ADMITTING ANIMATIONS: APPLIED PSYCHOLOGY RESEARCH AS A CALL FOR IMPROVED GUIDANCE IN ASSESSING THE PREJUDICIAL IMPACT OF COMPUTER-GENERATED ANIMATIONS

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ABSTRACT

Advances in recent technology have changed the evidentiary sources presented in both criminal and civil trials to include the use of full-motion, computer-generated animations. The presentation of computer-generated animations can increase juror retention, understanding, and synthesis of information, or it can act as a persuasive tool to undermine the deliberative process and to unduly influence juror decision making. In the advent of such new technology use, a balance must form between the usefulness of such evidentiary tactics and the elimination of undue influence or abuse of new technology. General foundational principles of demonstrative evidence apply to authenticate and determine the relevance of admission of such evidence. The Federal Rules of Evidence are not properly equipped to handle the implications of such new evidence and have provided little to no guidance for judges to determine admissibility. This Note discusses the analysis of the impact of computer-generated animations from the perspective of psychology. Through the application of psychological principles, this Note presents suggested guidelines for judicial determination of admissibility or inadmissibility of computer-generated animations as unduly prejudicial. Finally, this Note proposes an amendment to Federal Rule of Evidence 403 and the accompanying Advisory Committee's Note to accommodate the advanced technology.

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INTRODUCTION

Imagine that you are a juror in a major criminal or civil trial. You have waited for two days while enduring jury selection, spent hours figuring out a way to get out of serving, developed a strategy to deal with your job, and have finally been placed in a jury box to listen to lawyers present a complex case. Imagine that you are a juror sitting in a chair listening to testimony for seven hours per day. Countless witnesses have taken the stand to tell their stories; experts have given their interpretation of the evidence; the crying victims have expressed their heartfelt pain; and the lawyers have told you what to think. You have heard oral testimony, viewed physical evidence, and watched a computer-generated animation of the incident in dispute. Finally, the time comes when you are asked to enter the jury room and deliberate the outcome of the case. What do you remember and how do you begin to piece together the evidence into one coherent outcome? There is no way of knowing for sure how great an impact a computer-generated animation has on a jury;

however, if you believe the old adage "seeing is believing," you might determine that the impact is significant.[1]

In both the civil and criminal litigation contexts, lawyers have started using computer-generated evidence to present their theories of the case and to impact the jury.[2] The advances in technology in the past thirty years have allowed the framework of a jury trial to change dramatically.[3] Computer-generated evidence allows litigators the latitude to visualize for a jury—in ways not previously available—events that cannot be replicated in a courtroom.[4] These new sources of animated evidence allow litigators to reach into the minds of jurors and demonstrate what they could only otherwise imagine.[5] Computer-generated evidence demonstrations have become widely used in criminal trials,[6] aviation litigation,[7] products liability cases,[8] automobile accident liability determinations,[9] and medical malpractice claims.[10] These demonstrations generally consist of an animation that presents to the jury a party's theory of the

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1. The importance of visual media is heightened due to the ability to visually transmit multiple sources of coded information in a singular format. Jurors are able to translate this wealth of information through associative processes. Carrie Leonetti & Jeremy Bailenson, *High-Tech View: The Use of Immersive Virtual Environments in Jury Trials*, 93 MARQ. L. REV. 1073, 1074 (2010).

2. John Selbak, Comment, *Digital Litigation: The Prejudicial Effects of Computer-Generated Animation in the Courtroom*, 9 HIGH TECH. L.J. 337, 341–42 (1994). The actual prevalence of such technology is difficult to determine. Factors such as a general lack of trial court opinions on the matter, paired with a trend toward case settlement, suggest that any quantification would be inadequate. *See infra* notes 6–10.

3. *See* Selbak, *supra* note 2, at 338.

4. *See* Betsy S. Fiedler, Note, *Are Your Eyes Deceiving You?: The Evidentiary Crisis Regarding the Admissibility of Computer Generated Evidence*, 48 N.Y.L. SCH. L. REV. 295, 295 (2004).

5. *See* Selback, *supra* note 2, at 340.

6. *See generally* People v. McHugh, 476 N.Y.S.2d 721 (N.Y. Sup. Ct. 1984) (holding that a computer re-enactment of a car crash could be introduced at trial).

7. *See, e.g., Delta 191 Courtroom Animation from 1987*, YOUTUBE (May 18, 2012), http://www.youtube.com/watch?v=HY7pH3fzsvY. For general information on the Delta Flight 191 case, see *Connors v. United States*, 720 F. Supp. 1258 (N.D. Tex. 1989), *aff'd*, 919 F.2d 1079 (5th Cir. 1991).

8. *See generally* Datskow v. Teledyne Cont'l Motors Aircraft Prod., 826 F. Supp. 677, 685 (W.D.N.Y. 1993) (admitting an animated illustration where it was accompanied by a cautionary instruction).

9. *See generally* Starr v. Campos, 655 P.2d 794 (Ariz. Ct. App. 1982) (considering the admissibility of expert testimony based on a computer simulation of a car crash, but ultimately ruling on a separate issue).

