2012

More Than Words: Rethinking the Role of Modern Demonstrative Evidence

David S. Santee

Follow this and additional works at: http://digitalcommons.law.scu.edu/lawreview

Part of the Law Commons

Recommended Citation

David S. Santee, More Than Words: Rethinking the Role of Modern Demonstrative Evidence, 52 Santa Clara L. Rev. 105 (2012). Available at: http://digitalcommons.law.scu.edu/lawreview/vol52/iss1/4

This Article is brought to you for free and open access by the Journals at Santa Clara Law Digital Commons. It has been accepted for inclusion in Santa Clara Law Review by an authorized administrator of Santa Clara Law Digital Commons. For more information, please contact sculawlibrarian@gmail.com.
MORE THAN WORDS:
RETHINKING THE ROLE OF
MODERN DEMONSTRATIVE EVIDENCE

David S. Santee*

TABLE OF CONTENTS

Introduction
I. The Admissibility of Demonstrative Evidence
   A. The Evolution of Demonstrative Evidence
   B. The Devolution of the Law on Demonstrative Evidence
      1. Demonstrative Evidence as Nonverbal Testimony
      2. Demonstrative Evidence as Illustrative of Verbal Testimony
II. The Admissibility of Computer Animations
III. Testimonial Accountability for Modern Demonstrative Evidence
   A. Speculation
   B. Hearsay and Other "Otherwise Inadmissible" Evidence
   C. Relevance and Danger of Unfair Prejudice
Conclusion

INTRODUCTION

It has been nearly twenty years since Alexander Jason ignited a national debate on the use of computer animation in the courtroom.¹ He had been hired as a ballistics expert by

---
¹ Director of Trial Advocacy Programs and Externships, Villanova University School of Law. I thank Villanova University School of Law for its generous support, the participants of the Villanova Junior Faculty Scholarship series for their insights and inspiration, and Emily Morales for her excellent research assistance. I am especially grateful to Leonard Packel for his guidance from this article’s inception through its completion, to Michelle Dempsey for her thoughtful comments and suggestions on a draft, and to Mariam Koohdary for her invaluable editorial advice and constant moral support.

the prosecution in the high profile murder case of adult entertainment entrepreneur Jim Mitchell. The defendant had been accused of gunning down his brother and business partner, Artie, at Artie’s home in Corte Madera, California. The defense claimed that the shooting was an accident that occurred after the defendant had gone to the house and confronted his brother about the latter’s drinking problem. But Jason had a different opinion of what occurred inside the house. Based on the physical evidence collected from the scene and the audio recording of a 9-1-1 call made from the house during the shooting, Jason was confident that he could reconstruct the event to show that it was not an accident. He worried, however, that he would not be able to explain his conclusions to the jury.

Concerned that his verbal testimony would be confusing and boring, he created a computer animation to help the jury understand his conclusions. The animation he created be-

---


5. Chu, supra note 2. The victim’s girlfriend told the police that she was inside the house when the shooting began and called 9-1-1; the final five shots could be heard on the recording. See Dan Morain, Pornographer Arrested in Partner-Brother’s Slaying, L.A. TIMES, Mar. 1, 1991, at A34.

6. In Jason’s words:
   The complexities of this incident . . . made the written description of what actually occurred difficult to understand, to visualize . . . . It is very difficult to try to explain all the facts verbally. If I started telling you the details of each shot – the angle and direction of the trajectories, the location and position of the victim during each shot, and where the bullets ended up—you’d quickly become confused and probably be falling asleep by the fourth or fifth shot.

Chu, supra note 2.

gins with a view of the victim lying in his bedroom. The first three shots are fired toward the bedroom door from the hallway. The victim stands up and walks into the hallway, where he is struck in the torso. He ducks into the doorway of another room. Fifteen seconds elapse. Another bullet goes through a wall and into the victim's right arm. After another twenty-eight seconds, the victim peeks out from the doorway and is struck in the forehead. He collapses to the floor and dies. At the conclusion of the trial, the jury found Mitchell guilty of voluntary manslaughter. Although it is not clear what effect the animation had on the jury's verdict, attorneys on both sides of the case later commented that the impact was likely significant.

Twenty years later, the use of computer animation in the courtroom remains one of the most controversial issues in the law of evidence. Proponents claim that animation is a valuable tool that litigants should be allowed to use to illustrate their arguments to the jury. As one author observed, "If a


8. See Mitchell Animation, supra note 7. The animation is noticeably lacking in irrelevant detail. For example, at the beginning of the sequence, the victim is depicted lying supine in a room within the house. See id. Presumably, he is lying on a bed, but no bed is depicted, so the victim appears to be suspended a few feet from the ground. See id.; see also Morain, supra note 5 (discussing that the victim's girlfriend, who allegedly called 9-1-1 from the same room is not depicted at all).


10. Id. (discussing that as the victim is walking down the hall, a beer bottle is depicted in his right hand, yet the bottle was removed before the animation was shown to the jury). See Pinsky, supra note 1.

11. Pinsky, supra note 1.

12. Id. (discussing that the amount of time that elapsed between the shots was significant because the defense had argued that the defendant panicked and fired off several shots in rapid succession); see also Chu, supra note 2 (discussing that the time lapse on the animation was intended to rebut this claim).

13. Pinsky, supra note 1.

14. Id.

15. Id.

16. Id.

17. See Chu, supra note 2.
‘picture is worth a thousand words,’ then a computer-generated animation says a thousand words, sings a thousand songs, and paints with a thousand colors all at once.”18 Critics warn that computer animations are more likely to pervert the fact-finding process than they are to enhance it.19 Several courts have expressed concern that computer animations have such a powerful impact on jurors that they will forget that the animation is simply a visual representation of witness testimony.20 Many critics are skeptical that the purported desire to help jurors understand the evidence is nothing more than an excuse to dazzle them.21 Wright and Gra-


19. See, e.g., Adam T. Berkoff, Computer Simulations in Litigation: Are Television Generation Jurors Being Misled? 77 MARQ. L. REV. 829, 849–50 (1994) (discussing the concern that jurors will believe what they see in an animation to be true in much the same way that they tend to believe that what they see on television is true); John Selbak, Digital Litigation: The Prejudicial Effects of Computer-Generated Animation in the Courtroom, 9 HIGH TECH. L.J. 337, 355 (1994) (“[J]uries may surrender their role as fact-finder by accepting computer evidence as a factual conclusion.”). Selbak also discusses the research of Brian Stonehill, the director of media studies at Pomona College in Claremont, California, who hypothesizes that computer animations create “pseudo-memories” of an event; in other words, jurors will tend to remember the animation as having witnessed the event itself, rather than someone’s contention as to how the event occurred. Id. at 360–61. See also, e.g., Galves, supra note 18, at 218–19 (arguing that jurors deserve more credit because jurors are accustomed to seeing animations and know better than to assume that what is portrayed on a screen is the truth). For example, jurors know that animators can show dinosaurs walking on the earth, but it is unlikely that they believe they are actually witnessing the event itself. Id. See also Mario Borelli, The Computer as Advocate: An Approach to Computer-Generated Displays in the Courtroom, 71 IND. L.J. 439, 455–56 (1996) (“Jurors are also not easily tricked or persuaded by tactics or clever rhetoric. They may therefore be perfectly capable of giving proper weight to a computer display in summation when the judge admonishes them that the display is not itself evidence.”).

20. See, e.g., Racz v. R.T. Merryman Trucking, No. 92-3404, 1994 WL 124857, at *5 (E.D. Pa. Apr. 4, 1994) (precluding a computer animation of an automobile accident based on the concern that jurors may believe what the animation depicted simply because they saw it); State v. Stewart, 643 N.W.2d 281, 296 (Minn. 2002) (recognizing that “proposed animations must be carefully scrutinized” due to computer animation’s dramatic power); State v. Farner, 66 S.W.3d 188, 209 (Tenn. 2001) (“[T]he jury may be so persuaded by [the] life-like nature [of the computer animation] that it becomes unable to visualize an opposing or differing version of the event.”).

21. 22 CHARLES ALAN WRIGHT & KENNETH W. GRAHAM, JR., FEDERAL
ham, for example, refer to computer animations as "technological whiz-bang," and "paraphernalia used to Disney-up the evidence."22

Although the persuasive power of computer animations is certainly a cause for concern, the more serious danger is the declining level of scrutiny applied by courts when considering the admissibility of computer animations, and demonstrative evidence in general. This declining level of scrutiny is a result of a failure to understand the true function of demonstrative evidence in the proof process. In the Mitchell case, Alexander Jason understood the value of his animation. Jason discovered that he could better express his opinions by using the animation than he could have had he explained his opinions verbally. The animation was more than an illustration of his testimony; it was his testimony. More than a century ago, Wigmore made the same observation about demonstrative evidence when he called it "non-verbal testimony."23 The law has since devolved and demonstrative evidence is no longer considered testimonial or even substantive evidence.24 The prevailing law now allows demonstrative evidence to serve as an explanation or illustration of other evidence.25 As a result, witnesses may testify with the use of demonstrative evidence that they would not otherwise be permitted to say through verbal testimony because demonstrative evidence is not subject to the same evidentiary rules as testimonial evidence. And in the case of computer animations, the admissibility standards are even more relaxed. In one case, the court admitted a computer animation on the theory that it illustrated a party's contentions, even though those contentions were not supported by evidence.26 As advocates are pushing the envelope with ever more powerful visual displays, courts seem less and less concerned with the accuracy of what the displays depict.

