The Impact of Daubert on Forensic Science

Henry F. Fradella

Lauren O'Neill

Adam Fogarty

Follow this and additional works at: https://digitalcommons.pepperdine.edu/plr

Part of the Evidence Commons, and the Science and Technology Law Commons

Recommended Citation
Available at: https://digitalcommons.pepperdine.edu/plr/vol31/iss2/1

This Article is brought to you for free and open access by the Caruso School of Law at Pepperdine Digital Commons. It has been accepted for inclusion in Pepperdine Law Review by an authorized editor of Pepperdine Digital Commons. For more information, please contact bailey.berry@pepperdine.edu.
The Impact of *Daubert* on Forensic Science*

Henry F. Fradella**
Lauren O'Neil***
Adam Fogarty****

* This article was presented at the annual meeting of the Academy of Criminal Justice Sciences in Boston, MA in March of 2003. It was collaboratively researched and written as part of a year-long independent study conducted by Professor Fradella and his two research assistants during the 2002-2003 academic year at The College of New Jersey.


TABLE OF CONTENTS

I. INTRODUCTION

II. LITERATURE REVIEW
   A. Background on the Admissibility of Scientific Evidence
      1. The Frye General Acceptance Test
      2. The Federal Rules of Evidence
      3. The Daubert Standard for Admissibility of Scientific Evidence
         4. Daubert Expanded
   B. Implications for Forensic Science
   C. Purpose of the Present Study

III. RESEARCH METHODOLOGY
   A. Data Collection
   B. Data Exclusion
   C. Data Analysis and Coding

IV. RESULTS AND DISCUSSION
   A. Forensic Accounting and Economics (N = 16; 17.2%)
      1. Fraudulent Accounting
      2. Damage Calculations
   B. Forensic Toxicology (N = 11; 11.8%)
   C. Forensic Identification (N = 25; 26.9%)
      1. Fingerprint Identification
      2. Other Forensic Identification Practices
      3. Handwriting Analysis
   D. Fire Science (N = 5; 5.4%)
   E. Forensic Physics (N = 4; 4.3%)
   F. Forensic Pathology (N = 4; 4.3%)
   G. Forensic Engineering (N = 28; 30.1%)
      1. Design Defects
      2. Design and Manufacturing Defects
      3. Other Types of Defects

V. CONCLUSION
   A. Consistencies in Applying Daubert
   B. Inconsistencies in Applying Daubert
   C. Overall Conclusion
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. Peter Huber 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.” To address the problem of “junk science” in the courtroom, the United States Supreme Court decided Daubert v. Merrell Dow Pharmaceuticals, Inc. 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. 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.” 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.

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. 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.

---

5. Id. at 592.
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. In Frye v. United States, 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.

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." 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."

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." What is general acceptance? Is it "wide-spread, prevalent, [and] extensive, though not universal," or is it "[agreement] by a substantial section of the [relevant] scientific community?" 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."

10. 293 F. 1013 (D.C. Cir. 1923).
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. 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. 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." 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." 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. 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. Their parents brought suit alleging the defects were caused by Bendectin, an antinausea drug produced by the predecessor companies to the Merrell-Dow Pharmaceutical Company in the early 1950s. The drug was approved by the Food and Drug Administration in 1956 as an antinausea drug. Physicians frequently prescribed the drug for treatment of "morning-sickness" in pregnant women between 1957 and 1983. 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.

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.
23. Id. at 582.
24. Id.
26. Id.
27. Id.
be able to proffer evidence to the contrary. To support their motion, Merrell Dow introduced an affidavit by a well-credentialed epidemiologist with an expertise in chemical exposure risk. The physician cited thirty published studies on the subject, none of which concluded Bendectin caused birth defects.

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. The District Court granted Merrell Dow’s motion for summary judgment. 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.” 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. 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. The Court made clear that the critical concerns of Rule 702 are evidentiary reliability and relevancy.

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.”

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.” 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. Proffered scientific evidence must satisfy both prongs to be admissible.

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 Pharm., Inc., 951 F.2d 1128, 1129-30 (9th Cir. 1991) (citing Frye v. United States, 293 F. 1013, 1014 (D.C. Cir. 1923)).
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.
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.\textsuperscript{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."\textsuperscript{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, \textit{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."\textsuperscript{43} This involves an examination of the methodology underlying the expert opinion to determine whether it utilizes valid scientific methods and procedures. \textit{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.\textsuperscript{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.\textsuperscript{45}

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

\begin{quote}
[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
\end{quote}

\textsuperscript{41} Fed. R. Evid. 702.
\textsuperscript{43} \textit{Daubert}, 509 U.S. at 589.
\textsuperscript{44} \textit{See}, e.g., In re Paoli R.R. Yard PCB Litig., 35 F.3d 717, 750 (3d Cir. 1994).
\textsuperscript{45} \textit{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.”

