General Acceptance Versus Scientific Soundness: Mad Scientists in the Courtroom

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GENERAL ACCEPTANCE VERSUS SCIENTIFIC SOUNDNESS:
MAD SCIENTISTS IN THE COURTROOM

David W. Barnes
I. INTRODUCTION

Dramatic changes in rules governing admissibility of expert testimony impact all areas of law. Rule 702 of the Federal Rules of Evidence and the evidence law of many states impose a requirement that judges admit expert testimony only if it is based on a scientifically sound foundation. Just in the past year, an explosion of literature addressed to scholars and the practicing bar has explored the impact of new evidence standards on such diverse areas as the law of toxic torts,1 antitrust,2 state and federal criminal law,3 trademark and advertising law,4 hostile work environment cases,5 accident re-

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construction in torts, and bankruptcy law. States have been considering whether their evidence codes should be consistent with the approach articulated by the United States Supreme Court, which concluded that admissible scientific testimony must be grounded in the scientific method and based on more than subjective belief and unsupported speculation.

Among the state courts considering this issue, Florida’s Supreme Court has taken a particularly provocative approach. The Florida Supreme Court stoutly resists adoption of the Federal Rules governing admissibility of expert testimony, preferring the “higher standard of reliability” set forth under the Frye test. The Florida Supreme Court’s foray into the field of scientific and technical expertise in its three opinions in Ramirez v. State dealt with testimony based on a novel approach to matching the marks left by a knife on the murder victim’s chest cartilage with a knife found in the defendant’s

9. Id. at 590.
11. Ramirez v. State (Ramirez III), 810 So. 2d 836, 843 (Fla. 2001) (“[T]his Court has continued to use the Frye test when evaluating novel scientific evidence proposed by the State even though the United States Supreme Court, in a civil case, has adopted a different rule.”); Brim v. State, 695 So. 2d 268, 271-72 (Fla. 1997) (“Despite the federal adoption of a more lenient standard in Daubert, we have maintained the higher standard of reliability as dictated by Frye.”). Whether the standard articulated in Daubert, 509 U.S. 579 (1993), is more lenient, is subject to question. See discussion infra Part IV.B.
12. In Frye v. United States, 293 F. 1013, 1014 (D.C. Cir. 1923), the Court of Appeals for the District of Columbia articulated the “general acceptance test,” saying that the expert evidence “from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.”
13. Ramirez III, 810 So. 2d at 836; Ramirez v. State (Ramirez II), 651 So. 2d 1164 (Fla. 1995); Ramirez v. State (Ramirez I), 542 So. 2d 352 (Fla. 1989).
girlfriend’s car. The expert testified with “absolute certainty” that the found knife was the murder weapon. Rejecting the testimony’s evidentiary foundation for the third time, the Florida Supreme Court simultaneously rejected the federal rule and elaborated an approach remarkably similar to that rule, requiring judges to evaluate the scientific basis for novel expert testimony.

Ramirez III leaves Florida judges and advocates with two puzzles. First, to what expert testimony does Ramirez III apply? The case dealt with a novel forensic identification technique and the holding might be limited to that context. Florida’s judges might think they only have to worry about their own training in science only if a lawyer offers into evidence a new scientific principle or technical methodology.

This Article argues that the Florida Supreme Court’s reasoning inexorably requires application of the Ramirez III approach to conventional scientific evidence as well, scientific evidence of a type that has already been received in a substantial number of cases. That suggests that Florida judges and practitioners in state courts face the same travails as those in federal courts who are struggling to determine whether expert testimony based on such traditionally admissible techniques as fingerprint identification is admissible. Logic and precedent dictate that the principles of scientific soundness eventually will be extended to all expert evidence, whether novel or not.

Second, in cases where the approach of Ramirez III is applicable, how is the Florida test different from the Federal Rules approach rejected by the Florida Supreme Court? The United States Supreme Court’s competing “scientific soundness” approach was initially presented in the context of scientific expertise in Daubert v. Merrell Dow Pharmaceuticals, Inc. and was applied to technical expertise in Kumho Tire Co. v. Carmichael. It is now reflected in Rule 702 of the

14. Ramirez III, 810 So. 2d at 840-41.
15. Id. at 849.
16. In United States v. Plaza, 179 F. Supp. 2d 464 (E.D. Pa. 2001), the government moved to admit latent print evidence. District Court Judge Pollak held that the Federal Bureau of Investigation fingerprint expert could not give opinion testimony that a latent fingerprint was that of a particular person, because the fingerprint identification evidence was not sufficiently reliable to meet the standards for expert testimony set by Rule 702 of the Federal Rules of Evidence, as explicated by the Supreme Court in Daubert, 509 U.S. at 579, and reaffirmed in Kumho Tire Co. v. Carmichael, 526 U.S. 137 (1999). Then, on petition for reconsideration, the District Court in United States v. Plaza, 188 F. Supp. 2d 549, 576 (E.D. Pa. 2002), vacated its prior opinion and held that expert could give expert opinion consistent with the Daubert decision and federal procedural rules.
17. The Florida Supreme Court, in Ramirez III, 810 So. 2d at 843 n.8, adopted this characterization of the approach followed by the Federal Rules of Evidence.
18. 509 U.S. at 579.
19. 526 U.S. at 137.
Federal Rules of Evidence. Does the Florida Supreme Court’s articulation of the test for admissibility of novel scientific testimony differ significantly from that of the United States Supreme Court? This Article describes the scientific principles underlying the Federal Rules and shows that the Florida Supreme Court has adhered closely to the Daubert approach.

The lack of clarity about the scope of Ramirez III has misled Florida courts. For instance, in Jackson v. State, decided a year after Ramirez III, the appellate court affirmed a district court’s finding that expert testimony relying on psychological tests to determine the likelihood a violent predator would re-offend was admissible. The institutionalized appellant argued that the expertise had not been subject to the test for admissibility of novel scientific evidence. The appellate court did not address whether the proffered expertise was novel, even though that was the basis of the appellant’s argument. The court must have believed, however, that the testimony was scientific because it held that the testimony was admissible based on its general acceptance in the “relevant scientific community.” The court referred to no other Florida case accepting such evidence. Its holding was based on a citation to a Washington State appellate court decision. In Washington State, however, the Frye rule, rather than the Daubert criteria, is used to evaluate novel scientific evidence. Either the Jackson court did not recognize Florida’s distinction between novel and conventional evidence or it did not know that Ramirez III applied to novel evidence or it did not recognize that Ramirez III had created a new standard for novel scientific expertise. These distinctions and rules are the subject of this Article.

21. Ramirez III was decided on December 20, 2001. Jackson was decided on December 26, 2002.
23. Id.
24. See id.
25. Id. (emphasis added).
26. Id. (citing State v. Strauss (In re Strauss), 20 P.3d 1022 (Wash. Ct. App. 2001) (upholding admissibility of testing instruments such as those under consideration in Jackson)).
27. Strauss, 20 P.3d at 1025 (“Contrary to Strauss’s assertion, it is clear that the Frye test applies to civil commitment proceedings, not the test enunciated in [Daubert].”) (citation omitted); see also Reese v. Stroh, 907 P.2d 282 (Wash. 1995) (reaffirming adherence to the Frye test when determining the admissibility of novel scientific evidence in Washington courts).
28. Florida courts are not alone in failing to apply what this Article shows to be the current requirements for admissibility of novel scientific evidence. The leading treatise on scientific evidence, 1 DAVID L. FAIGMAN ET AL., MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY § 9-1.5, at 420 (2d ed. 2002), states that “no court has evaluated the admissibility of expert testimony regarding future violence under the Court’s Daubert decision.” While some states modify evidentiary standards in some procedural contexts where predictions of violence are relevant, see id. § 9-1.2, at 411, the Florida ap
Other post-Ramirez courts in Florida have continued to distinguish between fact-based evidence and opinion-based evidence without reference to the requirements of Ramirez III. The court in Rickgauer v. Sarkar relied on the Florida rule that most opinion testimony is not subject to any interpretation of the Frye rule, whether a pre- or post-Ramirez III interpretation:

Most expert testimony is not subject to the Frye test. Pure opinion testimony does not have to meet the Frye test because it is based on the expert’s personal opinion. We believe that Dr. Sharp’s testimony was pure opinion testimony and did not have to meet the Frye test.29

In Rickgauer, the expert testified that, based on his own experience, the defendant physician’s evaluation of the patient was inadequate and that the treatment was faulty.30 Because the testimony was opinion, not fact, different rules applied.31 In Ramirez III, the Florida Supreme Court’s basis for rejecting the expert testimony was that the expert’s “determination is entirely subjective and is based on the technician’s training and experience.”32 The Rickgauer court did not recognize any similarity or any important distinction between medical opinion, based on a background of medical school training and practice, and the “subjective [evidence] based on training and experience,”33 rejected in Ramirez III. The lack of clarity in the law may have led the Rickgauer court to conclude that medical opinion is either not subjective, in which case it is factual rather than opinion testimony34 and subject to the Frye test, or the court in Rickgauer failed to appreciate the scope of Ramirez III.