10. *See, e.g.,* Andre M. Thapedi, Comment, *A.D.A.M. — The Computer Generated Cadaver: A New Development in Medical Malpractice and Personal Injury Litigation*, 13 J. MARSHALL J. COMPUTER & INFO. L. 313, 313–15 (1995).

case in a cumulative and detailed fashion.[11] The admission of such animations can be contested pursuant to the Federal Rules of Evidence under theories of reliability, validity, relevance, and undue prejudice.[12] The final stop in the admissibility analysis of a computer-generated animation is the undue prejudice standard under Federal Rule of Evidence 403.[13] This is of serious concern to judges and litigators because "[i]f a '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."[14]

This situation happens every day in courtrooms across the United States. There were approximately 4,750 jury trials in the federal district courts alone in 2011.[15] This number should increase exponentially to take into account the numerous criminal and civil trials in each individual state. At the conclusion of these trials, jurors are asked to sit in a room of their peers and debate the relative merits of each party's case and declare a victor. Imagine, once again, that you are sitting in this jury room trying to find a way to come to one cohesive understanding of the trial among potentially divergent theories. You examine testimony from the transcript, attempt to understand the significance of expert reports, use your life experiences to evaluate witnesses, and consider all of the visual evidence that you saw during the trial. This entire lengthy and generally confusing process can be distilled into one clear question: Does the story make sense?

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11. *See* Leonetti & Bailenson, *supra* note 1, at 1074–75.

12. *See infra* Section II.B. The admission of such evidence is also challenged under state evidence rules that generally conform to the standards of the Federal Rules. A majority of cases are at the state court level because the evidence is admitted at the trial court level. The evaluation in this Note of Federal Rule of Evidence 403 will provide guidance for the state evidentiary rules as well due to the distinct similarities in language and application. This Note focuses solely on the Federal Rules of Evidence, as it is generally applicable across all states and in the federal courts. *See generally* Commonwealth v. Serge, 58 Pa. D. & C.4th 52 (Pa. C.P. Lackawanna Cnty. 2001) (discussing the admissibility of a computer-generated animation under the Pennsylvania State Rules of Evidence).

13. *See* FED. R. EVID. 403.

14. Fred Galves, *Where the Not-So-Wild Things Are: Computers in the Courtroom, the Federal Rules of Evidence, and the Need for Institutional Reform and More Judicial Acceptance*, 13 HARV. J.L. & TECH. 161, 190 (2000) (indicating that computer generated animations are a more efficient means of communication).

15. ADMIN. OFFICE OF THE U.S. COURTS, 2011 ANNUAL REPORT OF THE DIRECTOR: JUDICIAL BUSINESS OF THE UNITED STATES COURTS 376 (2012). Though these statistics do not represent the number of cases in which computer-generated evidence is utilized, they do demonstrate that despite a trend toward settlement rather than litigation, there are still a large number of full jury trials.

This Note strives to demonstrate the impact of computer-generated evidence—in the form of demonstrative animations—on jurors, and to suggest a framework for evaluating the potential for undue prejudice using psychological principles. Part I of this Note offers general background information on the types of computer-generated evidence. Part II describes the current state of the law and the applicable Federal Rules of Evidence as they relate to computer-generated evidence, and provides examples from criminal and civil cases. Part III provides background on the psychological principles and applied psychology research studies that frame the analysis in this Note. Finally, Part IV examines the potential for undue prejudice associated with computer-generated evidence and suggests guidance for judicial understanding and evaluation of potential prejudice in computer-generated animations.

I. WHAT IS COMPUTER-GENERATED EVIDENCE?

A. Forms of Computer-Generated Evidence

1. Static or full-motion evidence

Computer-generated evidence has evolved over time to the point that there are now several forms of evidence ranging from static images projected on a screen to full-motion animations of complex events.[16] There exist several types of full-motion animations, including general animations, re-creation animations, and simulation animations.[17] Each individual type of computer-generated evidence serves a particular purpose in the trial context.[18] Computer-generated evidence in the form of pictures, projected documents, or other

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16. *See* Galves, *supra* note 14, at 177–86 (describing the different categories of computer-generated evidence).

17. *Id.* at 180–86.

18. *See id.* at 178–80. Static images may be used simply for emphasis or to ensure that the jury is paying attention to the trial. Litigators have the ability to zoom in on or highlight certain aspects of the image to emphasize a particular point. *Id.* These static images or even tactics for emphasizing certain aspects of a document or image can have a greater impact on the jury than paper copies. *Id.* Despite the general lack of concern over these images, there is a potential for undue prejudice in the use of color or some other form of misleading emphasis. *See, e.*g., State v. Thompson, 788 N.W.2d 485, 494–96 (Minn. 2010) (discussing and admitting computer-generated images depicting bloody foot and shoe prints as "essentially static images subject to computer-driven manipulation including highlighting, enlargement, split screen presentation, and zooming").

static images is not met with the same level of controversy as the full-motion evidence.[19] The projection or manipulation of images on a screen is not categorically or significantly different from "being more persuasive or compelling in oral argument, like the skilled attorney who takes a dramatic pause for emphasis, raises or lowers her voice at key points, waves her arms, narrows her eyes, or shakes her head to convey meaning."[20] These differences are not so significant that they warrant admissibility concerns.[21] Conversely, the use of full-motion animations is highly contested due to the potential impact on the jury.[22]

2. Re-creations and simulations

Although there are substantive distinctions between animations, re-creations, and simulations, there are several general principles applicable to the creation and form of full-motion computer-generated evidence.[23] The first step in creating an animation is to determine the parameters of the animation based on the evaluations of the lawyers, relevant witnesses, and experts.[24] The most crucial step in creating an animation is gathering all of the relevant information.[25] This information may be obtained through eyewitness testimony, police investigations, administrative evaluations, expert testimony, and any available images of the incident in question.[26] At this point, the types of animations start to differentiate. In any case, a forensic animator will take all relevant information and compile it to create "still image frames, which are recorded in succession on a particular medium . . . to create what appears to be a moving image."[27]

Some computer animations can function more like cartoon drawings than anything else.[28] These animations are "artistic rendering[s]

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19. *See* Galves, *supra* note 14, at 180.

