

An abstract graphic featuring teal wireframe lines that form a series of overlapping, flowing loops. Scattered throughout the background are small, light-colored numbers (0-9).

3. SCIENTIFIC EVIDENCE

Sections 3.1 - 3.9

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3.1 INTRODUCTION

The goal of a trial, of course, is to find the truth about disputed questions. It is not unlike science which aims to find the truth about questions regarding the physical and natural world. When the answer to a legal question depends on science, then one might expect the law to provide a warm welcome to the scientific evidence that helps answer the legal question. But it turns out to be more complicated than that.

Scientific evidence features in many legal disputes. The criminal law often engages various forensic disciplines and recently algorithms that promise scientific predictions about “dangerousness.” Judges are being asked to make crucial decisions such as granting bail and, if so, with what conditions using these algorithms. Criticisms of them raise equal protection and other important issues. Tort cases and medical malpractice cases often turn on questions relating to scientific evidence about substances or procedures. And courts review administrative agency determinations which often involve adjudicating scientific evidence. But judges are not usually scientists, nor even fluent in the scientific method much less the specific scientific disciplines that might be critical in litigation. And to complicate it further, the disciplines have conflicting methodology, vocabulary, and norms. Law puts a high price on certainty and finality. Science, on the other hand, is comfortable with uncertainty and with open questions. This tension permeates the law/science relationship.

There is an inherent tension between law and science based on uncertainty.

As a result, a judge’s job as the gatekeeper of scientific evidence can be a hard one.



3.2 OPINION EVIDENCE: THE GENERAL RULE

The general rule governing opinion evidence in court is familiar to judges: a witness should testify only about the facts she observed and should not give her opinion about those facts. The rule has a truth-seeking foundation; opinion evidence does not assist a jury or judge and might mislead it. A witness's subjective opinion about an issue in a case is irrelevant. It is for the jury or judge to draw subjective conclusions from the facts, and a witness's opinion interferes with that function. The judge, as gate-keeper, is trained to exclude opinion evidence from lay witnesses, so that the fact-finder can draw its own conclusions about the evidence.

3.3 SCIENTIFIC EVIDENCE AS OPINION EVIDENCE

This particular gatekeeping function is more nuanced with scientific evidence. The exception to the general rule barring opinion testimony is for expert opinions. And expert opinion is commonly how scientific evidence is introduced in litigation.

Expert scientific opinion evidence generally is admissible when a witness's education, training, skill, or experience gives expertise and specialized knowledge in a particular subject beyond that of the average person. The expert's opinion is admissible to assist the fact-finder. Expert witnesses also may testify about facts within their field of expertise. An expert's opinion must be based on admissible evidence. The expert is expected to give the factfinder the evidentiary basis for her opinion so that the factfinder can form an independent judgment about the expert's opinion.

There are jurisdiction-specific rules which govern what scientific opinion evidence can make its way into a proceeding and how so. In the federal system and in many states, understanding the legal architecture around the admission of scientific opinion evidence requires understanding *Daubert v. Merrell Dow Pharmaceuticals, Inc.* 509 U.S. 579 (1993) and Federal Rule of Evidence (FRE) 702.

Before FRE 702 was enacted, courts determined the admissibility of testimony about novel scientific evidence by whether it has “gained general acceptance in the particular field in which it belongs.”¹ The trial court was the gatekeeper and was expected to defer to experts in the field in making the determination. In 1993 the Supreme Court held in *Daubert* that the *Frye* test was superseded by the 1975 Federal Rules of Evidence, and specifically by Rule 702 yet seven states still use the *Frye* standard. The *Daubert* Court held that the rules governing expert evidence simply did not support the idea “that ‘general acceptance’ is an absolute prerequisite to admissibility” of scientific evidence. Moreover, such “a rigid ‘general acceptance’ requirement would be at odds with the Rules’ liberal thrust and their ‘general approach of relaxing the traditional barriers to ‘opinion’ testimony.”²



FRE 702 permits a qualified expert to testify about her opinion if:

- a. the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;
- b. the testimony is based on sufficient facts or data;
- c. the testimony is the product of reliable principles and methods; and
- d. the expert has reliably applied the principles and methods to the facts of the case.

Every jurisdiction has a rule of evidence governing expert opinion evidence, and in most states it is codified as Rule 702. But whether a state uses the *Daubert* or *Frye* standard, some other standard, or a combination of both standards is jurisdiction specific. *Appendix 1* summarizes each state's approach.

