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The Impact of *Daubert* on Forensic Science*

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I. INTRODUCTION

Starting in the mid-1980s and continuing, in increasing force, through the 1990s, scholars began to vocally protest the ways in which highly questionable “expert testimony” was routinely admitted into evidence in the courts of the United States.¹ Peter Huber² offered one of the most powerful arguments that “the kind of expertise regularly accepted as admissible by courts was, frankly, ‘junk’ of scandalous lack of dependability.”³ To address the problem of “junk science” in the courtroom, the United States Supreme Court decided *Daubert v. Merrell Dow Pharmaceuticals, Inc.*⁴ in 1993. In it, the Court set forth a new standard for determining the admissibility of scientific evidence in the federal courts of the U.S.⁵ And, since the time *Daubert* was decided, subsequent decisions of the Supreme Court have extended *Daubert’s* application to all expert testimony, not just that which is technically “scientific.”⁶ The impact of *Daubert*, however, is not limited to federal courts since many states have also adopted the *Daubert* test for the admissibility of expert testimony.⁷

Since the time *Daubert* was decided, both courts and legal commentators have voiced concerns that *Daubert’s* focus on empirical testability, scientific falsifiability, and reliability and validity (including an assessment of error rates) may pose serious problems for expert testimony in the forensic sciences.⁸ The present study examines how *Daubert* has been applied to cases in the post-*Kumho* era in which expert testimony concerning forensic science has been offered in federal courts.

1. See, e.g., Richard H. Underwood, “X-Spurt” Witnesses, 19 AM. J. TRIAL ADVOC. 343 (1995).

2. PETER W. HUBER, GALILEO’S REVENGE: JUNK SCIENCE IN THE COURTROOM (New York, Basic Books 1991).

3. D. Michael Risinger, *Navigating Expert Reliability: Are Criminal Standards of Certainty Being Left on the Dock?*, 64 ALB. L. REV. 99, 100 (2000) (citing HUBER, *supra* note 2).

4. 509 U.S. 579 (1993).

5. *Id.* at 592.

6. *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999).

7. John Monahan, *Violence Risk Assessment: Scientific Validity and Evidentiary Admissibility*, 57 WASH. & LEE L. REV. 901, 911 (2000).

8. See generally, e.g., Jessica M. Sombat, *Latent Justice: Daubert’s Impact on the Evaluation of Fingerprint Identification Testimony*, 70 FORDHAM L. REV. 2819 (2002) (citing *United States v. Llera Plaza*, 179 F. Supp. 492 (E.D. Pa. 2002)); John Hein, *When Reliable is Reliable Enough: The Use of Expert Testimony After Kumho Tire v. Carmichael*, 6 WASH. U. J.L. & POL’Y 223, 238-41 (2001) (citing *Deering v. Reich*, 183 F.3d 645 (7th Cir. 1999); *Kinser v. Gehl*, 184 F.3d 1259 (10th Cir. 1999)); Andrew I. Gavil, *Defining Reliable Forensic Economics in the Post-Daubert/Kumho Tire Era: Case Studies from Antitrust*, 57 WASH. & LEE L. REV. 831, 867-75 (2000) (citing *Concord Boat Corp. v. Brunswick Corp.*, 207 F.3d 1039 (8th Cir. 2000)); Leonard J. Deftos, *Daubert & Frye: Compounding the Controversy Over the Forensic Use of DNA Testing*, 15 WHITTIER L. REV. 955 (1994).

II. LITERATURE REVIEW

A. Background on the Admissibility of Scientific Evidence

1. The *Frye* General Acceptance Test

At common law, the *Frye* test governed the admissibility of scientific testimony.⁹ In *Frye v. United States*,¹⁰ “the court rejected scientific testimony based on the use of a lie detector, stating that ‘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’ in order to be admissible.”¹¹

The purpose behind the *Frye* test was “to prevent . . . the introduction into evidence of specious and unfounded scientific principles or conclusions based upon such principles.”¹² At the heart of *Frye* is the realization that the expert witness is a hired gun.

“Whatever his credentials, publications, or affiliations, a scientist who becomes the alter ego of a lawyer is no longer a scientist So while a resume may be a necessary condition of expert competence, it is never a sufficient one. . . . Science is likewise defined by a community, not the individual, still less by a resume . . . [T]he cowl does not make a monk.”¹³

Despite the uniformity its followers argue the *Frye* rule provides, it employs several terms that are open to differing interpretation. Who comprises the relevant scientific community? After all, “[m]any scientific techniques do not fall within the domain of a single academic discipline or professional field.”¹⁴ What is general acceptance? Is it “wide-spread, prevalent, [and] extensive, though not universal,”¹⁵ or is it “[agreement] by a substantial section of the [relevant] scientific community?”¹⁶ Perhaps, however, the biggest problem with the *Frye* test is “that it often results in excluding relevant, probative evidence and thereby impedes the truth-seeking function of litigation.”¹⁷

9. *Daubert*, 509 U.S. at 585.

10. 293 F. 1013 (D.C. Cir. 1923).

11. Denise M. Dunleavy, *Expert Testimony and the Charge of Junk Science*, 451 PLI/LIT. 449, 451-52 (1992).

12. Paul C. Giannelli, *The Admissibility Of Novel Scientific Evidence: Frye v. United States, A Half-Century Later*, 80 COLUM. L. REV. 1197, 1224 (1980) (citations omitted).

13. Peter Huber, *Junk Science in the Courtroom*, 26 VAL. U. L. REV. 723, 742-43 (1992).

14. *Giannelli*, *supra* note 12, at 1208.

15. *United States v. Zeiger*, 475 F.2d 1280 (D.C. Cir. 1972).

16. *United States v. Williams*, 443 F. Supp. 269, 273 (S.D.N.Y. 1977).

17. N. Kathleen Strickland & Leah S. Elkins, *A Current Assessment of Frye in Toxic Tort Litigation*, 446 PLI/LIT. 321, 350 (1992) (citing *United States v. Downing*, 753 F.2d 1224, 1236 (3d Cir. 1985)); *see also* Jack B. Weinstein, *Improving Expert Testimony*, 20 U. RICH. L. REV. 473, 476 (1976).

2. The Federal Rules of Evidence

Given the various problems associated with the *Frye* rule, it was intentionally not incorporated into the Federal Rules of Evidence.¹⁸ Instead, the Federal Rules of Evidence opted for a more liberal approach to the admissibility of scientific evidence. This more liberal approach was adopted by some thirty-one states as of 1988.¹⁹ Federal Rule of Evidence 702 provides, "If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training or education, may testify thereto in the form of an opinion or otherwise."²⁰ Rule 703 requires that the facts or data relied upon in the formulation of an expert opinion be of "a type reasonably relied upon by experts in the particular field in forming opinions or inferences upon the subject."²¹ The role of the *Frye* test after the adoption of the Federal Rules of Evidence was unclear until 1993 when the U.S. Supreme Court decided *Daubert v. Merrell Dow Pharmaceuticals, Inc.*²² In *Daubert*, the Court set a new standard for determining the admissibility of scientific evidence.

3. The *Daubert* Standard for Admissibility of Scientific Evidence

Daubert involved two children born with serious birth defects.²³ Their parents brought suit alleging the defects were caused by Bendectin[®], an anti-nausea drug produced by the predecessor companies to the Merrell-Dow Pharmaceutical Company in the early 1950s.²⁴ The drug was approved by the Food and Drug Administration in 1956 as an anti-nausea drug.²⁵ Physicians frequently prescribed the drug for treatment of "morning-sickness" in pregnant women between 1957 and 1983.²⁶ In well over a thousand cases since its availability in 1956, women have alleged that the combination of dicyclomine hydrochloride and doxylamine succinate in Bendectin[®] is teratogenic, that is, a substance that causes birth defects.²⁷

Merrell Dow moved for summary judgment of the *Daubert* case claiming Bendectin[®] did not cause birth defects and the plaintiffs would not

18. See Weinstein's Evidence, §§ 702.36 - 702.44.

19. Bert Black, *Evolving Legal Standards for the Admissibility of Scientific Evidence*, 239 SCI. 1508, 1512 n.1 (1988).

20. Fed. R. Evid. 702.

21. Fed. R. Evid. 703.

22. 509 U.S. 579 (1993).

23. *Id.* at 582.

24. *Id.*

25. *Lynch v. Merrell-Nat'l Lab.*, 830 F.2d 1190, 1191 (1st Cir. 1987).

26. *Id.*

27. *Id.*

be able to proffer evidence to the contrary.²⁸ To support their motion, Merrell Dow introduced an affidavit by a well-credentialed epidemiologist with an expertise in chemical exposure risk.²⁹ The physician cited thirty published studies on the subject, none of which concluded Bendectin[®] caused birth defects.³⁰

The plaintiffs countered with eight well-credentialed experts of their own who had conducted various studies, all of which demonstrated a causal link between the product and birth defects.³¹ The District Court granted Merrell Dow's motion for summary judgment.³² Relying on the *Frye* standard, it concluded the plaintiff's expert testimony was inadmissible because it was not "sufficiently established to have general acceptance in the field to which it belongs."³³ The case was appealed, and the United States Court of Appeals for the Ninth Circuit affirmed the summary judgment stating that the reliability of a scientific technique must be "generally accepted" by the relevant scientific community for it to be admissible.³⁴ The Supreme Court, however, vacated the judgment of the lower courts and accepted the plaintiff's argument that the Federal Rules of Evidence superseded the *Frye* test.³⁵ The Court made clear that the critical concerns of Rule 702 are evidentiary reliability and relevancy.³⁶

The essence of the reliability standard lies within the Court's reference to philosopher of science Karl Popper's statement that "the criterion of the scientific status of a theory is its falsifiability, or refutability, or testability."³⁷

In order to best ensure relevant and reliable testimony and exclude "unsupported speculation," *Daubert* establishes a two-pronged test which requires a district court to determine "whether the expert is proposing to testify to (1) scientific knowledge that (2) will assist the trier of fact to understand or determine a fact in issue."³⁸ This "gatekeeping" role calls for the trial judge to make a "preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid, [i.e., whether it is reliable]; and whether that reasoning or methodology properly can be applied to the facts in issue," i.e., whether it is relevant to the issue involved.³⁹ Proffered scientific evidence must satisfy both prongs to be admissible.⁴⁰

28. *Daubert v. Merrell Dow Pharms., Inc.*, 727 F. Supp. 570, 571 (S.D. Cal. 1989).

29. *Id.* at 575.

30. *Id.*

31. *Id.* at 573-74.

32. *Id.* at 576.

33. *Id.* at 572 (quoting *United States v. Kilgus*, 571 F.2d 508, 510 (9th Cir. 1978)).

34. *Daubert v. Merrell Dow Pharms., Inc.*, 951 F.2d 1128, 1129-30 (9th Cir. 1991) (citing *Frye v. United States*, 293 F. 1013, 1014 (D.C. Cir. 1923)).

35. *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 597-98 (1993).

36. *Id.* at 589.

37. *Id.* at 593 (quoting KARL POPPER, *CONJECTURES AND REFUTATIONS: THE GROWTH OF SCIENTIFIC KNOWLEDGE* 37 (5th ed. 1989)).

38. *Id.* at 592.

39. *Joiner v. Gen. Elec. Co.*, 78 F.3d 524, 529-30 (11th Cir. 1996).

40. *Id.* at 530.

The first decision judges must determine, as gatekeepers, is whether a witness is sufficiently qualified by “knowledge, skill, experience, training, or education” to give expert testimony.⁴¹ This means a witness must be qualified in the specific subject for which his testimony is offered. “Just as a lawyer is not by general education and experience qualified to give an expert opinion on every subject of the law, so too a scientist or medical doctor is not presumed to have expert knowledge about every conceivable scientific principle or disease.”⁴² The evaluation of an alleged expert’s qualification in his or her field is not a novel concept, and it is well within the abilities of our capable federal judiciary.

Once a judge has decided a witness is qualified to serve as an expert, *Daubert* requires the judge to make an independent assessment to “ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable.”⁴³ This involves an examination of the methodology underlying the expert opinion to determine whether it utilizes valid scientific methods and procedures. *Daubert* suggests several factors to aid federal judges in evaluating whether a particular scientific theory or study is reliable: (1) its empirical testability; (2) whether the theory or study has been published or subjected to peer review; (3) whether the known or potential rate of error is acceptable; and (4) whether the method is generally accepted in the scientific community. But these factors are neither exhaustive nor applicable in every case.⁴⁴

This gatekeeping role is simply to guard the jury from considering as proof pure speculation presented in the guise of legitimate scientifically-based expert opinion. It is not intended to turn judges into jurors or surrogate scientists. Thus, the gatekeeping responsibility of the trial courts is not to weigh or choose between conflicting scientific opinions, or to analyze and study the science in question in order to reach its own scientific conclusions from the material in the field. Rather, it is to assure that an expert’s opinions are based on relevant scientific methods, processes, and data, and not on mere speculation, and that they apply to the facts at issue.⁴⁵

The *Daubert* standard was criticized in a variety of forums for a number of reasons. Even upon remand, the Ninth Circuit Court of Appeals wrote:

[S]omething doesn’t become “scientific knowledge” just because it’s uttered by a scientist; nor can an expert’s self-serving assertion that his conclusions were “derived by the scientific method” be deemed conclusive As we read the Supreme Court’s teaching

41. Fed. R. Evid. 702.

42. *Whiting v. Boston Edison Co.*, 891 F. Supp. 12, 24 (D. Mass. 1995).