20. *Id.* at 179–80.

21. *Id.* at 180.

22. *Id.* at 208–26.

23. Dean A. Morande, *A Class of Their Own: Model Procedural Rules and Evidentiary Evaluation of Computer-Generated "Animations,"* 61 U. MIAMI L. REV. 1069, 1077 (2007).

24. *Id.*

25. *Id.* at 1077–78.

26. *Id.* at 1078.

27. *Id.*

28. Animations based on conjecture or inaccurate data calculations can exhibit the same grasp on physics as the gravity-defying feats of Wile E. Coyote. The author would like to acknowledge the insights and input of Steven L. Morris, Senior Managing Consultant, at

of an image that is altered slightly frame by frame in order to mimic actual movement."[29] The actual creation of the animation is accomplished through the integration and input of "known parameters, data, and facts derived from the accident investigation,"[30] as testified to by witnesses, into a computer. The totality of the evidence consists of the artist's depictions, which are then shown to the jury.[31] This form of testimonial animation does not purport to represent anything other than a compilation of witness testimony as demonstrated through a visual mechanism.[32]

The animation is thus analogous to a witness or expert drawing a diagram or series of diagrams representing what he or she purports to be the facts at the time of the incident.[33] This comparison is helpful for understanding the admissibility concerns and controversy over animations. Where an animation is based on scientific data and expert opinion that purports to explain what must have happened, both parties can evaluate the animation at the commencement of litigation and can agree upon it.[34] Opposing counsel can cross-examine and completely evaluate the basis upon which a re-creation animation is made in the same way that counsel may examine the witness or expert on the stand during a trial.[35]

Re-creations and animations have one distinct difference: the source of the information used to create the series of images.[36] The re-creation represents a backward-looking form of evidence because it shows only what witnesses have testified to be factually true or what experts have determined to be the most likely factual scenario

Engineering Systems Incorporated (ESI) regarding the preparation and use of computer-generated animations. Telephone Interview with Steven L. Morris, Senior Managing Consultant, ESI (Oct. 15, 2013).

29. Adam T. Berkoff, *Computer Simulations in Litigation: Are Television Generation Jurors Being Misled?*, 77 MARQ. L. REV. 829, 830 (1994).

30. Kathlynn G. Fadely, *Use of Computer-Generated Visual Evidence in Aviation Litigation: Interactive Video Comes to Court*, 55 J. AIR. L. & COM. 839, 843 (1990).

31. Berkoff, *supra* note 29, at 830.

32. *See* Galves, *supra* note 14, at 182.

33. *See, e.g.*, Jones v. Kearfott Guidance & Navigation Corp., No. CIV. 93-64(DRD), 1998 WL 1184107, at *5 (D.N.J. Nov. 17, 1998); Galves, *supra* note 14, at 182.

34. Galves, *supra* note 14, at 183–84.

35. *See id.* at 182.

36. *Id.* at 183. Re-creations involve the use of scientific principles and formulas to develop a visual representation of a concept or factual situation. The ability to tell the jury that the animation they are viewing is scientifically accurate may go a long way in establishing credibility and represent an inherently more truthful story. *See id.* This may become an especially important factor when only one party chooses, or can afford, to use animation technology.

based on the evidence.[37] The value of such re-creations is tied to the validity of the input data used by the "computer program to correctly process that information so that the end result can be characterized as a 're-creation' of what must have happened according to the computer program and the input data."[38]

The creation of a "[s]imulation, on the other hand, incorporates more than the visible characteristics of an event. It involves mathematical calculations of mass, velocity, and acceleration, consistent with the laws of physics, which result in a mathematically and physically accurate picture or result."[39] The process of creating a simulation animation involves "an artificially created extrapolation of an event represented by limited data or input that continues the event beyond the stated mathematical or factual basis; in other words, a simulation provides information about what would have happened or alternate theories of the accident."[40] The use of simulations is especially useful, and highly contested, because experts can use this animation to change variables and to demonstrate, or discredit, the opposing party's theory of the case.[41] The computer data and formulas constitute the witness in the case of re-creations and simulations.[42]

II. CURRENT STATE OF ANIMATION ADMISSIBILITY

A. Demonstrative or Substantive Evidence

Demonstrative evidence, also termed illustrative evidence, has been defined as "physical evidence that one can see and inspect . . . and that, while of probative value and [usually] offered to clarify

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37. *Id.*

38. *Id.* at 184 (emphasis omitted).

