between attacking an expert's opinion through cross-examination and attacking that opinion through the testimony of a defense expert who has had an opportunity to examine the evidence.

Any possible abuse by the defense of the right to retest can be controlled. For instance, one court has established the following guidelines for retesting:

> A defendant who desires to analyze an article or substance should file a motion setting forth the circumstances of the proposed analysis, the identity of the expert who will conduct such analysis, his qualifications, and scientific background. The court may then, in its discretion, provide for appropriate safeguards, including, where necessary, the performance of such tests at the state laboratory under the supervision of the state's analyst [*101*].

A related issue concerns the defendant's right to have his own expert present when the prosecution conducts a scientific test that consumes the evidence and thus makes retesting impossible. The right is recognized in a few jurisdictions [*102*] and may be constitutionally required under certain circumstances. In commenting on the due process issues raised by consumptive testing, the Colorado Supreme Court was written: "[I]t may be incumbent on the state to contact the defendant to determine whether he wishes his expert to be present during the tests" [*103*]. The failure of most jurisdictions to address this issue in their discovery rules is unfortunate.

Depositions

A majority of jurisdictions do not permit discovery depositions in criminal cases. Instead, criminal depositions generally are used only to preserve the testimony of witnesses who may be unavailable for trial [*104*]. Several jurisdictions do permit discovery depositions, and these provisions apply to experts [*105*]. Moreover, Federal Rule of Evidence 706(a) provides for the deposition of court-appointed experts, which "can be justified on the grounds that an examination into the expert's findings will enable the parties to better prepare for examina-

tion and cross-examination thereby increasing the likelihood 'that truth may be ascertained and proceedings justly determined' "[*106*].

At least with respect to expert witnesses, the majority rule prohibiting discovery depositions is unjustified and hinders the pretrial preparation necessary for effective cross-examination of experts. The same reasons that support depositions of court-appointed experts support depositions of opposing experts. Federal Rule of Civil Procedure 26(b)(4) offers a striking contrast to the criminal rules of most jurisdictions; it provides that a

> party may through interrogatories require any other party to identify each person whom the other party expects to call as an expert at trial, to state the subject matter on which the expert is expected to testify, and to state the substance of the facts and opinions to which the expert is expected to testify and a summary of the grounds for each opinion.

Why such a provision applies in civil, but not criminal, cases remains unclear.

IV. Expert Assistance

In many criminal cases, securing the services of experts to examine evidence, to advise counsel, and to testify at trial is critical. In an early case, Justice Cardozo commented:

> [U]pon the trial of certain issues, such as insanity or forgery, experts are often necessary both for the prosecution and for defense. . . . [A] defendant may be at an unfair disadvantage, if he is unable because of poverty to parry by his own witnesses the thrusts of those against him [*107*].

Similarly, the ABA Standards note: "The quality of representation at trial . . . may be excellent and yet valueless to the defendant if his defense requires the assistance of a psychiatrist or handwriting expert and no such services are available" [*108*].

Obtaining expert assistance is generally not difficult for the prosecution. The prosecution has access to the services of state, county, or metropolitan crime laboratories [*109*]. In addition, federal laboratories often provide their services to state law enforcement agencies. For example, the services of the FBI Laboratory are available to "all duly constituted state, county, and municipal law enforcement agencies in the United States" [*110*]. These services include both the examination of evidence and the court appearance of the expert.

Forensic science laboratory services, however, are not generally available to criminal defendants. This may account for the disparity between the defense and prosecution use of experts. In their jury study, Kalven and Zeisel commented: "Again, the imbalance between prosecution and defense appears. In 22 percent of the cases the prosecution has the only expert witness, whereas in only 3 percent of the cases does the defense have such an advantage" [*111*]. The voiceprint cases offer another illustration. As one study noted, a "striking fact about the trials involving voicegram evidence to date is the very large proportion in which the only experts testifying were those called by the state" [*112*].

A number of statutory provisions, state and federal, attempt to provide expert assistance to indigent criminal defendants. In addition, courts have recognized a constitutional right to defense experts. Finally, trial courts have the authority to appoint experts to assist them [*113*].

Statutory Provisions

In federal trials, the Criminal Justice Act provides for expert assistance for indigent defendants. Section (e)(1) of the Act reads:

> Counsel for a person who is financially unable to obtain investigative, expert, or other services necessary for an adequate defense may request them in an ex parte application. Upon finding, after appropriate inquiry in an ex parte proceeding, that the services are necessary and the person is financially unable to obtain them, the court, or the United States magistrate if the services

> are required in connection with a matter over which he has jurisdiction, shall authorize counsel to obtain the services [*114*].

The Act limits expenses for expert services to $300.00 unless the court certifies that a greater amount is "necessary to provide fair compensation for services of an unusual character or duration . . ." [*115*]. The type of expert most commonly requested pursuant to the statute are psychiatrists in insanity defense cases [*116*]. Other requests have involved polygraph examiners [*117*], psychologists [*118*], fingerprint experts [*119*], handwriting examiners [*120*], as well as other experts [*121*].

A defendant seeking funds under the Act must meet a two-pronged test: "(1) The accused must satisfy the court that financial inability prevents him from obtaining the services he requests; and (2) The accused must show need for such services to present an adequate defense" [*122*]. A number of courts have interpreted this standard. The Fifth Circuit has ruled that "where the government's case rests heavily on a theory most competently addressed by expert testimony, an indigent defendant must be afforded the opportunity to prepare and present his defense to such a theory with the assistance of his own expert pursuant to section 3006A(e)" [*123*]. The Ninth Circuit has held that the "statute requires the district judge to authorize defense services when the defense attorney makes a timely request in circumstances in which a reasonable attorney would engage such services for a client having the independent financial means to pay for them" [*124*]. This standard includes "pretrial and trial assistance to the defense as well as potential trial testimony" [*125*]. Other courts have adopted this interpretation and added further elaboration. For example, the Second Circuit has stated that " '[n]ecessary' should at least mean 'reasonably necessary,' and 'an adequate defense' must include preparation for cross-examination of a government expert as well as presentation of an expert defense witness" [*126*].