43. *Daubert*, 509 U.S. at 589.

44. *See, e.g., In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 750 (3d Cir. 1994).

45. *Joiner*, 78 F.3d at 530.

in *Daubert*, therefore, though we are largely untrained in science and certainly no match for any of the witnesses whose testimony we are reviewing, it is our responsibility to determine whether those experts' proposed testimony amounts to "scientific knowledge," constitutes "good science," and was "derived by the scientific method."⁴⁶

The task before us is more daunting still when the dispute concerns matters at the very cutting edge of scientific research, where fact meets theory and certainty dissolves into probability. As the record in this case illustrates, scientists often have vigorous and sincere disagreements as to what research methodology is proper, what should be accepted as sufficient proof for the existence of a "fact," and whether information derived by a particular method can tell us anything useful about the subject under study.⁴⁷

4. *Daubert* Expanded

In *General Electric Co. v. Joiner*, the U.S. Supreme Court made it clear that a trial court's determination on the admissibility of expert testimony under *Daubert* is to be given great deference on appeal.⁴⁸ Admissibility decisions are to be overturned on appeal only if the trial court's decision was an abuse of discretion.⁴⁹ Initially, *Daubert* applied only to scientific evidence, but in *Kumho Tire Co. v. Carmichael*,⁵⁰ the Court held all expert testimony that involves scientific, technical, or other specialized knowledge must meet the *Daubert* test for admissibility.⁵¹

Kumho has been praised by several scholars for numerous reasons, but two reasons stand out in particular. The first is that the case gives a plain-text meaning to Federal Rule of Evidence 702, because it does not differentiate between "scientific," "technical," or "other specialized" knowledge.⁵² The second, more important reason is that *Kumho* "eliminated the trial judge's impossible task of differentiating between scientific and non-scientific evidence."⁵³ But, as the next section will explain, the

46. *Daubert v. Merrell Dow Pharmaceuticals*, 43 F.3d 1311, 1315-16 (9th Cir.).

47. *Id.*

48. *Gen. Elec. Co. v. Joiner*, 522 U.S. 136 (1997).

49. *Id.*

50. 526 U.S. 137 (1999).

51. *Id.* at 138.

52. Leslie Morsek, *Get on Board for the Ride of Your Life! The Ups, the Downs, the Twists, and the Turns of the Applicability of the "Gatekeeper" Function to Scientific and Non-Scientific Expert Evidence: Kumho's Expansion of Daubert*, 34 AKRON L. REV. 689, 721-22 (2001); C. WRIGHT & V. GOLD, FEDERAL PRACTICE AND PROCEDURE § 6266, at 285 (1997) ("Nothing in the language of the Rule suggests that scientific expert testimony should be treated differently from other expert testimony").

53. Morsek, *supra* note 52, at 728 (citing Patricia A. Krebs & Bryan J. De Tray, *Kumho Tire Co. v. Carmichael: A Flexible Approach to Analyzing Expert Testimony Under Daubert*, 34 TORT & INS. L.J. 989, 995 (1999)); see also Michelle Michelson, *Recent Development: The Admissibility of Expert Testimony on Battering and its Effects after Kumho Tire*, 79 WASH. U. L. Q. 367, 370 n.13 (2001) (comparing, e.g., *Watkins v. Telsmith, Inc.*, 121 F.3d 984, 990-91 (5th Cir. 1997) (finding application of *Daubert* not limited to scientific expert testimony), with *Compton v. Subaru of Am.*, 82 F.3d 1513, 1518-19 (10th Cir. 1996) (finding application of *Daubert* factors unwarranted "in

elimination of this distinction by *Kumho* has raised some problems concerning the admissibility of results from at least some of the fields subsumed under the broad term “forensic sciences.”⁵⁴

B. Implications for Forensic Science

Daubert has had a dramatic impact on the forensic sciences. For example, forensic scientific evidence that had long been accepted by the courts was reevaluated under *Daubert* and, in some cases, excluded.⁵⁵ An excellent example is the controversy caused by a federal district court’s exclusion of a positive identification using fingerprint analysis.

After a pre-trial *Daubert* hearing to consider the admissibility of fingerprint evidence, Judge Louis Pollak excluded expert testimony regarding fingerprints as unreliable. The court’s January 7, 2002 decision in *United States v. Llera Plaza* represented the first exclusion of fingerprint evidence on reliability grounds in the history of fingerprints.⁵⁶ While the court ultimately reversed itself on March 13, 2002, the debate over the admission of fingerprint evidence at trial is far from over.⁵⁷

One group of scholars criticized another court’s acceptance of fingerprint identification in the wake of *Daubert* by describing the opinion as “an excellent, albeit deeply troubling, example of a court straining scientific credulity for the sake of a venerable forensic science.”⁵⁸

Kumho’s extension of *Daubert* to “technical” or “non-scientific” fields has further muddied the waters since it does not explain how to determine the reliability of expert testimony in such non-scientific fields. After all, the *Daubert* factors were set forth by the Supreme Court for use in evaluating scientific evidence. But many of the factors used to guide such evaluation,

cases where expert testimony is based solely upon experience or training”); Diana K. Sheiness, *Out of the Twilight Zone: The Implications of Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 69 WASH. L. REV. 481, 491 (1994); Timothy B. Dyk & Gregory A. Castanias, *Daubert Doesn’t End Debate on Experts*, NAT’L L.J. 17, 20 (Aug. 2, 1993) (asking “Who is a scientist? A political scientist? A ‘human factors expert’?”).

54. See, e.g., D. Michael Risinger, *Defining the “Task at Hand”: Non-Science Forensic Science After Kumho Tire Co. v. Carmichael*, 57 WASH. & LEE L. REV. 767 (2000); Michael J. Saks, *Banishing Ipse Dixit: The Impact of Kumho Tire on Forensic Identification Science*, 57 WASH. & LEE L. REV. 879, 882 (2000) (“There is no systematic, rigorous, empirical research on which the forensic identification sciences’ knowledge is built.”).

55. Sombat, *supra* note 8, at 2822 (citing *United States v. Llera Plaza*, 179 F. Supp. 2d 492 (E.D. Pa. 2002)).

56. *United States v. Llera Plaza*, 179 F. Supp. 492 (E.D. Pa. 2002).

57. Sombat, *supra* note 8, at 2822-23.

58. David L. Faigman et al., *Legal Standards for the Admissibility of Scientific Evidence* (Draft Chapter of Forthcoming Second Edition of *Modern Forensic Evidence: The Law and Science of Expert Testimony*) (A.L.I.-A.B.A. Course of Study, April 2001), WL SF78 ALI-ABA 33 (criticizing the acceptance of fingerprint identifications in *United States v. Havvard*, 117 F. Supp. 2d 848, 849 (S.D. Ind. 2000), *aff’d*, 260 F.3d 597 (7th Cir. 2001)).

such as peer review and known error rates, are difficult to apply to non-scientific expert testimony.⁵⁹

Consider the impact of *Daubert-Kumho* on handwriting analysis. Several courts have already excluded handwriting analysis under *Daubert*, while others continue to admit it, and still others limit the scope of testimony to prevent positive identifications using handwriting analysis.⁶⁰ The continued reevaluation of the evidentiary value of forensic science evidence by the courts leads one to wonder whether there will be ever-increasing challenges to many types of forensic scientific evidence.⁶¹ This concern is especially palpable for those forensic scientific techniques that rely on human comparisons for similarities (e.g., firearm and toolmark identification, questioned document comparisons, hair and fiber comparisons, etc.).⁶² Similar concerns persist for the use of non-specific forensic techniques such as the use of Luminol and phenolphthalein as presumptive tests for the presence of blood even though they often yield false-positive results.⁶³

C. Purpose of the Present Study

Much of the scholarly literature concerning the application of *Daubert* has been largely theoretical. In other words, scholarship has focused on what *Daubert* should require and how it might affect certain disciplines.⁶⁴ Little attention has been paid to what the impact of *Daubert* has actually been. The present study is an attempt to fill that void in the literature by conducting a content analysis of both published and unpublished federal judicial cases applying *Daubert* to an issue of forensic science since *Daubert* was made applicable to all expert testimony by the Supreme Court's decision in *Kumho* in 1999.

59. See, e.g., sources cited *supra* at note 53.

60. *Sombat*, *supra* note 8, at 2858 n.327 (citing *United States v. Saelee*, 162 F. Supp. 2d 1097 (D. Alaska 2001); *United States v. Rutherford*, 104 F. Supp. 2d 1190 (D. Neb. 2000) (limiting handwriting evidence to objective comparison testimony); *United States v. Van Wyk*, 83 F. Supp. 2d 515 (D. N.J. 2000) (limiting handwriting expert testimony); *United States v. Hines*, 55 F. Supp. 2d 62 (D. Mass 1999) (excluding handwriting evidence involving an expert's opinion about the identification of a writer)).

61. *Id.* (citing Andy Newman, *Judge Rules Fingerprints Cannot Be Called a Match*, N.Y. TIMES, Jan. 11, 2002, at A14; *Printing Errors*, THE ECONOMIST, Jan. 19, 2002, at 66).

62. Terrence F. Kiely, *The Houses of Deceits: Science, Forensic Science, and Evidence: An Introduction to Forensic Evidence*, 35 LAND & WATER L. REV. 397, 431 (2000) (citing F. Taroni, C. Champod & P. Margot, *Forerunners of Bayesianism in Early Forensic Science*, 38 JURIMETRICS J. 183 (1998)).

63. *Id.* at 438 (citing Dale L. Laux, *Effects of Luminol on the Subsequent Analysis of Bloodstains*, 36 J. FORENSIC SCI. 1512 (1991); Fred E. Gimeno, *Fill Flash Color Photography to Photograph Luminol Bloodstain Patterns*, 39 J. FORENSIC IDENTIFICATION 305 (1989); *Ayers v. Arkansas*, 975 S.W.2d 88 (Ark. 1998)).

64. See *supra* notes 52-53 and accompanying text.

III. RESEARCH METHODOLOGY

A. Data Collection

The research sample for this study consisted of all the federal judicial opinions decided since *Kumho* was handed down in 1999 that applied the *Daubert* test to some forensic scientific issue. This purposeful sample was collected by conducting a search using Westlaw, a proprietary legal database. Within Westlaw, the following search was run in the “ALLFEDS” database:

DAUBERT & KUMHO & FORENSIC!

Accordingly, the search was designed to find all federal opinions, both published and unpublished, citing *Daubert* and *Kumho* that contain either “forensic” or “forensics.” The search yielded a total of ninety judicial opinions.

Of the ninety cases, seven cases were excluded because there were no specific *Daubert* objections relating to the expert testimony,⁶⁵ leaving a total of eighty-three relevant cases. Within these cases, a total of 121 *Daubert*-related issues were adjudicated. This higher number of claims is due to the fact that many cases raised several *Daubert*-related forensic scientific issues. When a case raised multiple issues, each issue was treated separately for the purpose of conducting the content analysis. In other words, the specific forensic scientific issues being subjected to a *Daubert/Kumho* analysis in a case constitute the unit of analysis for this study, not the mere number of cases. For this reason, cases frequently appear in more than one section of the typology, depending on the substance of the various *Daubert* claims adjudicated.

B. Data Exclusion

Of the 121 *Daubert* claims analyzed, twenty-eight were excluded from this study, leaving a total of ninety-eight claims in the research sample that were analyzed using qualitative content analysis techniques. The primary reason why any given claim was excluded from the research sample was that the claim at issue in the case did not involve forensic science. “[T]he criterion of the scientific status of a theory,” according to philosopher of science Karl Popper and the United States Supreme Court’s decision in

65. *Weisgram v. Marley Co.*, 528 U.S. 440 (2000); *United States v. Tabb*, 13 Fed. Appx. 422, 2001 WL 747576 (7th Cir. 2001); *Morgan v. Krenke*, 72 F. Supp. 2d 980 (E.D. Wis. 1999); *In re Lake States Commodities*, 272 B.R. 233 (N.D. Ill. 2002); *In re Lake States Commodities*, 271 B.R. 575 (N.D. Ill. 2002); *United States v. Cooper*, 91 F. Supp. 2d 79 (D.D.C. 2000); *United States v. Trala*, 162 F. Supp. 2d 336 (D. Del. 2001).