39. Fadely, *supra* note 30, at 844–45.

40. *Id.* at 842 (citing ASHLEY S. LIPSON, ART OF ADVOCACY — DEMONSTRATIVE EVIDENCE §§ 16.02, 16.03(4) (Matthew Bender ed., 1989)).

41. *See* Galves, *supra* note 14, at 185. An expert witness can take the stand and immediately impeach the testimony of a lay witness by changing an input variable and demonstrating the scientific impossibility, or improbability, of a particular fact or assumption. The ability to refute the statements of opposing counsel is grounded in the mathematical and statistical backing of expert witnesses. While a computer-generated animation is qualitative as a whole, the most bulletproof and valuable animations are quantitative at the core. Telephone Interview with Steven L. Morris, Senior Managing Consultant, ESI (Oct. 15, 2013).

42. *See* Elan E. Weinreb, *"Counselor, Proceed with Caution": The Use of Integrated Evidence Presentation Systems and Computer-Generated Evidence in the Courtroom*, 23 CARDOZO L. REV. 393, 404 (2001).

testimony, does not play a direct part in the incident in question."[43] The theory underlying the admissibility of demonstrative evidence suggests that the evidence must sufficiently illustrate testimony or facts to convey a greater sense of meaning or understanding for the jury.[44] The admissibility of such evidence under the Federal Rules of Evidence is left to the discretion of the trial court; thus, the standards are only as strict as the judge deems them to be.[45] Some commentators suggest that because the use of computer-generated evidence has become much more common, the "admission standards for computer [animations] have become more lenient . . . . They were originally viewed with trepidation, but are now seen as benign tools."[46]

There are several key methods of introducing computer-generated evidence into a courtroom[47]: (1) a depiction of eyewitness testimony;[48] (2) a depiction of expert witness testimony;[49] (3) an expert opinion formed based on the output of a simulation;[50] (4) testimony of experts involved in the actual creation of the animation;[51] and (5) a general theory of the case utilized during opening or closing statements.[52] The use of computer-generated evidence is generally admissible in court as demonstrative evidence.[53]

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43. BLACK'S LAW DICTIONARY 636 (9th ed. 2009).

44. Fadely, *supra* note 30, at 879.

45. Berkoff, *supra* note 29, at 840. The application of Federal Rule of Evidence 403, and equivalent state evidentiary rules, represents a great level of discretion on the part of the trial judge. *Id.* at 842–43. The judge performs a subjective balancing of the benefits and harms under the provisions of Rule 403 to determine admissibility. Furthermore, the reviewing court will only look for a clear abuse of discretion or substantial error to determine reversal of the judgment. *Id.* at 843.

46. *Id.* at 835–36.

47. Morande, *supra* note 23, at 1079.

48. *See, e.g.*, Jones v. Kearfott Guidance & Navigation Corp., No. CIV. 93–64(DRD), 1998 WL 1184107, at *1-6 (D.N.J. Nov. 17, 1998) (discussing an animation created based solely on eyewitness testimony).

49. *See, e.g.*, Hinkle v. City of Clarksburg, 81 F.3d 416, 424 (4th Cir. 1996); Commonwealth v. Serge, 896 A.2d 1170, 1186–87 (Pa. 2006); Pierce v. State, 718 So. 2d 806, 807 (Fla. Dist. Ct. App. 1997).

50. *See, e.g.*, Bullock v. Daimler Trucks N. Am., L.L.C., 819 F. Supp. 2d 1172, 1177 (D. Colo. 2011).

51. *See* James E. Carbine & Lynn McLain, *Proposed Model Rules Governing the Admissibility of Computer-Generated Evidence*, 15 SANTA CLARA COMPUTER & HIGH TECH. L.J. 1, 4 (1999) ("Expert . . . 'testimony' is being offered by computers. In the above example of an air crash, there was no expert witness taking the stand to testify as to how the final moments of Flight 162 looked. The computer itself was the expert.").

52. *See, e.g.*, Prestige Ford Co. v. Gilmore, 56 S.W.3d 73, 79 (Tex. App. 2001).

53. *See* Fadely, *supra* note 30, at 879−83.

The most common method of introducing computer-generated evidence is through an expert witness who uses the animation to demonstrate a theory of the case or a scientific principle to the jury.[54] Through the use of the animation, a witness can provide to the jury a clear background on complex scientific principles and increase understanding as to the causative consequences of scientific data.[55] For instance, when litigating an aviation accident, an expert may provide an animation discussing the flight path, roll, pitch, and yaw; this animation might be accompanied by additional scientific background principles necessary for understanding the crash.[56] Expert witnesses generally do not introduce or create an animation without their own accompanying testimony.[57] The animation acts as a tangible aspect of testimony, while the expert has the opportunity to "fill in the gaps" and explain the significance of the animation to the jury.[58] The animation may transform from one that is substantive to one that is demonstrative depending on the way in which the