A number of state statutes and rules also provide for expert assistance for indigent defendants. These provisions, however, differ in many respects. Some explicitly provide for the services of experts [*127*], while others mention only investigative services [*128*]. Still others refer to only the reimbursement of reasonable or necessary expenses incurred by attorneys representing indigent defendants [*129*].

The coverage of these provisions also differs with respect to the type of crime charged; some are limited to capital cases [*130*]. Moreover, some statutes provide for the payment of reasonable expenses [*131*], while others specify a maximum amount [*132*]. A number of the latter statutes provide for expenses above the maximum in extraordinary circumstances [*133*].

The Virginia statute [*134*] is somewhat unique because it established a laboratory independent of law enforcement agencies. Defense counsel, with court approval, may submit evidence directly to this laboratory.

Constitutional Requirements

The right of an indigent defendant to the services of expert witnesses may be based on several different constitutional grounds [*135*]: effective assistance of counsel, equal protection, due process, or compulsory process. In 1985, the U.S. Supreme Court in *Ake v. Oklahoma* [*136*] recognized the right to expert assistance. Ake, a capital murder defendant, requested a psychiatric evaluation at state expense to prepare an insanity defense. The trial court refused his request. Thus, although insanity was the only contested issue, no psychiatrists testified on this issue. Nonetheless, in seeking the death penalty, the prosecution relied on the testimony of state psychiatrists that Ake was dangerous to society.

On review, the Supreme Court overturned Ake's conviction. The Court wrote:

> We hold that when a defendant has made a preliminary showing that his sanity at the time of the offense is likely to be a significant factor at trial, the Constitution requires that a State provide

> access to a psychiatrist's assistance on this issue if the defendant cannot otherwise afford one [*137*].

The Court rested its decision on due process grounds and thus had no occasion to consider whether the right to expert assistance was also grounded in some other constitutional provision: "Because we conclude that the Due Process Clause guaranteed to Ake the assistance he requested and was denied, we have no occasion to consider the applicability of the Equal Protection Clause, or the Sixth Amendment, in this context" [*138*].

The Court's analysis included a finding that a defendant's interest in the accuracy of a criminal proceeding that placed his life or liberty at risk "is almost uniquely compelling" [*139*]. In contrast, the state's only interest is economic. Although the state claimed the cost of providing expert assistance would result in "a staggering burden to the State," the Court dismissed this argument, pointing out that many states as well as the federal government provided psychiatric assistance to indigent defendants and that its holding was limited to "one competent psychiatrist" [*140*]. The Court also found the need for expert assistance critical and the risk of error "extremely high" [*141*] if assistance is not provided.

Several aspects of *Ake* deserve comment. First, although the case involved a capital defendant, the Court did not appear to limit its decision to death penalty cases [*142*]. Second, the case involved psychiatric experts in insanity cases and although the importance of expert testimony in this type of case played a critical role in the decision, the Court's rationale would seem to extend to cases involving other types of experts. Indeed, the Court not only held that a defendant has the right to expert assistance when an insanity defense is raised but also when future dangerousness is an issue at the penalty stage of the trial [*143*]. Third, the Court did limit its decision in several respects. It ruled that the defendant had the right to "one competent examination" [*144*] when insanity is raised as a defense. It also held that this right did not include the "right to choose a psychiatrist of his personal liking or to receive funds to hire his own" [*145*]. Moreover, the defendant has the burden of showing the need for expert assistance. In a later case, *Caldwell v. Mississippi* [*146*], the Court declined to consider a trial court's refusal to appoint fingerprint and ballistics experts because the defendant had "offered little more than undeveloped assertions that the requested assistance would be beneficial . . ." [*147*].

The precise contours of the right to expert assistance under *Ake* are not clear. As one court has noted, "the *Ake* decision fails to establish a bright line test for determining when a defendant has demonstrated that sanity at the time of the offense will be a significant factor at the time of trial" [*148*]. Some courts have given *Ake* a broad reading:

> That duty [to appoint a psychiatrist] cannot be satisfied with the appointment of an expert who ultimately testifies contrary to the defense on the issue of competence. The essential benefit of having an expert in the first place is denied the defendant when the services of the doctor must be shared with the prosecution. In this case, the benefit sought was not only the testimony of a psychiatrist to present the defendant's side of the case, but also the assistance of an expert to interpret the findings of an expert witness and to aid in the preparation of his cross-examination. Without that assistance, the defendant was deprived of the fair trial due process demands [*149*].

Other courts, however, have taken a narrow view of *Ake*. For example, the Eleventh Circuit has written:

> *Ake* and *Caldwell*, taken together, hold that a defendant must demonstrate something more than a mere possibility of assistance from a requested expert; due process does not require the government automatically to provide indigent defendants with expert assistance upon demand. Rather, a fair reading of these precedents is that a defendant must show the trial court that there exists a reasonable probability both that an expert would be of assistance to the defense and that denial of expert assistance would result in a fundamentally unfair trial. Thus, if a defendant wants an expert to assist his attorney in confronting the prosecution's proof—by preparing counsel to cross-examine the prosecution's experts or by providing rebuttal testimony—he must inform the court of the nature of the prosecution's case and how the requested expert would be

useful. At the very least, he must inform the trial court about the nature of the crime and the evidence linking him to the crime. By the same token, if the defendant desires the appointment of an expert so that he can present an affirmative defense, such as insanity, he must demonstrate a substantial basis for the defense, as the defendant did in *Ake*. In each instance, the defendant's showing must also include a specific description of the expert or experts desired; without this basic information, the court would be unable to grant the defendant's motion, because the court would not know what type of expert was needed. In addition, the defendant should inform the court why the particular expert is necessary [*150*].