3.4 WHAT DISTINGUISHES SCIENTIFIC AND TECHNICAL EVIDENCE

The expert opinion rule is not limited to scientific evidence. Rather, it governs “scientific, technical, or other specialized knowledge” which requires an understanding of what distinguishes scientific evidence from technical evidence. The difference between scientific and technical evidence became especially relevant after *Daubert*, as the expert opinion evidence at issue in the case was scientific and some questioned whether the *Daubert* standard should apply equally to technical evidence. That particular debate is salient in few jurisdictions today as *Kumho Tire, Ltd. v. Carmichael*, 526 U.S. 137 (1999), which held that *Daubert* applies not only to scientific testimony but also to technical testimony unrelated to a pure science, settled it.

The ultimate question is: “Does the expert opinion assist the finder of fact?”

Exactly which disciplines are more technical than scientific can be a hard determination, and one about which reasonable people can disagree. For example, before *Kumho Tire* was decided, some fire investigators believed that their discipline was not a science but more a matter of technical evidence and was therefore not subject to *Daubert*. In any jurisdiction that has adopted *Daubert* but not adopted *Kumho Tire*, arson investigation might be an example of a technical discipline.³ In these jurisdictions technical evidence that is not tied to a specific science is not subject to the *Daubert* standard.



3.5 EXPERT OPINION

Nor are the rules governing expert opinion testimony limited to scientific and technical evidence. FRE 702 permits expert opinions about all “specialized” knowledge and an expert is any person qualified by “knowledge, skill, experience, training or education.” Expert opinions can take many forms: scientific experts, forensic experts, accounting experts, vocational experts, and any other area where a witness has specialized training and education. In many criminal cases, police officers are called to testify as experts about specific criminal activity.

The question for the court will always be whether the expert opinion will assist the factfinder. Disputes around this question are common. The judge’s job is to determine whether a particular question is one that a lay jury can decide without the help of someone with specialized knowledge. Expert opinions should be excluded when they are unhelpful and thus superfluous and a waste of time.⁴

3.6 DISTINGUISHING EXPERT SCIENTIFIC OPINION FROM OTHER EXPERT OPINION

The difference between scientific expert opinion and other expert opinion is important. As already explained, technical evidence might well be subject to *Daubert*, if a jurisdiction has adopted *Kuhmo Tire*. But expert opinion neither scientific nor technical isn't always a great fit for *Daubert* or *Frye*. For example, it is not uncommon for a litigant to offer a police officer as an expert in gang activity. This subject of how gangs behave isn't scientific or technical, but, the argument goes, the officer's opinion is based on her "specialized knowledge" from her experience. And while the *Daubert* decision does not govern this non-scientific, non-technical category of expert testimony, FRE 702 does not exempt it from its requirements. This may mean that it is harder for the proponent of that testimony to satisfy the rule.



3.7 LEGAL VS. SCIENTIFIC STANDARDS

As the preceding sections have shown, the intersection of legal and scientific standards can be complicated. The scientific method encompasses norms and practices for conducting experiments to test a concept, observing the results, making inferences from them and then testing those inferences with further experimentation. In other words, the “truth” is always in development. And scientific disciplines have safeguards for ensuring research and conclusions are sound such as peer review, controlled testing, and error rates.

This approach is categorically different than the legal process. Courts have borrowed some of these tools to determine whether scientific evidence should be admissible. However, the trial is the entire universe of evidence from which the factfinder makes a final decision, and that is the end of the question. Therefore for purposes of sorting out that legal truth, often the law follows slowly behind science, as sciences need to be fairly established (even if not universally accepted) before they become properly admissible in court.

This is so because of concerns of due process and fundamental fairness. The common law structure for trials used in the United States, which at its core relies on constitutional rules to control the admission of evidence, exists to prevent inaccurate factual final judgments.

The Sixth Amendment right to confront a witness was created to furnish a procedure to exclude evidence against an accused when its reliability cannot be tested at trial.

In other words, the stakes are different and thus the standards are too. Scientific standards for integrity and reliability are only a starting point for courts in determining legal admissibility. It is also suggested that (a) when scientists and lawyers talk about facts or evidence, each means something different, because (b) differences between science and law are hidden by similarities; and (c) institutional or procedural changes must address (a) and (b) if they are to succeed.

Scientific standards for integrity and reliability are only a starting point to determine admissibility.

3.8 CYBER AND DIGITAL EVIDENCE

The use of Electronically Stored Information (ESI) as evidence at trial has become commonplace. For the court to determine its admissibility properly, it must have a general understanding of the technology and the issues that will determine whether its proponent has properly established its authenticity. Most courts in the United States that have addressed the admissibility of ESI and provided analysis on its admission have applied the Federal Rules of Evidence, and specifically FRE 901. This section will too.