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.

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. Admissibility decisions are to be overturned on appeal only if the trial court’s decision was an abuse of discretion. Initially, *Daubert* applied only to scientific evidence, but in *Kumho Tire Co. v. Carmichael*, the Court held all expert testimony that involves scientific, technical, or other specialized knowledge must meet the *Daubert* test for admissibility.

*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. The second, more important reason is that *Kumho* “eliminated the trial judge’s impossible task of differentiating between scientific and non-scientific evidence.”

But, as the next section will explain, the

46. Daubert v. Merrell Dow Pharmaceuticals, 43 F.3d 1311, 1315-16 (9th Cir.).
47. Id.
49. Id.
51. Id. at 138.
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.\(^5\) 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.\(^6\) While the court ultimately reversed itself on March 13, 2002, the debate over the admission of fingerprint evidence at trial is far from over.\(^7\)

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."\(^8\)

*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,

---


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

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. 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. 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.). 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.

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. 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.
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, 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

Daubert, "is its falsifiability, or refutability, or testability." 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. The expert opined that the plaintiff had been fired after having made statements that the defendants maintained a work environment that was racially hostile. 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.

The remaining ten of the twenty-eight claims excluded from this study presented issues of forensic psychiatry or forensic psychology. 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. To avoid unnecessary duplication, no claims in the present study dealing with forensic behavioral science were included in the research sample.

67. 165 F.3d 1084 (7th Cir. 1999).
68. Id. at 1086.
C. Data Analysis and Coding

Each of the 130 claims was reviewed by three researchers and analyzed using ethnographic content analysis. 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, 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, 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, subcategories 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. Second, the accounting expert must adhere to generally accepted principles of forensic accounting in conducting his/her analysis. 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 illustrates the general rationale with regard to this type of testimony. The court was trying to determine the existence of a Ponzi scheme by reconstructing a debtor’s disarrayed accounting records from a business that involved selling airline tickets. Three experts were offered by the parties in support of their respective positions. All three were accepted by the court as being well-qualified experts in accounting practices, even though not all were Certified Public Accountants (“CPA”). The first expert, a

75. See supra notes 41-42 and accompanying text.
76. See supra notes 43-44 and accompanying text.
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.
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.\textsuperscript{82} The second expert was also permitted to testify since he was a CPA and had significant experience in reconstructive accounting.\textsuperscript{83} The third expert, however, was not permitted to testify even though he was well-qualified.\textsuperscript{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.”\textsuperscript{85} His lack of vigorous examination was the deciding factor for the court in determining that his testimony was inadmissible under Daubert.\textsuperscript{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.”\textsuperscript{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.,\textsuperscript{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.\textsuperscript{89} But not all courts have followed this “middle of the

\textsuperscript{82} Id. at 132.
\textsuperscript{83} Id.
\textsuperscript{84} Id. at 136.
\textsuperscript{85} In re Bonham, 251 B.R. at 136.
\textsuperscript{86} Id. at 135-36.
\textsuperscript{87} Fed. R. Evid. 702.
\textsuperscript{88} 214 F.3d 1235 (10th Cir. 2000).

337
road” approach. Some courts prohibit any testimony from forensic accountants or economists on the issue of damages calculations. In stark contrast to such an outright ban, other courts welcome such testimony.

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, 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. The court found this methodology to be unreliable since the father, as the person who would financially benefit from the verdict, was biased. 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. 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.

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. 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. 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.

93. Id.
94. Id. at *5.
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).
Virgin Islands v. Carela\textsuperscript{100} nicely illustrates two principles that seem in perfect accord with the intent of Daubert.\textsuperscript{101} First, results from properly maintained and calibrated instruments analyzing breath alcohol levels are admissible as direct evidence of intoxication.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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\textsuperscript{105} with United States v. Powe.\textsuperscript{106} Both were criminal cases in which defendants were convicted of drug use charges based on the results of toxicological tests.\textsuperscript{107} It was undisputed in both cases that the test results demonstrated the use of a controlled substance.\textsuperscript{108} But, these two cases differed as to whether such results were sufficient to show “knowing use” of the given substances.\textsuperscript{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.\textsuperscript{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 \textit{actus reus} of the offense) and the \textit{mens rea} requirement of scienter (i.e., knowing use) without any supplemental testimony.\textsuperscript{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.\textsuperscript{112} Thus, it appears that