This reading of *Ake* places a stringent burden on the indigent defendant who seeks expert assistance [*151*].

V. Conclusion

Expert testimony in criminal cases is governed by a number of evidentiary and procedural rules. The witness must be qualified and testify on a proper subject for expert testimony. The trial court determines these issues. The court also retains the authority to exclude testimony that is unfairly prejudicial, misleading, or time-consuming. These rules, however, establish only a minimum standard of admissibility, although some jurisdictions impose a special standard—the *Frye* test—for novel scientific evidence. The promulgation of qualification standards by the legislature or an appropriate administrative agency would be one way to improve expert testimony.

In the adversary system the principal responsibility for challenging and limiting expert testimony falls on the opposing party. Cross-examination can be an effective tool in this respect if counsel is competent and has sufficient pretrial notice of the nature of the expert testimony. In many respects, the current discovery rules fail to provide adequate notice. Presently, a defendant may not have notice that an expert will testify for the prosecution and even with notice may not know before trial the basis for the testimony or the qualifications of the expert. In addition, the defendant might not have the right to retest evidence that is crucial to the case. To rectify these problems, the discovery rules should be amended. Rules relating to the discovery of laboratory reports should specify the contents of the report, including the tests employed, the qualifications of the examiner, and a complete explanation of the findings reported. The right to retest evidence and the right to depose opposing experts should be explicitly recognized.

Finally, opposing experts are critical in challenging expert testimony. A number of statutory provisions attempt to provide such assistance, and the *Ake* decision recognizes a limited constitutional right to defense experts. This issue is better addressed by statute than by constitutional adjudication. For example, the amount of money that may be expended on expert assistance needs to be increased.

References

[*1*] Wigmore, J., *Evidence* (Chadbourn rev.), Vol. 6, Little, Brown and Co., Boston, 1976, pp. 413–444.
[*2*] *United States v. Looper*, 419 F.2d 1405, 1407 (4th Cir. 1969).
[*3*] *See* Fed. R. Evid. 614.
[*4*] *Doepel v. United States*, 434 A.2d 449, 460 (D.C. 1981).
[*5*] *State v. Ruybal*, 408 A.2d 1284, 1285 (Me. 1979).
[*6*] *See* Starrs, J., "Mountebanks Among Forensic Scientists," in *Forensic Science Handbook*, Vol. 2, Prentice Hall, Englewood Cliffs, NJ, 1988, pp. 1–37.
[*7*] Perkins, R. and Boyce, R., *Criminal Law*, 3d ed., Foundation Press, Mineola, NY, 1982, p. 511.
[*8*] *United States v. Schmidt*, 711 F.2d 595, 599 (5th Cir. 1983), *cert. denied*, 464 U.S. 1041 (1984).
[*9*] *United States v. Addison*, 498 F.2d 741, 744 (D.C. Cir. 1974).
[*10*] *United States v. Baller*, 519 F.2d 463, 466 (4th Cir.), *cert. denied*, 423 U.S. 1019 (1975).
[*11*] *People v. Marx*, 54 Cal. App. 3d 100, 111, 126 Cal. Rptr. 350, 356 (1975).
[*12*] *State v. Spencer*, 298 Minn. 456, 461, 216 N.W.2d 131, 134 (1974).