Six months after the Rickgauer opinion, the Florida Supreme Court, in United States Sugar Corp. v. Henson,35 addressed the question of whether the Frye test, as interpreted by Ramirez III, applied to new and novel medical opinion testimony, though in the limited context of workers’ compensation cases where there is a statutorily

pellate court in Jackson did not suggest that it was applying any special rules. See Jackson, 833 So. 2d at 246.
29. 804 So. 2d 502, 504 (Fla. 5th DCA 2001) (citations omitted).
30. Id. at 505.
31. The court in Rickgauer, 804 So. 2d at 505 n.4, recognized the Florida distinction between fact and opinion evidence:
A distinction exists between factual evidence or testimony and opinion testimony and as a general rule, factual evidence cannot be rejected unless it is contrary to law, improbable, untrustworthy, unreasonable or contradictory. Walls v. State, 641 So.2d 381, 390 (Fla. 1994); Brannen v. State, 94 Fla. 656, 114 So. 429 (1927). Opinion testimony is not subject to the same rule. Walls; Brannen.
32. Ramirez III, 810 So. 2d 836, 847 (Fla. 2001).
33. Rickgauer, 804 So. 2d at 505 n.4.
34. See id.
35. 823 So. 2d 104 (Fla. 2002).
reduced burden of proof on the plaintiff. The court, in Henson, extended the Ramirez III approach to such opinion testimony, describing the test as focused “on the general acceptance of the scientific principles and methodologies upon which an expert relies in rendering his or her opinion.” The court reiterated the need for courts to “examine expert testimony, scientific and legal writings, and judicial opinions in making its determination,” and commended the district court for its comprehensive and exhaustive inquiry into the methodology and scientific principles underlying the testimony.

Unanswered is the policy question of why new and novel medical opinion testimony should be subjected to the more rigorous Ramirez III standard, while testimony based on conventional medical opinion, which has never been scrutinized in detail, should not be reconsidered. This question is implicit in a larger issue discussed in this Article, whether conventional as well as novel expert testimony should be subject to the Ramirez III test.

On some occasions where Florida courts have recognized the need for an expanded hearing to test the reliability of new or novel scientific testimony, the standards of Ramirez III have been confused with the earlier Ramirez opinions. Arnold v. State, though decided only shortly after Ramirez III, remanded for a hearing on the admissibility of DNA evidence, which it described as “new and novel” based on

36. Id. at 107.
37. Id. at 110.
38. Id. at 109 (quoting Hadden v. State, 690 So. 2d 573, 579 (Fla. 1997)).
39. Id. Florida appellate courts have recognized the application of Ramirez III to novel medical testimony. See State v. Sercey, 825 So. 2d 959, 980 (Fla. 1st DCA 2002) (stating this conclusion as a general rule and applying the expanded Frye test). The court in Sercey conducted what it described as an “extensive research of the scientific principles” underlying the basis for the experts’ new and novel testimony on the effects of marijuana. Id. at 984.
40. Also unanswered is the question of why pure opinion testimony, which apparently has no foundation at all, is admitted without any scrutiny, whether conventional or novel. The Florida Supreme Court, in Flanagan v. State, offered this explanation:

[Pure opinion testimony, such as an expert’s opinion that a defendant is incompetent, does not have to meet Frye, because this type of testimony is based on the expert’s personal experience and training. While cloaked with the credibility of the expert, this testimony is analyzed by the jury as it analyzes any other personal opinion or factual testimony by a witness. [Sex offender profile] testimony, on the other hand, by its nature necessarily relies on some scientific principle or test, which implies an infallibility not found in pure opinion testimony. The jury will naturally assume that the scientific principles underlying the expert’s conclusion are valid. Accordingly, this type of testimony must meet the Frye test, designed to ensure that the jury will not be misled by experimental scientific methods, which may ultimately prove to be unsound.

625 So. 2d 827, 828 (Fla. 1993) (citations omitted). Whether this is a sensible distinction is beyond the scope of this Article.
41. 807 So. 2d 136 (Fla. 4th DCA 2002) (decided Jan. 30, 2002).
42. Id. at 140.
the different standards established by Ramirez II, an earlier opinion in the same case. Those standards seem to apply a more traditional Frye-based general acceptance test. It is critical that Florida courts and lawyers recognize the distinction between the traditional Frye and Ramirez III tests.

Part II of this Article focuses on the distinction between the Frye and Daubert tests. The history of the development of both the Frye and Daubert tests has been well-examined elsewhere. Part II also presents a brief outline of the Daubert test (Daubert identified four (nonexclusive) factors to be considered when evaluating the soundness of expert scientific evidence) and compares it to the language of Frye, which was followed in Ramirez II. Part III of this Article describes in detail the role of those factors in the scientific method, providing guidance to both judges and lawyers on how to evaluate the admissibility of novel scientific evidence in jurisdictions that acknowledge following the approach of the Federal Rules of Evidence. Part III also traces the parallels between the Daubert factors and the Florida Supreme Court’s analysis of the evidence in Ramirez III. It concludes that despite the Florida Supreme Court’s denial that it follows Daubert, all Daubert factors are relevant to admissibility in Florida courts and Ramirez III identifies no other relevant factors.

Part IV considers whether conventional expert testimony should logically be subject to the same standards as novel expert evidence. The United States Supreme Court made it clear in Daubert that the

43. 651 So. 2d 1164 (Fla. 1995). In Ramirez II, the court followed a more traditional statement of the applicable test:

In utilizing the Frye test, the burden is on the proponent of the evidence to prove the general acceptance of both the underlying scientific principle and the testing procedures used to apply that principle to the facts of the case at hand. The trial judge has the sole responsibility to determine this question. The general acceptance under the Frye test must be established by a preponderance of the evidence.

Id. at 1168.

44. The court in Arnold, 807 So. 2d at 140, stated:

The supreme court has set forth a step-by-step analysis that a trial court must make before admitting into evidence the testimony of an expert witness concerning a new scientific principle. Ramirez II, 651 So. 2d at 1166. A trial court must determine whether: (1) expert testimony will assist the jury in understanding the evidence or in determining a fact in issue; (2) the expert’s testimony is based on a scientific principle or discovery that is “sufficiently established to have gained general acceptance in the particular field in which it belongs” under the Frye test; and (3) the particular expert witness is qualified to render an opinion on the subject in issue. Id. If the trial court’s answer to the first three questions is in the affirmative, then the expert may testify at trial and the jury can assess the expert’s credibility and either accept or reject his or her opinion. Id.

To compare the Ramirez III standards, see discussion infra Parts II, III.

45. A most authoritative and exhaustive discussion of these rules appears in 1 FAIGMAN ET AL., supra note 28, § 1, at 1-68.
principle of scientific soundness applies to new as well as conventional expertise. In Ramirez III, the Florida Supreme Court limited its holding, as Frye is interpreted as having done, to novel expert evidence. Its limitation is based on the conclusion that novel expertise is “inherently unreliable.” Part IV also considers Florida law related to admissibility of expert evidence generally, then analyzes whether Daubert really is more lenient and whether Frye is a “higher standard of reliability” as the Florida Supreme Court claimed in Ramirez III. It identifies cases where courts continue to accept scientific expertise of dubious reliability and the status of Florida rules governing challenges to that testimony. Finally, it concludes that when the reliability of conventional expertise is challenged, the Ramirez III standards should apply.

II. Frye Versus Daubert

To facilitate a comparison of Florida and federal evidence law on the admissibility of expert testimony, this Part of the Article briefly compares the analytical standards set forth in Ramirez III and Daubert. Florida evidence law requires that expert testimony of a scientific or technical nature, or based on specialized knowledge, be reliable. For novel scientific evidence, at least, Florida courts after Ramirez III have followed a “Frye-Plus” test for reliability, which requires exclusion of the evidence “unless the theory has been adequately tested and accepted by the relevant scientific community.” The requirement that the theory be “accepted” is derived from Frye v.