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54. Morande, *supra* note 23, at 1079. In one of the most overwhelmingly controversial recent criminal trials, George Zimmerman was charged with second-degree murder for the death of Trayvon Martin on the night of February 26, 2012. Zimmerman had called the police non-emergency line to report that a suspicious person was in his housing development. Zimmerman, a member of the Neighborhood Watch, and Martin, a Florida teen, engaged in an ensuing struggle that resulted in Martin being shot in the chest. In his defense, Zimmerman asserted that the shooting was justified under the Florida stand-your-ground statute and the applicable Florida self-defense provisions. *Trayvon Martin Shooting Fast Facts*, CNN LIBRARY (Aug. 29, 2013, 10:36 PM), http://www.cnn.com/2013/06/05/us/trayvon-martin-shooting -fast-facts. During the second week of the televised trial, after the conclusion of testimony from the prosecution's eye and ear witnesses, the defense attempted to admit into evidence a computer-generated animation of the night in question. The animation represented the culmination of expert and lay witness testimony in a singular visual format. Erin Donaghue, *George Zimmerman Trial: Defense Can't Introduce Animation of Fight as Evidence, Judge Rules*, CBS NEWS (July 10, 2013, 9:35 AM), http://www.cbsnews.com/2102-504083_162-57593035.html. At the end of the hearing on admissibility, Circuit Judge Debra Nelson concluded,

> To have an animation that goes back to the jury room that they can play over and over again like they can the 911 call and the reenactment and those other things gives a certain weight to certain things this court is not particularly certain that comports with the evidence presented at the trial.

Id. Judge Nelson sustained the prosecution's objection to the use of the animation as substantive evidence during the proceedings. Despite the prohibition on substantive evidence, defense counsel was permitted to use the computer-generated animation as a demonstrative exhibit during closing arguments. For a complete discussion of the animation admission considerations, see *George Zimmerman Trial Judge Rules on Text Messages and Animation 7.10.13 Pt. 1*, YOUTUBE, http://www.youtube.com/watch?v=713ZB7kh6RA (last visited Jan. 21, 2014).

55. Morande, *supra* note 23, at 1079.

56. *See, e.g.*, *Delta 191 Courtroom Animation from 1987*, *supra* note 7.

57. *See id.*

58. *Id.*

simulation is created.[59] The order in which the data is calculated and the weight of the testimony on which the evidence is based will determine the type of animation.[60] An animation based on an expert's calculations and interpretations is demonstrative while an animation based on raw data calculated by the computer is substantive.[61]

B. Federal Rules of Evidence

1. Admission: 401, 402, 702, 703, and 901

Computer-generated animations function in court to illustrate or explain testimony or other evidence, and they are generally considered to be a form of demonstrative evidence.[62] Demonstrative evidence, unlike substantive evidence, has no independent evidentiary weight in a courtroom and can only serve as an illustration of witness testimony.[63] Under the Federal Rules of Evidence, the standards of admissibility for demonstrative evidence are lower than those for substantive evidence because the exhibit is not formally admitted or available for the jury to view during deliberation.[64] In order to be admitted as a demonstrative exhibit, a computer-generated animation must meet only the following requirements: it must be relevant, it must fairly and accurately reflect the oral testimony presented, and it should aid the jury in understanding the testimony.[65]

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59. *Id.*

60. *See id.*

61. *Id.*

62. *See, e.g.*, People v. Hood, 62 Cal. Rptr. 2d 137, 139 (Cal. Ct. App. 1997); State v. Stewart, 643 N.W.2d 281, 293 (Minn. 2002); People v. McHugh, 476 N.Y.S.2d 721, 722–23 (N.Y. Sup. Ct. 1984).

63. Karen D. Butera, *Seeing Is Believing: A Practitioner's Guide to the Admissibility of Demonstrative Computer Evidence*, 46 CLEV. ST. L. REV. 511, 513–14 (1998).

64. *Id.* at 514. The argument can be made that while the substantive evidence may be played in the jury room, the demonstrative evidence acts as a tool for recall and reference when discussing the testimony or content in the animation. Although litigators and judges question the admissibility of substantive evidentiary animations, they should not be too quick to dismiss the impact of a single-viewing demonstrative exhibit.

65. *See McHugh*, 476 N.Y.S.2d at 723. In one of the more recent cases dealing with computer-generated animation admissibility, the Pennsylvania Supreme Court concluded that a Computer Generated Image (CGA) should be admitted as demonstrative evidence if it meets the requirements of PA. R. EVID. 401, 402, 403, and 901. Commonwealth v. Serge, 896 A.2d 1170, 1176 (Pa. 2006).

As a primary concern, the computer-generated animation must be relevant under Federal Rules of Evidence 401 and 402.[66] A computer-generated animation is relevant if "(a) it has any tendency to make a fact more or less probable than it would be without the evidence; and (b) the fact is of consequence in determining the action."[67] The evaluation of testimony should be made on a determination, based on a reasonable relationship to the dispute, that the piece of evidence adduced possesses sufficient probative value to be admitted to the jury.[68] Additionally, under Federal Rule of Evidence 402, "[r]elevant evidence is admissible unless any of the following provides otherwise: the United States Constitution; a federal statute; these rules; or other rules prescribed by the Supreme Court."[69]

The computer-generated animation presented must also be authenticated under Federal Rule of Evidence 901. To authenticate a piece of evidence, "the proponent must produce evidence sufficient to support a finding that the item is what the proponent claims it is."[70] Computer-generated evidence authentication is considered under four general evaluative criteria: "(1) completeness of data; (2) complexity of manipulation; (3) routineness of entire operation; and (4) verifiability of result."[71] A party may lay the foundation to authenticate an animation by demonstrating that the system or process used is inherently reliable and that the resulting animation is a fair and accurate depiction of the evidence.[72]

As demonstrative evidence serves as an illustration of witness or expert testimony, its admissibility is tied to that of the original testimony.[73] Therefore, the standards for admission differ based on the foundation for the illustration. The court may subject the expert witness and the expert who prepared the animation to scrutiny under Rules 702 and 703 of the Federal Rules of Evidence.[74] Rule 702

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66. *See* Gregory J. Morse, *Techno-Jury: Techniques in Verbal and Visual Persuasion*, 54 N.Y.L. SCH. L. REV. 241, 253 (2010).