[13] 539 F.2d 924 (2d Cir. 1976).
[14] *Id.* at 928 (quoting United States v. Robinson, 530 F.2d 1076, 1081 [D.C. Cir. 1976]).
[15] *See* Maguire, J., *Evidence, Common Sense and Common Law.* Foundation Press, Mineola, NY, 1947, p. 30 ("The field of expertness is bounded one one side by the great area of the commonplace, supposedly within the ken of every person of moderate intelligence, and on the other by the even greater area of the speculative and uncertain. Of course, both these boundaries constantly shift. . . .").
[16] Fed. R. Evid. 702 advisory committee note.
[17] *Salem v. United States Lines Co.*, 370 U.S. 31, 35 (1962). *See also Hamling v. United States*, 418 U.S. 87, 108 (1974) ("[T]he District Court has wide discretion in its determination to admit and exclude evidence, and this is particularly true in the case of expert testimony.").
[18] *E.g., Fineberg v. United States*, 393 F.2d 417, 421 (9th Cir. 1968) ("beyond the knowledge of the average layman"); *Jenkins v. United States*, 307 F.2d 637, 643 (D.C. Cir. 1962) ("beyond the ken of the average layman").
[19] *State v. Chapple*, 135 Ariz. 281, ___, 660 P.2d 1208, 1219-1220 (1983) (quoting Ladd, M., "Expert Testimony," *Vanderbilt Law Review*, Vol. 5, 1952, p. 418).
[20] Wigmore, J., *Evidence* (Chadbourn rev.), Vol. 7, Little, Brown and Co., Boston, 1978, p. 29.
[21] *State v. Porraro*, 121 R.I. 882, 892, 404 A.2d 465, 471 (1979).
[22] 135 Ariz. 281, 660 P.2d 1208 (1983).
[23] *Id.* at ___, 660 P.2d at 1220. *See also United States v. Moore*, 786 F.2d 1308, 1312 (5th Cir. 1986); *United States v. Downing*, 753 F.2d 1224, 1231-1232 (3d Cir. 1985); *United States v. Smith*, 736 F.2d 1103, 1106-1107 (6th Cir.), *cert. denied*, 105 S. Ct. 213 (1984); *People v. McDonald*, 37 Cal. 3d 351, 369, 690 P.2d 709, 721, 208 Cal. Rptr. 236, 248 (1984).
[24] *State v. Thomas*, 66 Ohio St. 2d 518, 521, 423 N.E.2d 137, 140 (1981).
[25] *See State v. Kelly*, 97 N.J. 178, 196, 478 A.2d 364, 372 (1984) ("Only by understanding these unique pressures that force battered women to remain with their mates, despite their longstanding and reasonable fear of severe bodily harm and the isolation that being a battered woman creates, can a battered woman's state of mind be accurately and fairly understood.").
[26] *Ibn-Tamas v. United States*, 407 A.2d 626, 634-635 (D.C. 1979), *appeal on remand*, 455 A.2d 893 (D.C. 1983).
[27] Wigmore, J., *Evidence* (Chadbourn rev.), Vol. 2, Little, Brown and Co., Boston, 1979. p. 751.
[28] *See* Fed. R. Evid. 104(a) ("Preliminary questions concerning the qualification of a person to be a witness . . . shall be determined by the court. . . ."); *Hamling v. United States*, 418 U.S. 87, 108 (1974) ("[T]he District Court has wide discretion in its determination to admit and exclude evidence, and this is particularly true in the case of expert testimony.").
[29] *United States v. Barker*, 553 F.2d 1013, 1024 (6th Cir. 1977) (quoting *Holmgren v. Massey-Ferguson, Inc.*, 516 F.2d 856, 858 [8th Cir. 1975]).
[30] *Jenkins v. United States*, 307 F.2d 637, 643 (D.C. Cir. 1962).
[31] *Id.* at 645.
[32] *Id.* at 644.
[33] *Id.*
[34] *E.g., United States v. Bermudez*, 526 F.2d 89, 97-98 (2d Cir. 1975) (FBI agent qualified to identify cocaine based on 4 years experience, during which time he identified cocaine by sight on 35 occasions), *cert. denied*, 425 U.S. 970 (1976).
[35] *See United States v. Monu*, 782 F.2d 1209, 1210-1211 (4th Cir. 1986) (narcotics "tools of the trade"); *United States v. Brown*, 776 F.2d 397, 401 (2d Cir. 1985) (narcotic operations); *United States v. Ginsberg*, 758 F.2d 823, 830 (2d Cir. 1985) (narcotics operations); *United States v. Hutchings*, 757 F.2d 11, 13 (2d Cir.) (confidence schemes), *cert. denied*, 105 S. Ct. 3511 (1985).
[36] *People v. King*, 266 Cal. App. 2d 437, 457, 72 Cal. Rptr. 478, 491 (1968).
[37] *See French v. State*, 484 S.W.2d 716, 719 (Tex. Crim. App. 1972).
[38] *See State v. James*, 68 Ohio App. 2d 227, 229, 428 N.E.2d 876, 878 (1980) (state trooper qualified as an expert in the operation of intoxilyzer, but did not possess sufficient learning and knowledge about effects of alcohol consumption).
[39] *See* Giannelli, P. and Imwinkelried, E., *Scientific Evidence*, Michie Co., Charlottesville, VA, 1986, p. 266.
[40] *Id.* at 896.
[41] 293 F. 1013 (D.C. 1923). For a discussion of facts of the *Frye* case, *see* Starrs, J., " 'A Still-Life Watercolor': *Frye v. United States*," *Journal of Forensic Sciences*, Vol. 27, No. 3, July 1982, pp. 684-694.
[42] 293 F. at 1014.
[43] *Id.*
[44] *See United States v. Alexander*, 526 F.2d 161, 163 n.3 (8th Cir. 1975) (The "federal courts of appeals continue to subscribe to [the] 'general scientific acceptability' criterion."); *United States v. Skeens*, 494 F.2d 1050, 1053 (D.C. Cir. 1974) (*Frye* "has been followed uniformly in this and

other Circuits and there has never been any successful challenge to it in any federal court."); *Reed v. State*, 283 Md. 374, 382, 391 A.2d 364, 368 (1978) ("This criterion of 'general acceptance' in the scientific community has come to be the standard in almost all of the courts in the country which have considered the question of the admissibility of scientific evidence.").

[45] *See United States v. Distler*, 671 F.2d 954, 961-962 (6th Cir.) (gas chromatograph/FID/FPD), *cert. denied*, 454 U.S. 827 (1981); *United States v. Tranowski*, 659 F.2d 750, 756 (7th Cir. 1981) (astronomical calculations); *United States v. Hendershot*, 614 F.2d 648, 654 (9th Cir. 1980) (shoeprint lifting technique); *United States v. Kilgus*, 571 F.2d 508, 510 (9th Cir. 1978) (Forward Looking Infrared System); *United States v. Brown*, 557 F.2d 541, 559 (6th Cir. 1977) (ion microprobic analysis); *United States v. Bowers*, 534 F.2d 186, 193 (9th Cir.) (tool mark identification), *cert. denied*, 429 U.S. 942 (1976).

[46] *See Ibn-Tamas v. United States*, 407 A.2d 626, 637 (D.C. 1979) (battered wife syndrome), *aff'd*, 455 A.2d 893 (D,C. 1983); *People v. Barbara*, 400 Mich. 352, 404, 255 N.W.2d 171, 193 (1977) (polygraph).

[47] *E.g., United States v. Addison*, 498 F.2d 741, 743 (D.C. Cir. 1974); *People v. Kelly*, 17 Cal. 3d 24, 30-31, 549 P.2d 1240, 1244-1245, 130 Cal. Rptr. 144, 148-149 (1976).

[48] *E.g., United States v. Stifel*, 433 F.2d 431, 441 (6th Cir. 1970), *cert. denied*, 401 U.S. 994 (1971); *State v. Coolidge*, 109 N.H. 403, 421-422, 260 A.2d 547, 560 (1969), *rev'd on other grounds*, 403 U.S. 443 (1971).

[49] *See State v. Smith*, 50 Ohio App. 2d 183, 193, 362 N.E.2d 1239, 1246 (1976) (modified Harrison-Gilroy technique not generally accepted).