46. Daubert v. Merrell Dow Pharms., Inc., 509 U.S. 579, 592 n.11 (1993) (“Although the Frye decision itself focused exclusively on ‘novel’ scientific techniques, we do not read the requirements of Rule 702 to apply specially or exclusively to unconventional evidence. Of course, well-established propositions are less likely to be challenged than those that are novel, and they are more handily defended.”).
47. Id.
48. Ramirez III, 810 So. 2d 836, 843 (Fla. 2001).
49. See supra note 11.
If scientific, technical, or other specialized knowledge will assist the trier of fact in understanding the evidence or in determining a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education may testify about it in the form of an opinion; however, the opinion is admissible only if it can be applied to evidence at trial.
51. See Ramirez III, 810 So. 2d at 842-43 (quoting FLA. STAT. § 90.403 (2000)).
United States,52 wherein the Federal Court of Appeals for the District of Columbia held that the principles “must be sufficiently established to have gained general acceptance in the particular field in which it belongs.”53 The Plus part of the Florida’s Frye-Plus test requires, at least, that a novel theory has been adequately54 or sufficiently55 tested.

To meet the Frye-Plus standard, a trial court “must consider the quality, as well as quantity, of the evidence supporting or opposing a new scientific technique.”56 Asking experts in the particular field whether their own principles are sound is not enough. A “nose count” of the experts is not sufficient57 and “counting a majority of the members of the relevant scientific community is not controlling.”58 Even general acceptance by members of some discipline is not enough where the discipline itself lacks reliability.59 Judges must be familiar enough with the adequacy and sufficiency of scientific testing to decide what evidence of novel theories or techniques to admit under Florida’s Frye-Plus test.

The competing “scientific soundness” test from Daubert instructs trial judges to be gatekeepers, excluding unreliable testimony by considering the following four factors (perhaps among others), at least where they reasonably shed light on the reliability of the proffered evidence:

—Whether a “theory or technique . . . can be (and has been) tested”;
—Whether it “has been subjected to peer review and publication”;
—Whether, in respect to a particular technique, there is a high “known or potential rate of error” and whether there are “standards controlling the technique’s operation”; and

52. 293 F. 1013 (D.C. Cir. 1923).
53. Id. at 1014.
54. Ramirez III, 810 So. 2d at 843.
55. Id. at 843 n.7 (“This standard requires a determination, by the judge, that the basic underlying principles of scientific evidence have been sufficiently tested and accepted by the relevant scientific community.”) (quoting Brim v. State, 695 So. 2d 268, 272 (Fla. 1997)).
56. Id. at 844 n.12 (“Of course, the trial courts, in determining the general acceptance issue, must consider the quality, as well as quantity, of the evidence supporting or opposing a new scientific technique.”) (quoting Brim, 695 So. 2d at 272 (quoting People v. Leahy, 882 P.2d 321, 336-37 (Cal. 1994))).
57. Id. at n.9 (“A ‘nose count’ is not alone sufficient to establish general acceptance in the scientific community.”) (quoting Brim, 695 So. 2d at 272).
58. Id. (“Merely counting a majority of the members of the relevant scientific community is not controlling.”) (quoting CHARLES W. EHRHARDT, FLORIDA EVIDENCE § 702.3 (perm. ed., rev. vol. 2000)).
59. Id. (“Nor, on the other hand, does the presence of [general acceptance] help show that an expert’s testimony is reliable where the discipline itself lacks reliability, as, for example, do theories grounded in any so-called generally accepted principles of astrology or necromancy.”) (quoting Kumho Tire Co. v. Carmichael, 526 U.S. 137, 151 (1999)).
—Whether the theory or technique enjoys “general acceptance” within a “relevant scientific community.”  

The United States Supreme Court has recognized that evidence necessary to establish reliability varies from one theory or technique to another: Daubert’s list of specific factors neither necessarily nor exclusively applies to all experts or in every case. Thus, the reliability inquiry is designed to be a flexible one. Focusing on the four Daubert factors, however, facilitates a comparison to the Frye-Plus approach articulated in Ramirez III.


61. Id. at 142. Kumho Tire emphasized that different factors are more or less relevant in different cases:

Engineering testimony rests upon scientific foundations, the reliability of which will be at issue in some cases. See, e.g., Brief for Stephen N. Bobo et al. as Amici Curiae 23 (stressing the scientific bases of engineering disciplines). In other cases, the relevant reliability concerns may focus upon personal knowledge or experience. As the Solicitor General points out, there are many different kinds of experts, and many different kinds of expertise. See Brief for United States as Amicus Curiae 18-19, and n. 5 (citing cases involving experts in drug terms, handwriting analysis, criminal modus operandi, land valuation, agricultural practices, railroad procedures, attorney’s fee valuation, and others). Our emphasis on the word “may” thus reflects Daubert’s description of the Rule 702 inquiry as “a flexible one.” 509 U.S., at 2786. Daubert makes clear that the factors it mentions do not constitute a “definitive checklist or test.” Id., at 2786. And Daubert adds that the gatekeeping inquiry must be “tied to the facts” of a particular “case.” Id., at 591, 113 S.Ct. 2786 (quoting United States v. Downing, 753 F.2d 1224, 1242 (C.A.3 1985)). We agree with the Solicitor General that “[t]he factors identified in Daubert may or may not be pertinent in assessing reliability, depending on the nature of the issue, the expert’s particular expertise, and the subject of his testimony.” Brief for United States as Amicus Curiae 19. The conclusion, in our view, is that we can neither rule out, nor rule in, for all cases and for all time the applicability of the factors mentioned in Daubert, nor can we now do so for subsets of cases categorized by category of expert or by kind of evidence. Too much depends upon the particular circumstances of the particular case at issue.

Daubert itself is not to the contrary. It made clear that its list of factors was meant to be helpful, not definitive. Indeed, those factors do not necessarily apply even in every instance in which the reliability of scientific testimony is challenged. It might not be surprising in a particular case, for example, that a claim made by a scientific witness has never been the subject of peer review, for the particular application at issue may never previously have interested any scientist. Nor, on the other hand, does the presence of Daubert’s general acceptance factor help show that an expert’s testimony is reliable where the discipline itself lacks reliability, as, for example, do theories grounded in any so-called generally accepted principles of astrology or necromancy.

Id. at 150-51.

62. See Daubert, 509 U.S. at 594; Gen. Elec. Co. v. Joiner, 522 U.S. 136, 143 (1997); Kumho Tire, 526 U.S. at 141 (“[A]s the Court stated in Daubert, the test of reliability is ‘flexible,’ and Daubert’s list of specific factors neither necessarily nor exclusively applies to all experts or in every case.”).
III. Scientific Method, the Daubert Factors, and the Ramirez III Approach

A detailed examination of the Florida Supreme Court’s application of its standards for the admissibility of novel expert testimony in this Part reveals a striking similarity between the Florida and the federal approaches. This Part considers the four Daubert factors and how the Florida Supreme Court’s analysis fits within that framework. It demonstrates that the analytical structures of the two approaches are identical.

A. Testability and Tested

The United States Supreme Court described “testability” as “a key question to be answered in determining whether a theory or technique is scientific knowledge that will assist the trier of fact.”\(^{63}\) Testability is also described as “falsifiability” or “refutability.”\(^{64}\) Testability refers to “potential reliability,” whether the theory or technique is susceptible to scientific testing of its reliability.\(^{65}\) By any of these descriptions, mere assertions that a technique is reliable are unacceptable as a foundation for the admission of expert evidence. By testing, the actual reliability of a theory or technique may be evaluated.

A typical scientific approach to knowledge assumes that there is no relationship between two phenomena (such as taking a drug and recovering from an illness) and no validity to a technique (such as examining a knife wound and identifying the knife that made the wound) until the relationship or validity is established using the scientific method. Testing a theoretical relationship or technique is essential to the scientific method. Some theories, however, are inherently or practically untestable.