22. Id. at § 5471.1, 215 n.33.
23. See 1 JOHN HENRY WIGMORE, A TREATISE ON THE SYSTEM OF EVIDENCE IN TRIALS AT COMMON LAW § 789 (Little, Brown 1904); See also infra notes 53–59 and accompanying text.
24. See infra Part I.B.
25. See infra Part I.B.
26. See Commonwealth v. Serge, 896 A.2d 1170, 1177 (Pa. 2006) (discussing that computer animation was admissible on the theory that it illustrated the prosecution's theory of the case). See also infra Part II.
This Article is not critical of the use of computer animations, or of demonstrative evidence generally. On the contrary, demonstrative evidence plays a very important role by helping witnesses express themselves more effectively. Rather, this Article criticizes of the misuse of demonstrative evidence to accomplish what cannot be achieved with competent evidence. This Article calls for testimonial accountability for demonstrative evidence. Part II begins by tracing the development of demonstrative evidence from the first use in American courts more than 150 years ago to the powerful computer generated exhibits that are becoming increasingly common in courtrooms today. This part traces the simultaneous decline in the law governing the admissibility of demonstrative evidence over the last century and a half. As demonstrative evidence became more advanced, the admissibility standards for demonstrative evidence have become more relaxed. Part III analyses the impact that these relaxed standards had on the admissibility of computer animations. Part IV discusses how to restore testimonial accountability for demonstrative evidence so witnesses will not be able to express through an exhibit what they would not be allowed to say in words.

I. THE ADMISSIBILITY OF DEMONSTRATIVE EVIDENCE

Demonstrative evidence is one of two types of nonverbal evidence—the other type of evidence is commonly referred to as “real evidence.” Real evidence consists of objects that played “an actual or direct part in the incident or transaction giving rise to the trial.” It is the gun allegedly possessed by

27. MCCORMICK ON EVIDENCE §§ 213–214 (Kenneth S. Broun et al. eds., 6th ed. 2006) [hereinafter MCCORMICK, 6th ed.]. The McCormick treatise uses the term “demonstrative aid,” rather than “demonstrative evidence.” See id. Some add a third category called “documentary evidence” to refer to original documents, such as a contract or a piece of correspondence, that have some relevance to the case. See, e.g., Robert D. Brain & Daniel J. Broderick, The Derivative Relevance of Demonstrative Evidence: Charting Its Proper Evidentiary Status, 25 U.C. DAVIS L. REV. 957, 979 (1992). Brain & Broderick attempt to distinguish documentary evidence from real evidence by asserting that “real evidence imparts information first-hand to the trier of fact, whereas documentary evidence imparts such information only through the medium of a writing or recording.” Id. at 979. In my opinion, this is neither a distinction nor a difference. Documents must be authenticated like any other form of real evidence and, once authenticated, they impart information first-hand to the trier of fact just like any other form of real evidence.

the defendant offered to prove barrel length, the counterfeit bills bearing identical serial numbers offered to prove the defendant's knowledge that they were counterfeit, and the drugs seized from the defendant's motel room. Demonstrative evidence is all nonverbal evidence that is not real evidence. It is the model used to show the jury how a scaffold is constructed, the map used in a trespass action to show the location of boundary lines, the photograph used by the plaintiff to explain the defect in the street that caused him to fall, and the staggering gait of a police officer showing the jury how the defendant walked during his field sobriety test. As discussed below, courts have been inconsistent in their assessment of demonstrative evidence and its function in the proof process.

A. The Evolution of Demonstrative Evidence

Although American courts have permitted the use of demonstrative evidence for over 150 years, it was not until the 1940's that advocates began to appreciate its true persuasive power. Much of the credit has gone to Melvin Belli,
claimed to have an epiphany in 1946 while he was representing a woman whose leg had been amputated as a result of a streetcar accident. After defense counsel attempted to minimize the plaintiff's injury by suggesting that she could be fitted with a prosthetic leg, Belli pulled out a prosthesis, handed it to the jurors, and asked each of them to "feel the fine texture of the flesh, to feel the warm blood coursing through the veins, to move the noiseless joints, to compare them with the articulating parts of their own knees." In 1980, Belli marveled at how far demonstrative evidence had come in the previous thirty years. According to Belli, the varieties of demonstrative evidence "are limited only by the creativity and originality of the trial lawyer's mind and the trial court's discretion." He predicted that "[t]he next 25 years shall be at the very least equally exciting."

There is no doubt that Belli would be excited by what an advocate can do with computer animation today. It can provide varied perspectives and allows jurors see an event from different points of view. It can show the jury an event in real time, or it can speed up, slow down, or stop the action completely. The computer can also highlight one or more aspects of the animation to draw the jurors' attention to what the advocate deems most important. Like the prosthetic leg that Belli handed to a jury in 1946, computer animations bring a case to life. As demonstrative exhibits have become increasingly more powerful, one might expect courts to have responded by becoming more vigilant about what the exhibits depict. This has not been the case.

40. See Melvin M. Belli, Demonstrative Evidence and the Adequate Award, 22 Miss. L.J. 284, 298 (1951).
41. Id. at 299.
42. See Melvin M. Belli, Demonstrative Evidence: Seeing is Believing, 16 Trial 70, 73 (1980).
43. Id.
44. Id.
45. See Berkoff, supra note 19, at 849.
46. Id.
47. Id.
B. The Devolution of the Law on Demonstrative Evidence

The advancements in demonstrative evidence have coincided with a decline in the law governing its admissibility. The first courts to encounter demonstrative evidence recognized its value as an alternative means for a witness to express an idea that was more difficult to express in words. Demonstrative evidence was considered just as testimonial and substantive as the witness's use of words. Over time, however, demonstrative evidence was classified as secondary to testimonial evidence; its function was to illustrate or explain substantive evidence. This was a significant shift. Demonstrative evidence was no longer the subject to the same evidentiary standards as testimonial evidence. Rather, courts fashioned admissibility standards specific to demonstrative evidence. The application of those standards has been problematic, especially when it comes to the most sophisticated computer generated exhibits used today.49

1. Demonstrative Evidence as Nonverbal Testimony

To the first courts that encountered demonstrative evidence, its evidentiary significance was obvious. In Shook v. Pate,50 for example, in an action for trespass to lands, a witness used a diagram to show the jury the location of the relevant property lines.51 The court found this perfectly acceptable:

A witness may as well speak by a diagram, or linear description, when the thing may be so described, as by words. It is a common and usual method of pointing out localities and lines. Even savages resort to it, in lieu of words, in describing the course of rivers, and the lines of the sea shores. It is enough if it serves the purpose of the witness in the explanation of the lines and localities he is seeking to exhibit.52

It would have been difficult for the witness to explain the location of the boundary lines in words. So, rather than testify in words, he testified by showing the jury a diagram. In his first evidence treatise, Wigmore acknowledged a "univer-

49. See infra Part II.
50. 50 Ala. 91 (1873).
51. Id.
52. Id. at 91.
sal judicial concession [that] a map, model, diagram, or photograph, takes an evidential place only as a non-verbal mode of expressing a witness' testimony.” Wigmore called it “non-verbal testimony.”

Nonverbal testimony, according to Wigmore, includes such visual aids as dramatic communication, models, maps, diagrams, and photographs. Wigmore began his discussion of nonverbal testimony with the observation that “[people do] not communicate by words alone; and it may occur that words become inferior to action as a mode of communicating a correct impression of a scene observed.”

Thus, when a witness uses a model, diagram, or photograph to express a point to the jury, the witness is merely using an alternative to words as a means of communication. According to Wigmore, “[i]t would be folly to deny ourselves on the witness stand those effective media of communication commonly employed at other times as a superior substitute for words.”