[50] *E.g., People v. Slone*, 76 Cal. App. 3d 611, 623, 143 Cal. Rptr. 61, 68 (1978); *State v. Sager*, 600 S.W.2d 541, 573 (Mo. 1980), *cert. denied*, 450 U.S. 910 (1981).

[51] *See United States v. Hearst*, 412 F. Supp. 893, 895 (N.D. Cal. 1976), *aff'd on other grounds*, 563 F.2d 1331 (9th Cir. 1977), *cert. denied*, 435 U.S. 1000 (1978).

[52] *E.g., United States v. Solomon*, 753 F.2d 1522, 1526 (9th Cir. 1985); *Lindsey v. United States*, 237 F.2d 893, 896 (9th Cir. 1956).

[53] *See People v. Palmer*, 80 Cal. App. 3d 239, 252, 145 Cal. Rptr. 466, 472 (1978).

[54] *E.g., Collins v. Superior Court*, 132 Ariz. 180, 195-199, 644 P.2d 1266, 1281-1285 (1982); *People v. Shirley*, 31 Cal. 3d 18, 51-54, 641 P.2d 775, 794-796, 181 Cal. Rptr. 243, 263-265, *cert. denied*, 459 U.S. 860 (1982); *State v. Collins*, 296 Md. 670, 702, 464 A.2d 1028, 1044 (1983).

[55] *E.g., State v. Washington*, 229 Kan. 47, 53-55, 622 P.2d 986, 991-993 (1981) (multi-system blood testing); *People v. Borcsok*, 114 Misc. 2d 810, 812, 452 N.Y.S.2d 814, 815 (1982) (blood typing by enzyme analysis).

[56] *E.g., United States v. Brady*, 595 F.2d 359, 363 (6th Cir.), *cert. denied*, 444 U.S. 862 (1979); *People v. Watkins*, 78 Mich. App. 89, 96, 259 N.W.2d 381, 385 (1977).

[57] *E.g., United States v. Metzger*, 778 F.2d 1195, 1203 (6th Cir. 1985) (thin-layer chromatography of exposive residue); *United States v. Smith*, 776 F.2d 892, 898 (10th Cir. 1985) (intoxilyzer); *United States v. Lewellyn*, 723 F.2d 615, 619 (8th Cir. 1983) (psychiatric testimony); *Hughes v. Mathews*, 576 F.2d 1250, 1258 (7th Cir.) (psychiatric testimony), *cert. denied*, 439 U.S. 801 (1978); *Medley v. United States*, 155 F.2d 857, 860 (D.C. Cir.) (spectroscopic analysis), *cert. denied*, 328 U.S. 873 (1946); *United States v. Traficant*, 566 F. Supp. 1046, 1047 (N.D. Ohio 1983) (psychological stress evaluation); *United States v. Bruno*, 333 F. Supp. 570, 574 (E.D. Pa. 1971) (chromatographic analysis of ink).

[58] 425 Mich. 470, 391 N.W.2d 270 (1986).

[59] *Id.* at 476, 391 N.W.2d at 272. Most courts, however, have admitted this type of evidence, even under the *Frye* test. *See People v. Morris*, 199 Cal. App. 3d 377, 245 Cal. Rptr. 52 (1988); *People v. Reilly*, 196 Cal. App. 3d 1127, 242 Cal. Rptr. 496 (1987). *See generally* Note, "The Admissibility of Electrophoretic Methods of Genetic Marker Bloodstain Typing Under the Frye Standard," *Oklahoma City University Law Review*, Vol. 11, 1986, p. 773.

[60] *United States v. Addison*, 498 F.2d 741, 743-744 (D.C. Cir. 1974). *See also People v. Barbara*, 400 Mich. 352, 405, 255 N.W.2d 171, 194 (1977) ("It therefore is best to adhere to a standard [*Frye*] which in effect permits the experts who know most about a procedure to experiment and to study it. In effect, they form a kind of technical jury, which must first pass on the scientific status of a procedure before the lay jury utilizes it in making its findings of fact.").

[61] *United States v. Addison*, 498 F.2d 741, 744 (D.C. Cir. 1974).

[62] *People v. Kelly*, 17 Cal. 3d 24, 31, 549 P.2d 1240, 1244-1245, 130 Cal. Rptr. 144, 148-149 (1976).

[63] *Reed v. State*, 283 Md. 374, 388, 391 A.2d 364, 371-372 (1978).

[64] *E.g., United States v. Downing*, 753 F.2d 1224, 1236-1238 (3d Cir. 1985) (psychological testimony on eyewitness identifications); *United States v. Williams*, 583 F.2d 1194, 1198 (2d Cir. 1978) (voiceprints), *cert. denied*, 439 U.S. 1117 (1979); *United States v. Baller*, 519 F.2d 463, 466 (4th Cir.) (voiceprints), *cert. denied*, 423 U.S. 1019 (1975); *Whalen v. State*, 434 A.2d 1346, 1354 (Del. 1980) (semen test), *cert. denied*, 455 U.S. 910 (1982); *Harper v. State*, 249 Ga. 519, 524-

525, 292 S.E.2d 389, 395 (1982) (truth serum); *State v. Hall*, 297 N.W.2d 80, 84-85 (Iowa 1980) (blood flight characteristics), *cert. denied*, 450 U.S. 927 (1981); *State v. Catanese*, 368 So. 2d 975, 978-980 (La. 1979) (polygraph), *rev'd on other grounds*, 385 So.2d 235 (La. 1980); *State v. Williams*, 388 A.2d 500, 504 (Me. 1978) (voiceprints); *Barmeyer v. Montana Power Co.*, 202 Mont. 185, 192-194, 657 P.2d 594, 598 (1983) (corrosion analysis); *State v. Dorsey*, 88 N.M. 184, 185, 539 P.2d 204, 205 (1975) (polygraph); *State v. Williams*, 4 Ohio St. 3d 53, 56-58, 446 N.E.2d 444, 446-448 (1983) (voiceprints); *State v. Brown*, 297 Or. 404, 413-418, 687 P.2d 751, 757-759 (1984) (polygraph); *State v. Kersting*, 50 Or. App. 461, 469, 623 P.2d 1095, 1100 (1981) (hair analysis), *aff'd*, 292 Or. 350, 638 P.2d 1145 (1982); *State v. Wheeler*, 496 A.2d 1382, 1387-1389 (R.I. 1985) (voiceprints); *Phillips v. Jackson*, 615 P.2d 1228, 1233-1234 (Utah 1980) (HLA blood test); *State v. Walstad*, 119 Wis. 2d 483, 514-519, 351 N.W.2d 469, 485-487 (1984) (breathalyzer ampoule retesting); *Cullin v. State*, 565 P.2d 445, 456-457 (Wyo. 1977) (polygraph).