Professor David Faigman offers an example of an untestable proposition from criminology.\(^{66}\) He considers the proposition that “punishments imposed by the criminal law reflect society’s ‘conscious and unconscious urges.’”\(^{67}\) Every example of criminal punishment fits this theory. If punishments are severe, it must be because society consciously or subconsciously wants severe punishments. Even if everyone denies wanting severe punishment, it must be that subconsciously they really do, but do not understand their subconscious. If

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63. Daubert, 509 U.S. at 593.
64. See id. (quoting Karl Popper, CONJECTURES AND REFUTATIONS: THE GROWTH OF SCIENTIFIC KNOWLEDGE 37 (5th ed., Routledge 1989) (1962) (“[T]he criterion of the scientific status of a theory is its falsifiability, or refutability, or testability.”) (emphasis omitted)).
65. See id.
67. Id. (quoting Charles Schoenfeld, Psychoanalysis and the Law 19 (1973)).
society adopts more lenient punishments, the theory is neither contradicted nor supported. The conscious urges may have changed or the subconscious urges, heretofore repressed, might be taking charge. A falsifiable theory is one that can be proved logically wrong by at least one statement. There is no way to prove this theory false. If untestable, this assertion cannot be considered even potentially reliable from a scientific perspective. If a theory is incapable of scientific support, testimony based on the theory is inadmissible.

What about the knife identification methodology considered in Ramirez III? Is it testable? Has it been tested? Does the Florida Frye-Plus rule care? The Florida Supreme Court’s description of the technology in Ramirez III made the methodology seem like a black box into which one cannot peer and from which startling results emerge. According to the expert, there is a match between the tested knife and the murder weapon if the marks left by the two knives are “sufficiently similar.” According to the Florida Supreme Court:

This determination is entirely subjective and is based on the technician’s training and experience; there is no minimum number of matching striations or percentage of agreement or other objective criteria that are used in this method. No photographs are made of the casts, [the expert explained,] because lay persons and those not trained in this procedure would be unable to understand the comparison process; similarly, no notes are made describing the basis for identification. Once a match is declared under his theory, no other knives are examined because an identification under this method purportedly eliminates all other knives in the world as possible sources of the wound.

68. Even these black box techniques can be tested for reliability. Such testing is common when establishing the health effects of exposure to drugs or toxic substances. The testing does not necessarily involve determining how the drug or toxin works, but rather considers whether it produces the hypothesized benefit or harm.

Such testing has other legal applications. In employment discrimination law, the question may be whether an employer’s work force is discriminatorily composed. The plaintiff need not establish how the workforce ended up with an under-representation of one ethnic group, only that it ended up that way. If proper scientific testing revealed that a vaccine prevented polio frequently enough, the beginnings of a proper foundation would have been laid for its use. If proper testing revealed that fingerprint experts, handwriting experts, hair and fiber experts, or knife identification experts produced correct results frequently enough, the secrets of their methodology would be less significant than the results.

I do not mean to suggest that there need be no theory explaining the mechanism of a drug or no objective criteria underlying conclusions regarding knife identification. General acceptance of a theory or technique, a separate factor to consider, may require that the black box be opened, or at least that its contents be described. Proper testing of the reliability of a technique may, though need not, require knowledge of the contents. The efficacy of polio vaccine can, for instance, be tested without knowing exactly how the body works.

69. Ramirez III, 810 So. 2d 836, 846 (Fla. 2001).
70. Id. at 847.
Does this discussion by the Florida Supreme Court reflect a concern with testability and whether a technique has been tested? The court concluded that “a team of expert technicians trained by [the testifying expert] would be virtually impossible to challenge notwithstanding the fact that his procedure is untested.” The technique is neither testable as described by the expert, nor has it been tested. According to the court, the fact that the methodology has never been formally tested is the first reason why the method failed the Frye test.

From a scientific perspective, testability and testing are essential elements of the scientific method. Testing separates knowledge from speculation. Modern Scientific Evidence: The Law and Science of Expert Testimony is the leading treatise on scientific evidence. With respect to the testing factor, the authors conclude:

In fact, courts will find application of Daubert difficult if they treat testability as an optional factor. The other three factors all presuppose testability; in science, a non-testable hypothesis cannot have an error rate and is exceedingly unlikely to be published in a peer-reviewed journal and achieve general acceptance. And indeed, since Daubert, courts generally appear to treat testability as a prerequisite rather than just another factor.

The Florida Supreme Court’s interpretation of the Frye rule appears to be in agreement with this proposition in that it ranks testing as the first of its concerns with respect to the lack of reliability of novel evidence.

**B. Peer Review and Publication**

The United States Supreme Court has described peer review as a “relevant” factor and publication as “an element” of peer review. Scientific publications require review by the peers of people submitting articles. Survival of the submission and review process is an indication that a theory or technique has been objectively evaluated by persons familiar with the scientific method. Such scrutiny “increases the likelihood that substantive flaws in methodology will be detected.”

Unlike testability and scientific testing, peer review and publication are not essential elements. Flaws in the peer review system

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71. Id.
72. Id. at 849.
73. 1 FAIGMAN ET AL., supra note 28.
74. Id. § 1-3.4.1, at 28-29.
75. See Ramirez III, 810 So. 2d at 849.
77. Id.
78. See id. (stating that peer review is “relevant” and is a “pertinent consideration”).
and varying standards among scientific journals mean that publication does not necessarily correlate with reliability. And, as the United States Supreme Court observed, well-grounded but innovative theories might not have been published, especially if the underlying theories are "too particular, too new, or of too limited interest to be published." Publication is, therefore, a relevant but not dispositive factor under *Daubert*.

Under the *Frye*-Plus test articulated by the Florida Supreme Court in *Ramirez III*, the second reason why the knife identification testimony was inadmissible was because "the record does not show that [the expert's] test has ever been subjected to meaningful peer review or publication as a prerequisite to scientific acceptance." The court examined two groups of publications, North American publications and European publications. The North American publications did not undertake "the kind of searching, critical review that is the *sine qua non* of scientific acceptance." The European articles addressed only conventional knife-mark theory, rather than this expert's approach, and none supported the expert's claim that knife-mark identification techniques could identify a knife with absolute certainty.

*Ramirez III* creates a precedent for courts in Florida to do more than simply consider whether others have published articles supporting the theory. The Florida Supreme Court evaluated the quality of the published support and rejected the North American studies because they were insufficiently critical, detailed, or scientific.

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79. *Id.*
80. *Id.*
82. *Id.* at 850 n.39 (explaining that "the North American articles [were] brief," containing "only a page or two of text," were "uncritical," and were "limited to a single anecdotal study").
83. *Id.* at 850-51.
84. The court in *Ramirez III*, 810 So. 2d at 849-50 n.35 cited several studies:
   
   *See* J.I. Galan, *Identification of a Knife Wound in Bone*, 18 Ass'n Firearm & Toolmark Examiners J. (Oct.1986) (finding a positive match between the suspected knife, i.e., a KA-BAR kitchen knife with a well-worn fourteen-inch blade, and a wound in the victim's rib bone based on gross and fine striae; with photos); Valerie Rao and Robert Hart, *Tool Mark Determination in Cartilage of Stabbing Victim*, 28 J. Forensic Sci. 794, 798 (1983) (finding a match "within reasonable scientific certainty" between the suspected knife, i.e., a marine survival knife with a cross guard, a serrated blunt edge, a sharp edge, and visible defects on the blade, and a wound in the victim's cartilage based on fine and coarse striae arising from class and individual characteristics and supported by two "cross guard" abrasions in the skin surrounding the wound; with photos); Y.J. Tuira, *Tire Stabbing with Consecutively Manufactured Knives*, 14 Ass'n of Firearm & Toolmark Examiners J. (Jan.1982) (concluding that two consecutively manufactured Buck knives left different microscopic marks when used to stab an automobile tire; with photos); Donald J. Watson, *The Identification of Tool Marks Produced from Consecutively Manufactured Knife Blades in Soft
court also evaluated the relevance of the published support and rejected the European studies because they did not relate to the technique being proposed and did not support the expert’s conclusions. Any Florida judge or lawyer believing he or she can avoid understanding the scientific method must be made uncomfortable by the court’s articulation of a judicial obligation to test the quality of peer review under the Frye-Plus test.

C. Error Rate

The scientific method consists of forming and testing hypotheses. In science, a null hypothesis is a statement of the underlying assumption that there is no relationship between the phenomena or no validity to a technique. Even if a technique appears to produce predictable outcomes (such as a cured disease or a correct knife identification), the appearance may be misleading. Your astrologer may find the stars aligned perfectly for you to make a serious commitment to technology stocks today and your investment may pay off, but the scientific method assumes that there is no connection between your controlling stars’ alignment and investment success until other plausible explanations are eliminated.