67. FED. R. EVID. 401.

68. *See* FED. R. EVID. 401 advisory committee note.

69. FED. R. EVID. 402.

70. FED. R. EVID. 901.

71. Evelyn D. Kousoubris, Comment, *Computer Animation: Creativity in the Courtroom*, 14 TEMP. ENVTL. L. & TECH. J. 257, 264 (1995) (citing Gregory P. Joseph, *A Simplified Approach to Computer-Generated Evidence and Animations*, 156 F.R.D. 327, 327 (1994)).

72. *See* Marc A. Ellenbogen, Note, *Lights, Camera, Action: Computer-Animated Evidence Gets Its Day in Court*, 34 B.C. L. REV. 1087, 1102 (1993).

73. Butera, *supra* note 63, at 525–27.

74. *See* Ellenbogen, *supra* note 72, at 1107.

establishes that expert testimony shall be admissible at trial "in the form of an opinion or otherwise" if, among other things, "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."[75] The analysis under Rule 702 applies to animations expressing expert scientific conclusions and to mere illustrations of expert opinion testimony.[76] When facts relied upon by the expert are not in evidence, Rule 703 constrains otherwise admissible expert testimony.[77] Rule 703 requires that the basis for the expert opinion must be of the same type as that upon which other experts in the field would reasonably rely.[78] Under Rules 702 and 703, the evaluation of computer-generated animations includes expert qualification for the substantive expert and the animation expert.[79]

2. Exclusion: 403

Once a computer-generated animation meets the admissibility requirements of Rules 401, 402, 702, 703, and 901, the court then evaluates the animation under the balancing test of Rule 403.[80] Rule 403 provides that "[t]he court may exclude relevant evidence if its probative value is substantially outweighed by a danger of one or more

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75. FED. R. EVID. 702. The full text of Rule 702 provides:

    A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise 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.

Id.

76. Ellenbogen, *supra* note 72, at 1107.

77. *Id.* at 1107.

78. FED. R. EVID. 703. Federal Rule of Evidence 703 provides in full:

    An expert may base an opinion on facts or data in the case that the expert has been made aware of or personally observed. If experts in the particular field would reasonably rely on those kinds of facts or data in forming an opinion on the subject, they need not be admissible for the opinion to be admitted. But if the facts or data would otherwise be inadmissible, the proponent of the opinion may disclose them to the jury only if their probative value in helping the jury evaluate the opinion substantially outweighs their prejudicial effect.

Id.

79. Butera, *supra* note 63, at 522–24.

80. *See* Ellenbogen, *supra* note 72, at 1108 ("[I]n jurisdictions adopting the Federal Rules of Evidence, requirements of authentication, relevancy, expert testimony and the balancing test of Federal Rule of Evidence 403 must all be satisfied.").

of the following: unfair prejudice, confusing the issues, misleading the jury, undue delay, wasting time, or needlessly presenting cumulative evidence."[81] Whatever the source of the demonstrative evidence, the computer-generated animation in question must be evaluated under the balancing test of Rule 403.[82]

The 1972 Advisory Committee Notes for Rule 403 describe "unfair prejudice" as "an undue tendency to suggest decision on an improper basis, commonly, though not necessarily, an emotional one."[83] The exclusion of potentially prejudicial evidence is founded upon the supposition that "certain relevant evidence should not be admitted to the trier of fact where the admission would result in an adverse effect upon the effectiveness or integrity of the fact finding process."[84] The decision to exclude potentially prejudicial evidence rests solely within the discretion of the trial judge.[85] An appellate court will not overturn the decision of a trial court unless there is a showing of abuse of discretion.[86]

When a computer-generated animation is admitted as demonstrative evidence, it may be considered cumulative because it repeats, illustrates, or demonstrates other evidence already presented at trial.[87] When a judge determines that a particular computer-generated animation is cumulative in nature, the court may exclude such evidence on grounds that the probative value does not substantially outweigh the potential for undue prejudice.[88] Despite a determination that a computer-generated animation is cumulative, the party opposing the admission of the animation must convince the court that the prejudicial nature of the animation substantially outweighs its probative value.[89]

Of particular relevance to the admissibility of computer-generated animations is the evaluation of undue influence or undue weight of

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81. FED. R. EVID. 403.

82. *See* Ellenbogen, *supra* note 72, at 1106–07. This analysis applies to both lay and expert witness testimony.

83. FED. R. EVID. 403 advisory committee note.

84. GLEN WEISSENBERGER, WEISSENBERGER'S FEDERAL EVIDENCE § 403.1, at 77–78 (2d ed. 1995).

85. Carlo D'Angelo, *The Snoop Doggy Dogg Trial: A Look at How Computer Animation Will Impact Litigation in the Next Century*, 32 U.S.F. L. REV. 561, 569 (1998).