[65] McCormick, C., *Evidence*, West Publishing Co., St. Paul, MN, 1954, pp. 363-364.

[66] *See United States v. Ridling*, 350 F. Supp. 90, 94-95 (E.D. Mich. 1972) ("The acceptance of the basic theory [of the polygraph] is a part of the process of making the evidence relevant."); *United States v. DeBetham*, 348 F. Supp. 1377, 1384 (S.D. Cal.) ("This is not to say that the polygraph may escape all requirements of demonstrating its reliability, since that is an integral part of whatever probative value the technique may possess."), *aff'd*, 470 F.2d 1367 (9th Cir. 1972), *cert. denied*, 412 U.S. 907 (1973).

[67] *See* Strong, J., "Questions Affecting the Admissibility of Scientific Evidence," *University of Illinois Law Forum*, 1970, p. 22 ("[I]n the case of scientific evidence the court will generally be forced to accept the probative value of the evidence as what a qualified expert testifies it to be. . . .").

[68] Weinstein, J. and Berger, M., *Weinstein's Evidence*, Vol. 3, Matthew Bender, New York, 1987, pp. 702-719. *See also* McCormick, M., "Scientific Evidence: Defining a New Approach to Admissibility," *Iowa Law Review*, Vol. 67, 1982, pp. 911-912 (listing eleven factors to be considered in determining admissibility).

[69] *People v. King*, 266 Cal. App. 2d 437, 461, 72 Cal. Rptr. 478, 493 (1968).

[70] *See* Wright, C. and Graham, K., *Federal Practice and Procedure*, Vol. 22, West Publishing Co., St. Paul, MN, 1978, pp. 309-310.

[71] *See United States v. Williams*, 583 F.2d 1194, 1200 (2d Cir. 1978), *cert. denied*, 439 U.S. 1117 (1979); *United States v. Baller*, 519 F.2d 463, 467 (4th Cir.), *cert. denied*, 423 U.S. 1019 (1975). *But see State v. Dean*, 103 Wis. 2d 228, 276-278, 307 N.W.2d 628, 652-653 (1981) (questioning effectiveness of instruction on polygraph evidence).

[72] *United States v. Downing*, 753 F.2d 1224, 1241 (3d Cir. 1985).

[73] *United States v. Baller*, 519 F.2d 463, 466 (4th Cir.), *cert. denied*, 423 U.S. 1019 (1975).

[74] *See* Giannelli, P., "The Admissibility of Novel Scientific Evidence: *Frye v. United States*, a Half-Century Later," *Columbia Law Review*, Vol. 80, 1980, pp. 1232-1245.

[75] *See Douglas v. Alabama*, 380 U.S. 415, 418 (1965) ("Our cases construing the [confrontation] clause hold that a primary interest secured by it is the right of cross-examination.").

[76] *United States v. Ridling*, 350 F. Supp. 90, 95-96 (E.D. Mich. 1972).

[77] *United States v. Baller*, 519 F.2d 463, 466 (4th Cir.), *cert. denied*, 423 U.S. 1019 (1975).

[78] *United States v. Wilson*, 361 F. Supp. 510, 513 (D. Md. 1973).

[79] *State v. Dean*, 103 Wis. 2d 228, 274, 307 N.W.2d 628, 650-651 (1981).

[80] *See Strickland v. Washington*, 446 U.S. 668 (1984).

[81] *See* Fed. R. Evid. 803(18) advisory committee note.

[82] Fed. R. 803(18) provides: "To the extent called to the attention of an expert witness upon cross-examination or relied upon by him in direct examination, statements contained in published treatises, periodicals, or pamphlets on a subject of history, medicine, or other science or art, established as a reliable authority by the testimony or admission of the witness or by other expert testimony or by judicial notice. If admitted, the statements may be read into evidence but may not be received as exhibits."

[83] Fed. R. Evid. 803(18) advisory committee note.

[84] *Id.*

[85] *See United States v. An Article of Drug*, 661 F.2d 742, 745 (9th Cir. 1981) ("The district court allowed expert witnesses to read excerpts from treatises into evidence during the course of their testimony, but refused to admit the treatises themselves as exhibits. . . .").

[86] *ABA Standards Relating to Discovery and Procedure Before Trial* 66 (Approved Draft 1970).

[87] Wright, C., *Federal Practice and Procedure*, 2d ed., Vol. 2, West Publishing Co, St. Paul, MN, 1982, pp. 36-37.

[88] *ABA Standards Relating to Discovery and Procedure Before Trial* 67 (Approved Draft 1970).

[89] *E.g.*, Ark. Stat. Ann. 43-2011.2(a)(2) (1977); Idaho Code 19-1309(1)(b) (1979); Ky. R. Crim. P. 7.24(1)(b); Nev. R. Crim. P. 174.235(2) (1979); Wyo. R. Crim. P. 18(a)(2).

[90] *See United States v. Parker*, 491 F.2d 517, 525 (8th Cir. 1973), *cert. denied*, 416 U.S. 989 (1974) (BND lab report).