In the astrology example, the most obvious alternative explanation to the assertion that humans can predict financial consequences by examining the alignment of stars is that chance explains astrologers’ successes. (Another explanation may be that recipients of the predictions only remember the correct advice and forget the predictions that do not come true.) A well-structured scientific experiment might be designed to test whether the astrologer’s technique produced reliable predictions. If the astrologer made too many errors, chance, rather than star-reading ability, may be the explanation for the occasional success.

Plastics, 10 Ass’n Firearm & Toolmark Examiners J. (Sept.1978) (concluding that two consecutively manufactured Buck knives left different microscopic marks when used to cut soft plastic; with photos).

85. The court in Ramirez III, 810 So. 2d 850 n.36, also cited several German studies: See Wolfgang Bonte, Tool Marks in Bones and Cartilage, 20 J. Forensic Sci. 315 (1975) (concluding that class and individual characteristics of specially ground knives can be determined from wounds in cartilage; with photos); Kyrill Bosch, On Stabbing and Cutting Wounds from Knives with Serrated Blades, 54 German J. Forensic Med. (1973) (translation in present record) (conducting stab wounds in various mediums with various knives and concluding that several characteristics of the knife can be deduced from the nature of the corresponding wound; with photos); Wolfgang Bonte, Considerations on the Identification of Notch Traces from Stabbing Injuries, 149 Arch-Kriminal 77 (March-April 1972) (translation in present record) (conducting stab wounds in human cartilage with twelve different styles of serrated-blade knives and concluding that each blade left characteristic marks; with photos).
Statistical methods are used to calculate the probability that chance is so likely to be the explanation that we cannot accept the reliability of astrology. Perhaps to their dismay, judges in federal courts, and those of the twenty-one states that have accepted Daubert, must be conversant with the details of scientific testing and inferential statistical analysis. The United States Supreme Court held that “in the case of a particular scientific technique, the court ordinarily should consider the known or potential rate of error . . . and the existence and maintenance of standards controlling the technique’s operation.” Understanding the role of the error rate in reliability has three aspects: (1) appreciating the practical significance of a quantified statement regarding the likelihood of error; (2) interpreting the statistical significance of that measured error rate; and (3) evaluating the quality of the scientific method underlying the measurement. Each of these is discussed separately in this Part.

1. Error Rates: Practical Significance

There are two relevant aspects to error rate. The first is a summary measure of how consistent and strong the theory is in correctly predicting outcomes. Testing of fingerprint identification methods may show that technicians correctly match the print to the individual sixty percent of the time. This success rate is often described as one measure of the practical significance of the test. Whether this success rate is high enough for the evidence to be admissible and ultimately for the fact-finder is a question in the first instance for the court.

The second aspect of error rate is a measure of whether the test is designed to distinguish between the reliability of the technique and other reasons for success. If crime lab technicians are only given prints from people about whom there is other strong evidence of guilt, it may be the investigators’ other evidence, rather than the re-
liability of the technique, that accounts for successes. Scientific studies are typically designed to produce both the first and second measures of error.

Courts permit experts to testify that a particular knife could have been the murder weapon, is consistent with the victim’s wounds, that the wounds were caused by the particular knife or a similar one, and that the victim’s wounds could not have been caused by a particular knife. These conclusions are similar to testimony regarding practical significance. They lack any statement about the accuracy of any inference from the testimony. Without accompanying testimony about the probability that a knife was or was not the murder weapon, how reliable is the testimony that the wounds could have or could not have been caused by the murder weapon? A fact finder would probably give little weight to an eyewitness’s statement that the defendant could have been the perpetrator. That eyewitness would probably never be put on the witness stand. The reliability of an expert, to whom a jury is likely to give greater deference, should be given even greater scrutiny.

The expert, and perhaps even the eyewitness, is likely to testify to more than simply the conclusion. If either gives the basis for the conclusion, the evidence appears to be more reliable. But this appearance may also be deceiving. Knife, handwriting, or fingerprint identification experts describe in detail the similarity between the sample and the victim’s wounds in terms of striations (for knives), loops and spacing (for handwriting), or swirls (for fingerprints). Without knowing how common such striations, loops, or swirls are generally, there is no way to evaluate how much weight the evidence deserves or whether it is more misleading than helpful to the fact-finder. Testimony as to similarity or difference without comparison to the general population of knives, handwriting styles, or fingerprint resembles the eyewitness saying: “It could have been the defendant because the defendant and the perpetrator were both men.” Until we know that about half the population at the time and place of the incident were men, we have no measure of how helpful that testimony is to the jury.

The scientific method requires more of expert witnesses than testimony without a measure of the reliability of inferences to be drawn.


90. Ramirez III, 810 So. 2d at 846.

91. See id. at 844 ("The trustworthiness of expert scientific testimony is especially important because oftentimes 'the jury will naturally assume that the scientific principles underlying the expert’s conclusion are valid.’") (quoting Flanagan v. State, 625 So. 2d 827, 828 (Fla. 1993)).
The knife identification technique evaluated in Ramirez III was based on the unproven “premise that every knife blade is unique due to microscopic imperfections in the steel caused by the manufacturing process.” There is no way to judge the reliability of such testimony, no way to evaluate the value of inferences drawn from the bare conclusion that the particular knife was the murder weapon or even more detailed testimony that the striations were similar without scientific evidence of the frequency with which striations like those appear in knives.

2. Error Rates: Statistical Significance

The gold standard for experimental testing that will yield an error rate measuring reliability is the randomized, controlled, double-masked study. This standard avoids a wide variety of errors to which experimental testing is vulnerable. Because the effect of many of these errors cannot be quantified by statistical significance testing, these errors fall into the category of potential errors. It is worthwhile to explain briefly the errors that may result from ignoring each of these three characteristics of a well-designed study because Ramirez III indicates the necessity of evaluating the quality of empirical support of a theory or technique.

The keys to quantifying the error rate are randomness and statistical significance testing. Aside from measuring and summarizing interesting outcomes of a study (descriptive statistics), statistical analysis promotes scientific inquiry in two ways. First, it guides analysts in drawing inferences from those outcomes (inferential statistics). Second, and most important for error rates, it provides measures of the likelihood that an observed relationship posited by a theory or an identification produced by a technique is due to happenstance, the luck of the draw, or chance (significance testing).

Randomization may be the most familiar element of study design. If an expert asserts that the predictions of astrology are due to chance, a randomized study’s design must ensure that all predictions made by a particular method or a random sample of these predictions are evaluated, not just those (perhaps mostly correct predictions) the recipient of astrological advice remembers. A friend of mine believes that she can consistently win at blackjack, but I suspect she only remembers the good times. A test for the efficacy of a polio vaccine, since polio is a disease that is contagious and (oddly) more prevalent

92. Id. at 846; see also D. Michael Risinger & Michael J. Saks, Science and Nonscience in the Courts: Daubert Meets Handwriting Identification Expertise, 82 IOWA L. REV. 21, 39 (1996) (observing that uniqueness is not a scientific concept, given that no two things can ever be exactly alike, but that science is concerned with perceivable differences and similarities that can be used to assess common origin).
among children who live in hygienic surroundings, must involve comparison groups of children who are equally interactive with others who have been exposed to the disease and who come equally from hygienic and unsanitary conditions. A randomized test for knife identification must include knives that are and are not the murder weapon. Note that the randomization requirement does not mean that the technician must be given an assortment of knives each time he or she makes an identification in practice. It means that when the technique is evaluated for its reliability in producing correct outcomes, the evaluation must not be loaded in favor of a particular result.  

Statistical analysis of a randomized test that is perfectly designed according to the other gold standard criteria yields an error rate that measures the likelihood that the technique’s apparent success in making correct identifications (or the vaccine’s apparent effectiveness in preventing polio) is due to chance. This is referred to as sampling error, to distinguish it from other sources of error described below. The randomization process is part of the study design that eliminates the influence of other confounding influences.

This sampling error is usually presented as a fraction (often a decimal fraction) between zero and one. This fraction is called a p-value and measures the statistical significance of the summary

93. Many sources of error, including many that are not quantifiable, are discussed in David W. Barnes, Too Many Probabilities: Statistical Evidence of Tort Causation, 64 LAW & CONTEMP. PROBS. 191 (2001).

94. For a discussion of “sampling error,” as compared to other kinds of error that results from designing and carrying out experiments, see id. at 198-205.

The sampling error probability refers to a statistical property of data underlying evidence offered to prove a relevant fact, such as the connection between the defendant’s act and the plaintiff’s harm. Statistics used to prove causation are typically derived from a study of the relationship between acts like the defendant’s and harms like the plaintiff’s. Such a study is typically based on a sample, because of the literal and practical impossibility of measuring the effect of that act on all living human beings. Studying only a sample inevitably gives rise to the possibility that the sample chosen is atypical of a larger group, the population represented by the sample.