53. WIGMORE, supra note 23, § 790, at 894.
54. Id. at 892.
55. By “dramatic communication,” Wigmore was referring to a witness using his or her own body to communicate a point to the jury. An example is a witness who uses her own hand to demonstrate the hand motion made by a police officer to signal a motorist to stop. Id.
56. WIGMORE, supra note 23, §§ 789–798.
57. WIGMORE, supra note 23, § 790, at 892. Here, as the word “action” suggests, Wigmore is referring to dramatic communication, but the same point applies to all forms of nonverbal testimony.
58. Id. at 893.
59. Id. Wigmore presented his nonverbal testimony theory, not as something of his own creation, but rather a statement of the common law on demonstrative exhibits. In fact, Wigmore asserted that nonverbal testimony was the law “by universal judicial concession.” Id. at 894. As evidence of this common law, he quoted the opinions of six mid to late nineteenth century jurists. In one case, for example, the court observed:

A witness who speaks to personal appearance or identity tells in more or less detail the minutia thereof as taken in by his eye. What he says is a description thereof by one mode of signs, by words orally uttered. If his testimony be written instead of spoken and is offered as a deposition, it is a description in another mode of signs, by words written; and the value of that mode, the deposition, depends on the accuracy with which his words uttered are put into words written. Now if he has before him a portrait or photograph of the person, and it shows to him a correct copy of that person, if it produces to his view a correct description, which he testifies is a likeness, why may not that be given to the jury as a description of the person by the witness in another mode of signs?

Id. at 894 (quoting Cowley v. People, 83 N.Y. 464, 478 (N.Y. 1881)).
When a witness uses a demonstrative display to communicate something to the jury, the display is just as valuable substantive evidence as a witness’s verbal testimony. Thus, according to the nonverbal testimony theory, there is no distinction between substantive evidence and illustrative or derivative evidence. The demonstrative display holds no evidentiary value when it is not used by a witness to communicate something to the jury. In Wigmore’s words, “[i]t is somebody’s testimony, or it is nothing.”

In the first edition of his evidence treatise, published in 1954, McCormick agrees with Wigmore that demonstrative evidence is substantive testimonial evidence. McCormick wrote that a photograph is properly admitted as demonstrative evidence if the witness identifies it as a “correct representation of [facts relevant to the issue].” He went on to explain the evidentiary significance of the photograph:

The adjective “illustrative” aptly describes the role of the picture thus incorporated in the testimony, but it is sometimes used as contrasted with “substantive” evidence. It is believed that this distinction is groundless, and that the photograph, as part of the descriptive testimony, is just as much substantive evidence as the testimony of a witness describing the features of a scene or object without a photograph would be. It may be correctly described as both “illustrative” and “substantive.”

This reasoning is consistent with Wigmore’s nonverbal testimony theory; the witness’s use of the photograph is an alternative, and likely better, mode of communicating the substance of the photograph.

Brain and Broderick criticized Wigmore for failing to distinguish demonstrative evidence from “real” evidence:

While Wigmore did much to classify the distinguishing characteristics of substantive and demonstrative evidence, he failed to note that the principal distinction between demonstrative evidence and substantive real (or testimonial) evidence is in the purpose for which such evidence is used at trial.

---

60. Id. at 893 (emphasis in original).
62. Id. at 388 (emphasis added).
63. Brain & Broderick, supra note 27, at 998.
This criticism fails to take into account the important observation made by Wigmore and eighteenth century courts—demonstrative evidence is just as "real" as verbal testimony.

Yet Wigmore does make the important distinction between the exhibits used by a witness to communicate testimony and the exhibits that have some other evidentiary significance to the facts in issue, which parallels our modern distinction between "real evidence" and "demonstrative evidence." Wigmore appreciated that one particular exhibit could have different evidentiary significances depending on its functions in the trial. He uses the example of a map. When used by a witness in lieu of words to communicate what the map depicts, it is nonverbal testimony. To be admissible, it is necessary for the witness to vouch for the map's accuracy. Otherwise, the map is just as irrelevant as admittedly inaccurate verbal testimony. If, on the other hand, a witness identifies the map as an item that was stolen, the evidentiary character of the map is completely different. In that case, the map is not nonverbal testimony describing what the map depicts. The map could be entirely inaccurate. Nevertheless, the map is relevant because it is an item that was allegedly stolen. Thus, Wigmore's theory does not extend to all exhibits presented at trial. By "non-verbal testimony," Wigmore was referring to a special category of exhibits: those that witnesses use in lieu of words to communicate something to the jury.

To illustrate Wigmore's theory, consider the case of a woman who alleges that her right knee was injured in an automobile accident and that, as a result of the accident, she walked with a limp for the next six months. Two years later, when the case comes to trial, it is important that the woman communicate to the jury how this injury has affected her abil-

---

64. WIGMORE, supra note 23, § 790, at 893. See also supra notes 27–36 and accompanying text.  
65. WIGMORE, supra note 23, § 790, at 893.  
66. Id.  
67. Id.  
68. Id.  
69. Id.  
70. Id.  
71. Id.  
72. Id.  
73. Id.
Consider the following alternatives:

- In response to the question, "How did the injury to your knee affect your ability to walk?" she could simply say, "I walked with a limp."

- In response to the same question, she could give a far more detailed answer: "I was unable to bend my right knee more than fifteen degrees without experiencing unbearable pain. Therefore, when I walked, I bent my right knee only slightly, no more than fifteen degrees. Of course, when I usually walk, I move my right leg forward on a plane that is perpendicular to the ground. But, when I bent my right knee slightly, I was unable to lift my leg high enough to prevent my foot from dragging on the ground. So to keep my foot from dragging on the ground, I had to swing my right leg away from my body each time I moved my right leg forward."

- She could draw a bent line on a blackboard and point to her drawing while saying, "I was able to bend my knee this much."

- If given a model of a human leg, she could bend the knee, hold it up for the jury to see, and say, "I was able to bend my knee this much."

- If given a series of photographs of herself walking during the time when her injury affected her range of motion, she could say, "These photographs fairly and accurately depict how I walked for the first six months after the accident."

- If permitted to leave the witness stand, she could demonstrate how the injury affected her stride by limping across the courtroom in front of the jury.

Wigmore would define each of these six alternatives as testimony: the first two examples illustrate verbal testimony, while the last four demonstrate nonverbal testimony.

In some cases, demonstrative evidence may be useful even if it is not entirely accurate. Demonstrative evidence
has probative value when used by a witness to communicate a point to the fact finder, and it may assist the witness for that purpose despite being inaccurate. For example, a witness may testify nonverbally by using a photograph even if the conditions shown on the photograph are different than the conditions that existed at the relevant time.74 If there are inaccuracies, it is important that the witness identifies how the illustration in the photograph is different than what she actually perceived during the relevant time.75 If the witness cannot or does not describe the inaccuracies, the photograph should be excluded.76

Of course, demonstrative evidence, like verbal testimony, may be excluded if the court finds that the inaccuracies may create an unfair prejudice or confusion of the issues that substantially outweighs their probative value.77 The prejudice is especially unfair when the demonstrative evidence in question has been prepared by the party offering it. There is no excuse for inaccuracies in prepared exhibits. Moreover, there is a higher risk that jurors will believe that the depiction in a prepared exhibit is accurate: when the preparer of the exhibit has full control over its contents, it is reasonable for jurors to conclude that the preparer had good reason for including everything that it contains.

2. Demonstrative Evidence as Illustrative of Verbal Testimony

Sometime during the 1900's, the nonverbal testimony theory gave way to the much different theory that demonstrative evidence serves to illustrate or explain other evidence. This shift in demonstrative evidence theory is apparent when comparing the treatment of demonstrative evidence in the

74. See, e.g., Een v. Consolidated Freightways, 220 F.2d 82, 88–89 (8th Cir. 1955). Photographs of the accident scene are admissible even though they depicted chalk marks on the roadway not present at the time of the accident. Id. Bradshaw v. State, 323 S.E.2d 253, 253–54 (Ga. App. 1984). Photographs of burglarized office are admissible as demonstrative evidence even though there were changes in the appearance of the office since the time of the burglary. Id.
75. See, e.g., Een, 220 F.2d at 88–89.
76. See, e.g., Allemand v. Zip's Trucking Co., Inc., 552 So.2d 1023, 1029 (La. App. 1 Cir. 1989). Photographs of the scene of an automobile accident are properly excluded where there was no testimony as to how the scene changed between the time of the accident and the time the photographs were taken. Id.
77. See FED. R. EVID. 403.
first edition of McCormick's evidence treatise to the subsequent treatment in later editions. Although McCormick's treatment of demonstrative evidence in the first edition was consistent with Wigmore's nonverbal testimony theory, the treatment of demonstrative evidence in the second edition, published in 1972, is much different:

It is today increasingly common to encounter the offer of tangible items . . . which are . . . tendered for the purpose of rendering other evidence more comprehensible to the trier of fact. [Examples of this type frequently] include models, maps, photographs, charts, and drawings. If an article is offered for these purposes, rather than as real or original evidence, its specific identity or source is generally of no significance whatever. Instead, the theory justifying admission of these exhibits requires only that the item be sufficiently explanatory or illustrative of relevant testimony in the case to be of potential help to the trier of fact.78

Although McCormick used the term "illustrative" in the first edition, the term "illustrative" is used differently here. Rather than being illustrative of the facts in issue, the photograph is now seen as illustrative of the verbal testimony of the witness that authenticates the photograph for the jury.