Daubert, “is its falsifiability, or refutability, or testability.”⁶⁶ Although under *Kumho* any expert testimony, whether it involves “science” or not, is subject to the *Daubert* test, this paper is concerned with the applicability of *Daubert* to forensic science. Claims not dealing with a Popperian notion of what constitutes forensic science or those closely related to that definition using generally accepted methods of applied technical forensic techniques (e.g. fingerprinting and forensic accounting) are, therefore, beyond the scope of this study. For example, *Huey v United Parcel Service, Inc.* dealt with a “forensic vocational expert” who had been called by the plaintiff to support a wrongful discharge claim.⁶⁷ The expert opined that the plaintiff had been fired after having made statements that the defendants maintained a work environment that was racially hostile.⁶⁸ While certainly a valid basis for expert testimony (and hence the type of evidence that *Kumho* mandates be subjected to a *Daubert* analysis), a forensic vocational expert is not a forensic scientist within the meaning of the term as used in this study. Therefore, this claim, and seventeen others like it, were excluded from analysis.⁶⁹

The remaining ten of the twenty-eight claims excluded from this study presented issues of forensic psychiatry or forensic psychology.⁷⁰ While it might be a debatable point whether the forensic behavioral sciences constitute “science” with Popper’s definition of the term, that epistemological question was not the grounds for exclusion. The researchers recognize the important contributions of the forensic behavioral sciences and have, therefore, devoted an entire study of the ways in which *Daubert* has been applied to issues of forensic psychiatry and psychology.⁷¹ To avoid unnecessary duplication, no claims in the present study dealing with forensic behavioral science were included in the research sample.

66. *Daubert*, 509 U.S. at 600 (quoting KARL POPPER, CONJECTURES AND REFUTATIONS: THE GROWTH OF SCIENTIFIC KNOWLEDGE 37 (5th ed. 1989)).

67. 165 F.3d 1084 (7th Cir. 1999).

68. *Id.* at 1086.

69. *Id.*; see also *United States v. Allen*, 269 F.3d 842 (7th Cir. 2001); *Maiz v. Virani*, 253 F.3d 641 (11th Cir. 2001); *Tlamka v. Serrell*, 2002 WL 500651 (D. Neb. 2002); *Katt v. City of N.Y.*, 151 F. Supp. 2d 313 (S.D.N.Y. 2001); *Schieber v. City of Phila.*, 2000 WL 1843246 (E.D. Pa. 2000); *Meister v. Med. Eng’g Corp.*, 267 F.3d 1123 (D.C. Cir. 2001); *Yarchak v. Trek Bicycle Corp.*, 2002 WL 1370634 (D.N.J. 2002); *Lassiegné v. Taco Bell Corp.*, 202 F. Supp. 2d 512 (E.D. La. 2002); *Tolliver v. Naor*, 2001 WL 1345735 (E.D. La. 2001); *Ward v. Am. Med. Sys., Inc.*, 170 F. Supp. 2d 594 (W.D.N.C. 2001); *Borgognone v. Trump Plaza*, 2000 WL 341135 (E.D.N.Y. 2000). Some cases raised multiple claims.

70. See *United States v. Barnette*, 211 F.3d 803 (4th Cir. 2000); *Flores v. Johnson*, 210 F.3d 456 (5th Cir. 2000); *Lassiegné v. Taco Bell Corp.*, 202 F. Supp. 2d 512 (E.D. La. 2002); *United States v. Pendergraft*, 120 F. Supp. 2d 1339 (M.D. Fla. 2000); *Walker v. Consol. Rail Corp.*, 111 F. Supp. 2d 1016 (N.D. Ind. 2000); *United States v. Duhon*, 104 F. Supp. 2d 663 (W.D. La. 2000); *Smith v. Rasmussen*, 57 F. Supp. 2d 736 (N.D. Iowa 1999); *United States v. Huberty*, 50 M.J. 704 (A.F. Ct. Crim. App. 1999). Some cases raised multiple claims.

71. Henry F. Fradella, et al., *The Impact of Daubert on the Admissibility of Behavioral Science Testimony*, 30 PEPP. L. REV. 403 (2003).

C. Data Analysis and Coding

Each of the 130 claims was reviewed by three researchers and analyzed using ethnographic content analysis.⁷² This method is particularly appropriate because multiple claims were reviewed in an attempt to discover emergent patterns and differing emphases among and between the cases reviewed. Consistent with the research method as set forth by Altheide,⁷³ the research involves a focus on narrative data in which both categorical and unique data were obtained from each case studied. Claims were then classified based on the patterns that emerged during the analysis.

The content analysis was conducted in five phases. First, as described above, seven cases in the purposeful sample that did not present a bona-fide *Daubert* issue for some aspect of forensic science were discarded. In the second phase of the research, the remaining eighty-three cases were examined and the number of *Daubert* claims was quantified, yielding a total of 121 claims. In the third phase, the contents of each of the claims were studied by the researchers so that claims that were beyond the scope of the study (i.e., the twenty-eight claims that were excluded in the previously discussed manner) could be eliminated. In the fourth phase, the ninety-three relevant claims presenting a forensic scientific issue being subjected to a *Daubert* analysis were qualitatively analyzed.

Consistent with proper ethnographic content analysis methodology,⁷⁴ the comparing and contrasting of the ninety-three relevant claims without predefined content analysis categories allowed for the emergence of central themes. Claims that presented similar themes in applying *Daubert* were grouped together. Seven primary themes emerged from this analysis, allowing for the development of a typology of the way in which *Daubert* has been applied to forensic science. These seven categories include: (1) forensic accounting and economics; (2) forensic toxicology; (3) forensic identification; (4) the forensic investigation of fire; (5) forensic physics; (6) forensic pathology; and (7) forensic engineering. Whenever possible, sub-categories within one of the seven main typology categories were also created. For example, the forensic identification category was able to be broken down into cases concerning fingerprint evidence, DNA evidence, and other means of identification, like hair analysis or shoe imprint analysis.

In the fifth and final phase of the content analysis, the outcome of the deciding court's *Daubert* analysis was classified as having been admitted, excluded, or limited. Caution should be taken, however, not to assume that exclusion of expert testimony on a particular issue necessarily means that the expert was prohibited from testifying *in toto*. Many of the judicial opinions

72. DAVID ALTHEIDE, *QUALITATIVE MEDIA ANALYSIS* (Sage Publishing Co. 1996).

73. *Id.*

74. *Id.*

in the research sample failed to specify whether the issue being discussed was the only topic of testimony for the expert. It is possible, therefore, that a case in which testimony on a given issue was excluded for the reasons explained in our typology may have admitted the testimony of the proffered expert on some other point not adjudicated by the written opinion that formed the data set for the present study's research sample.

IV. RESULTS AND DISCUSSION

A. *Forensic Accounting and Economics* (N = 16; 17.2%)

A total of sixteen claims in the research sample involved *Daubert* rulings on the admissibility of expert testimony by accountants. Two sub-categories of claims emerged when analyzing these cases: testimony with respect to fraudulent accounting and testimony regarding the calculation of damages in civil lawsuits.

1. Fraudulent Accounting

In general, courts accept testimony by accountants regarding fraudulent accounting practices so long as two criteria are met. First, the expert must be a qualified accountant through education, skill, or experience.⁷⁵ Second, the accounting expert must adhere to generally accepted principles of forensic accounting in conducting his/her analysis.⁷⁶ When these basic requirements of *Daubert* are met, the testimony of a forensic accountant is welcomed by courts as is illustrated by the fact that six of the seven experts proffered to give testimony regarding fraudulent accounting practices were accepted by courts in this sub-category. The case of *In re Bonham*⁷⁷ illustrates the general rationale with regard to this type of testimony. The court was trying to determine the existence of a Ponzi scheme⁷⁸ by reconstructing a debtor's disarrayed accounting records from a business that involved selling airline tickets.⁷⁹ Three experts were offered by the parties in support of their respective positions.⁸⁰ All three were accepted by the court as being well-qualified experts in accounting practices, even though not all were Certified Public Accountants ("CPA").⁸¹ The first expert, a

75. See *supra* notes 41-42 and accompanying text.

76. See *supra* notes 43-44 and accompanying text.

77. 251 B.R. 113 (D. Alaska 2000); see also *ProtoComm Corp. v. Novell Advanced Servs.*, 171 F. Supp. 2d 473 (E.D. Pa. 2001); *Maiz v. Virani*, 253 F.3d 641 (11th Cir. 2001).

78. Ponzi schemes are a type of illegal pyramid scheme named for Charles Ponzi, who duped thousands of New England residents into investing in a postage stamp speculation scheme back in the 1920s. Ponzi thought he could take advantage of differences between U.S. and foreign currencies used to buy and sell international mail coupons. . . . Decades later, the Ponzi scheme continues to work on the "rob-Peter-to-pay-Paul" principle, as money from new investors is used to pay off earlier investors until the whole scheme collapses. United States Sec. and Exch. Comm'n, *Ponzi Schemes* (Sept. 19, 2000), available at <http://www.sec.gov/answers/ponzi.htm>.

79. *In re Bonham*, 251 B.R. at 117-31.

80. *Id.* at 118.

81. *Id.* at 131-32.

non-CPA, had significant experience in reconstructive accounting by taking poorly kept records and making sense of them.⁸² The second expert was also permitted to testify since he was a CPA and had significant experience in reconstructive accounting.⁸³ The third expert, however, was not permitted to testify even though he was well-qualified.⁸⁴ The court found his testimony to be based on substantial “factual mistakes, speculation, innuendo, and inferences that [were not] supported by full explanations and analysis.”⁸⁵ His lack of vigorous examination was the deciding factor for the court in determining that his testimony was inadmissible under *Daubert*.⁸⁶

2. Damage Calculations

Courts are more hostile to expert testimony with regard to the calculations of damages than they are when dealing with testimony concerning fraudulent accounting. This hostility manifests itself with inconsistent rulings under *Daubert*. The inconsistency in judicial rulings in this sub-category of claims appears to be due to judges having different opinions with regard to whether a jury would be capable of determining a specific amount for damages without assistance from an expert. In other words, in the context of damage calculations, judges do not agree on the interpretation of Federal Rule of Evidence 702, which mandates that expert testimony “assist the trier of fact to understand the evidence or to determine a fact in issue.”⁸⁷ Application of the prescriptions of Rule 702 have resulted in courts taking one of three approaches to damage calculation testimony.

Some courts, as illustrated by *Smith v. Ingersoll-Rand Co.*,⁸⁸ allow forensic accountants to testify generally regarding what should be included in a jury’s calculations for damages. They are similarly permitted to testify about general practices for the actual calculation of damages (e.g., present value compared to future value). But these experts are not permitted to quantify damages for the jury. Some courts feel that an expert’s offering of specific amounts usurps the jury’s function. Other courts feel there is a lack of foundation for an expert to make specific damage calculations, especially in wrongful death cases in which there is often no way of knowing how a person’s life would have progressed, thereby making damage calculations speculative at best.⁸⁹ But not all courts have followed this “middle of the

82. *Id.* at 132.

83. *Id.*

84. *Id.* at 136.

85. *In re Bonham*, 251 B.R. at 136.

86. *Id.* at 135-36.

87. Fed. R. Evid. 702.

88. 214 F.3d 1235 (10th Cir. 2000).

89. *Schieber v. City of Philadelphia*, 2000 WL 1843246 (E.D. Pa. 2000); *Saia v. Sears Roebuck & Co.*, 47 F. Supp. 2d 141 (D. Mass. 1999).

road” approach. Some courts prohibit any testimony from forensic accountants or economists on the issue of damages calculations.⁹⁰ In stark contrast to such an outright ban, other courts welcome such testimony.⁹¹

Even when forensic accounting or economics experts are permitted to testify with regard to the calculation of damages, yet another inconsistency was found concerning the types of evidence upon which a damages expert may rely in forming an opinion. For example, in *Schieber v. City of Philadelphia*,⁹² a forensic accounting expert was prohibited from testifying with regard to damages because the expert’s calculations were exclusively based upon information provided by the father of a decedent about whom the wrongful death case was being litigated.⁹³ The court found this methodology to be unreliable since the father, as the person who would financially benefit from the verdict, was biased.⁹⁴ But in a remarkably similar case, a court permitted a forensic account to testify with regard to an award of damages using calculations the expert made based upon information provided by the decedent’s mother.⁹⁵ Although the mother’s projections of her economic losses may not have been a particularly sound basis for the expert’s assumptions, the court ruled this shortcoming went more to the weight to be accorded the expert’s testimony, rather than forming a sufficient basis for excluding it.⁹⁶

B. Forensic Toxicology (N = 11; 11.8%)

Eleven of the claims in the research sample involved the use of expert testimony with regard to an issue of forensic toxicology.⁹⁷ Interestingly, most of these claims concern questions about the proper use or scope of toxicological evidence, rather than the admissibility of any particular technique. Ostensibly, this is due to the fact that true toxicological analysis is done in a laboratory by a skilled scientist using standard techniques of analytic chemistry on samples obtained via a proper chain of custody.⁹⁸ Presuming these fundamental prerequisites under *Daubert* are met, one would expect the results of nearly all forensic toxicological testing to be admissible. Where courts appear to be struggling is with respect to how the results of forensic toxicological technique should be used once admitted.⁹⁹

90. *E.g.*, *Voilas v. Gen. Motors Corp.*, 73 F. Supp. 2d 452 (D.N.J. 1999).