Id. at 193. See also BARNES & CONLEY, supra note 88, § 6.16, at 287 (“[Sampling error] does not refer to all types of errors made in the course of sampling, such as incorrectly reading a measurement. Sampling error is inevitably associated with any sample size that is smaller than the entire population . . . .”).

95. See BARNES & CONLEY, supra note 88, § 1.13, at 33 (“The calculation of the p-value provides a means of quantifying the probability that an observed discrepancy or relationship is attributable to chance . . . .”); Barnes, supra note 93, at 198 (“Statisticians use the ‘p-value’ to measure the sampling error probability, which is the probability that the observed relationship is due to the unrepresentative nature of the randomly selected subjects studied, rather than characteristic of the population from which they were drawn.”).

96. See BARNES & CONLEY, supra note 88, § 1.13, at 33 (“When the statistical analysis yields a p-value that is less than the predetermined criterion, the results are deemed statistically significant. If the results are not statistically significant, they are rejected because of the unacceptably high probability that they occurred as a matter of chance.”).
measure of success. If a test shows that knife identification technicians correctly identify the murder weapon 98% of the time (the summary measure of success), then 98% is the success rate and 2% is the failure rate. The failure rate is first evaluated for its practical significance (whether it is too high to be reliable). Sampling error is one measure of the reliability of the error rate. A $p$-value of .38, for instance, means that 38% of such tests will yield such impressive success rates (or small failure rates) even if there is no legitimate basis for the identification technique. That 38% figure measures the likelihood that good fortune was smiling on the technicians in this test. The higher the $p$-value, the higher the probability that the apparent success was due to chance. Scientists evaluating the statistical significance of a summary measure traditionally require a $p$-value of .05 or less before concluding that chance is unlikely to be the explanation for the success.\footnote{While a $p$-value of .05 or less is a conventional measure, it is sensible to think of using different thresholds for different purposes. Where the harm associated with erroneously concluding that there is an association between two variables is small, a larger sampling error may be acceptable. There is no magical significance to the .05 figure. See Barnes, supra note 93, at 198-99 (arguing that the purpose of the scientific investigation affects the appropriateness of a given $p$-value).} When proper study design eliminates all other explanations, and statistical significance testing eliminates chance as an explanation, the reliability of the technique is the remaining explanation for the success.

3. Error Rate and Study Design

An important aspect of a controlled study is that it is designed to eliminate explanations other than chance for the success of the experiment. If an expert claims that a technique can identify the author of a particular document, the test must include some documents that were and some that were not written by the purported author.\footnote{See generally D. Michael Risinger, Handwriting Identification, in 3 FAIGMAN ET AL., supra note 28, § 28, at 400-83.} Tests of the effectiveness of polio vaccine must include a group of children who get the vaccine and a control group that does not. If a study is not controlled, it is difficult to tell whether the results of the test (rate of correct identification, effectiveness of vaccine) are due to the methodology or some other variable. The sampling error measured by statistical significance testing does not also measure the effect of improper control on the error rate. For the error rate to be reliable, the study must involve proper control.

A double-masked (formerly double blind) study ensures that no bias is introduced into the test by predispositions or foreknowledge of those either administering or subject to the testing. Physicians who know which subjects have been gargling with Listerine may (perhaps
subconsciously) be predisposed to incorrectly interpreting those subjects’ apparent gingivitis as being due to something else. Subjects who know they are not getting the real Listerine may not gargle as regularly. Neither experimenter nor subject must know who is getting the polio vaccine. Neither the person handing over the test knives nor the technician may have any external clues (such as hints by police investigators) as to which knife is the murder weapon. Again, the sampling error measured by statistical significance testing does not measure the error introduced by the conscious and subconscious bias created by lack of masking. For a reported error rate to be reliable, it must have been calculated from a properly controlled and unbiased study and be statistically significant.

4. Error Rate and Frye-Plus

Do Florida judges and lawyers need to worry about these arcane and technical research design issues after Ramirez III? There had been no testing of the expert’s methodology in Ramirez III, so there was no in-depth inquiry about the adequacy of the testing. There was, however, reference to a single experiment in which a German forensic scientist examined cartilage wounds made by twelve grossly different types of serrate-blade knives. The Florida Supreme Court’s first objection to this test was that the test was not “blind.” In addition, the German study was not designed to determine whether there were microscopic differences between knives of the same type due to manufacturing, which was the key to the expert’s methodology. As a result, the German study was not controlling the experiment to produce results by which the reliability of the technique could be proven. There were, accordingly, no error rates. The expert simply claimed that his technique was infallible.

In Ramirez II, the court also referred to a holding by the First District Court of Appeal, which rejected expert testimony based on an uncontrolled experiment. Experimental design appears to be yet another skill with which Florida judges and lawyers must become familiar.

99. Ramirez III, 810 So. 2d 836, 849 (Fla. 2001) (“[T]he record does not show that [the expert’s] methodology—and particularly his claim of infallibility—has ever been formally tested or otherwise verified.”).
100. Id.
101. Id.
102. Id.
103. See id.
104. Id. at 851 (“[T]he State’s experts testified that the method is infallible, that it is impossible to make a false positive identification.”).
105. Ramirez II, 651 So. 2d 1164, 1167 (Fla. 1995) (quoting Copeland v. State, 566 So. 2d 856, 858 (Fla. 1st DCA 1990)).
D. General Acceptance by the Relevant Scientific Community

_Daubert_ finally considers whether the theory or technique is generally accepted.

A “reliability assessment does not require, although it does permit, explicit identification of a relevant scientific community and an express determination of a particular degree of acceptance within that community.” Widespread acceptance can be an important factor in ruling particular evidence admissible, and “a known technique which has been able to attract only minimal support within the community” may properly be viewed with skepticism.\(^{106}\)

There can be no question that general acceptance is the heart of the _Frye_ test and is relevant after _Ramirez III_, in which the court said: “Finally, the record contains no written authority—including [the expert’s] own published article—that upholds his current methodology.”\(^{107}\)

For novel expertise, all of the _Daubert_ factors appear relevant in Florida after _Ramirez III_. Neither the Federal Rules nor _Ramirez III_ requires discussion of all the elements.\(^{108}\) Neither the Federal Rules nor _Daubert_ and its progeny required any factors that the Florida Supreme Court did not consider. Nor did _Ramirez III_ suggest any factors the Federal Rules do not permit. _Ramirez III_ characterizes these scientific reliability factors as “hallmarks of acceptability.”\(^{109}\) The United States Supreme Court characterizes them as characteristics of “scientific knowledge.”\(^{110}\) The end result appears to be the same.

IV. CONVENTIONAL THEORIES AND TECHNIQUES: _Frye_ OR _Frye_-PLUS?

The analytical approach of _Ramirez III_ is explicitly limited to novel expertise. Part IV examines the appropriate test to be applied

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107. _Ramirez III_, 810 So. 2d at 851.

108. In _Kumho Tire Co. v. Carmichael_, 526 U.S. 137, 141-42 (1999), the United States Supreme Court concluded that:

[A] trial court _may consider one or more of the more specific factors that Daubert mentioned when doing so will help determine that testimony’s reliability. But, as the Court stated in Daubert, the test of reliability is “flexible,” and Daubert’s list of specific factors neither necessarily nor exclusively applies to all experts or in every case. Rather, the law grants a district court the same broad latitude when it decides _how_ to determine reliability as it enjoys in respect to its ultimate reliability determination. See _General Electric Co. v. Joiner_, 522 U.S. 136, 143, 118 S.Ct. 512, 139 L.Ed.2d 508 (1997) (courts of appeals are to apply “abuse of discretion” standard when reviewing district court’s reliability determination).

109. _Ramirez III_, 810 So. 2d at 844.

110. _Daubert_, 509 U.S. at 593.
to conventional theories and techniques. Part IV.A describes the general Florida rules defining what evidence is legally and scientifically reliable. It compares state and federal approaches to novel and conventional evidence. Part IV.B compares the relative rigor of the Frye and Daubert tests, asking whether it is true, as asserted by the Florida Supreme Court, that Daubert is more lenient. Part IV.C considers whether the Florida general acceptance test successfully excludes expertise with no scientific foundation. This Part concludes that when the soundness of traditional evidence is challenged, the Ramirez III standard should be applied to test the admissibility of that evidence.