The notion that demonstrative evidence is illustrative of verbal testimony has posed a problem for evidence scholars seeking to explain its role in the proof process. Brain and Broderick, for example, theorize that demonstrative evidence has a "derivative relationship with material facts."79 It functions differently from so-called substantive evidence. Whereas substantive evidence has the capacity to make a relevant factual proposition more or less likely,80 demonstrative evidence does not have the ability to move the evidentiary ball forward. In other words, demonstrative evidence is not a piece of evidence offered to prove or disprove a factual proposition.81 It is evidence offered to illuminate the substantive pieces of evidence and make the substantive evidence more

79. Brain & Broderick, supra note 27, at 975.
80. See FED. R. EVID. 401.
81. See Brain & Broderick, supra note 27, at 973–75.
comprehensible to the jury.\textsuperscript{82}

The notion that demonstrative evidence has a "derivative relationship with material facts" creates a dilemma for Brain and Broderick. According to the plain meaning of Rule 401 of the Federal Rules of Evidence, an exhibit that merely illustrates other evidence fails to satisfy the definition of relevant evidence.\textsuperscript{83} Indeed, Brain and Broderick have concluded that demonstrative evidence is not "relevant evidence" as defined by Rule 401 of the Federal Rules of Evidence\textsuperscript{84} because it does not make any fact of consequence to the action more or less probable.\textsuperscript{85} To the extent that demonstrative evidence helps the jury understand substantive evidence, it "secondarily augments the perceived likelihood that a fact of consequence either occurred or did not occur."\textsuperscript{86} They proceed to elaborate on how this process of secondary augmentation occurs:

After viewing a demonstrative exhibit, jurors may believe in the existence or nonexistence of a fact with more certitude than without such a view. Indeed, that is largely the purpose of demonstrative proof in litigation. This increase in juror belief, however, stems from an increased appreciation or understanding of the other evidence to which the demonstrative proof relates. In other words, it is a secondary effect of the purpose for which the demonstrative display was introduced. This increased juror belief does not flow from any increase or decrease in the probable existence of the relevant, underlying fact.\textsuperscript{87}

To address this anomaly, which they contend inadvertently excludes demonstrative evidence from the universe of relevant evidence, Brain and Broderick propose a revised Rule 401 designed to bring demonstrative exhibits within the definition of "relevant evidence."\textsuperscript{88} Their proposed revision adds a

\textsuperscript{82} Id.
\textsuperscript{83} Id. at 975–76.
\textsuperscript{84} Rule 401 provides that "relevant evidence" means evidence having any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would without the evidence. FED. R. EVID. 401.
\textsuperscript{85} See Brain & Broderick, supra note 27, at 975–76.
\textsuperscript{86} Id. at 975.
\textsuperscript{87} Brain & Broderick, supra note 27, at 1018 n.210.
\textsuperscript{88} Id. at 1019. The editors of the 6th edition of McCormick's treatise contend that Brain and Broderick's revised Rule 401 is not necessary. See MCCORMICK, 6th ed., supra note 27, § 212 n.5. The treatise points to the Advisory Committee Notes to Rule 401, which interpret the phrase "fact of conse-
second, alternative definition to Rule 401: “evidence that accurately and equitably explains, illustrates, or clarifies other admissible evidence.”

Brain and Broderick are not alone in questioning whether demonstrative evidence is relevant under Rule 401. According to the standard jury instructions adopted in several federal circuits, demonstrative evidence—often referred to as “illustrative exhibits”—is not evidence. This is not an unreasonable conclusion when starting from the false premise that demonstrative evidence merely illustrates the testimony of the witness who uses it. If, according to Rule 401, relevant evidence makes the existence of a fact of consequence to the action more or less probable, one can infer that “evidence” would include everything that makes any fact more or less probable, regardless of whether the fact is of consequence to the determination of the action. By definition, exhibits that merely assist the trier of fact in understanding the evidence do not make any facts more or less probable. Therefore, if the exhibit is not evidence, there is no need to consider its relevance. Rather, the question is whether the court should allow the witness to use the exhibit under Rule 611(a)(1), which grants discretion to the trial court to manage the presentation of evidence.

---

89. Brain & Broderick, supra note 27, at 1019.

90. PATTERN CRIM. JURY INSTR., 7.12 (6th Cir. 2005) (“This material [referring to summaries, charts, drawings, etc.] is not itself evidence and must not be considered as proof of any facts.”); MODEL CRIM. JURY INSTR., 4.11 at 114 (8th Cir. 2007) (“Certain charts and summaries have been shown to you in order to help explain the facts disclosed by the books, records, or other underlying evidence in the case. Those charts or summaries are used for convenience. They are not themselves evidence or proof of any facts. If they do not correctly reflect the facts shown by the evidence in the case, you should disregard these charts and summaries and determine the facts from the books, records or other underlying evidence.”); PATTERN JURY INSTR., 2.8 (5th Cir. 2009) (“Exhibit [describe] is an illustration. It is a party’s [description or picture or model] to describe something involved in this trial. If your recollection of the evidence differs from the exhibit, rely on your recollection.”); FED. CIV. JURY INSTR., 1.24 at 32 (7th Cir. 2005). This is similar to Fifth Circuit instruction; however, comments repeatedly use phrase “demonstrative evidence.” Id.

91. Brain & Broderick, supra note 27, at 1017. The Advisory Committee Note to Rule 611(a)(1) explains that the Rule “restates in broad terms the power and obligation of the judge as developed under common law principles. It covers such concerns as . . . the use of demonstrative evidence . . . .” FED. R. EVID.
But does demonstrative evidence merely explain, illustrate, or clarify other admissible evidence? Or does it impart additional information to the jury beyond what has already been conveyed by the "other evidence"? The answer is obvious, considering the verbal testimony that ordinarily accompanies a demonstrative exhibit. In most cases, there is very little, if any, "other evidence" that accompanies the demonstrative exhibit, aside from the testimony required to lay the foundation. Here is a typical example:

Q. Mr. Doe, have you ever been at the intersection of North and Clark Streets?
A. Yes.
Q. How many times have you been there?
A. About 50 times.
Q. Are you familiar with that intersection as it looked on December 13, 2000?
A. Yes, I am.
[Counsel marks exhibit, shows it to opposing counsel, and shows it to the witness.]

Q. I show you what has been marked as Plaintiff's Exhibit #1 and ask you to examine it. (Witness does so.) Do you recognize the scene in that photograph?
A. Yes.
Q. What scene is shown in that photograph?
A. It shows the intersection of North and Clark Streets.
Q. Mr. Doe, does Plaintiff's Exhibit #1 fairly and accurately show that intersection as it appeared on December 13, 2000?
A. Yes sir, it does.92

At this point, counsel has laid sufficient foundation to enter the demonstrative exhibit in evidence.93

According to the prevailing theory of demonstrative evidence, the purpose of Exhibit #1 is to help the jury understand the witness's verbal testimony. One would be hard pressed, however, to identify the verbal testimony within the

---

93. See id. (assuming that the jurisdiction allows demonstrative evidence to be admitted).
witness's statements. The witness gave no description of the intersection apart from the names of the streets. The jurors understanding of the intersection is entirely based on the photograph. The witness has offered no verbal testimony from which the jurors could understand the configuration of the intersection. Thus, in this example, the photograph fails to satisfy the traditional definition of demonstrative evidence because it does not help the jurors understand other evidence. 

The same is true even when the witness uses the photograph while verbally explaining the appearance of what is depicted. After laying the foundation set forth above, counsel may have the witness use the photograph to explain the location of people and objects that were present at the relevant time:

Q. Using Plaintiff's Exhibit #1, would you show the jury where you were standing when the accident occurred?
A. Yes, I was standing right here [witness points to photograph].

Q. Would you write your initials on the photograph where you just pointed?
A. [Witness writes her initials on the photograph.]

Here, the witness's verbal testimony does not help the jury understand where she was standing at the time of the accident. Her testimony is her nonverbal act of pointing to a spot on the photograph. Thus, the photograph does not help the jury understand the witness's verbal testimony. It provides information in addition to the information provided by the verbal testimony. The witness's use of the photograph provided more evidence tending to prove the truth of her assertion that she was in a position to see the car accident.

As this example illustrates, no piece of demonstrative evidence merely explains, illustrates, or clarifies other admitted evidence. Every time a witness uses demonstrative evidence, the witness communicates something in addition to what the witness has said, if for no other reason than providing an alternative means of communication. Take a photograph for example. It is impossible to express in words everything that

94. This is my own extension of Mauet's illustration. Mauet discusses "[h]ow to use exhibits" and provides his own illustrations. See id. at 243–49.
a photograph depicts because words can never describe an image the same way as a photograph. Thus, even if the verbal testimony were so elaborate that it covered every detail of the photograph, the photograph is still further evidence because it necessarily conveys the information in a different manner.

The notion that demonstrative evidence is not testimonial has serious consequences. It means that demonstrative evidence is no longer subject to the same rules of evidence that apply to verbal testimony. When a witness offers a picture in lieu of the thousand words it would take to describe what it shows, there is no inquiry into whether each of those thousand words would have been admissible. Demonstrative evidence is not subject to the evidentiary burdens that apply to verbal testimony. As a result, courts have been forced to create an artificial rule in an effort to ensure the reliability of demonstrative evidence: the demonstrative evidence must be a "fair and accurate" depiction. This is a poor substitute for the rules that apply to testimonial evidence.