\begin{thebibliography}{112}
\item 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.).
\item 100. 2001 WL 1825823 (V.I. 2001).
\item 101. Id.
\item 102. Id. at *11.
\item 103. Id. at *4.
\item 104. Id. at *8; see also United States v. Horn, 185 F. Supp. 2d 530, 533 (D. Md. 2002).
\item 105. 55 M.J. 76 (C.A.A.F. 2001).
\item 107. See Green, 55 M.J. at 77; Powe, 2000 WL 703684 at *1.
\item 108. Powe, 2000 WL 703684 at *2; Green, 55 M.J. at 79.
\item 109. Powe, 2000 WL 703684 at *5; Green, 55 M.J. at 81.
\item 110. Green, M.J. at 81-85.
\item 111. Id. at 81-85.
\item 112. Id. at 87; see also Powe, 2000 WL 703684 at *5.
\end{thebibliography}
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.

---


\(^{115}\) 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.


\(^{123}\) 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 subcategories. 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).
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.\textsuperscript{135}

Next, despite the fact that \textit{Kumho} had expanded \textit{Daubert} to apply to technical evidence, the court determined the peer review factor applied exclusively to the evaluation of a scientific community.\textsuperscript{136} Since fingerprinting does not belong to a specific scientific community, the court concluded that true peer review was not possible, and thus that \textit{Daubert} factor weighed against the admissibility of fingerprint evidence.\textsuperscript{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.\textsuperscript{138}

Finally, the court determined there was a lack of controlling standards when evaluating fingerprint identification evidence for three reasons.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{142}

Given the court’s \textit{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 . . . \textsuperscript{143}

\begin{itemize}
\item \textsuperscript{135} \textit{Id.} at 506-509, 516.
\item \textsuperscript{136} \textit{Id.}
\item \textsuperscript{137} \textit{Id.} at 509, 516.
\item \textsuperscript{138} \textit{Id.} at 509-13, 516.
\item \textsuperscript{139} \textit{Id.} at 513.
\item \textsuperscript{140} \textit{Id.} at 514.
\item \textsuperscript{141} \textit{Llera Plaza I}, 179 F. Supp. 2d at 513.
\item \textsuperscript{142} \textit{Id.} at 513-14.
\item \textsuperscript{143} \textit{Id.} at 516.
\end{itemize}
Two months after the decision in Plaza I was issued, the court reversed itself. 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. The agent also explained the very low error rate enjoyed by FBI-certified practitioners. This testimony convinced the court that its initial conclusions regarding the error rate and controlling standards factors of the Daubert test were incorrect. 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. 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. 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.

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. But so far, this has not materialized. No court has granted a motion to exclude fingerprint evidence as unreliable under Daubert. Courts continue to receive fingerprint identification evidence using the rational 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.

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.
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.\footnote{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.\footnote{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.\footnote{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.\footnote{156} In other words, a particular footprint or hair sample “is consistent with” or “could be” a match with a particular suspect.\footnote{157} Individualization is only proper with techniques designed to allow for individualization, such as forensic DNA analysis.\footnote{158}

One forensic identification case, *United States v. Pollard*,\footnote{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.\footnote{160} The defense objected that the physician had relied upon the Tanner Scale of Human Development to make an age determination.\footnote{161} The Tanner Scale is designed to estimate sexual maturity, not a child’s chronological age.\footnote{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

\begin{footnotesave}
\footnotetext{153}{Epstein, *supra* note 151, at 650.}
\footnotetext{154}{See *Daubert*, 509 U.S. at 590; FED. R. EVID. 702, 703.}
\footnotetext{155}{See *Daubert*, 509 U.S. at 590.}
\footnotetext{156}{See *United States v. Allen*, 208 F. Supp. 2d 984, 985 (N.D. Ind. 2002).}
\footnotetext{157}{See id. at 986; see also *United States v. Santiago*, 156 F. Supp. 2d 145 (D.P.R. 2001).}
\footnotetext{158}{*United States v. Trala*, 162 F. Supp. 2d 336 (D. Del. 2001); Santiago, 156 F. Supp. 2d 145.}
\footnotetext{159}{128 F. Supp. 2d 1104 (E.D. Tenn. 2001).}
\footnotetext{160}{Id. at 1107.}
\footnotetext{161}{Id. at 1113.}
\footnotetext{162}{Id. at 1115-16.}
\end{footnotesave}
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 \textit{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 \textit{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 \textit{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


\(^{164}\) 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. Fuji, 152 F. Supp. 2d 939 (N.D. Ill. 2000) (excluding a handwriting analysis expert for lack of expertise in dealing with Japanese handprinting).