91. *Maiz v. Virani*, 253 F.3d 641 (11th Cir. 2001); *EFCO Corp. v. Symons Corp.*, 219 F.3d 734 (8th Cir. 2000); *Smithers v. C&G Custom Module Hauling*, 172 F. Supp. 2d 765 (E.D. Va. 2000); *Coleman v. Dydula*, 139 F. Supp. 2d 388 (W.D.N.Y. 2001); *Walker v. Yellow Freight Sys.*, 1999 WL 757022 (E.D. La. 1999).

92. 2000 WL 1843246 (E.D. Pa. 2000).

93. *Id.*

94. *Id.* at *5.

95. *Walker v. Yellow Freight Sys.*, 1999 WL 757022 (E.D. La. 1999).

96. *Id.* at *8.

97. *See supra* Section III.A. for the description of research methodology utilized.

98. *See Cooper v. Lab. Corp. of Am. Holdings*, 150 F.3d 376 (4th Cir. 1998) (excluding expert testimony since he was not a toxicologist and had no knowledge beyond general chemistry of forensic toxicology).

99. *Compare* *United States v. Green*, 55 M.J. 76 (C.A.A.F. 2001) with *United States v. Powe*,

*Virgin Islands v. Carela*¹⁰⁰ nicely illustrates two principles that seem in perfect accord with the intent of *Daubert*.¹⁰¹ First, results from properly maintained and calibrated instruments analyzing breath alcohol levels are admissible as direct evidence of intoxication.¹⁰² Second, results from a police-administered and interpreted field sobriety test may not be used as the basis of a forensic toxicologist's opinion regarding a specific blood alcohol concentration.¹⁰³ However, such field sobriety test results may be introduced through the testimony of the administering police officer as circumstantial evidence of intoxication, so long as no specific levels of blood alcohol concentration are deduced from the test.¹⁰⁴

Rulings are less consistent when it comes to the interpretation of drug test results insofar as what elements of a crime the results prove, as illustrated by a comparison of *United States v. Green*¹⁰⁵ with *United States v. Powe*.¹⁰⁶ Both were criminal cases in which defendants were convicted of drug use charges based on the results of toxicological tests.¹⁰⁷ It was undisputed in both cases that the test results demonstrated the use of a controlled substance.¹⁰⁸ But, these two cases differed as to whether such results were sufficient to show "knowing use" of the given substances.¹⁰⁹ In *Green*, expert testimony regarding the results of a urinalysis test was held to be sufficient to establish all elements of the substantive offense so long as the laboratory methods used were reliable and yielded results indicated the presence of the drug or its metabolite above a standard cutoff level.¹¹⁰ So long as the specific metabolite relied upon for analysis was not naturally produced by the body or by another substance, the court held that its presence as detected in the urinalysis test was sufficient to establish both use of the drug (the *actus reus* of the offense) and the *mens rea* requirement of scienter (i.e., knowing use) without any supplemental testimony.¹¹¹ The dissent in the case, however, echoed the holding in *Powe*, both of which argued that more evidence than toxicological test results was needed to establish the criminal intent element of knowledge.¹¹² Thus, it appears that

2000 WL 703684 (N.M. Ct. Crim. App. 2000) (The cases differed as to whether toxicology results were sufficient to show certain elements of the crime.).

100. 2001 WL 1825823 (V.I. 2001).

101. *Id.*

102. *Id.* at *11.

103. *Id.* at *4.

104. *Id.* at *8; see also *United State v. Horn*, 185 F. Supp. 2d 530, 533 (D. Md. 2002).

105. 55 M.J. 76 (C.A.A.F. 2001).

106. 2000 WL 703684 (N.M. Ct. Crim. App. 2000).

107. See *Green*, 55 M.J. at 77; *Powe*, 2000 WL 703684 at *1.

108. *Powe*, 2000 WL 703684 at *2; *Green*, 55 M.J. at 79.

109. *Powe*, 2000 WL 703684 at *5; *Green*, 55 M.J. at 81.

110. *Green*, M.J. at 81-85.

111. *Id.* at 81-85.

112. *Id.* at 87; see also *Powe*, 2000 WL 703684 at *5.

some courts are misapplying *Daubert* in assuming that the admissibility of forensic toxicological test results can establish the *mens rea* element of an offense when, in fact, such results go to the *actus reus* element.

The remaining six claims all demonstrate the difficult time courts have when determining the admissibility of evidence in toxic tort cases when experts attempt to testify regarding a causal link between toxicological exposure and a particular illness.¹¹³ *Louderback v. Orkin Exterminating Co., Inc.*¹¹⁴ illustrates the way most courts deal with toxicological causation evidence under *Daubert/Kumho*.¹¹⁵ A neuro-psychologist was being offered in *Louderback* to testify that the plaintiffs' exposure to chlorpyrifos caused physical and psychological illnesses.¹¹⁶ Consistent with the mandate of *Daubert*, the court permitted the expert to testify about the extent and duration of the plaintiffs' illnesses, but would not allow him to offer any opinions relating to the causation of those illnesses since he was not a toxicologist.¹¹⁷ The difficulty in the case, however, concerned the testimony of a medical doctor who was board-certified in toxicology.¹¹⁸ The court permitted this expert to testify that the plaintiffs' exposure to chlorpyrifos caused the alleged illnesses over the objections of the defense that the expert lacked sufficient expertise with chlorpyrifos.¹¹⁹ The court felt this objection was an "overly constrictive view of the requirements of Rule 702."¹²⁰ It appears the key element underlying the court's rationale for admitting the testimony had to do with the fact that he was a board-certified physician.¹²¹ In other toxic tort cases, courts have been much more hesitant to admit similar testimony by an expert who is not a medical doctor. For example, in *Plourde v. Gladstone*,¹²² the court did not permit an expert to testify that exposure to herbicides caused illness in the plaintiffs and their livestock.¹²³ Yet, the expert at issue had earned a Ph.D. in toxicology.¹²⁴ In spite of this credential, the court felt it was an insufficient basis for testimony on illness causation since the expert was not a medical doctor.¹²⁵

It is unclear from a review of the few cases in the research sample if judges are confused about the scope of a toxicologist's expertise, or whether they are simply biased—whether consciously or not—in favor of physicians with expertise in toxicology as being the proper expert to opine with respect to causation of illnesses stemming from toxic exposure.

113. *Plourde v. Gladstone*, 190 F. Supp. 2d 708 (D. Vt. 2002); *Amorgianos v. Nat'l R.R. Passenger Corp.*, 137 F. Supp. 2d 147 (E.D.N.Y. 2001).

114. 26 F. Supp. 2d 1298 (D. Kan. 1998).

115. *See id.*

116. *Id.* at 1301.

117. *Id.* at 1302.

118. *Id.* at 1303-07.

119. *Id.* at 1307.

120. *Id.* at 1302.

121. *See id.* at 1305.

122. 190 F. Supp. 2d 708 (D. Vt. 2002).

123. *Id.* at 720-24.

124. *Id.* at 719.

125. *Id.* at 719-20.

C. *Forensic Identification* (N = 25; 26.9%)

There were twenty-five *Daubert* claims regarding experts testifying on forensic identification practices.¹²⁶ Because there are many different methods of identification, these claims were broken down into sub-categories. As a generalization, though, courts overwhelmingly accept forensic identification evidence with the notable exception of handwriting analysis.¹²⁷

1. Fingerprint Identification

The application of *Daubert* to fingerprint identifications has caused much controversy.¹²⁸ Although all eight challenges to the admissibility of fingerprint identification evidence ultimately resulted in the admission of the fingerprint evidence, this result occurred only after much public outcry after a federal district judge ruled such evidence inadmissible under *Daubert*, and then reversed his own opinion.¹²⁹

In *United States v. Llera Plaza*, the court decided that the ACE-V (analysis, comparison, evaluation, and verification) method of fingerprint identification was not fully admissible because it did not satisfy the majority of the criteria for admissibility under *Daubert*.¹³⁰ Although the court agreed fingerprint analysis had gained general acceptance within the American fingerprint examiner community, it considered this an insufficient basis to warrant full admissibility of fingerprint identifications since general acceptance was only one of the five *Daubert* factors to be considered when determining the admissibility of expert testimony.¹³¹

At the outset, it should be noted that the court stressed the importance of referring to fingerprint evidence as “technical” rather than “scientific” – a distinction that has more symbolic than practical importance in light of *Kumho* since under it, all expert testimony, whether “scientific, technical, or other specialized knowledge,”¹³² must be scrutinized under *Daubert*.¹³³ The court then went on to apply each of the other *Daubert* criteria.¹³⁴ First, the

126. See *supra* section III.A. for description of research methodology.

127. See generally Joan Griffin & David LaMagna, *Daubert Challenges to Forensic Evidence: Ballistics Next on the Firing Line*, 26 OCT CHAMP 20 (2002).

128. See generally Jessica M. Sombat, *Latent Justice: Daubert's Impact on the Evaluation of Fingerprint Identification Testimony*, 70 FORDHAM L. REV. 2819 (2002).

129. See *United States v. Llera Plaza*, 179 F. Supp. 2d 492 (E.D. Pa. 2002) [hereinafter *Llera Plaza I*].

130. *Id.* at 515.

131. *Id.* at 515-16.

132. FED. R. EVID. 702.

133. *Scheiber*, 2000 WL 1843246 at *2.

134. *Llera Plaza I.*, 179 F. Supp. 2d at 506-09, 516.

court concluded fingerprint evidence failed the testability factor because no objective criteria existed to prove or disprove the ultimate conclusion.¹³⁵

Next, despite the fact that *Kumho* had expanded *Daubert* to apply to technical evidence, the court determined the peer review factor applied exclusively to the evaluation of a scientific community.¹³⁶ Since fingerprinting does not belong to a specific scientific community, the court concluded that true peer review was not possible, and thus that *Daubert* factor weighed against the admissibility of fingerprint evidence.¹³⁷ The court concluded there was insufficient reliable data regarding the error for fingerprint identification and, therefore, surmised this lack of the known error rate weighed against the admissibility of fingerprint evidence.¹³⁸

Finally, the court determined there was a lack of controlling standards when evaluating fingerprint identification evidence for three reasons.¹³⁹ The first controlling standard that was lacking had to do with the qualifications of fingerprint examiners because there was no formal requirement for certification or formal training for anyone to be a fingerprint examiner.¹⁴⁰ The second controlling standard the court determined was lacking had to do with the fact that there was no agreement on the number of matching points that need to be found between two prints before a “match” is declared by the fingerprint examiner.¹⁴¹ Finally, the court found that because the ultimate determination of whether two fingerprints came from the same person is based upon the subjective opinion of an examiner, this too constituted a lack of controlling standards that weighed against the admissibility of fingerprint evidence for positive identification purposes.¹⁴²

Given the court’s *Daubert* analysis, it held that testimony would be admitted when offered by

fingerprint examiners who, suitably qualified as “expert” examiners by virtue of training and experience . . . (1) describe how the rolled and latent fingerprints at issue in this case were obtained, (2) identify and place before the jury the fingerprints and such magnifications thereof as may be required to show minute details, and (3) point out observed similarities (and differences) between any latent print and any rolled print the government contends are attributable to the same person. What such expert witnesses will not be permitted to do is to present “evaluation” testimony as to their “opinion” (Rule 702) that a particular latent print is in fact the print of a particular person . . .¹⁴³

135. *Id.* at 506-509, 516.

136. *Id.*

137. *Id.* at 509, 516.

138. *Id.* at 509-13, 516.

139. *Id.* at 513.

140. *Id.* at 514.

141. *Llera Plaza I*, 179 F. Supp. 2d at 513.

142. *Id.* at 513-14.

143. *Id.* at 516.

Two months after the decision in *Plaza I* was issued, the court reversed itself.¹⁴⁴ The court heard testimony of an FBI agent who explained the three-day training course through which FBI fingerprint examiners go in order to become certified to testify in court.¹⁴⁵ The agent also explained the very low error rate enjoyed by FBI-certified practitioners.¹⁴⁶ This testimony convinced the court that its initial conclusions regarding the error rate and controlling standards factors of the *Daubert* test were incorrect.¹⁴⁷ The court also determined it had made a mistake when it decided the conclusions of fingerprint examiners should be excluded due to their subjectivity because qualified experts in other fields are often permitted to give their subjective opinions so long as they are drawn from reliable data gathered from reliable methods.¹⁴⁸ The court also expanded its view on the peer review and general acceptance factors, stating that general acceptance in a technical field should not be discounted, especially when such general acceptance is international in scope as evidenced by the long-standing acceptance of the ACE-V method in other common law courts.¹⁴⁹ Given the change of heart on these factors, although the court still expressed concern about the testability/falsifiability factor, it determined that this concern, when balanced against the other factors, did not warrant exclusion of positive fingerprint identification under *Daubert*.¹⁵⁰

Some critics of the *Llera Plaza I* decision contended it spawned a new wave of sub-litigation in which defense attorneys have been contesting fingerprint evidence.¹⁵¹ But so far, this has not materialized. No court has granted a motion to exclude fingerprint evidence as unreliable under *Daubert*.¹⁵² Courts continue to receive fingerprint identification evidence using the rationale offered by the court in *Llera Plaza II*.