Suppose that the photograph in the example above depicts a streetlight on the southeast corner of North and Clark Streets, but the witness cannot recall whether the light was there at the relevant time. The photograph is still admitted upon a showing that the photograph is generally a fair and accurate representation of the intersection at the relevant time, even though the proponent cannot establish that the witness providing the foundation for the exhibit has personal knowledge of the light. To the extent that the witness cannot account for something in the photograph, cross-examination provides the proper remedy and it is a question of weight, not admissibility.95 Thus, the illustrative purposes theory has the serious consequence of allowing a witness to communicate something by photograph that the witness could not say in words.

II. THE ADMISSIBILITY OF COMPUTER ANIMATIONS

Most courts consider computer animations to be a form of demonstrative evidence, functioning as explanations or illustrations of other evidence.96 Although courts do not subject

95. See, e.g., Roland v. Langlois, 945 F.2d 956, 963 (7th Cir. 1991).
96. See, e.g., People v. Hood, 62 Cal. Rptr. 2d 137, 139 (Cal. App. 4th 1997);
animations to the same evidentiary safeguards that pertain to testimonial evidence, they tend to apply the same rules designed to insure reliability of other forms of demonstrative evidence. For example, the animation must be a “fair and accurate” representation of the evidence it purports to explain.97 Several courts have excluded animations depicting images that are unsupported by the evidence.98 Unlike speculative verbal testimony, however, which is per se inadmissible,99 speculative computer animations tend to be excluded on the grounds that they create an unfair prejudice.100

Nevertheless, treating computer animations as non-testimonial demonstrative evidence has led to some confusing legal analyses and questionable, if not obviously erroneous, results. Federal courts considering the admissibility of computer animations have analogized them to recordings of experiments used to demonstrate the scientific principles underlying the expert opinion.101 If the experiment is merely a


97. Farner, 66 S.W.3d at 209 (emphasis added). See also Dunkle, 139 P.3d at 247. Further defined as “a correct representation of the object portrayed, or . . . a fair and accurate representation of the evidence to which it relates.” Id. See also Commonwealth v. Serge, 896 A.2d 1170, 1177 (Pa. 2006). See also Clark, 529 S.E.2d at 536. The animation must be “fair and accurate representation of the evidence to which it relates.” See also Sommervold, 518 N.W.2d at 738 (“[T]he animation must fairly and accurately reflect the oral testimony of the witness.”); Farner, 66 S.W.3d at 209 (“[T]he proponent must further establish that the computer animation is a fair and accurate depiction of the event it purports to portray.”).

98. See, e.g., Dunkle, 139 P.3d at 250 (holding that the trial court erred in admitting an animation that depicted the position of the victim’s body and the distance between the body and the gun, where the evidence did not support those depictions); Stewart, 643 N.W.2d at 295 (facial expressions and movements of shooter not supported by the evidence); Clark, 529 S.E.2d at 538 (position of car inconsistent with evidence); Sommervold, 518 N.W.2d at 738 (speed of bicycles, lighting conditions, location of injuries inconsistent with evidence). Farner, 66 S.W.3d at 210 (relative position of cars not supported by evidence or competent scientific opinion).

99. See infra Part III.B.

100. See, e.g., Dunkle, 139 P.3d at 250; Clark, 529 S.E.2d at 538; Sommervold, 518 N.W.2d at 738; Farner, 66 S.W.3d at 209 (“If a computer animated portrayal is inaccurate, its probative value decreases and the likelihood that it will be subject to exclusion under Rule 403 increases.”).

demonstration of scientific principles in the abstract, it is not required "to reflect conditions substantially similar to those at issue in the trial." If, however, the experiment is intended "to recreate events at the focus of the trial," the experiment must be performed under conditions that are "substantially similar to the actual events."

This analogy is faulty because animations, unlike simulations, are not experiments designed to generate results under variable conditions. Rather, the animation is intended to depict a result that the expert has already determined without the aid of the animation software. To make matters worse, courts tend to find that animations are not intended to be re-creations, despite the fact that they obviously depict the people, places, and events at issue in the trial. Because the animation need not be substantially similar to the actual events, there is little to no scrutiny over what it depicts. Whether the animation is inconsistent with the evidence is a question of weight, not admissibility. Opposing counsel can address any inconsistencies during cross-examination of the expert.

Because of the lack of scrutiny over the contents of computer animations, experts have been allowed to resolve disputed facts by making assumptions even when there are insufficient facts or data to produce an admissible expert opinion. The animation in Hinkle v. City of Clarksburg, for example, was the result of numerous choices that resolved conflicting eyewitness and expert testimony. Hinkle involved


103. Hinkle, 81 F.3d at 424–25.
104. A “computer animation” simply illustrates the conclusions that the expert has reached independent of the computer program. With a “simulation” or “computer model,” the computer program generates the result based on the variables provided. See Galves, supra note 18, at 180–85.
105. See, e.g., Altman, 349 F. App’x at 764; Hinkle, 81 F.3d at 425 (animation depicting defendant shooting plaintiff’s decedent); Jones, 1998 WL at *3.
106. See, e.g., Altman, 349 F. App’x at 764; Hinkle, 81 F.3d at 425; Jones, 1998 WL at *3.
108. Altman, 349 F. App’x at 763–64.
109. 81 F.3d 416 (4th Cir. 1996).
a police standoff that ended when the plaintiffs' decedent, Bea Wilson, was shot to death.\textsuperscript{110} When police arrived, Wilson was inside his apartment brandishing a shotgun.\textsuperscript{111} Wilson's son, Adam, was also inside.\textsuperscript{112} The police convinced Wilson to let Adam out of the apartment.\textsuperscript{113} After Adam left, the door was left slightly open and the police officers were able to see Wilson inside.\textsuperscript{114} Sometime thereafter, one of the police officers, Officer Lake, shot Wilson through the open door.\textsuperscript{115} The circumstances of the shooting were in dispute. The plaintiffs claimed that Wilson was shot in the back without provocation, whereas the defendants contended that Wilson was shot in the chest after he raised his gun toward the officers.\textsuperscript{116}

At trial, the defense played a computer animation prepared by "Forensic Animation Technologist" Alexander Jason.\textsuperscript{117} The animation showed Officer Lake shooting Wilson in the chest as Wilson was raising his gun toward the doorway where Officer Lake was positioned.\textsuperscript{118} According to the Court of Appeals, the animation "showed how the officers' version of the event was consistent with the physical evidence . . . ."\textsuperscript{119}

The court did not mention or address the plaintiffs' contention that there were several discrepancies between the animation and other evidence, including testimony by defense witnesses. The first discrepancy involved the location of Wilson's body at the time of the shooting.\textsuperscript{120} Officer Lake, along with another police officer at the scene, testified that Wilson was at or near the door to the apartment with the shotgun extending through the doorway.\textsuperscript{121} A defense expert (not Jason),\textsuperscript{122} however, concluded that Wilson was at least six feet

\begin{itemize}
\item \textsuperscript{110} Id. at 419.
\item \textsuperscript{111} Id.
\item \textsuperscript{112} Id.
\item \textsuperscript{113} Id.
\item \textsuperscript{114} Id.
\item \textsuperscript{115} Id.
\item \textsuperscript{116} Id.
\item \textsuperscript{117} Id. at 424.
\item \textsuperscript{118} Id.
\item \textsuperscript{119} Id.
\item \textsuperscript{120} See Brief for Appellant at 40–41, Hinkle v. City of Clarksburg, 81 F.3d 416 (4th Cir. 1996) (No. 94–1925).
\item \textsuperscript{121} Id. at 41.
\item \textsuperscript{122} Id. The expert is not identified in the court opinion.
\end{itemize}
inside the apartment at the time he was shot.\textsuperscript{123} The plaintiffs argued that the animation was not consistent with either alternative because it depicted Wilson five feet from the door when he was shot.\textsuperscript{124} According to the plaintiffs, Jason was unable to provide any calculations to justify his conclusion regarding Wilson’s location as reflected in the animation.\textsuperscript{125} The second inconsistency related to the testimony of a second police officer, Officer Alonso, who claimed that he could not see Wilson before the shooting.\textsuperscript{126} According to the plaintiffs, the animation depicted Wilson passing through Officer Alonso’s field of vision before Officer Lake fired his gun.\textsuperscript{127} The third inconsistency involves the timing between shots fired by Officer Lake and Wilson.\textsuperscript{128} The animation showed Officer Lake firing first, striking Wilson in the chest, Wilson spinning around, and then Wilson firing his gun into the back wall of the apartment.\textsuperscript{129} This sequence, according to the plaintiffs, was inconsistent with the accounts of several witnesses who heard only one shot, and with the testimony of police officers, who claimed that both Officer Lake’s gun and Wilson’s gun were fired simultaneously.\textsuperscript{130}