The determination of authenticity of ESI will require the court to develop an understanding of the technology underlying the proposed ESI

ESI is digital evidence. There is not one single exhaustive list of categories of ESI. “ESI comes in multiple ‘flavors,’ including e-mail, website ESI, internet postings, digital photographs, and computer-generated documents and data files.”⁵ “Examples of internet postings include data posted by the site owner, data posted by others with the consent of the site owner, and data posted by others without consent, such as by ‘hackers.’ Examples of computer-generated documents and files include electronically stored records or data, computer simulation, and computer animation.”⁶

After the determination of whether the proffered ESI evidence is relevant, a court will need to conduct a detailed inquiry into its authenticity. The determination of authenticity of ESI will require the court to develop an understanding of the technology underlying the proposed ESI, which in turn will enable the court to ask the right questions and appropriately weigh the foundation evidence for its introduction.

Because of the underlying technologies involved in creating and storing ESI, it may have characteristics that make it extremely reliable and probative, but it also may have characteristics that create doubt about its authenticity. The court should recognize this when reviewing the admission of ESI into evidence.



Digital evidence is different than traditional evidence. Digital evidence is easily modifiable. But the fact that it is potentially modifiable is not enough to establish its untrustworthiness.⁷ Although a court may decide based on the circumstances not to presume ESI has been modified, the fact that it could be modified, because of advances in technology, create authenticity issues about which courts should be aware. For instance, it has become easier to change the text in scanned documents. In addition to human tampering of evidence, data can be improperly or unexpectedly altered because of a computing error that is user caused or the result of a software defect.

Although ESI is subject to modification that can potentially affect its admissibility, there are positive characteristics of ESI. ESI is difficult to destroy, it is easily duplicated and it is potentially more expressive.

When considering the introduction of ESI, it is important to know how the ESI was created, stored, retrieved and preserved. Whether the ESI is recovered as a result of a warrant or through discovery, ESI obtained/seized should be frozen upon being obtained (“seizing and freezing”) to ensure its authenticity.

When someone (including a forensic examiner) obtains ESI from a system, the court will also need to determine whether the activities of the person obtaining the ESI from the system or anyone else modified the data. This inquiry will need the competency of the person who obtained the data and a review of the documentation setting forth how the data were seized/obtained, accessed, stored and transferred to the medium presented to the court.⁸ Sufficient documentation must be maintained by the person obtaining the ESI from the system for the court to make a proper determination of its admissibility. Merely accessing data may alter it; thus courts must undertake to determine what alterations may have taken place when assessing the authenticity of ESI being offered into evidence. For instance, if the date that a file was last accessed is the relevant question, simply accessing that file for the pending proceedings by someone inexperienced at preserving ESI in its unaltered form may change the date it was last accessed, thereby altering the proffered evidence.

If ESI results from software processing data inputted, it will be important to understand how the data were first entered, i.e., its source and whether it was entered accurately without interpretation or opinion, or whether there was opinion and analysis applied to the data ultimately inputted.⁹ Additionally, the court should review the measures taken to verify the accuracy of any software that processes data.¹⁰ This is ultimately a two-step inquiry for the court to undertake: first, the admissibility of the entered data must be analyzed; and second, the admissibility of the processed data must be analyzed.

The proponent's ability to demonstrate to the court that the data stored on the computer was merely stored and not altered will resolve many authentication issues. Once stored data has been processed to derive new or different data, additional authentication issues will arise. In *In re Vee Vinhnee*, 336 BR 437, 444 (BAP 9th Cir. 2005), one court's admission analysis of ESI was:

*Electronically
Stored Information
must be shown to
be an accurate
representation of
the record that was
originally created.*

The primary authenticity issue in the context of business records is on what has, or may have, happened to the record in the interval between when it was placed in the files and the time of trial. In other words, the record being proffered must be shown to continue to be an accurate representation of the record that originally was created.¹¹

Authenticity of ESI under FRE 901 will require evidence sufficient to show that the evidence in question is what the proponent claims.¹² This means that the proponent must be able to demonstrate that the record that has been retrieved from the file is the same as the record originally placed into the file.¹³ This may be satisfied by:

1. a competent witness,¹⁴
2. a "process or system" used to produce the result and showing that the process or system produces an accurate result,¹⁵ or
3. "the appearance, contents, substance, internal patterns, or other distinctive characteristics of the item taken together with all the circumstances."¹⁶



This list is not exhaustive.