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. For example, in United States v. Paul, 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. 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.

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. 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. 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. 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. 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. Weisgram involved a townhouse that had allegedly caught fire as a result of a defective baseboard heater. The local captain of the fire department conducted the initial investigation into the origin of the fire. He ruled out

168. 175 F.3d 906 (11th Cir. 1999).
169. Id. at 911.
170. Id. at 909.
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.” Instead, it was his opinion that the fire had started near the baseboard heater. 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. But the trial court had permitted the fire chief to opine that the fire had started because of “a malfunction of the heater,” even though the fire chief admitted he was “not an electrical expert” and that he did not ‘know what happened with the heater.’

The plaintiff in Weisgram also offered another expert who the trial court had accepted as a “fire investigator” and “technical forensic expert.” The court’s opinion did not identify what qualified him as either of these but did mention the expert was a certified “master electrician.” 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. 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.

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. However, courts will disallow such testimony if the proffered expert lacks the proper qualifications. For example, in Gates v. City of Memphis, the plaintiff appealed the exclusion of an expert it had offered to testify about the level of threat another officer would likely have
entertained prior to shooting and killing someone approaching a marked
police car with a drawn gun. This opinion was based, in part, on the
expert’s trajectory analysis of bullets discharged at the scene. 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,” 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.

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. Failing to do so will result in exclusion under
Daubert as illustrated by Smithers v. C & G Custom Module Hauling.
The plaintiff in Smithers had been involved in an automotive accident. 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. 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.

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., concerned the physics of sound. The defendants

---

190. Id.
191. Id. at *3.
192. Id. at *3-**4.
193. Smithers, 172 F. Supp. 2d at 771.
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.\(^{211}\)
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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{214} This opinion was based on "physical evidence of mouth injuries, including bruising and a 'bite mark type laceration of the tongue.'\textsuperscript{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.\textsuperscript{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.\textsuperscript{217}

*Verzwyvelt v. St. Paul Fire & Marine Ins. Co.*\textsuperscript{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.\textsuperscript{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."\textsuperscript{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"\textsuperscript{221} and that he had "little or no scientific knowledge concerning listeria, listeria infections, or the subfield of hematopathology."\textsuperscript{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.\textsuperscript{223}

\textbf{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

\begin{footnotesize}
\begin{enumerate}
\item \textsuperscript{212} Id. at *4.
\item \textsuperscript{213} Id. at *4.
\item \textsuperscript{214} Id. at *5.
\item \textsuperscript{215} Id.
\item \textsuperscript{216} Id.
\item \textsuperscript{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).
\item \textsuperscript{218} 175 F. Supp. 2d 881 (W.D. La. 2001).
\item \textsuperscript{219} Id. at 881.
\item \textsuperscript{220} Id. at 882.
\item \textsuperscript{221} Id. at 883.
\item \textsuperscript{222} Id. at 886.
\item \textsuperscript{223} Id. at 887-88.
\end{enumerate}
\end{footnotesize}
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. Most of the time, the experts involved in these cases are mechanical engineers. But neither Rule 702 nor Daubert requires an academic degree for someone to be a qualified expert. Thus, in some cases, a non-engineer with relevant expertise may be accepted by the court as was the case in Tolliver v. Naor. The plaintiffs were injured when their car was struck from behind by another vehicle. "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." The defense sought to exclude the plaintiff's automotive fuel system design expert under Daubert because he was "not an engineer and had never taken a college-level engineering course." 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. The Tolliver case, however, is the exception not the rule. Courts are vigilant about excluding the testimony of non-qualified experts as illustrated by Kinser v. Gehl Co.

\[\text{References:}\]

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.").
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.
\(^{243}\) Id. at 470.
\(^{244}\) Id. at 477.
designed bicycle seat was the cause of his problem. 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. The expert was offered to establish causation, specifically that the bike seat was capable of causing “erectile difficulties.” 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). His opinion was also based, in part, on the report of a physician who specialized in erectile dysfunction who had examined the plaintiff. 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.” 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. Not only did the court approve of the physician’s use of the differential diagnosis methodology, 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. In contrast to Yarchak, when qualified experts are not using reliable methodologies, courts have no hesitation excluding their opinions.