In several cases, however, trial judges have held, over the prosecutor's objection, that the defendant could present expert testimony at trial regarding the scientific bankruptcy of the field.

144. *United States v. Llera Plaza*, 188 F. Supp. 2d 549 (E.D. Pa. 2002) [hereinafter *Llera Plaza II*].

145. *Id.* at 555-57.

146. *Id.* at 557.

147. *Id.* at 564-72.

148. *Id.* at 563-64.

149. *Id.* at 563-64.

150. *Id.* at 571-72.

151. See Robert Epstein, *Fingerprints Meet Daubert: The Myth of Fingerprint "Science" Is Revealed*, 75 S. CAL. L. REV. 605, 606 (2002).

152. *Id.* at 649-50; see also *United States v. Turner*, 285 F.3d 909 (10th Cir. 2002) (admission of fingerprint testimony was harmless error); *United States v. Havvard*, 260 F.3d 597 (7th Cir. 2001) (admitting fingerprint identification evidence as expert testimony); *United States v. Mitchell*, 199 F. Supp. 2d 262 (E.D. Pa. 2002) (holding that solicitation regarding fingerprint technology was not material); *United States v. Salim*, 189 F. Supp. 2d 93 (S.D.N.Y. 2002) (fingerprint evidence satisfied *Daubert* requirements); *United States v. Reaux*, 2001 WL 883221 (E.D. La. 2001) (motion to exclude fingerprint testimony denied).

Moreover, in a number of other cases where challenges were filed, prosecutors have sought to avoid litigation of this issue altogether, either by coming forward with a much improved plea offer, or by withdrawing the fingerprint evidence from the case. Accordingly, from the defense point of view, there have been some significant benefits from challenging fingerprint evidence.¹⁵³

2. Other Forensic Identification Practices

In much the same way that fingerprint identification evidence is universally accepted in federal courts under *Daubert*, the same is true for other well-established types of identification evidence. As with all expert testimony, a qualified expert must have conducted the analysis at issue using an accepted methodology.¹⁵⁴ Assuming the *Daubert* threshold requirements are met, then experts are permitted to give their opinions regarding the source of evidence in question, so long as they do so within the limitations of the technique at issue.¹⁵⁵ For example, identifications based on footwear impressions or hair comparisons are admissible under *Daubert* so long as the ultimate conclusion is framed within the respective class characteristic limitations.¹⁵⁶ In other words, a particular footprint or hair sample “is consistent with” or “could be” a match with a particular suspect.¹⁵⁷ Individualization is only proper with techniques designed to allow for individualization, such as forensic DNA analysis.¹⁵⁸

One forensic identification case, *United States v. Pollard*,¹⁵⁹ presented a rather unique fact pattern in which the court allowed an expert to give an opinion regarding the age of a child in a pornographic video in order to determine whether the child was a minor.¹⁶⁰ The defense objected that the physician had relied upon the Tanner Scale of Human Development to make an age determination.¹⁶¹ The Tanner Scale is designed to estimate sexual maturity, not a child’s chronological age.¹⁶² Consider this editorial in the journal *Pediatrics* in which the creator of the Tanner Scale criticized the use of the scale to estimate chronological age:

This is a wholly illegitimate use of Tanner staging: no equations exist estimating age from stage, and even if they did, the degree of unreliability in the staging [of] the independent variable would introduce large errors into the estimation of age, the dependent variable. Furthermore, the unreliability of the stage rating is

153. Epstein, *supra* note 151, at 650.

154. See *Daubert*, 509 U.S. at 590; FED. R. EVID. 702, 703.

155. See *Daubert*, 509 U.S. at 590.

156. See *United States v. Allen*, 208 F. Supp. 2d 984, 985 (N.D. Ind. 2002).

157. See *id.* at 986; see also *United States v. Santiago*, 156 F. Supp. 2d 145 (D.P.R. 2001).

158. *United States v. Trala*, 162 F. Supp. 2d 336 (D. Del. 2001); *Santiago*, 156 F. Supp. 2d 145.

159. 128 F. Supp. 2d 1104 (E.D. Tenn. 2001).

160. *Id.* at 1107.

161. *Id.* at 1113.

162. *Id.* at 1115-16.

increased to an unknown degree by improperly performed staging, that is, not at a clinical examination but through nonstandardized [sic] and, thus, unsuitable photographs.

Therefore, we wish to caution pediatricians and other physicians to refrain from providing “expert” testimony as to chronological age based on Tanner staging, which was designed for estimating development or physiologic age for medical, educational, and sports purposes, in other words, identifying early and late maturers. The method is appropriate for this, provided chronologic age is known. It is not designed for estimating chronologic age and, therefore, not properly used for this purpose.¹⁶³

The court, however, allowed the physician to testify since he had other qualifications to make his determination as to the child’s age and only used the Tanner Scale as a supplemental tool.¹⁶⁴

3. Handwriting Analysis

The court’s rationale in *Llera Plaza I* is very similar to the rationale offered as the basis for most courts excluding identifications based on handwriting analysis. Of the eleven *Daubert* claims contesting the admissibility of handwriting analysis evidence, six experts were permitted to testify under limitations; three were permitted to testify without limitations; and two were excluded. The complete exclusions occurred only in cases in which the proffered expert lacked sufficient expertise under Rule 702.¹⁶⁵ Thus, the inconsistency in applying *Daubert* to handwriting analysis concerns the scope of the testimony.

The majority of the courts in the research sample have limited handwriting analysis experts such that they are only permitted to testify regarding the “physical mechanics and characteristics of handwriting” and “similarities between the questioned documents and defendant’s known exemplars.”¹⁶⁶ Thus, the majority approach is to prohibit experts from

163. Arlan L. Rosenbloom & James Tanner, *Misuse of Tanner Puberty Stages to Estimate Chronological Age*, 102 PEDIATRICS 1494 (1998).

164. *Pollard*, 128 F. Supp. 2d at 1123.

165. *United States v. Paul*, 175 F.3d 906 (11th Cir. 1999) (excluding a lawyer from testifying as to handwriting identification); *United States v. Fujii*, 152 F. Supp. 2d 939 (N.D. Ill. 2000) (excluding a handwriting analysis expert for lack of expertise in dealing with Japanese handprinting).

166. *United States v. Hernandez*, 42 Fed. Appx. 173, 175 (10th Cir. 2002); see also *United States v. Rutherford*, 104 F. Supp. 2d 1190 (D. Neb. 2000) (rejecting handwriting expert opinion as to authorship of allegedly forged documents.); *United States v. Van Wyk*, 83 F. Supp. 2d 515 (D.N.J. 2000) (allowing expert to testify as to similarities and differences but not authorship of unknown documents.); *United States v. Santillan*, 1999 WL 1201765 (N.D. Cal. 1999) (limiting testimony to mechanics and characteristics of handwriting); *United States v. Hines*, 55 F. Supp. 2d 62 (D. Mass.

testifying with regard to their opinion whether there are sufficient similarities between questioned documents and known samples to conclude they are a “match,” leaving that determination to be made by the jury. Yet, other courts take a much more lenient look at handwriting analysis experts and permit them to testify regarding their ultimate conclusions as to whether someone was or was not the author of a specific document.¹⁶⁷ For example, in *United States v. Paul*,¹⁶⁸ a qualified handwriting expert was permitted to opine his ultimate conclusion after giving specific testimony as to the similarities and differences between the questioned document and the defendant’s writing sample.¹⁶⁹ The fact that the defendant had misspelled several words in his handwriting exemplar the same way the words were misspelled in the questioned document appears to have been a strong factor in influencing the court’s decision to permit the ultimate identification testimony.¹⁷⁰

D. Fire Science (N = 5; 5.4%)

Three cases in the research sample dealt with the admissibility of expert testimony regarding the origin of a fire.¹⁷¹ In these three cases, a total of five experts were proffered to provide opinions regarding either the location of a fire’s origin or the cause of a fire. Of these five, only two were permitted to testify, both in the same case.¹⁷² Unfortunately, the court did not describe the scope of the expert testimony in its written opinion, nor did it explain its reasoning for admitting the expert testimony under *Daubert*.¹⁷³ Therefore, the focus of the analysis in this section is on the three claims which were excluded or limited by *Daubert*.

*Weisgram v. Marley Co.*¹⁷⁴ is a good example of how courts welcome fire origin testimony but are limiting the scope of such testimony in light of *Daubert*’s strictures to those who are qualified experts who conduct an investigation using the standard methods of fire science investigation.¹⁷⁵ *Weisgram* involved a townhouse that had allegedly caught fire as a result of a defective baseboard heater.¹⁷⁶ The local captain of the fire department conducted the initial investigation into the origin of the fire.¹⁷⁷ He ruled out

1999) (allowing expert testimony regarding similarities and differences but not authorship of unknown document).

167. *Paul*, 175 F.3d at 911; *United States v. Gricco*, 2002 WL 746037 (E.D. Pa. 2002); *United States v. Elmore*, 56 M.J. 533 (N-M Ct. Crim. App. 2001).

168. 175 F.3d 906 (11th Cir. 1999).

169. *Id.* at 911.

170. *Id.* at 909.

171. *Weisgram v. Marley Co.*, 169 F.3d 514 (8th Cir. 1999) (holding expert witness testimony as to fire’s origin unreliable; *Knotts v. Black & Decker, Inc.*, 204 F. Supp. 2d 1029 (N.D. Ohio 2002); *Tolliver v. Naor*, 2001 WL 1345735 (E.D. La. 2001) (allowing expert witness testimony).

172. 2001 WL 1345735.

173. *Id.*

174. 169 F.3d 514 (8th Cir. 1999).

175. *Id.* at 517 n.3.

176. *Id.* at 516.

177. *Id.* at 518.

careless smoking on a sofa as the cause of the fire since he “saw no smoking materials in the home and because he did not think the burn pattern in the sofa indicated that the fire began as the result of careless smoking.”¹⁷⁸ Instead, it was his opinion that the fire had started near the baseboard heater.¹⁷⁹ While such testimony was deemed proper on appeal given the fire chief’s expertise as to fire cause and origin, the court ruled that his testimony should have been limited to that opinion.¹⁸⁰ But the trial court had permitted the fire chief to opine that the fire had started because of “a malfunction of the heater,”¹⁸¹ even though the fire chief admitted he was “‘not an electrical expert’ . . . and that he did not ‘know what happened with the heater.’”¹⁸²

The plaintiff in *Weisgram* also offered another expert who the trial court had accepted as a “fire investigator” and “technical forensic expert.”¹⁸³ The court’s opinion did not identify what qualified him as either of these but did mention the expert was a certified “master electrician.”¹⁸⁴ Yet, this expert did not conduct an investigation as to the cause of the fire for himself; all he did was offer an opinion based on the information the fire chief had provided to him.¹⁸⁵ The appeals court ruled that the admission of his testimony was in error and remanded the case with instructions to enter judgment as a matter of law for the defendant-appellants.¹⁸⁶

E. Forensic Physics (N=4; 4.3%)

Courts welcome expert testimony regarding both bullet matching and bullet trajectory, often commenting on how helpful such testimony is to the trier of fact in understanding the often complicated issues involved in forensic physics.¹⁸⁷ However, courts will disallow such testimony if the proffered expert lacks the proper qualifications. For example, in *Gates v. City of Memphis*,¹⁸⁸ the plaintiff appealed the exclusion of an expert it had offered to testify about the level of threat another officer would likely have

178. *Id.*

179. *Id.*

180. *Weisgram*, 169 F.3d at 518.

181. *Id.*

182. *Id.*

183. *Id.* at 519.

184. *Id.*

185. *Id.* at 519-20.

186. *Weisgram*, 169 F.3d at 522.

187. *United States v. Santiago*, 199 F. Supp. 2d 101, 111-12 (S.D.N.Y. 2002) (“The Court . . . can only imagine the number of convictions that have been based, in part, on expert testimony regarding the match of a particular bullet to a gun seized from a defendant or his apartment.”); *Smithers v. C & G Custom Module Hauling*, 172 F. Supp. 2d 765, 771 (E.D. Va. 2000) (“The ‘science’ of momentum analysis and the related theories at issue in this case are well-tested, commented upon, verified, and accepted”).