86. *Id.*; *see also* WEISSENBERGER, *supra* note 84, § 403.2, at 78.

87. Fadely, *supra* note 30, at 896.

88. *Id.*

89. *See id.*

evidence.[90] A trial court may exclude a computer-generated anima-
tion under Rule 403 if the opposing party can demonstrate that it
would create an improper basis for a decision by confusing the is-
sues in the case.[91] In the alternative, the animation may be excluded
for having the tendency of influencing the jury to ascribe undue
weight to the probative and determinative value of evidence.[92] The
basis for the jury's decision is a strong indicative factor in determin-
ing the undue prejudice of a computer-generated animation. Where
the "evidence arouses the jury's emotional sympathies, evokes a
sense of horror, or appeals to an instinct to punish," the evidence
may be excluded on the grounds that it could produce a biased or
prejudicial verdict.[93]

Computer-generated animations pose a particularly strong risk of
undue prejudice because of the immersive full-motion graphics,
persuasive narrative structure, and lack of corresponding eviden-
tiary weight.[94] The persuasive nature of the animation may cause the
juror to relinquish his fact-finding role and instead incorporate and
adopt the demonstrative computer-generated animation as a clear
depiction of fact in his analysis.[95] The mere fact that computer-
generated animations represent a strong and persuasive element of
evidence does not necessarily require that they should be excluded
from the jury's consideration.[96]

The trial court judge must rely on Rule 403's subjective balancing
test as guidance to determine whether the admission of such evi-
dence will result in undue prejudice, or "the undue tendency to
suggest a decision on an improper basis."[97] Judges cannot begin to
adequately address the specific issue of computer-generated anima-
tion admissibility in a courtroom without a basic understanding of
the actual impact and presence of resulting prejudice. In making
these determinations, the court evaluates the probative value of the
evidence as well as the court's ability to reduce the associated
prejudice through the use of limiting instructions.[98] The subjective

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90. *See* WEISSENBERGER, *supra* note 84, § 403.4, at 82–83.
91. D'Angelo, *supra* note 85, at 569–70.
92. *Id.*
93. *See* WEISSENBERGER, *supra* note 84, § 403.3, at 81.
94. *See* D'Angelo, *supra* note 85, at 569–70.
95. Selbak, *supra* note 2, at 355.
96. *Id.* at 361.
97. *Id.*; *see also* D'Angelo, *supra* note 85, at 569.
98. *See* FED. R. EVID. 403 advisory committee note.

balancing test can be enhanced, and the potential impact and prejudice of a computer-generated animation better understood, through the application of psychological principles.[99]

C. Animation Examples from Civil and Criminal Trials[100]

1. People v. Mitchell

One of the first examples of computer-generated animation being admitted as evidence in a criminal case was in the 1992 trial of San Francisco theater operator Jim Mitchell for allegedly killing his brother, Artie Mitchell.[101] The prosecution in this case pushed for a conviction of first-degree murder, arguing that Mitchell "gunned [his brother] down in cold blood."[102] Mitchell stated in his testimony that he went to Artie's house on February 27, 1991, to confront his brother about his drinking habits and to convince him to enter rehabilitation.[103] He claimed that after kicking open the door, he remembered seeing his brother running toward him with a gun and subsequently firing one shot into the ceiling.[104] The investigation by police revealed that Mitchell fired eight shots that night, three of which hit his brother.[105]

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99. *See infra* Part III.

100. This Section examines solely animations that have been admitted into court. However, the impact of computer-generated evidence extends far beyond use in the actual trial. Computer-generated animations can also be effective in forcing a settlement due to a fear that the jury might be allowed to view a prepared animation. In preparation for the litigation surrounding the crash of ValuJet Flight 592, attorneys for the plaintiffs prepared a ten-minute animation combined with audio replay of the plane crash. This animation was a strong factor in obtaining a favorable settlement. For a general discussion and to view the animation, see Ken Lopez, *The Litigation Consulting Report: Aviation Litigation Graphics and Effective Demonstrative Evidence*, A2L CONSULTING BLOG (July 6, 2011, 7:15 AM), www.a2lc.com/blog/bid/36317/Aviation-Litigation-Graphics-and-Effective-Demonstrative-Evidence.

101. Mark I. Pinsky, *Jury Out on High-Tech Courtroom: Computer Animation, Televised Testimony and Other Innovations Could Streamline the Justice System*, L.A. TIMES (Dec. 17, 1993), http://articles.latimes.com/1993-12-17/news/mn-2822_1_computer-animation. In this unreported case—*People v. Mitchell*, No. SC-12462-A (Cal. App. 1st Dist. Div. 2, Marin Cty. Super. Ct. 1994)—the California Rules of Evidence were analogous to the Federal Rules of Evidence. *Compare* CAL. R. EVID. 403, *with* FED. R. EVID. 403.

102. Richard C. Paddock, *S.F. Porn King Jim Mitchell Guilty in Slaying of Brother*, L.A. TIMES (Feb. 20, 1992), http://articles.latimes.com/1992-02-20/news/mn-3543_1_jim-mitchell.