[91] "Symposium on Science and the Rules of Legal Procedure," 101 F.R.D. 599, 632 (1984) (statement of Professor Anna J. Harrison).
[92] Allis, N., "Limitations on Prosecutorial Discovery of the Defense Case in Federal Courts: The Shield of Confidentiality," *Southern California Law Review*, Vol. 50, 1977, p. 475, n. 51.
[93] *See United States v. Johnson*, 713 F.2d 654, 659 (11th Cir. 1983).
[94] *Williams v. State*, 251 Ga. 749, 312 S.E.2d 40 (1983).
[95] *Id.* at 753, 826, 312 S.E.2d at 51, 99-100.
[96] *E.g.*, Fla. R. Crim. P. 3.220(a)(1); La. Code Crim. Proc. art. 718 (West 1981) ("test scientifically").
[97] *E.g.*, *James v. Commonwealth*, 482 S.W.2d 92, 94 (Ky. 1972); *State v. Gaddis*, 530 S.W.2d 64, 69 (Tenn. 1975).
[98] *E.g.*, *United States v. Gaultney*, 606 F.2d 540, 545 (5th Cir. 1979), *rev'd on other grounds sub. nom.*, *Steagald v. United States*, 451 U.S. 204 (1981); *United States v. Sullivan*, 578 F.2d 121, 124 (5th Cir. 1978) (right of inspection "includes the right to have an expert examine the narcotics before trial.").
[99] *E.g.*, *Bernard v. Henderson*, 514 F.2d 744, 746 (5th Cir. 1975); *Warren v. State*, 292 Ala. 71, 75, 288 So.2d 826, 830 (1973).
[100] *See People v. Anderson*, 88 Mich. App. 513, 516-517, 276 N.W.2d 924, 926 (1979).
[101] *State v. Faraone*, 425 A.2d 523, 526 (R.I. 1981).
[102] *See* Ohio Rev. Code Ann. 2925.51(E) (Baldwin 1982) (drug cases).
[103] *People v. Gomez*, 198 Colo. 105, 112, 596 P.2d 1192, 1197 (1979), *cert. denied*, 455 U.S. 943 (1982).
[104] *E.g.*, Fed. R. Crim. P. 15(a); Colo. R. Crim. P. 15(a).
[105] *E.g.*, Alaska R. Crim. P. 15(a); Ariz. R. Crim. P. 15.3(a)(2); Fla. R. Crim. P. 3.220(d).
[106] Weinstein, J. and Berger, M., *Weinstein's Evidence*, Vol. 3, Matthew Bender, New York, 1987, pp. 706-717.
[107] *Reilly v. Berry*, 250 N.Y. 456, 461, 166 N.E. 165, 167 (1929).
[108] *ABA Standards Relating to Providing Defense Services*, 5-1.4 (2d ed. 1980).
[109] *E.g.*, Iowa Code Ann. § 691.1 (West 1979); Kan. Stat. Ann. § 21-2502 (1981); La. Rev. Stat. Ann. § 40:2261 (West Supp. 1988); Mont. Code Ann. § 44-3-301 (1988); N.D. Cent. Code § 19-01-10 (1981 & Supp. 1983); Ohio Rev. Code Ann. § 307.75 (Baldwin 1987); Tenn. Code Ann. § 38-6-103 (Supp. 1987); Va. Code § 2.1-426 (1987); Wis. Stat. Ann. § 165.75 (West 1974 & Supp. 1987).
[110] Federal Bureau of Investigation, *Handbook of Forensic Science 7*, rev. ed. 1984.
[111] Kalven, H. and Zeisel, H., *The American Jury*, Little, Brown, and Co., Boston, 1966, p. 139.
[112] National Academy of Sciences, *On the Theory and Practice of Voice Identification*, Washington, DC, 1979, p. 49.
[113] Fed. R. Evid. 706.
[114] 18 U.S.C. § 3006(A)(e)(1) (1982).
[115] 18 U.S.C. § 3006(A)(e)(3) (1982).
[116] *E.g.*, *United States v. Reason*, 549 F.2d 309 (4th Cir. 1977); *United States v. Bass*, 477 F.2d 723 (9th Cir. 1973); *United States v. Theriault*, 440 F.2d 713 (5th Cir. 1971), *cert. denied*, 411 U.S. 984 (1973); *United States v. Taylor*, 437 F.2d 371 (4th Cir. 1971).
[117] *E.g.*, *United States v. Penick*, 496 F.2d 1105 (7th Cir.) (request granted in part and denied in part), *cert. denied*, 419 U.S. 897 (1974). *See generally* Annot., 11 A.L.R. 4th 733 (1982).
[118] *E.g.*, *United States v. Purham*, 725 F.2d 450, 454 (8th Cir. 1984) (not error to refuse to appoint psychologist to testify about unreliability of eyewitness identifications); *United States v. Sims*, 617 F.2d 1371 (9th Cir. 1980) (same); *United States v. Fosher*, 590 F.2d 381 (1st Cir. 1979) (same).
[119] *E.g.*, *United States v. Walborn*, 730 F.2d 192, 194 (5th Cir.) (denial of request not error), *cert. denied*, 469 U.S. 842 (1984); *United States v. Patterson*, 724 F.2d 1128, 1131 (5th Cir. 1984) (denial of request error); *United States v. Durant*, 545 F.2d 823, 829 (2d Cir. 1976) (reversal for failure to grant request).
[120] *E.g.*, *United States v. Sailer*, 552 F.2d 213 (8th Cir.), *cert. denied*, 431 U.S. 959 (1977) (no abuse of discretion to deny request under circumstances of case).
[121] *E.g.*, *United States v. Moss*, 544 F.2d 954 (8th Cir. 1976), *cert. denied*, 429 U.S. 1077 (1977) (optometrist); *United States v. Harris*, 542 F.2d 1283 (7th Cir. 1976) (upholding denial of request for clinical psychologist to assist in jury selection and of request for urban sociologist).
[122] *United States v. Schultz*, 431 F.2d 907, 908 (8th Cir. 1970). *Accord United States v. Sailer*, 552 F.2d 213, 215 (8th Cir. 1977), *cert. denied*, 431 U.S. 959 (1977).
[123] *United States v. Patterson*, 724 F.2d 1128, 1130 (5th Cir. 1984).
[124] *United States v. Bass*, 477 F.2d 723, 725 (9th Cir. 1973).
[125] *United States v. Bass*, 477 F.2d 723, 726 (9th Cir. 1973).
[126] *United States v. Durant*, 545 F.2d 823, 827 (2d Cir. 1976).
[127] *E.g.*, Hawaii Rev. Stat. § 802-7 (1985); Iowa Code Ann. § 813.2 R.19(4) (West 1979 & Supp. 1987); Kan. Stat. Ann. § 22-4508 (Supp. 1985); Mass. Gen. Laws Ann. ch. 261, § 27A & 27C(4)