188. 2000 WL 377343 (6th Cir. 2000) (*aff’d*, 210 F.3d 371 (Table)).

entertained prior to shooting and killing someone approaching a marked police car with a drawn gun.¹⁸⁹ This opinion was based, in part, on the expert's trajectory analysis of bullets discharged at the scene.¹⁹⁰ But the person on whom the defense relied for this opinion evidence was a former police officer who, in the words of the court, had "never received a block of training specifically devoted to trajectory analysis,"¹⁹¹ but instead had been trained in the investigation of shooting scenes. Since he was being called to testify specifically about trajectory analysis, the court ruled his background in shooting scene investigation was an insufficient basis for qualification.¹⁹²

Even if a court finds that an expert of forensic physics is qualified to give an opinion, the expert must still use proper methods in forming the basis of that opinion.¹⁹³ Failing to do so will result in exclusion under *Daubert* as illustrated by *Smithers v. C & G Custom Module Hauling*.¹⁹⁴ The plaintiff in *Smithers* had been involved in an automotive accident.¹⁹⁵ He called an expert in "momentum analysis" to testify regarding the pre-impact speed of the defendant's vehicle in order to establish the defendant's speeding as the proximate cause of the accident.¹⁹⁶ The court excluded the expert based on the following reliability issues:

The "science" of momentum analysis and the related theories at issue in this case are well-tested, commented upon, verified, and accepted. However, the Court does not have sufficient confidence that such theories were properly applied by the Plaintiff's expert to the facts of this case in order to admit his various opinions, especially as concerns the all-important issue of the pre-impact speed of the defendant's vehicle. Among the Court's concerns is the fact that [the expert] effectively discounts several variables that *may* not have made a difference in the ultimate outcome of his analysis, but his discounting of them (which was fatal in the opinion of the defense expert) creates enough of a doubt as to the overall reliability of [his] ultimate opinions as to render them inadmissible. . . . In addition, [he] could not provide an acceptable explanation for his failure to consider the fact that the two vehicles traveled together at an angle after impact.¹⁹⁷

There was only one case in the research sample that concerned an issue of physics other than ballistics or momentum analysis. That case, *Rushing v. Kansas City S. Ry. Co.*,¹⁹⁸ concerned the physics of sound. The defendants

189. *Gates*, 2000 WL 377343 at **3.

190. *Id.*

191. *Id.* at *3.

192. *Id.* at *3-*4.

193. *Smithers*, 172 F. Supp. 2d at 771.

194. 172 F. Supp. 2d 765 (E.D.Va. 2000).

195. *Id.* at 768.

196. *Id.* at 769-70.

197. *Id.* at 771-72 (emphasis in original).

198. 185 F.3d 496 (5th Cir. 1999).

had constructed a railroad switching yard approximately fifty-five feet from the plaintiffs' home.¹⁹⁹ Although an acoustical noise barrier was constructed to mitigate noise emissions that might disturb area residents, the plaintiffs brought suit alleging it was insufficient and, accordingly, the switchyard constituted a private nuisance.²⁰⁰ The defendants retained an industrial audiologist to take and analyze noise measurements at the switchyard.²⁰¹ It was the expert's opinion that "the sound emissions originating in the yard complied with federal regulations promulgated pursuant to the Noise Control Act."²⁰² Since the audiologist was qualified through his educational background and experience, and since he followed the prescribed testing methods necessary to ensure reliable results, the expert was permitted to testify that the switching yard complied with all federal noise regulations.²⁰³ This resulted in partial summary judgment for the defendants, which was later upheld on appeal.²⁰⁴

F. Forensic Pathology (N = 4; 4.3%)

Both criminal and civil cases frequently rely on pathological testimony to establish cause, manner, mechanism, and time of death.²⁰⁵ Courts regularly admit such opinions so long as the expert is properly qualified and uses standard autopsy procedures to arrive at his/her opinion.²⁰⁶ But courts have become more vigilant in limiting the testimony of forensic pathologists to opinions that are strictly within their scope of expertise, as illustrated by *Schieber v. City of Philadelphia*.²⁰⁷ In *Schieber*, a woman was gagged, raped, and murdered in her own apartment.²⁰⁸ Presumably while the attack was taking place, a neighbor called 911.²⁰⁹ Two officers responded to the call, but after knocking on the victim's door and receiving no response, they simply left having made no other attempt to investigate the call or to enter the apartment.²¹⁰ The woman's body was later discovered by family members who subsequently sued the city of Philadelphia for the way in which the police handled the 911 phone call.²¹¹

199. *Id.* at 502.

200. *Id.*

201. *Id.*

202. *Id.* at 502.

203. *Id.* at 502, 507.

204. *Id.* at 507.

205. See generally DOMINIC J. DIMAIO & VINCENT J.M. DIMAIO, FORENSIC PATHOLOGY (2d ed., CRC Press 2001).

206. See, e.g., *Deering v. Reich*, 183 F.3d 645 (7th Cir. 1999).

207. 2000 WL 1670888 (E.D. Pa. 2000).

208. *Id.* at *1.

209. *Id.*

210. *Id.*

211. *Id.*

The testimony of a forensic pathologist was critical to establishing causation in the plaintiff's case. The court, finding the pathologist was a qualified expert who used reliable methods in reaching his conclusions, allowed the forensic pathologist to give several key pieces of opinion evidence.²¹² He was permitted to opine that he believed the victim would have still been alive at the time the police officers arrived at the apartment; had they forced the door open, the pathologist believed the victim would have been capable of being resuscitated by police.²¹³ The pathologist was also permitted to testify as to his belief that a gag had been placed in the victim's mouth which would have prevented her from calling out at the time the police arrived.²¹⁴ This opinion was based on "physical evidence of mouth injuries, including bruising and a 'bite mark type laceration of the tongue.'"²¹⁵ The court, however, did not permit the pathologist to testify "that the mouth pressure applied was intended to prevent [the woman] from calling out for help and was sufficient for that purpose only."²¹⁶ The court reasoned that not only was this beyond the pathologist's expertise, but also that there was no scientific basis for such a conclusion.²¹⁷

*Verzwyvelt v. St. Paul Fire & Marine Ins. Co.*²¹⁸ is another case in which the scope of an otherwise qualified forensic pathologist's testimony was limited. The plaintiff brought suit alleging the victim had died from eating sausage meat contaminated with listeria.²¹⁹ The court permitted the coroner to testify, consistent with the autopsy report, that the cause of death was "more probably than not . . . a bacterial infection."²²⁰ The coroner, however, did not test specifically for the listeria bacteria, but in fact, conceded he "did not know the type or nature of the bacterial infection"²²¹ and that he had "little or no scientific knowledge concerning listeria, listeria infections, or the subfield of hematopathology."²²² Accordingly, the court prevented the coroner from testifying as to any opinion regarding the cause or nature of the bacterial infection that was presumably the cause of death.²²³

G. Forensic Engineering (N = 28; 30.1%)

All of the cases that fall into the category of forensic engineering involve claims of defects in a variety of products. The overwhelming

212. *Id.* at *4.

213. *Id.* at *4.

214. *Id.* at *5.

215. *Id.*

216. *Id.*

217. *Id.*; see also *Tlamka v. Serrell*, 2002 WL 500651 (D. Neb. 2002) (permitting a forensic pathologist to testify regarding cause of death and whether life-saving measures would have prevented it, but disallowing testimony regarding whether proper or improper CPR procedures had been used).

218. 175 F. Supp. 2d 881 (W.D. La. 2001).

219. *Id.* at 881.

220. *Id.* at 882.

221. *Id.* at 883.

222. *Id.* at 886.

223. *Id.* at 887-88.

number of cases in this category deal mainly with allegations of design defects, but manufacturing defects and other types of defects are also common. Each of these three subtypes of forensic engineering claims is analyzed separately given the common themes found in each subtype.

1. Design Defects

Thirteen cases raised sixteen issues pertaining to a defect in a product's design, ranging from nail guns and ladders to bike seats and automotive fuel systems.²²⁴ Most of the time, the experts involved in these cases are mechanical engineers.²²⁵ But neither Rule 702 nor *Daubert* requires an academic degree for someone to be a qualified expert.²²⁶ Thus, in some cases, a non-engineer with relevant expertise may be accepted by the court as was the case in *Tolliver v. Naor*.²²⁷ The plaintiffs were injured when their car was struck from behind by another vehicle.²²⁸ They alleged their injuries were worsened by a series of factors, among which was a defect in the vehicle's fuel system which caused it to burst into flames after impact.²²⁹ The defense sought to exclude the plaintiff's automotive fuel system design expert under *Daubert* because he was "not an engineer and ha[d] never taken a college-level engineering course."²³⁰ The court permitted the expert to testify even though he was not a licensed engineer because more than thirty years of experience in the automotive industrial design industry qualified him to give an opinion.²³¹ The *Tolliver* case, however, is the exception not the rule.²³² Courts are vigilant about excluding the testimony of non-qualified experts as illustrated by *Kinser v. Gehl Co.*²³³

224. *Lauzon v. Senco Prods.*, 270 F.3d 681 (8th Cir. 2001); *Smith v. Ingersoll-Rand Co.*, 214 F.3d 1235 (10th Cir. 2000); *Kinser v. Gehl Co.*, 184 F.3d 1259 (10th Cir. 1999); *Weisgram v. Marley Co.*, 169 F.3d 514 (8th Cir. 1999); *Yarchak v. Trek Bicycle Corp.*, 2002 WL 1370634 (D.N.J. 2002); *Knotts v. Black & Decker, Inc.*, 204 F. Supp. 2d 1029 (N.D. Ohio 2002); *Shanks v. Home Depot, Inc.*, 2001 WL 1837829 (W.D. Mich. 2001); *Tolliver v. Naor*, 2001 WL 1345735 (E.D. La. 2001); *Rapp v. Singh*, 152 F. Supp. 2d 694 (E.D. Pa. 2001); *Lauzon v. Senco Prods.*, 123 F. Supp. 2d 510 (D. Minn. 2000), *rev'd* 270 F.3d 681 (8th Cir. 2001); *Padillas v. Stork-Gamco, Inc.*, 2000 WL 1470210 (E.D. Pa. 2000); *Clark v. R.D. Werner Co.*, 2000 WL 666380 (E.D. La. 2000); *Jarvis v. Ford Motor Co.*, 69 F. Supp. 2d 582 (S.D.N.Y. 1999).

225. *See, e.g.*, *Tolliver v. Naor*, 2001 WL 1345735 (E.D. La. 2001) (utilizing one expert with a bachelor's degree in mechanical engineering).

226. FED. R. EVID. 702; *Daubert v. Merrell-Dow Pharms., Inc.*, 509 U.S. 579 (1993).

227. 2001 WL 1345735 (E.D. La. 2001).

228. *Id.* at *1.

229. *Id.*

230. *Id.* at *3.

231. *Id.* at *4.

232. *See also* *Fee v. Brass Eagle, Inc.*, 2002 WL 1465762 at *6 (N.D. Ohio. 2002) (allowing testimony regarding alleged defects in a paintgun from a non-engineer who had over thirty years of experience in "forensic analyses of firearms, firearms operation, tool mark identification, and firearm repair.").

233. 184 F.3d 1259 (10th Cir. 1999).

Kinser was a product liability lawsuit in which a farmer was killed when he was operating a baler and became entangled in the machine.²³⁴ Although there were no witnesses to the accident, the surviving family members sought to prove their wrongful death case by offering an expert who theorized the farmer “was either attempting to unplug the baler or fix the automatic tying mechanism.”²³⁵ In either scenario, the farmer would have been within inches of the baler’s pick-up tines.²³⁶ If the farmer had “lost his footing” at that time, he would have been “pulled into the machine.”²³⁷ In addition to believing the baler contained insufficient warnings regarding the risk of such injuries, the expert also claimed the baler was defectively designed since a number of modifications could have been made to improve upon its safety.²³⁸ Although the expert appeared to the court to be qualified in the realm of product safety and warnings, his credentials did not qualify him to testify on possible alternative designs for the baler.²³⁹ The court reasoned:

The expert has no practical experience in mechanical design. He focuses solely on concepts and has no expertise with respect to the design of products under a traditional engineering method. He has never published a single paper examining any type of agricultural equipment, never operated a big round baler, and, excluding this case, never consulted on behalf of a plaintiff or manufacturer regarding big round balers. In fact, other than familiarizing himself with the deposition testimony of three farmers, [the expert] ha[d] neither investigated nor spoken with any individual regarding their experience with big round balers.²⁴⁰

Kinser is representative of a number of cases in which an expert’s testimony was excluded for lack of proper expertise.²⁴¹

When an expert is properly qualified to give an opinion on design defects, courts welcome their testimony so long as the expert’s investigation and conclusions are based upon reliable methodologies. *Yarchak v. Trek Bicycle Corp.*²⁴² is a good example. The plaintiff was a police officer who was required to ride a bicycle as part of his patrol responsibilities.²⁴³ After doing so for a while, he began to experience problems maintaining an erection.²⁴⁴ He eventually filed a lawsuit in which he claimed a defectively

234. *Id.* at 1259.

235. *Id.* at 1265.

236. *Id.*

237. *Id.*

238. *Id.* at 1266.

239. *Kinser*, 184 F.3d at 1271.

240. *Id.* at 1271.

241. *See also* Weisgram v. Marley Co., 169 F.3d 514 (8th Cir. 1999); Clark v. R.D. Werner Co., 2000 WL 666380 (E.D. La. 2000); Jarvis v. Ford Motor Co., 69 F. Supp. 2d 582 (S.D.N.Y. 1999).

242. 208 F. Supp. 2d 470 (D.N.J. 2002).

243. *Id.* at 470.