Although the Court of Appeals acknowledged the plaintiffs’ contention that the animation “failed to reflect conditions substantially similar to those existing at the time of the shooting,” the court did not address any of the alleged inconsistencies between the evidence and the animation.\textsuperscript{131} The court found that the animation was not a re-creation and therefore it was not required to reflect conditions substantially similar to the conditions that existed at the time of the shooting.\textsuperscript{132} Notwithstanding the alleged discrepancies, the court noted that “the jury here fully understood this animation was designed merely to illustrate [defendants’] version of the shooting and to demonstrate how that version was consist-

\begin{thebibliography}{99}
\bibitem{123} Id.
\bibitem{124} Id. at 40.
\bibitem{125} Id.
\bibitem{126} See id. at 41–42.
\bibitem{127} Id. at 42.
\bibitem{128} Id.
\bibitem{129} Id. at 42–43.
\bibitem{130} Id.
\bibitem{131} Hinkle, 81 F.3d at 424.
\bibitem{132} See Hinkle, 81 F.3d 416.
\bibitem{133} Id. at 425.
\end{thebibliography}
tent with the physical evidence." The court did not address plaintiffs' contention that certain conclusions depicted in Jason's animation had no scientific basis. Nor did the court identify Jason's expert opinions, let alone discuss whether the animation fairly and accurately illustrated those opinions. It is not clear whether Jason would have been permitted to testify verbally to the conclusions shown in his animation. The court was satisfied that the animation served as an illustration of the defendants' contentions, rather than a representation of a competent expert opinion.

Federal courts have continued to apply a relaxed standard for the admissibility of expert opinions expressed by animation, rather than by verbal testimony. In 2009, the Third Circuit applied the same test used in Hinkle in Altman v. Bobcat Co. The plaintiffs in Altman alleged that the defective design of the backhoe's operator compartment caused the operator to accidently engage the backhoe's control lever with his knee. To support this claim, the plaintiffs presented a computer animation that purportedly showed how such an accident would have been less likely if the operator compartment been designed differently. On appeal, the defendants enumerated seven aspects of the animation that were unsupported by the evidence, including the size of the operator, the manner in which the operator inadvertently engaged the control lever, and the amount of force required to activate the lever. Finding that the animation was not intended to be a re-creation of the accident, the Court of Appeals held that it was not error to admit the animation despite the inconsistenc-

134. Id.
135. Id.
136. Id.
137. See id. The animation may well have illustrated an admissible opinion by Jason even if it was not consistent with some evidence. His opinion may have been simply that it was possible for Wilson to have been facing the door when he was shot, then spun around before firing his own gun. If other evidence conflicted with that opinion, it would have gone to the weight, not the admissibility.
138. Id.
139. 349 F. App'x 758 (3d Cir. 2009).
140. Id. at 760.
141. Id. at 763.
As with the animation in *Hinkle*, it appears that the animation in *Altman* depicted factual inferences supporting a case theory as opposed to scientific conclusions admissible as evidence. Cross-examination was not an effective remedy because the jury should not have seen the animation in the first place. Suppose the expert had testified verbally to an opinion that the control lever could have been engaged with a simple bump of the knee. It should not be the opposing party’s obligation to elicit an admission on cross-examination that the opinion is not based on sufficient facts or data. It is a question of admissibility not weight. The opinion should not be offered in the first place.

In *Commonwealth v. Serge*, the Supreme Court of Pennsylvania expressly approved the use of a computer animation to illustrate not only the opinion of an expert but also the party’s theory of the case. The defendant in *Serge* shot and killed his wife. He admitted that he shot her, but claimed that he did so in self-defense after she approached him with a knife. The prosecution contended that the defendant moved his wife’s body after the shooting and planted a knife on the floor next to her body to support his story of self-defense. To support this theory, the prosecution presented a computer animation showing the location and relative positions of both the defendant and the victim when each of the three shots was fired and the path of each bullet. The prosecution’s experts had formed opinions on these subjects without the use of the computer. The animation showed that the defendant fired the first shot while the victim was facing away from him and the bullet entered the victim’s lower back. Next, the animation shows the second

---

143. *Altman*, 349 F. App’x at 764. In fact, the court noted, with approval, that the District Court instructed the jury that there were certain discrepancies between the evidence and the event as depicted in the animation. *Id.*


145. 896 A.2d 1170 (Pa. 2006).

146. *Id.* at 1173.

147. *Id.* at 1175.

148. *Id.*

149. *Id.*

150. *Id.* at 1179–80.

151. DVD: 21st Century Forensic Animations, Demo Version 18 (21st Cen-
shot missing the victim entirely. When the third shot was fired, the victim was on her knees. The bullet entered her upper right arm, went through her torso, and exited from her left side (see Figure 1). The last image is of the victim lying on the floor with a knife on the floor next to her; the knife was not shown at any prior point in the animation.

![Figure 1](image)

Figure 1. Image from the computer animation in Commonwealth v. Serge, depicting the prosecution's theory on the relative positions of the defendant and the victim when the second shot struck the victim.

The defendant enumerated six aspects of the animation that were unsupported by evidence. Most significant was the appearance of the knife in the final scene (see Figure 2). Although the court discussed evidence that appeared to support most of the depictions complained of, the court made no attempt to explain how the evidence supported an expert opinion that the victim was not holding a knife when the de-

---

152. *Id.*
153. *Id.*
154. *Id.*
155. *Id.*
156. Forensic Animations, supra note 150.
Rather, the court justified the depiction of a defenseless victim as being consistent with the prosecution's "theory of the case." Thus, no witness, expert or otherwise, was held accountable for the conclusion depicted in the animation, that the victim was not brandishing a knife at the time the defendant shot her. And no witness, other than the defendant, could have provided competent testimony on the subject. No one had personal knowledge as to whether she had a knife in her hand. And there was not sufficient facts or data to for an expert witness to form a competent scientific opinion on the subject. Although the prosecution was entitled to argue in closing that the victim did not have a knife in her hand, the prosecution should not have been allowed to use an exhibit to present that argument during its case in chief. To make matters worse, before showing the animation to the jurors, the court told them that they were about to see "a graphic depiction, or illustration, of an opinion that an expert has already formed based upon his or her own independent investigation, computations, and analysis." This left the unfortunate misimpression that the experts had concluded that the victim did not have a knife in her hand at the time of the shooting.

158. Id. at 1180–81.
159. Id. at 1182.
163. Serge, 896 A.2d at 1186.
Figure 2. Image from the computer animation in Commonwealth v. Serge depicting the victim on the floor after the shooting. The knife visible on the floor next to the victim was not present in the victim's hand or elsewhere during the shooting (see Figure 1).

This misapplication of evidence principles to the admission of computer animations opens the door to abuses that can have dramatic negative consequences to the party against whom the animation is offered. Litigants can use a computer animation to make an end run around their burdens under the Rules of Evidence. Their experts can offer unscientific opinions through an animation that they would never be able to offer through verbal testimony. To allow litigants to display computer animations for the purpose of illustrating their theories of the case is tantamount to allowing counsel to argue to the jury in the middle of their case-in-chief. As demonstrative evidence continues to evolve, the argumentative use of them will continue to undermine our adversary system.

164. Id.
III. TESTIMONIAL ACCOUNTABILITY FOR MODERN
DEMONSTRATIVE EVIDENCE

As demonstrative evidence becomes increasingly more persuasive, it is very important that it be subject to the appropriate evidentiary standards. Demonstrative evidence is nonverbal testimony and, as such, should be held to the same admissibility standards as other testimonial evidence. Litigants must have the same opportunity to challenge testimony conveyed by way of animation that they have to challenge testimony offered verbally. Moreover, proponents of demonstrative evidence must be held to the same burdens as proponents of verbal testimony. There are several challenges to the admission of demonstrative evidence that should be considered. Each is discussed below.

A. Speculation

The prohibition against speculation is easily enforced when the demonstrative exhibit is offered as the nonverbal testimony of a lay witness. Rule 602 provides that a witness may testify only to matters of which the witness has personal knowledge. The burden is on the proponent of the testimony to establish evidence sufficient to support a finding that the witness has personal knowledge. Applying this Rule to nonverbal testimony, the proponent must establish that the witness has personal knowledge of everything depicted in the demonstrative evidence. If the proponent fails to meet that burden, the portions of the demonstrative evidence that are not supported by the witness's personal knowledge must be redacted before the demonstrative evidence is displayed. It is a question of admissibility, not weight. Because Rule 602 places this burden squarely on the proponent, it is not appropriate to expect the opposition to identify on cross-examination those aspects of the demonstrative evidence not supported by the witness's personal knowledge. A witness vouches for the contents of the demonstrative evidence in its entirety, just as the witness vouches for the veracity of every word of verbal testimony.