The *In re Vee Vihnee* Court explained FRE 901(b)(9) in further detail:

Rule 901(b)(9), which is designated as an example of a satisfactory authentication, describes the appropriate authentication for results of a process or system and contemplates evidence describing the process or system used to achieve a result and demonstration that the result is accurate.¹⁷ The advisory committee note makes plain that Rule 901(b)(9) was designed to encompass computer-generated evidence and also that it did not preclude taking judicial notice in appropriate circumstances.¹⁸

To determine whether ESI has been altered or manipulated, its proponent should have some form of audit procedures to assure the integrity of the records, which may include records of regular testing the computer and its software for potential errors.¹⁹ A witness supporting the authentication of ESI should be able to “testify as to the mode of record preparation, that the computer is the standard acceptable type, and that the business is conducted in reliance upon the accuracy of the computer in retaining and retrieving information.”²⁰

Professor Edward J. Imwinkelried set forth an eleven-step inquiry for electronic business records, which serves as an excellent framework to analyze the authenticity of ESI.²¹ Professor Imwinkelried perceives electronic records as a form of scientific evidence and employs this eleven-step foundation for computer records:

1. The business uses a computer.
2. The computer is reliable.
3. The business has developed a procedure for inserting data into the computer.
4. The procedure has built-in safeguards to ensure accuracy and identify errors.
5. The business keeps the computer in a good state of repair.

6. The witness had the computer readout certain data.
7. The witness used the proper procedures to obtain the readout.
8. The computer was in working order at the time the witness obtained the readout.
9. The witness recognizes the exhibit as the readout.
10. The witness explains how he or she recognizes the readout.
11. If the readout contains strange symbols or terms, the witness explains the meaning of the symbols or terms for the trier of fact.

Once the proponent of ESI can demonstrate through a *prima facie* showing that the evidence is what it is claimed to be, then the opponent's claimed flaws about its authenticity will go to its weight, not its admissibility.²²

Throughout a court's assessment of ESI, additional issues may arise. Although not all digital evidence is hearsay, some of it is in which case, the court will need to determine whether one of the hearsay exceptions under FRE 803, 804 or 807 apply. For instance, "[w]here postings from internet websites are not statements made by declarants testifying at trial and are offered to prove the truth of the matter asserted, such postings generally constitute hearsay under Fed. R. Evid. 801."²³

The next step in determining the admissibility of electronic evidence is to analyze issues associated with Fed. R. Evid. 1001-1008. The *Lorraine* Court provides a detailed analysis of the issues associated with the original writing rule.²⁴

The last step in determining the admissibility of electronic evidence is to analyze it to determine whether its probative value outweighs any unfair prejudice.²⁵

3.9 ENDNOTES

1. *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923).
2. *Daubert v. Merrell Dow Pharmaceuticals, Inc.* 509 U.S. 579, 588 (1993).
3. *But see Michigan Millers Mut. Ins. Corp. v. Benfield*, 140 F.3d 915 (11th Cir. 1998).
4. 7 J. WIGMORE, WIGMORE ON EVIDENCE § 1918.
5. *Lorraine v. Markel American Ins Co*, 241 F.R.D. 534, 538 (D.Md. 2007).
6. *Id.*, 241 F.R.D. at 538 n. 4, citing 2 MCCORMICK ON EVIDENCE § 227 (John William Strong, et al. eds., 6th ed. 2006); Gregory P. Joseph, *Internet and Email Evidence*, 13 PRAC. LITIGATOR (Mar 2002), *reprinted* in 5 STEPHEN A. SALTZBURG, ET AL., FEDERAL RULES OF EVIDENCE MANUAL § 4 at 20 (9th ed. 2006); Paul W. Grimm & Claudia Diamond, *Low-Tech Solutions to High-Tech Wizardry: Computer Generated Evidence*, 37 MD. B.J. 4 (July/August 2004).
7. *United States v. Bonallo*, 858 F.2d 1427, 1436 (9th Cir. 2013).
8. DANIEL J. RYAN & GAL SHPANTZER, LEGAL ASPECTS OF DIGITAL EVIDENCE (2016), at 3-4.
9. *United States v Scholle*, 553 F.2d 1109, 1125 (8th Cir. 1977).
10. *Id.*
11. *In re Vee Vinhnee*, 336 B.R. 437, 444 (B.A.P. 9th Cir. 2005).
12. FRE 901(a); *See also United States v Lubich*, 72 M.J. 170 (2013).
13. FRE 901(a).
14. FRE 901(b)(1).
15. FRE 901(b)(9).
16. FRE 901(b)(4).
17. FRE 901(b)(9).
18. *In re Vee Vinhnee*, 336 B.R. at 446.
19. *Id.* at 445.
20. *Id.* at 445-446 (citing BARRY RUSSELL, BANKRUPTCY EVIDENCE MANUAL, at § 803.17 (2005) (“Russell”); *cf.* 5 Weinstein § 900.07[1][c]).

21. *In re Vee Vinhnee*, 336 B.R. at 446, *citing* EDWARD J. IMWINKELRIED, EVIDENTIARY FOUNDATIONS (5th ed. 2002).
22. *Lubich*, at 174 (2013)
23. *People v Johnson*, 51 Misc.3d 450, 465 (2015).
24. *Lorraine v. Markel American Ins Co*, 241 F.R.D at 576-583.
25. *Id.*