244. *Id.* at 477.

designed bicycle seat was the cause of his problem.²⁴⁵ To prove his case, he sought to introduce the testimony of a forensic engineer with expertise in both accident reconstruction and in biomechanics to support the allegation that a bicycle seat was defective because it failed to warn users of its risk of causing erectile dysfunction in male riders.²⁴⁶ The expert was offered to establish causation, specifically that the bike seat was capable of causing “erectile difficulties.”²⁴⁷ The expert’s opinion was based upon a variety of factors including an examination of the bicycle at issue, a photograph of the subject bicycle, the owner’s manual for the bicycle, advertising brochures for the bicycle and those like it from the same manufacturer, and the plaintiff’s medical records (which contained documentation of the plaintiff’s visits to several medical specialists, some of whose notes suggested a causal link between his erectile dysfunction and his bicycle riding).²⁴⁸ His opinion was also based, in part, on the report of a physician who specialized in erectile dysfunction who had examined the plaintiff.²⁴⁹ The physician concluded that “prolonged periods of persistent pressure from the bicycle seat caused enduring damage to [p]laintiff’s perineal arteries, restricting the flow of oxygen-carrying blood to [p]laintiff’s genitals, and preventing [p]laintiff from achieving and maintaining an erection.”²⁵⁰ He arrived at this diagnosis using the methodology of “differential diagnosis”—ruling out other potential causes of the plaintiff’s problem such as “diabetes, neurological disease, or high blood pressure” that might explain impotency in young males.²⁵¹ Not only did the court approve of the physician’s use of the differential diagnosis methodology,²⁵² but also the court approved of the forensic engineer’s reliance on this report in coming to his opinion regarding the defective design of the bicycle seat.²⁵³ In contrast to *Yarchak*, when qualified experts are not using reliable methodologies, courts have no hesitation excluding their opinions.²⁵⁴

245. *Id.* at 478.

246. *Id.* at 496-97.

247. *Id.* at 499.

248. *Id.* at 500.

249. *Id.* at 496.

250. *Id.* at 496-97.

251. *Id.* at 497.

252. *Id.* at 498.

253. *Id.* at 501-02; *see also* *Lauzon v. Senco Prods.*, 270 F.3d 681 (8th Cir. 2001); *Smith v. Ingersoll-Rand Co.*, 214 F.3d 1235 (10th Cir. 2000); *Shanks v. Home Depot, Inc.*, 2001 WL 1837829 (W.D. Mich. 2001); *Tolliver v. Naor*, 2001 WL 1345735 (E.D. La. 2001); *Padillas v. Stork-Gamco, Inc.*, 2000 WL 1470210 (E.D. Pa. 2000).

254. *See* *Kinser v. Gehl Co.*, 184 F.3d 1259 (10th Cir. 1999); *Weisgram v. Marley Co.*, 169 F.3d 514 (8th Cir. 1999); *Knotts v. Black & Decker, Inc.*, 204 F. Supp. 2d 1029 (N.D. Ohio 2002); *Shanks v. Home Depot, Inc.*, 2001 WL 1837829 (W.D. Mich. 2001); *Rapp v. Singh*, 152 F. Supp. 2d 694 (E.D. Pa. 2001); *Padillas v. Stork-Gamco, Inc.*, 2000 WL 1470210 (E.D. Pa. 2000); *Clark v. R.D. Werner Co.*, 2000 WL 666380 (E.D. La. 2000); *Jarvis v. Ford Motor Co.*, 69 F. Supp. 2d 582 (S.D.N.Y. 1999)

Sometimes judges have a difficult time understanding how to apply *Daubert* correctly in the design defect area as illustrated by *Lauzon v. Senco Products, Inc.*²⁵⁵ The plaintiff in *Lauzon*, a carpenter, sued the creators of a bottom-fire pneumatic nail gun alleging a defect in the gun's design permitted an extra nail to be fired from the gun unexpectedly which resulted in injury to the plaintiff.²⁵⁶ The court did not permit the plaintiff's forensic engineer to testify for the following reasons.²⁵⁷ First, the expert was unable to test his theory of design defect by duplicating the events of the accident.²⁵⁸ Second, he was also unable to rule out other accident theories other than the lack of a manufacturing defect.²⁵⁹ Third, the expert's theory regarding the cause of the accident had "never been subjected to peer review, nor [had] it been published."²⁶⁰ Without the opinion of the plaintiff's forensic engineer, there was a lack of evidence to support the plaintiff's claim, so summary judgment was entered in favor of the defendant.²⁶¹ The plaintiff appealed on the basis that the district court erred in excluding the expert under *Daubert*.²⁶²

On appeal, the court reversed the exclusion the forensic engineer.²⁶³ Even though the expert was unable to duplicate the events of the accident, his testing still provided insight as to how the accident may have occurred.²⁶⁴ Moreover, the appellate court took issue with the trial court's dismissal of several articles, one of which had been authored by the expert in question, that supported the plaintiff's theory of the case.²⁶⁵ This suggested it had at least been peer reviewed, and perhaps even accepted in the relevant scientific community.²⁶⁶ The appellate court also took issue with the district court's problem regarding the expert's inability to rule out other theories of the incident since the ability to do so is not required under *Daubert*.²⁶⁷ The case was reversed and remanded with instructions to admit the testimony of the expert.²⁶⁸

2. Design and Manufacturing Defects

Kumho Tire Co., Ltd. v. Carmichael,²⁶⁹ the landmark case which was responsible for extending *Daubert* to all types of expert testimony, not just

255. *Lauzon v. Senco Prods.*, 123 F. Supp. 2d 510 (D. Minn. 2000), *rev'd*, 270 F.3d 681 (8th Cir. 2001).

256. *Id.*

257. *Id.* at 513.

258. *Id.* at 512.

259. *Id.*

260. *Id.*

261. *Id.* at 513-14.

262. *Lauzon v. Senco Prods.*, 270 F.3d 681 (8th Cir. 2001).

263. *Id.*

264. *Id.* at 689.

265. *Id.* at 690-91.

266. *Id.* at 691.

267. *Id.* at 693-94.

268. *Lauzon*, 270 F.3d at 696.

269. 526 U.S. 137 (1999).

those concerned with scientific opinion, was a design and manufacturing defect case. The plaintiffs in *Kumho* had brought suit after a tire on a minivan blew out causing the vehicle to overturn.²⁷⁰ They alleged the accident was caused by defects in the tire's design and/or manufacture.²⁷¹ The plaintiffs rested their case on the testimony of an expert in tire failure analysis who opined a defect did, in fact, cause the blowout.²⁷² The court excluded the expert after applying the relevant *Daubert* factors to the case and concluding they weighed against the reliability of the expert's methods.²⁷³ The Eleventh Circuit reversed on the basis that the district court had erred in applying *Daubert* because the evidence at issue in the case was technical, not scientific evidence.²⁷⁴ The Supreme Court reversed the circuit court's opinion stating it "would prove difficult, if not impossible, for judges to administer evidentiary rules under which a gatekeeping obligation depended upon a distinction between 'scientific' knowledge and 'technical' or 'other specialized' knowledge."²⁷⁵ All of the cases that form the population from which the research sample was drawn for the present study qualified for inclusion as a result of the decision in *Kumho*. With that in mind, we now turn to examining how other design and manufacturing defect cases have been decided since *Kumho* altered the landscape so dramatically.

Beyond the *Kumho* decision, five *Daubert* claims from four cases dealt with expert testimony on the existence of defects in both a product's design and manufacture.²⁷⁶ So long as the expert at issue was properly qualified to give an opinion and had provided the court with sufficient evidence to establish a reliable methodology, the courts in the research sample always admitted such testimony. For example, in *Rudd v. General Motors Corp.*,²⁷⁷ the plaintiff was injured when the fan blade in his truck broke loose and struck him in the head, neck, and arm. The plaintiff claimed his injuries occurred as a result of defects in the fan blade's design and manufacture.²⁷⁸ One of the experts offered by the plaintiff to establish causation was a mechanical engineer whose expertise was in failure analysis.²⁷⁹ This expert concluded to a reasonable degree of engineering certainty "that the fan metal contained [a] microscopic defect (either a scratch or mark or an inclusion)

270. *Id.*

271. *Id.*

272. *Id.*

273. *Id.* at 145

274. *Carmichael v. Samyang Tire, Inc.*, 131 F.3d 1433, 1436-37 (11th Cir. 1997).

275. *Kumho*, 526 U.S. at 148.

276. *Fee v. Brass Eagle, Inc.*, 2002 WL 1465762 (N.D. Ohio 2002); *Tolliver v. Naor*, 2001 WL 1345735 (E.D. La. 2001); *Mannix v. Chrysler Corp.*, 2001 WL 477291 (E.D.N.Y. 2001); *Rudd v. Gen. Motors Corp.*, 127 F. Supp. 2d 1330 (M.D. Ala. 2001).

277. 127 F. Supp. 2d 1330 (M.D. Ala. 2001).

278. *Id.* at 1332.

279. *Id.* at 1338.

because he had gone through a process of eliminating the alternative explanations.²⁸⁰ Although the expert was unable to provide any direct evidence of such a defect, he was permitted to testify.²⁸¹

[H]is testimony is replete with circumstantial evidence that – through a process of eliminating alternative explanations – might support a finding of a manufacturing defect. [His] testimony offers a list of alternative possible causes of a metal-fatigue fracture, a description of the physical indicia of alternative causes, and a claim that his physical examination revealed an absence of any of the physical indicia of alternative causes.²⁸²

The court also concluded that the expert testimony was based upon sufficient data, reliable principles and methods, and reliable application of the methods to the facts.²⁸³

*Mannix v. Chrysler Corp.*²⁸⁴ stands in contrast to *Rudd* in demonstrating the exclusion of experts when the court finds they used unreliable methods. In *Mannix*, the plaintiff was severely burned after the vehicle he was riding in burst into flames upon colliding with another automobile.²⁸⁵ The plaintiff alleged that the fire was caused by defects in the airbag system and proffered an expert to support this claim.²⁸⁶ The expert admittedly had “never taken a course relating to airbag design, testing or manufacture.”²⁸⁷ Despite lacking qualifications, the expert concluded that there was a defect in the car.²⁸⁸ The court not only disposed of this testimony due to the lack of qualifications, it also noted the complete lack of reliable methodology for basing the opinion.²⁸⁹

He did not conduct any test to confirm his conclusion that an airbag malfunction caused the fire, and when asked “According to your theory, what caused the airbag to malfunction?” he replied, “I don’t know.” When asked: “Is your theory that the airbag caused the fire based upon any assumptions?” He answered, “Yes” and then “Can you tell us what assumptions your theory is based on?” he replied, “I would have to think about that at some length.”²⁹⁰

280. *Id.* at 1341.

281. *Id.* at 1342.

282. *Id.*

283. *Id.*; see also *Fee v. Brass Eagle, Inc.*, 2001 WL 477291 at *6 (E.D.N.Y. 2001) (allowing plaintiff’s experts to testify in light of their experience in the forensic examination of firearms and the fact that they had actually examined the gun in question as the basis for their opinions).

284. 2001 WL 477291 (E.D.N.Y. 2001).

285. *Id.* at *1.

286. *Id.*

287. *Id.* at *3.

288. *Id.* at *1.

289. *Id.*

290. *Id.* at *4-5.

3. Other Types of Defects

Six of the forensic engineering claims in the research sample did not allege either a design or manufacture defect, but instead concerned other things that went wrong with a product as was the case in *Fee v. Brass Eagle, Inc.*²⁹¹ Two experts were excluded by the court from testifying in a case brought to recover damages for injuries allegedly caused to a child from a spontaneous discharge from a paintball gun.²⁹² Two of the defense experts would have opined that the “trigger extension of the gun broke due to an excessive or abnormal amount of force applied to that component.”²⁹³ Both experts believed this to be the case since “the only way to break [the] trigger. . . is by having the [gun’s safety mechanism on] and pulling the trigger at a force that exceeds 35 to 40 pounds, which is not your normal situation.”²⁹⁴ But the experts could not offer any grounds for their opinions.²⁹⁵ Neither had tested the paintball gun at issue to determine the amount of force necessary to break the trigger while the safety mechanism was engaged.²⁹⁶ The only basis for the experts’ assumption was the standards of the American Society for Testing and Materials.²⁹⁷ Yet, there was no evidence that the paintball gun was designed to meet these standards.²⁹⁸ Accordingly, their opinions were deemed to be speculative and were excluded on that basis.²⁹⁹

In *Reliance Ins. Co. v. Keystone Shipping Co.*,³⁰⁰ an insurance company filed a declaratory judgment action in which the primary issue in dispute was whether damages to a ship were caused by normal “wear and tear” as asserted by the insurance company, or by corrosion from biological microbes as asserted by the ship owners.³⁰¹ A total of four experts were offered from both parties to testify regarding the cause of damage.³⁰² The court excluded all three of the experts offered by the defense since all three had failed to conduct a comprehensive inspection of the ship, had relied on unproven methods in analyzing the ship’s measurements and had relied on theories that had not been reliably demonstrated to apply to marine vessels.³⁰³ The court did, however, permit the plaintiff’s expert to testify.³⁰⁴

291. 2002 WL 1465762 (N.D. Ohio 2002).