Speculation is problematic, however, when dealing with a demonstrative exhibit used to illustrate the opinions of ex-

166. Id.
experts—as experts are not required to have personal knowledge of the facts or data underlying their opinions.\textsuperscript{167} Usually an animation offered to illustrate an expert's opinion consists entirely of information of which the witness has no personal knowledge. Notwithstanding the rule permitting experts to opine, the expert's testimony must still be "based upon sufficient facts or data."\textsuperscript{168} The burden is on the proponent of the evidence to prove by a preponderance of the evidence that the expert opinion is admissible.\textsuperscript{169} Many computer animations run afoul of this rule. No matter how much evidence exists, there is never enough to fill in every detail necessary to complete the animation. The expert (or the animator) must make assumptions to fill in the blanks. For example, the defense in the \textit{Mitchell} case challenged the animation prepared by the prosecution's ballistics expert because it was based in part on the expert's assumptions.\textsuperscript{170} Although the evidence supported the conclusion that there were a total of eight shots fired, the sequence of those shots was a "guess," according to the defense.\textsuperscript{171} Such assumptions seem to be harmless, but there is no way of knowing the extent to which they may inadvertently influence the jury.

Other assumptions are not so arbitrary and do not seem so harmless. There are often disputed facts that cannot be resolved by expert opinion, but nevertheless must be depicted one way or another in the animation. Of course, the choice is made in favor of the party offering the animation. In the \textit{Mitchell} case, the question of whether the victim was holding anything in his hands was in dispute.\textsuperscript{172} The prosecution's

\textsuperscript{167} See FED. R. EVID. 702. According to Rule 702, an expert "may testify . . . in the form of an opinion or otherwise, if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case." \textit{Id.}

\textsuperscript{168} \textit{Id.} See also Compania Embotelladora Del Pacifico, S.A., v. Pepsi Cola Co., 650 F. Supp. 2d 314, 318–19 (S.D.N.Y. 2009) ("[A]n expert's testimony must be excluded if it is 'speculative or conjectural.'").

\textsuperscript{169} See Daubert, 113 S. Ct. at 2796 n.10 (citing Bourjaily v. United States, 107 S. Ct. 2775, 2778–79 (1987)) (discussing that the proponent of expert testimony has burden to prove by a preponderance of the evidence that expert is qualified to give opinion).


\textsuperscript{171} \textit{Id.}

\textsuperscript{172} See Pinsky, \textit{supra} note 1.
experts could not determine, through physical evidence or otherwise, whether the victim was holding anything and, if so, how he was holding it. The animator had to make a choice—depict an object in his hand or not depict an object in his hand—and either choice was problematic. Having neither personal knowledge nor sufficient facts or data to form a scientific opinion on the subject, the expert would not have been permitted to answer that question with verbal testimony. For that reason, he should not have been permitted to answer that question with nonverbal testimony in the form of a computer animation.

Similarly, in *Serge*, the defense contended that the defendant shot the victim in self-defense after she charged at him with a knife. Although there was no evidence as to whether she was holding a knife at the time of the shooting, the prosecution offered a computer animation that depicted the victim empty-handed at the time she was shot. At the end of the animation, after the victim had already collapsed to the ground, a knife appears on the floor next to her. Although unsupported by the evidence, the appearance of the knife for the first time at the end of the sequence was consistent with the prosecution's case theory that the defendant planted the knife after the shooting to support his claim of self-defense. The absence of the knife during the shooting was not an arbitrary and harmless choice by the animator. It was a deliberate choice made to ensure that the animation reinforced the prosecution's theory that the victim was unarmed at the time of the shooting. No testifying witness was required to account for that choice and testify under oath that the depiction of the unarmed victim was a fair and accurate representation of how she appeared to the defendant when he fired his gun. Nevertheless, the jurors saw a reenactment

---

173. Id.
174. The victim was shown holding a beer bottle in his right hand as he is walking out of the bedroom (see Figure 6). Mitchell Animation, *supra* note 7. The bottle was removed before the animation was shown to the jury. Pinsky, *supra* note 1.
175. *Serge*, 896 A.2d at 1175.
176. Id. at 1181.
177. See Forensic Animations, *supra* note 150.
178. See *id*.
179. See *Serge*, 896 A.2d at 1181.
180. In its instructions to the jury before showing the animation, the Court stated that the two experts had testified that "the computer-generated anima-
of the defendant shooting an unarmed woman and were told that it was prepared to help them understand the experts' opinions on how the shooting occurred.\(^{181}\)

In his concurring opinion in *Serge*, Pennsylvania Supreme Court Justice Castille warned that animations may be overkill, implying that there should be a preference for "old fashioned means, such as testimony and diagrams" when they would be useful to the jury in understanding the expert testimony.\(^{182}\) Although he did not elaborate on the implications of his observation, he appeared to be advocating a rule of preference for the least sophisticated medium necessary to assist the jury in understanding the testimony. This is not an attack on computer animation as a medium, instead Justice Castille criticizes the desire to include every detail to make the animation as realistic as possible. The more detailed the animation, the greater the need for arbitrary assumptions.\(^{183}\)

\(^{181}\) This is part of what the court explained to the jury:

You heard testimony from Dr. Gary Ross and Trooper Brad Beach that the computer-generated animation, which will now be shown to you, is a fair and accurate illustration of the opinions that they formed as to how this shooting allegedly occurred. You also heard this witness describe how he produced the three-dimensional drawings with computer software to depict those opinions, and thereafter transform them onto this DVD to produce moving images, which will be played for you . . . .

\(^{182}\) This computer-generated animation is a demonstrative exhibit, not substantive evidence, and it is being offered solely as an illustration of the Commonwealth's version of events as recreated by Dr. Gary Ross and Trooper Brad Beach.

\(^{183}\) For example, compare Figure 1 with Figure 3. Because Figure 3 contains less detail, there is less need to make the type of arbitrary assumptions necessary to fill in details in an animation such as the one shown in Figure 1.
Figure 3. Diagram prepared by Trooper Beach depicting his opinion in *Serge* related to the relative positions of the defendant and the victim when the second shot struck the victim.\(^{184}\)

**B. Hearsay and Other “Otherwise Inadmissible” Evidence**

In some cases, there may be sufficient facts or data to support an expert opinion, but the expert is not permitted to testify about the evidence because they are “otherwise inadmissible.”\(^{185}\) An expert may not testify about evidence that is otherwise inadmissible unless the court finds that the probative value of the evidence substantially outweighs the danger of unfair prejudice.\(^{186}\) The same should apply to an expert’s nonverbal testimony offered through a computer animation or other form of demonstrative evidence. Unless the court finds that the probative value of the evidence substantially outweighs the danger of unfair prejudice, the otherwise inadmissible evidence should not be included in a computer animation.

---

\(^{184}\) Brief of Appellant with Apps. at App. D, Commonwealth v. Serge, 896 A.2d 1170, (Pa. 2006) (No. 150 MAP2004). As shown in the animation, this was the third shot fired by the defendant; the second shot missed the victim entirely. *See* Forensic Animations, *supra* note 150.

\(^{185}\) *See* FED. R. EVID. 703.

\(^{186}\) *Id.*
When evidence is otherwise inadmissible, it is often hearsay. Hearsay is a statement made outside of court offered "to prove the truth of the matter asserted."\(^{187}\) This is a particular concern with demonstrative evidence because exhibits often contain depictions based on information provided by someone other than the testifying witness. When a witness couches for the accuracy of the exhibit, it is often unclear whether the witness is claiming to have first-hand knowledge of everything depicted, or whether the witness is relying on information provided by another source. If it is the later, the exhibit contains hearsay.

Suppose an expert in an automobile accident case has based an opinion in part on an eyewitness statement that the traffic light was green at the time of the accident. The eyewitness never testifies at trial and no hearsay exception applies to the out-of-court statement. That out-of-court statement is otherwise inadmissible. The expert should not be permitted to testify verbally that the light was green. Nor should the expert be permitted to testify to that fact nonverbally by showing a green light in a demonstrative exhibit.

C. Relevance and Danger of Unfair Prejudice

The relevance of demonstrative evidence is determined in the same manner as any other form of witness testimony. Evidence is relevant if it has "any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence."\(^{188}\) The probative value of the evidence, however, must be balanced against other considerations. Relevant evidence may be excluded on the grounds that "the probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury, or by considerations of undue delay, waste of time, or needless presentation of cumulative evidence."\(^{189}\)

To illustrate how this balance applies to nonverbal testimony, consider the testimony of an eyewitness to an automobile accident. The appearance of the scene of the accident is relevant and, therefore, the eyewitness is allowed to testify

\(^{187}\) Fed. R. Evid. 801(c).
\(^{188}\) Fed. R. Evid. 401.
\(^{189}\) Fed. R. Evid. 403.
about it. Some aspects of the scene, however, may have very little probative value, yet pose a danger of unfair prejudice. Suppose that the plaintiff alleges that the defendant was negligent in causing the accident because he was speeding. And suppose further, that the plaintiff claims that there was a playground on the corner nearest the accident, but concedes that the playground had nothing to do with what caused the accident. The judge may rule that the danger of unfair prejudice posed by the evidence regarding the playground substantially outweighs its probative value and preclude the eyewitness from testifying about it. The same considerations should apply if the eyewitness describes the scene through a photograph instead.