A. Reliability

The Florida Supreme Court recognizes a distinction between “legal reliability” and “scientific reliability.”" Evidence is legally unreliable “if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of issues, misleading the jury, or needless presentation of cumulative evidence.” Section 90.403 of the Florida Evidence Code is not limited to novel evidence. Nor would it be sensible to admit prejudicial, confusing, misleading, or cumulative evidence just because it has been admitted before. According to Ramirez III, the issue of scientific reliability arises when there is a novel assertion of scientific or technical expertise:

When a court is faced with expert testimony based on a new or untried scientific theory, however, the balancing test in section 90.403 is inapposite because the court may be unable to gauge accurately the danger of misleading or confusing the jury due to the unproven nature of the testimony. In such a case, “scientific” reliability must be established as a predicate to “legal” reliability.

Is scientific reliability ever relevant to traditionally accepted, that is, *old and tried*, evidence, or is general acceptance the only test? There may be old and tried theories that are not generally accepted by the relevant scientific community (note the emphasis on scientific). It may also be that, with a better understanding of what expert testimony may be misleading to juries, some theories or techniques traditionally accepted by Florida courts would not pass the Ramirez III, Frye-Plus test.

The Florida Supreme Court’s distinction between novel and conventional expertise is based on its observation that novel expertise is “inherently unreliable.” Non-novel theories may not be inherently unreliable, but still unreliable. Can the admissibility of traditionally

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111. Ramirez III, 810 So. 2d at 842.
112. Id. (quoting FLA. STAT. § 90.403 (2000)).
113. Id.
114. Id. at 843.
admissible, generally accepted but scientifically dubious evidence be challenged? The Florida Supreme Court stated in *Brim v. State* that the standard of reliability dictated by *Frye* is indeed higher than the “more lenient” standard in *Daubert*.\(^\text{115}\) Can traditionally admissible but scientifically unreliable expertise be challenged?

Federal courts and state courts following the *Daubert* approach to admissibility of scientific and technical expertise have answered this question in the affirmative. They have begun to question evidence traditionally considered reliable. The United States Supreme Court opened the door for this scrutiny in *Daubert*, stating:

> Although the *Frye* decision itself focused exclusively on “novel” scientific techniques, we do not read the requirements of Rule 702 to apply specially or exclusively to unconventional evidence. Of course, well-established propositions are less likely to be challenged than those that are novel, and they are more handily defended. Indeed, theories that are so firmly established as to have attained the status of scientific law, such as the laws of thermodynamics, properly are subject to judicial notice under Federal Rule of Evidence 201.\(^\text{116}\)

It is now widely recognized that the federal rule may require reconsideration of evidence that has long been admitted under the *Frye* test.\(^\text{117}\) Does broad application of Federal Rule 702 mean that *Frye*, rather than *Daubert*, is the more lenient rule? Does traditionally admissible evidence skate around the scientific screen in Florida?

### B. Relative Rigor of Frye and Daubert

*Frye* may be more rigorous than *Daubert* because it rejects new theories and techniques until they are generally accepted. The scientific rigor of the general acceptance test depends on the scientific rigor of the community supporting the theory or technique. If both the judge and the scientific community believe the approach has a strong scientific foundation, that is more rigorous than just relying on the judge—as *Daubert* appears to do, though *general acceptance* is one of the *Daubert* factors. Thus, *Daubert* might admit novel evidence that *Frye* would exclude.

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\(^\text{115}\) *Brim v. State*, 695 So. 2d 268, 271-72 (Fla. 1997).


\(^\text{117}\) *See, e.g.*, United States v. Horn, 185 F. Supp. 2d 530, 554 (D. Md. 2002).

Following the *Kumho Tire* decision and the December 2000 changes to Rule 702, a detailed analysis of the factual sufficiency and reliability of the methodology underlying expert testimony is required for all scientific, technical or specialized evidence, not just “novel scientific” evidence. This has required, at times, a reexamination of the admissibility of evidence that long has been admitted under the *Frye* test, which may result in exclusion of evidence that for years routinely has been admitted.
The standard response to assertions of Frye’s greater rigor is that Frye admits some evidence that Daubert rejects. A typical example of this response appears in the 2002 edition of *Modern Scientific Evidence: The Law and Science of Expert Testimony.* The authors include in their discussion a table resembling Table 1:

**Table 1: Admissibility Under Frye and Daubert**

<table>
<thead>
<tr>
<th>Scientific Foundation Strong</th>
<th>Scientific Foundation Weak</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Acceptance High</strong></td>
<td>Both Admit</td>
</tr>
<tr>
<td><strong>General Acceptance Low</strong></td>
<td>Frye Excludes Daubert Admits</td>
</tr>
</tbody>
</table>

The standard application of Frye excludes evidence where general acceptance is low. Where general acceptance is low and the scientific foundation is strong, Frye excludes while Daubert admits. This is the basis for the claim that the Frye standard is higher. But where the scientific foundation is weak and general acceptance is high, Daubert excludes while Frye admits. This is the basis for the claim that Daubert is a higher standard.

Which standard is preferable undoubtedly depends on the answers given to several questions. First, are there many cases where the scientific foundation for a theory or technique is strong but there is no general acceptance? Discussing peer review and publication rather than general acceptance, the United States Supreme Court observed that well-grounded but innovative theories might not have been published, especially if the underlying theories are “too particular, too new, or of too limited interest to be published.” If the number of such theories with legal relevance is great, application of Frye would exclude a significant amount of evidence that would “assist the trier of fact . . . in determining a fact in issue,” contrary to the dictates of Florida Evidence Rule 90-702.

The Frye-Plus rule articulated in *Ramirez III* addresses the problem of excluding scientifically sound novel theories by subjecting them to a scientific reliability test. As long as Frye-Plus, as applied,

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118. 1 FAIGMAN ET AL., supra note 28, § 1-3.4, at 28.
119. Id.
does not require general acceptance of a novel and innovative theory or technique, *Daubert* and *Frye-Plus* are equivalent. *Ramirez III* does not address evidence that is either *too particular* or *of too limited interest* to be generally accepted. This might include expertise that is not novel. What test should be applied to these cases?

Second, how well does *general acceptance* match strong *scientific foundation*? If there are no generally accepted theories or techniques with weak scientific foundations, the apparent superiority of *Daubert* for this set of cases is of no practical significance. But commentators identify numerous examples of generally accepted theories and techniques—including handwriting analysis, bite mark identification, and fingerprint identification—121—that are based on weak scientific foundations. Professor Michael Saks and others have pointed out that widespread acceptance of techniques with weak foundations may lie with the fact that these approaches were first introduced at a time when “society was less demanding of proof and more trusting of authority.”122

C. Rigor in the Florida Courts

Some theories with high general acceptance and weak scientific support are traditionally accepted in Florida courts. In *State v. Hickson*, for instance, the Florida Supreme Court held that the battered woman syndrome theory had gained general acceptance “as a matter of law.”123 The court cited thirty other states that have also held evidence based on the syndrome admissible.124 The authors of the 2002 edition of *Modern Scientific Evidence*, on the other hand, state that:

No court or commentator has defended the methodology used to develop the syndrome or has suggested that adequate research methods were employed in its development. Unfortunately, courts have almost uniformly failed to examine in any detail whatsoever, the empirical support, or lack thereof, for the battered woman syndrome. . . . [T]he battered woman syndrome remains little more than an unsubstantiated hypotheses that, despite being extant for over fifteen years, has yet to be tested adequately or has failed to be corroborated when adequately tested.125

121. 1 FAIGMAN ET AL., supra note 28, § 1-3.7, at 61.
122. Michael J. Saks et al., *Toward a Model Act for the Prevention and Remedy of Erroneous Convictions*, 35 NEW ENG. L. REV. 669, 677 n.18 (2001) (referring to the fact that “[t]he uniqueness of friction ridge patterns, be they fingerprints, palmprints, or bare footprints, has long been accepted by the scientific community and by the courts”).
123. State v. Hickson, 630 So. 2d 172, 175 (Fla. 1993).
124. Id. at 174 n.1.
125. 2 FAIGMAN ET AL., supra note 28, § 11-1.5, at 35.
There is similar criticism of the scientific foundation for firearms identification regularly admitted without inquiry into its scientific validity in Florida Courts.