292. *Id.* at *6.

293. *Id.* at *4.

294. *Id.*

295. *Id.*

296. *Id.*

297. *Id.*

298. *Fee*, 2002 WL 1465762 at *4.

299. *Id.*

300. 102 F. Supp. 2d 181 (S.D.N.Y. 2000).

301. *Id.* at 186.

302. *Id.* at 188-91.

303. *Id.* at 189-91.

Not only did the expert's experience qualify him to testify, but also his conclusions were based on standard analysis of gauging data, which is an acceptable methodology according to the court.³⁰⁵

V. CONCLUSION

A. *Consistencies in Applying Daubert*

First and foremost, courts are taking their gatekeeping responsibilities very seriously when examining the qualifications of a witness to give an expert opinion. There were several cases in the research sample in which judges barred people with questionable or inapplicable credentials from testifying.³⁰⁶ Yet, judges are being careful not to make such rulings cursorily. They appear to be conducting the case-by-case analysis mandated by Rule 702 by qualifying not only those expert with appropriate academic degrees, but also qualifying those experts skilled in various forensic investigative techniques by virtue of their training and experience as well.³⁰⁷

Second, just because a witness is accepted by a court as a qualified expert, does not mean the court will allow the expert wide latitude in the scope of the testimony to be given at trial. Judges appear to be taking great care to limit the scope of expert testimony to only those opinions properly within the witness' field of expertise. Courts have become vigilant in prohibiting even well-qualified experts from giving opinions that go beyond data supported by their investigations and go into the realm of speculation.³⁰⁸ Thus, for example, medical doctors with specializations in forensic pathology were limited to testifying with regard to the results of their autopsies.³⁰⁹ One was not permitted to speculate as to what he believed a perpetrator might have been trying to accomplish by gagging a victim;³¹⁰ another was not permitted to speculate with regard to results of toxicological tests that were not actually performed.³¹¹ Similarly, qualified toxicologists were not permitted to approximate blood alcohol concentrations by reviewing the results of police-administered field sobriety tests,³¹² nor was a

304. *Id.* at 188-91.

305. *Id.* at 191.

306. *See, e.g.*, *Gates v. City of Memphis*, 2000 WL 377343 (6th Cir. 2000) (excluding police officer from testifying with regard to bullet trajectory analysis); *Weisgram v. Marley Co.*, 169 F.3d 514 (8th Cir. 1999) (excluding fire chief from giving an opinion on whether a baseboard heater was defective); *Kinser v. Gehl Co.*, 184 F.3d 1259 (10th Cir. 1999) (excluding product safety expert from testifying about design defects in the absence of design engineering credentials).

307. *See, e.g.*, *Fee v. Brass Eagle, Inc.*, 2002 WL 1465762 (N.D. Ohio. 2002) (allowing testimony regarding alleged defects in a paintgun from a non-engineer with experience in forensic analysis of firearms); *In re Bonham*, 251 B.R. 113 (D. Alaska 2000) (accepting non-CPAs as experts in forensic accounting); *Tolliver v. Naor*, 2001 WL 1345735 (E.D. La. 2001) (accepting non-engineer as an expert in an automotive design defect case in light of his experience in automotive design).

308. *See infra* notes 311-12 and accompanying text.

309. *Id.*

310. *Schieber v. City of Philadelphia*, 2000 WL 1670888 (E.D. Pa. 2000).

311. *Verzwyvelt v. St. Paul Fire & Marine Ins. Co.*, 175 F. Supp. 2d 881 (W.D. La. 2001).

312. *See, e.g.*, *United States v. Horn*, 185 F. Supp. 2d 530 (D. Md. 2002); *Virgin Islands v. Carela*,

neuro-psychologist permitted to testify about toxicological causation of neuro-psychological illness because he was not a toxicologist.³¹³

Third, even when an expert is properly qualified to give an opinion, and further when the opinion is limited to the area of the witness' expertise, consistent with *Daubert's* mandate, judges exclude testimony that is based upon unreliable methodologies.³¹⁴ So, for example, a CPA was not permitted to offer an opinion on an alleged fraudulent accounting scheme when there were factual mistakes in calculations and when there was insufficient consideration of all relevant factors.³¹⁵ Similarly, a qualified expert in momentum analysis could not give an opinion as to the cause of an accident when the calculations underlying the opinion failed to take into account several important variables.³¹⁶ And an engineer was not permitted to testify about consumer misuse as the cause of a gun accident when he had not actually tested the weapon in question.³¹⁷

Given these three conclusions overwhelmingly supported by the data in the research sample, it appears that judges are doing an excellent job in consistently applying the *Daubert* factors to screen out unqualified experts, speculative forensic scientific opinions, and opinions based on unreliable methodologies.

B. Inconsistencies in Applying Daubert

Unlike the study that found only two limited exceptions to the general rule of consistency in applying *Daubert* to judge the admissibility of behavioral scientific expert testimony,³¹⁸ the present study revealed more inconsistencies when examining how *Daubert* is being applied to forensic sciences in the post-*Kumho* era. The first major inconsistency has to do with expert testimony from forensic accountants or forensic economists concerning the calculation of damages in civil cases.³¹⁹ Some courts prohibit any testimony from forensic accountants or economists on the issue of damages calculations.³²⁰ Other courts welcome such testimony.³²¹ And still other courts permit only general testimony regarding what should be included in a jury's calculations for damages, but prevent the expert from

2001 WL 1825823 (V.I. 2001).

313. *Louderback v. Orkin Exterminating Co.*, 26 F. Supp. 2d 1298 (D. Kan. 1998).

314. *See infra* notes 317-19 and accompanying text.

315. *In re Bonham*, 251 B.R. 113 (D. Alaska 2000).

316. *Smithers v. C & G Custom Module Hauling*, 172 F. Supp. 2d 765 (E.D.Va. 2000).

317. *Fee v. Brass Eagle, Inc.*, 2002 WL 1465762 (N.D. Ohio 2002).

318. *Fradella, et al.*, *supra* note 71.

319. *See infra* notes 322-23 and accompanying text.

320. *See, e.g.*, *Voilas v. Gen. Motors Corp.*, 73 F. Supp. 2d 452 (D. N.J. 1999).

321. *See, e.g.*, *Maiz v. Virani*, 253 F.3d 641 (11th Cir. 2001); *EFCO Corp. v. Symons Corp.*, 219 F.3d 734 (8th Cir. 2000); *Coleman v. Dydula*, 139 F. Supp. 2d 388 (W.D.N.Y. 2001); *Walker v. Yellow Freight Sys.*, 1999 WL 757022 (E.D. La. 1999).

testifying with respect to any particular amount of damages. The rationale for limiting damages testimony varies. Some courts so hold on the basis that allowing such testimony would usurp the jury's fact-finding role.³²² Other courts reason that testimony with regard to specific figures lacks a proper foundation, especially in wrongful death cases in which there is often no way of knowing how a person's life would have progressed, thereby making damage calculations speculative at best.³²³ Even when such expert testimony is permitted by a court, there are inconsistencies in court rulings as to what information the expert may base his or her calculations.³²⁴

The second inconsistency that was revealed by the qualitative content analysis concerned from whom courts will accept testimony as to causation of illness in cases where someone has allegedly been made ill by exposure to a toxic substance. Ideally, such causation testimony should be provided by a physician with expertise in toxicology.³²⁵ A physician without expertise in toxicology is probably not qualified to give such causation testimony.³²⁶ But whether a qualified expert in the field of toxicology, who is not also a physician, is permitted to give such causation testimony remains in question.³²⁷

The third major inconsistency has to do with what type of testing is required before an expert in forensic engineering is permitted to testify with respect to a design or manufacturing defect. While it seems clear that testing the alleged faulty product is necessary,³²⁸ actually identifying the specific defect does not appear to be necessary.³²⁹ Ruling out other potential causes of an accident, even though there is not necessarily any direct evidence of the remaining cause is acceptable to some courts, but at least one court refused to do so without more evidence.³³⁰

By far, however, the most inconsistencies are found in the area of forensic identifications.³³¹ Numerous scholars and at least one court have questioned whether fingerprint identifications are sufficiently reliable to be admitted under *Daubert-Kumho*.³³² In spite of the controversy caused by

322. See, e.g., *Smith v. Ingersoll-Rand Co.*, 214 F.3d 1235 (10th Cir. 2000).

323. See, e.g., *Schieber v. City of Philadelphia*, 2000 WL 1843246 (E.D. Pa. 2000); *Saia v. Sears Roebuck & Co.*, 47 F. Supp. 2d 141 (D. Mass. 1999).

324. See *Schieber v. City of Philadelphia*, 2000 WL 1843246 (E.D. Pa. 2000); compare with *Walker v. Yellow Freight Systems*, 1999 WL 757022 (E.D. La. 1999).

325. See, e.g., *Louderback v. Orkin Exterminating Co.*, 26 F. Supp. 2d 1298 (D. Kan. 1998).

326. *Amorgianos v. Nat'l R.R. Passenger Corp.*, 137 F. Supp. 2d 147, 182-85 (E.D.N.Y. 2001) (excluding causation testimony from plaintiff's treating physician and from a consulting neurologist due to lack of expertise in toxicology), *aff'd*, 303 F.3d 256 (2d Cir. 2002).

327. See, e.g., *Plourde v. Gladstone*, 190 F. Supp. 2d 708 (D. Vt. 2002) (rejecting causation testimony from a Ph.D. in toxicology); *Amorgianos*, 137 F. Supp. 2d at 158-59 (rejecting causation testimony from a certified industrial hygienist with both a bachelor's and master's degree in environmental health, and a Doctorate in Public Health).

328. *Fee v. Brass Eagle, Inc.*, 2002 WL 1465762 (N.D. Ohio 2002).

329. See *infra* note 332 and accompanying text.

330. See, e.g., *Rudd v. Gen. Motors Corp.*, 127 F. Supp. 2d 1330 (M.D. Ala. 2001); *Lauzon v. Senco Prods.*, 270 F.3d 681 (8th Cir. 2001).

331. *Saks*, *supra* note 54.

332. See *United States v. Llera Plaza*, 179 F. Supp. 2d 492 (E.D. Pa. 2002); see also *Faigman et al.*, *supra* note 58. But see *United States v. Llera Plaza*, 188 F. Supp. 2d 549 (E.D. Pa. 2002); see

that one case, courts have continued to be consistent in admitting fingerprint identification testimony, even though the arguments put forth in *Llera Plaza I* are well-founded and well-reasoned.³³³

A much more pronounced split on the admissibility of forensic identification testimony can be seen in cases ruling on handwriting analysis. Most of the time, handwriting analysis experts are only permitted to testify regarding the “physical mechanics and characteristics of handwriting” and “similarities between the questioned documents and defendant’s known exemplars. . . .”³³⁴ Under this approach, experts are not permitted to offer an opinion on whether there is a match between a known exemplar and a questioned sample. In contrast to this approach, however, some courts allow handwriting experts to offer such ultimate conclusions.³³⁵

C. Overall Conclusion

Consistent with the prior study of the way in which *Daubert* was being applied to behavioral sciences,³³⁶ it appears that judges have been remarkably consistent in applying *Daubert* to several types of forensic science since *Kumho* made *Daubert* applicable to many areas originally thought to be beyond its province when *Daubert* was first decided. This consistency is marked when applying *Daubert* to truly scientific areas of forensic investigations, such as with forensic pathology, forensic physics (i.e., ballistics and audiology), forensic fire science, and certain types of forensic engineering. But application of *Daubert*, post-*Kumho*, to the more technical areas of forensic science, such as forensic accounting, fingerprint analysis, and handwriting analysis has proven more difficult for the courts. This is undoubtedly due, in part, to *Daubert*’s factors for admissibility being based on Karl Popper’s notion of science – specifically on falsifiability. In spite of struggling to fit technical forensic evidence into the scientific rubric of peer review, replication, and known error rates as set forth in *Daubert*, courts are doing a remarkably good job in applying *Daubert* fairly consistently in the post-*Kumho* era.

also sources cited, *supra* note 58.

333. See, e.g., Faigman *et al.*, *supra* note 58; see also Sombat, *supra* note 8.

334. United States v. Hernandez, 2002 WL 1335595 (10th Cir. 2002); see also, United States v. Rutherford, 104 F. Supp. 2d 1190 (D. Neb. 2000); United States v. Van Wyk, 83 F. Supp. 2d 515 (D. N.J. 2000); United States v. Santillan, 1999 WL 1201765 (N.D. Cal. 1999); United States v. Hines, 55 F. Supp. 2d 62 (D. Mass. 1999).

335. See, e.g., United States v. Paul, 175 F.3d 906 (11th Cir. 1999); United States v. Gricco, 2002 WL 746037 (E.D. Pa. 2002); United States v. Elmore, 56 M.J. 533 (N.M. Ct. Crim. App. 2001).

336. Fradella, *et al.*, *supra* note 71.