This balance also applies to expert testimony. Although experts are permitted to testify to facts outside their personal knowledge, the probative value of the testimony is measured by its relevance to permissible expert opinions. In Serge, for example, the computer animation depicts the clothing that the defendant and the victim were wearing at the time of the shooting. (See Figures 2 and 3.) The defendant is wearing a red plaid hunting jacket and the victim is wearing spotted pajamas. This imagery reinforced the prosecution's case theory that the defendant (dressed as a hunter) came home with the intention of shooting his wife and that his wife (dressed for bed) was not the aggressor. But the clothing had little

190. The balancing may produce a different outcome due to the difference between showing a photograph and describing everything in it. Because using a photograph saves the time it would take the witness to describe the scene in more detail, the court may be more inclined to admit it even if some aspects of it pose a danger of unfair prejudice.

191. See, e.g., Smith v. Ford Motor Co., 215 F.3d 713, 720 (7th Cir. 2000) (holding that expert testimony was admissible because it was relevant to a factual matter in the case).

192. Forensic Animations, supra note 150.

193. The defendant made a similar argument about the impact of such imagery in his brief to the Supreme Court of Pennsylvania: [The human face ... always carries with it an expression, even when presented in blank stare. Here, the Defendant's facial expression, while portrayed as shooting the Decedent, was recreated to appear cold and callous. So often, it is the appearance of an individual as being cold and callous, and sometimes the most innocuous appearance, that impasses individuals to develop and hold opinions, right or wrong, as to the character of the individual portrayed. Defendant was portrayed as an emotionless executioner, as cold as the expression on his face to bolster the Commonwealth's theory that the Defendant had the actual specific intent and malice.]
probative value to the expert opinions the animation was intended to illustrate. Therefore, the prosecution should not have been permitted to include the clothing in the animation.

Aside from the contents, a danger of unfair prejudice may also stem from the mode of presentation. There has long been a concern that there is an inherent danger of unfair prejudice when it comes to demonstrative evidence generally. Wigmore noted that "a material object . . . always tends to impress the mind unconsciously, upon the bare sight of it, with the verity of its purport." Nevertheless, if the opposing party contends that a visual representation of the witness's testimony, either in whole or in part, would pose a danger of unfair prejudice, an objection should be lodged pursuant to Rule 403.

Another source of potential unfair prejudice is the inability of the opponent to cross-examine non-verbal testimony. If a witness can more effectively communicate certain information to the jury by reference to a demonstrative exhibit, it follows that the cross-examination of that witness, if limited to verbal testimony, will be less effective than the nonverbal testimony given on direct. In Racz v. R.T. Merryman Trucking

---

194. WIGMORE, supra note 23, § 790 at 893. But see Borelli, supra note 19, at 455–56 (arguing that jurors are capable of following instructions to consider demonstrative evidence for what it is worth); Galves, supra note 18, at 218–19 (arguing that jurors are so accustomed to computer generated graphics that it is unlikely that they will mistake a computer animation for reality).

195. Although it is often presumed that jurors will believe what the computer animation shows simply because they have seen it, there is insufficient empirical data to draw any reliable conclusions on that issue. Bennett et al., Seeing Is Believing, Or Is It? An Empirical Study of Computer Simulations as Evidence, 34 WAKE FOREST L. REV. 257, 285–87 (1999). In that study, two sets of juries heard a hypothetical civil trial arising from an automobile accident. Id. at 267–70. The defendant truck driver allegedly crested a vertical curve then struck the plaintiff's car as she was pulling onto the roadway. Id. at 269. The posted speed limit was 55 mph, but there was an advisory sign on the upside of the hill that recommended that the driver reduce speed to 40 mph. Id. The law of the jurisdiction did not require the driver to reduce speed. Id. at 269 n.46. In addition to the truck driver, the state was also named as a defendant for negligent construction of the roadway. Id. at 269. In one set of trials, the plaintiff's accident reconstruction expert used a computer animation to show that the defendant would have missed plaintiff by quite a bit had he slowed to 40 mph as recommended by the sign on the upside of the hill. Id. at 272. In other set of trials, the plaintiff's expert used photos in place of the animation. The authors found no statistically significant relationship between seeing a computer animation and the verdict, either in terms of the apportionment of fault or the measure of damages. Id. at 277–85.
the court was mindful of the plight of the cross-examiner when seeking to discredit nonverbal testimony given on direct. 197 Racz involved an automobile accident between a car and a tractor trailer, both moving in the same direction in adjacent lanes. 198 The plaintiff alleged that the back wheels of the defendant’s tractor-trailer entered the lane with the decedent’s car, thus causing the decedent to lose control of her car. 199 The defendant prepared a computer animation based on the opinions of the defendant’s accident reconstruction expert. 200 The expert had concluded that the wheels of the tractor-trailer did not enter the car’s lane, disregarding deposition testimony of a passenger in the car who claimed he saw the trailer come into their lane. 201 In deciding to exclude the animation, the court noted that “[i]t would be an inordinately difficult task” to cross-examine the expert and establish that, if the trailer did in fact cross into the decedent’s lane, the accident would have occurred differently than depicted in the animation. 202 The defendant’s expert had the

197. Id. at *5.
198. Id. at *1.
199. Id.
200. Id. at *5.
201. Id.
202. Id. at 810–11; see also Spyrka v. County of Cook, 851 N.E.2d 800, 810 (Ill. App. 2006). (holding that the trial court erred in admitting a computer animation that depicted clotting blood cells). One of the plaintiff’s experts opined that the decedent’s cause of death was a blood clot that was allowed to increase in size because the defendant doctor discontinued the anticoagulant Heparin. Id. at 804. The expert used a computer animation of a blood clot forming to explain his testimony. Id. at 806. On cross-examination, the expert conceded that the animation did not necessarily depict what actually happened to the decedent. Id. at 807, 811. He acknowledged that there was evidence that a clot had existed before Heparin was discontinued and that he “did not know how much clot was in her lung prior to the fatal embolism.” Id. Despite the uncertainty as to whether the animation depicted what actually happened inside the decedent’s blood vessels, the animation would still seem to be relevant under either the illustrative purposes theory or the nonverbal testimony theory. If expert testimony regarding how a blood clot generally causes an embolism is relevant, and one would think that it is, a graphic representation of that testimony would be equally relevant. Nevertheless, the court appears to have been concerned about the net impact of the animation after what appears to be an excellent verbal cross-examination. According to the court, “the jury had already seen the prejudicial video at that point.” Id. at 811. Thus, the problem appears to be that the verbal cross-examination was simply no match for the computer animation because the cross-examiner was not able to visually depict the pre-existing blood clot and how that, not the absence of Heparin, may have caused the embolism.
unfair advantage of being able to use the animation to show the jury how he believed the accident occurred. Unless the animation could be altered based on testimony elicited on cross-examination, the plaintiff was unable to show the jury its version of how the accident occurred.\footnote{203}

**CONCLUSION**

In 1990, the television franchise credited with anticipating the invention of the cellular phone and the MRI scanner\footnote{204} gave us a glimpse at the courtroom of the future.\footnote{205} For anyone who values our adversary system, the portrayal is nothing short of apocalyptic. The story involves an extradition hearing held aboard a twenty fourth century space ship. A member of the crew had been charged with murder and the hearing turned on genuine issues of fact. Nevertheless, no witnesses swore to tell the truth, no evidentiary foundations were laid, and no witnesses were cross-examined. Instead, the hearing consisted of competing animated re-creations of an event, created by the ship's computer, each with "a nominal eight-point-seven percent margin of error."\footnote{206}

This scenario is not that far-fetched. If courts continue to allow litigants to present computer animations that illustrate case theories, the line between evidence and argument will continue to be blurred, and trials will not be based on which party has the evidence, but rather which party put on the better show. Our adversary system, which depends on the gathering, producing, and testing of evidence, will suffer.

Despite the potential for its abuse, demonstrative evidence adds tremendous value to our adversary system. As Alexander Jason recognized nearly twenty years ago, and as Wigmore recognized more than a century ago, witnesses are often able to express themselves better through demonstra-

\footnote{203. It is not enough that the plaintiff could have offered a competing animation, either in its case in chief, or as rebuttal to the expert's testimony. The plaintiff should be able to confront the defendant's expert on cross-examination, forcing that expert to acknowledge how changes in an animation's underlying premises would affect the conclusions reached.}
\footnote{206. *Id.*}
tive evidence than through words. Demonstrative evidence should continue to play an increasingly important role in our adversary system. And, as demonstrative evidence continues to evolve, courts must be careful that it is serving its proper role as nonverbal testimony, and apply the same evidentiary standards that apply to testimonial evidence.