(West Supp. 1987); Minn. Stat. Ann. § 611.21 (West Supp. 1986); N.H. Rev. Stat. Ann. § 604-A:6 (1986); N.Y. County Law § 722-c (McKinney Supp. 1988); N.C. Gen. Stat. § 7A-454 (1986); Ohio Rev. Code Ann. § 2925.51 (Baldwin 1979); Or. Rev. Stat. § 135.055(4) (1983).

[*128*] *E.g.*, Alaska Stat. § 18.85.100 (1986) (see also Alaska R. Crim. P. 39 (reasonable cost of investigation); Alaska Admin. R. 12(g) [expert witness fees]); Utah Code Ann. § 77-32-1(3) (Spec. Supp. 1982).

[*129*] *E.g.*, Ala. Code § 15-12-21(c) (Supp. 1987); Colo. Rev. Stat. § 21-1-105 (1986); Del. Code Ann. tit. 29, § 4605 (1983); Idaho Code § 19-860(b) (1987); S.C. Code Ann. § 17-3-80 (Supp. 1987).

[*130*] *E.g.*, Ariz. Rev. Stat. Ann. § 13-4013(B) (1978); Cal. Penal Code § 987.9 (West Supp. 1988); Ill. Ann. Stat. ch. 38, § 113-3(d) (Smith-Hurd Supp. 1987); Tenn. Code Ann. § 40-14-207(b) (Supp. 1987). *See also* Ohio Rev. Code Ann. § 2925.51 (Baldwin 1979) (controlled substance cases).

[*131*] *E.g.*, Fla. Stat. Ann. § 914.06 (West Supp. 1987); Iowa Code Ann. § 813.2 R.19(4) (West 1979); Kan. Stat. Ann. § 22-4508 (Supp. 1985).

[*132*] *E.g.*, Ill. Ann. Stat. ch. 38, § 113-3(d) (Smith-Hurd Supp. 1987) ($250 maximum in capital cases); Minn. Stat. Ann. § 611.21 (1986) ($300 maximum); Tex. Crim. Proc. Code Ann. art. 26.05 (Vernon Supp. 1988) ($500 maximum).

[*133*] *E.g.*, N.H. Rev. Stat. Ann. § 604-A:6 (1986) ($300 except in extraordinary circumstances); N.Y. County Law § 722-c (McKinney Supp. 1988) ($300 maximum unless extraordinary circumstances).

[*134*] Va. Code § 2.1-433 (1987). *See generally* Note, "Exploring the Limits of *Brady v. Maryland*: Criminal Discovery as a Due Process Right in Access to Police Investigations and State Crime Laboratories," *University of Richmond Law Review*, Vol. 15, 1980, pp. 208-210.

Other statutory provisions that permit the defense to submit evidence for analysis include: Iowa Code Ann. § 691.1 (West 1979 & Supp. 1987); N. Dakota Cent. Code § 19-01-10 (1981 & Supp. 1983); Wis. Stat. Ann. § 165.79 (West 1974 & Supp. 1987).

[*135*] *See generally* LaFave, W. and Israel, J., *Criminal Procedure*, Vol. 2, West Publishing Co., St. Paul, MN, 1984, § 11.2.

[*136*] 470 U.S. 68 (1985).

[*137*] *Id.* at 74.

[*138*] *Id.* at 87 n.13.

[*139*] *Id.* at 78.

[*140*] *Id.* at 78-79.

[*141*] *Id.* at 82.

[*142*] Chief Justice Burger in his concurring opinion, however, emphasized the fact that *Ake* involved a capital case: "The facts of the case and the question presented confine the actual holding of the Court. In capital cases the finality of the sentence imposed warrants protections that may or may not be required in other cases." *Id.* at 87. Dissenting, Justice Rehniquist acknowledged, however, that the majority opinion was not limited to capital cases. He disagreed with the majority's analysis but in any event, "would limit the rule to capital cases. . . ."

[*143*] *Id.* at 86.

[*144*] *Id.* at 83.

[*145*] *Id.*

[*146*] 105 S.Ct. 2633 (1985).

[*147*] *Id.* at 2637 n.1.

[*148*] *Volson v. Blackburn*, 794 F.2d 173, 176 (5th Cir. 1986).

[*149*] *United States v. Sloan*, 776 F.2d 926, 929 (1985).

[*150*] *Moore v. Kemp*, 809 F.2d 702, 712 (11th Cir. 1987) (en banc).

[*151*] *See generally* Note, "Expert Services and the Indigent Criminal Defendant: The Constitutional Mandate of *Ake v. Oklahoma*." *Michigan Law Review*, Vol. 84, 1986, pp. 1326-1362; Note, "The Right to a Partisan Psychiatric Expert: Might Indigency Preclude Insanity?," *New York University Law Review*, Vol. 61, 1986, pp. 703-737.

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