If scientific rigor is a dominant value in Florida evidence law, Florida courts must adopt a rule allowing reconsideration of traditionally accepted evidence under the Frye-Plus test. Correll v. State suggests that Florida law is headed in that direction. Correll states:

Thus, we hold that when scientific evidence is to be offered which is of the same type that has already been received in a substantial number of other Florida cases, any inquiry into its reliability for purposes of admissibility is only necessary when the opposing party makes a timely request for such an inquiry supported by authorities indicating that there may not be general scientific acceptance of the technique employed.

A party opposing the admission of expert testimony may, therefore, challenge that expertise. The standard, consistent with Frye, is deferential to authorities discussing whether there is general scientific acceptance. Note the inconsistency between this approach to challenging conventional evidence and the new Ramirez III standards.

Ramirez III, decided after Correll, took a large step away from deferential general acceptance, though it was in the context of a novel technique:

The court may peruse disparate sources—e.g., expert testimony, scientific and legal publications, and judicial opinions—and decide for itself whether the theory in issue has been “sufficiently tested and accepted by the relevant scientific community.” In gauging acceptance, the court must look to properties that traditionally inhere in scientific acceptance for the type of methodology or procedure under review—i.e., “indicia” or “hallmarks” of acceptability.

Thus, there is no sensible reason to evaluate conventionally admissible expertise by any other standard. Correll may set a threshold, based on a lack of general acceptance, for deciding when courts may

126. 3 FAIGMAN ET AL., supra note 28, § 24-9.1, at 174 (stating that “firearms identification is so firmly entrenched that is its unlikely that courts will look askance at it, despite the fact it would be so rely tried to comply with [the Daubert] criteria (1) [tested and testable] and (3) [known error rates]

127. A selection of such Florida appellate cases considering testimony of firearms identification experts without examining the scientific foundations for that testimony includes: Smolka v. State, 662 So. 2d 1255 (Fla. 5th DCA 1995); Dixon v. State, 627 So. 2d 1337 (Fla. 2d DCA 1993); State v. Kelley, 588 So. 2d 595 (Fla. 1st DCA 1991); Vasquez v. State, 518 So. 2d 1348 (Fla. 4th DCA 1987); Loren v. State, 518 So. 2d 342 (Fla. 1st DCA 1987); and Williams v. State, 468 So. 2d 447 (Fla. 1st DCA 1985).

128. 523 So. 2d 562 (Fla. 1988).

129. Id. at 567.

130. Ramirez III, 810 So. 2d 836, 844 (Fla. 2001).
consider an admissibility challenge. Once this threshold proof is met, however, the *sufficiency of the testing* criterion, as applied to novel techniques, should be relevant in reconsideration of conventional expertise as well.

General acceptance in Florida is not just a “nose count.” 131 It is an evaluation in which the court looks for “properties that traditionally inhere in scientific acceptance.” 132 These properties are those factors outlined in *Daubert*. In *Brim v. State*, the Florida Supreme Court suggested that “general acceptance” meant “acceptance by a clear majority of the members of the relevant scientific community.” 133 But the court in *Brim* then quoted the California Supreme Court, which had said, “[o]f course, the trial courts, in determining the general acceptance issue, must consider the quality, as well as quantity, of the evidence supporting or opposing a new scientific technique.” 134 The Florida Supreme Court in *Ramirez III* adopted this language when calling for an evaluation of the factors that indicate whether a theory or technique has a strong scientific foundation. 135 Although *Ramirez III* is a case involving a novel technique, the theories of general acceptance developed in *Brim* and *Ramirez III* together suggest that acceptance by others is no longer the main focus for Florida courts, even for traditionally admissible evidence.

Expertise with a strong scientific foundation and high acceptance is admitted under either *Frye* or *Daubert*. Expertise with a weak scientific foundation and low acceptance is excluded under either test. Table 2 illustrates how mixed cases are treated:

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131. *Id.*
132. *Id.*
133. 695 So. 2d 268, 272 (Fla. 1997).
134. *Id.* (quoting People v. Leahy, 882 P.2d 321, 336-37 (Cal. 1994)).
135. *Ramirez III*, 810 So. 2d at 844.
Table 2: Admissibility of Novel and Conventional Evidence

<table>
<thead>
<tr>
<th>Support for Theory or Technique</th>
<th>Novel or Conventional Evidence</th>
<th>Daubert</th>
<th>Frye</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong Scientific Foundation/Low Acceptance</td>
<td>Novel</td>
<td>Admit</td>
<td>Admit under Frye-Plus</td>
</tr>
<tr>
<td></td>
<td>Conventional</td>
<td>Admit</td>
<td>Exclude under Frye? Admit if Frye-Plus applies to reconsiderations</td>
</tr>
<tr>
<td>Weak Scientific Foundation/High Acceptance</td>
<td>Novel</td>
<td>Exclude</td>
<td>Exclude under Frye-Plus?</td>
</tr>
<tr>
<td></td>
<td>Conventional</td>
<td>Exclude</td>
<td>Admit under Frye Exclude if Frye-Plus applies to reconsiderations</td>
</tr>
</tbody>
</table>

If the Ramirez III analysis, described on the chart as Frye-Plus, means that the proffered expertise, whether novel or conventional and being reconsidered, must have a strong scientific foundation, then the Florida rule is consistent with the Federal Rules of Evidence. While Frye would exclude evidence with a strong scientific foundation but low general acceptance, Frye-Plus (and Daubert) would admit it. And while Frye would admit evidence with a weak scientific foundation but a high general acceptance, Frye-Plus (and Daubert) would exclude it. Applying the Frye-Plus approach to reconsidered conventional evidence perfectly aligns the Florida and federal rules.

There is a concern that application of Frye-Plus to conventional evidence may open Pandora’s box. In addressing this concern, one federal court stated:

Alarmists may see this as undesirable, envisioning courtrooms populated by mad scientists in white lab coats and overzealous judges in black robes, busily undoing established precedent. The more probable outcome is that judges, lawyers and expert witnesses will have to learn to be comfortable refocusing their thinking about the building blocks of what truly makes evidence that is beyond the knowledge and experience of lay persons useful to them.
in resolving disputes. The beneficiaries of this new approach will be the jurors that have to decide increasingly complex cases.136

V. CONCLUSION

Ramirez III created new law in Florida for the admissibility of testimonial evidence based on novel theories and techniques. The Florida Supreme Court maintained that the new rule is different and more rigorous than the corresponding federal rule that was derived from the United States Supreme Court opinion in Daubert. While doing so, however, the Florida court evaluated the proffered novel expert testimony using the same factors enunciated in Daubert, substituting a scientific soundness rule for the general acceptance rule in Frye, which had theretofore been the law. Florida judges must henceforth apply the standards of scientific rigor to novel admissibility questions, asking questions analogous to (1) whether a theory or technique is testable and has been tested; (2) whether the results of such testing have been subject to peer review; (3) whether error rates associated with the technique are known and how great the error rate is; and (4) whether the theory or technique is generally accepted in the relevant scientific community.137

This new rule for novel theories and techniques gives rise to the issue of whether scientific evidence of a type that has already been received in a substantial number of cases is subject to the same scrutiny. It apparently is if there are doubts as to the current acceptability of the evidence in the relevant scientific community. Perhaps all such evidence should be subject to the test of scientific soundness. If it were, Florida courts would face the same broad challenges facing federal judges and those in many other Daubert jurisdictions, where the reliability of traditionally accepted techniques, such as fingerprint identification, is being questioned.

Whether Frye or Daubert is more lenient depends on what kinds of evidence are likely to come before the court. If evidence with weak scientific foundations but strong general acceptance, or cases with weak general acceptance but strong scientific foundations, are common, the (scientific) reliability of expert testimony will be correspondingly weak under the Frye test because the former will be inappropriately admitted and the latter inappropriately excluded. The federal (Daubert) rule would exclude the former and admit the latter. Daubert is considered more lenient because it will admit evidence with a strong scientific foundation even if it is not generally accepted.

From a scientific perspective, this admissibility is appropriate. For novel evidence, at least, *Ramirez III* seems to agree.

The implications of *Ramirez III* for scientific evidence of a type that has already been received in a substantial number of cases is not known. *Correll* provides precedent for challenging the scientific soundness of expert evidence based on theories with declining general acceptance. There is also a basis in the Florida Evidence Code for applying the scientific soundness principal to all expert testimony because the predicate for admissibility is reliability. Whether Florida courts will eventually do so is as yet unknown. Combining the lessons of *Correll* and *Ramirez III*, however, suggests that, when these doubts arise, courts should apply the test of scientific soundness.