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.
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.* 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. The court did not permit the plaintiff’s forensic engineer to testify for the following reasons. First, the expert was unable to test his theory of design defect by duplicating the events of the accident. Second, he was also unable to rule out other accident theories other than the lack of a manufacturing defect. Third, the expert’s theory regarding the cause of the accident had “never been subjected to peer review, nor [had] it been published.” 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. The plaintiff appealed on the basis that the district court erred in excluding the expert under *Daubert*.

On appeal, the court reversed the exclusion the forensic engineer. 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. 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. This suggested it had at least been peer reviewed, and perhaps even accepted in the relevant scientific community. 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*. The case was reversed and remanded with instructions to admit the testimony of the expert.

2. Design and Manufacturing Defects

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

---

256. *Id.*
257. *Id.* at 513.
258. *Id.* at 512.
259. *Id.*
260. *Id.*
261. *Id.* at 513-14.
263. *Id.*
264. *Id.* at 689.
265. *Id.* at 690-91.
266. *Id.* at 691.
267. *Id.* at 693-94.
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. They alleged the accident was caused by defects in the tire's design and/or manufacture. 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. 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. 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. 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." 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. 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.*, 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. One of the experts offered by the plaintiff to establish causation was a mechanical engineer whose expertise was in failure analysis. 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)
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).
285. Id. at *1.
286. Id.
287. Id. at *3.
288. Id. at *1.
289. Id.
290. Id. at *4-*5.

356
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.* 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. 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." 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." But the experts could not offer any grounds for their opinions. 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. The only basis for the experts' assumption was the standards of the American Society for Testing and Materials. Yet, there was no evidence that the paintball gun was designed to meet these standards. Accordingly, their opinions were deemed to be speculative and were excluded on that basis.

In *Reliance Ins. Co. v. Keystone Shipping Co.*, 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. A total of four experts were offered from both parties to testify regarding the cause of damage. 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. The court did, however, permit the plaintiff's expert to testify.

292. *Id.* at *6.
293. *Id.* at *4.
294. *Id.*
295. *Id.*
296. *Id.*
297. *Id.*
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.  

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.  

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.

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. Thus, for example, medical doctors with specializations in forensic pathology were limited to testifying with regard to the results of their autopsies. One was not permitted to speculate as to what he believed a perpetrator might have been trying to accomplish by gagging a victim; another was not permitted to speculate with regard to results of toxicological tests that were not actually performed. Similarly, qualified toxicologists were not permitted to approximate blood alcohol concentrations by reviewing the results of police-administered field sobriety tests, 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).
308. See infra notes 311-12 and accompanying text.
309. Id.
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.\textsuperscript{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 \textit{Daubert}'s mandate, judges exclude testimony that is based upon unreliable methodologies.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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 \textit{Daubert} factors to screen out unqualified experts, speculative forensic scientific opinions, and opinions based on unreliable methodologies.

\textbf{B. Inconsistencies in Applying \textit{Daubert}}

Unlike the study that found only two limited exceptions to the general rule of consistency in applying \textit{Daubert} to judge the admissibility of behavioral scientific expert testimony,\textsuperscript{318} the present study revealed more inconsistencies when examining how \textit{Daubert} is being applied to forensic sciences in the post-\textit{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.\textsuperscript{319} Some courts prohibit any testimony from forensic accountants or economists on the issue of damages calculations.\textsuperscript{320} Other courts welcome such testimony.\textsuperscript{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

\textbf{2001 WL 1825823 (V.I. 2001).}
\textsuperscript{314} See infra notes 317-19 and accompanying text.
\textsuperscript{315} \textit{In re} Bonham, 251 B.R. 113 (D. Alaska 2000).
\textsuperscript{318} Fradella, et al., supra note 71.
\textsuperscript{319} See infra notes 322-23 and accompanying text.
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. 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. 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.

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. A physician without expertise in toxicology is probably not qualified to give such causation testimony. 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.

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, actually identifying the specific defect does not appear to be necessary. 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.

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

---

322. See, e.g., Smith v. Ingersoll-Rand Co., 214 F.3d 1235 (10th Cir. 2000).
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).
329. See infra note 332 and accompanying text.
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.\textsuperscript{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..."\textsuperscript{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.\textsuperscript{335}

C. Overall Conclusion

Consistent with the prior study of the way in which Daubert was being applied to behavioral sciences,\textsuperscript{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.

\textsuperscript{333} See, e.g., Faigman et al., supra note 58; see also Sombat, supra note 8.


\textsuperscript{336} Fradella, et al., supra note 71.