103. *Id.*

104. *Id.*

105. *Id.*

The prosecution hired a forensic expert to examine the physical evidence at the scene and to create an animated reconstruction reflecting this evidence.[106] The three-dimensional animation used by the prosecution is in no way reflective of the type of technology available today;[107] however, at the time of the trial, this animation represented a great step in the ability to visually present evidence.[108] The simple animation began with

> a sleeping figure resembling a crash dummy [as] seen from above, lying in bed. The man suddenly awakens as the first of eight gunshots is fired in his direction. Walking down a corridor, the gray figure is hit by shots in the arm, the chest and finally the head. He crumples and falls to the floor.[109]

The animation was accompanied by explanatory text detailing the timing and number of shots fired.[110] Before the jury viewed the animation, the judge required that the prosecution make several changes to the animation, including the position of the victim's arms and the victim's "threatening" stance.[111] Despite the efforts of the prosecution, Mitchell was subsequently convicted of voluntary manslaughter.[112]

Mitchell appealed the conviction, arguing that the animation should not have been admitted into evidence because it was "based on inaccurate and misleading information," and was "speculative and prejudicial."[113] While recognizing the trial court's discretion in admitting evidence, the court of appeal found that the admission of the animation was an error but affirmed the conviction nonetheless.[114] Although it was found to be in error, the treatment of the animation during the trial court nonetheless represents a first step in the process of technological evolution.

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106. *See generally* Selbak, *supra* note 2, at 342 (discussing the use of forensic and expert testimony to create the animation).

107. *See The People vs Mitchell Computer Animation*, YOUTUBE (Oct. 15, 2007), http://www.youtube.com/watch?v=iburPk37s4Y [hereinafter *Mitchell Computer Animation*].

108. *See* Selbak, *supra* note 2, at 340 n.12 (noting the novelty of the use of three-dimensional animation).

109. Pinsky, *supra* note 101.

110. The animation is devoid of any details other than those representing the trajectory of the bullets and demonstrating the entirety of the event in question. For a video of the actual animation, see *Mitchell Computer Animation*, *supra* note 107.

111. Ellenbogen, *supra* note 72, at 1098.

112. Pinsky, *supra* note 101.

113. *Id*. (internal quotation marks omitted).

114. Selback, *supra* note 2, at 342.

2. Jones v. Kearfott Guidance & Navigation Corp.

This wrongful death action, which arose from a helicopter crash in New Jersey, provides two different examples of computer-generated evidence.[115] The initial lawsuit alleged products liability, negligence, and breach of warranty against the manufacturers on the grounds that the helicopter—piloted by the decedent—crashed due to engine defects.[116] The plaintiffs in this action submitted to the court a motion in limine to prevent one of the defendants from using two demonstrative animations during the trial.[117]

The first animation was based on the eyewitness testimony of an individual who observed the helicopter moments before the crash.[118] The animation depicted two separate angles of the exact same moments in the flight path.[119] In an effort to exclude this animation, the plaintiffs argued that it did not accurately reflect what the witness observed, and that, unless the eyewitness testified at trial, the animation was inadmissible hearsay.[120]

The second animation illustrated the expert witness's interpretation of collected data regarding the crash.[121] This animation purported to express the expert's opinions as to the causes of the accident based on his own personal calculations.[122] It depicted two alternative flight patterns of the helicopter in the event that it lost power.[123] The first situation showed the flight pattern if the pilot attempted to keep the helicopter's nose from pitching down, whereas the second situation showed the consequences if the pilot did not pull back to keep the nose from pitching down.[124] The plaintiffs challenged this animation on the grounds that it was irrelevant and inaccurate.[125]

The court admitted the animations into evidence despite the plaintiffs' concerns because it found that the animations were demonstrative visualizations of witness testimony rather than re-creations of the

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115. Jones v. Kearfott Guidance & Navigation Corp., No. CIV. 93-64(DRD), 1998 WL 1184107, at *1 (D.N.J. Nov. 17, 1998).

116. *Id.*

117. *Id.*

118. *Id.*

119. *Id.* at *2.

120. *Id.*

121. *Id.*

122. *Id.*

123. *Id.*

124. *Id.*

125. *Id.*

accident.[126] To mitigate any appearance of prejudice against the parties, the judge issued a cautionary instruction to the jury.[127] The court took a substantial step in the analysis of the value of computer-generated animations and set precedent within the state for the use of limiting jury instructions.[128]

3. Bullock v. Daimler Trucks North America, L.L.C.

The issue in *Bullock* was the admissibility of a computer-generated animation in a products liability action.[129] Under theories of negligence and strict liability, the plaintiffs alleged defects in the design and production of a tractor-trailer vehicle.[130] Counsel for the defendants submitted a motion to the court to admit the testimony of an expert witness accompanied by a computer animation of the one-vehicle accident.[131] Unlike the illustrative animations in *People v. Mitchell* and *Jones v. Kearfott Guidance & Navigation Corp.*, the animation here was created by a computer program relying on simulation data.[132]

The animation was ruled inadmissible as substantive evidence.[133] The court, however, allowed an expert to use the animation to demonstrate general scientific principles for the jury.[134] This case

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126. *Id.* at *5.

127. *Id.* (instructing the jury "that the video[s] [were] not meant to be a re-creation of the accident but simply computer pictures to help them understand the opinions and testimony of [the expert witnesses]").

128. *See id.*

129. Bullock v. Daimler Trucks N. Am., L.L.C., 819 F. Supp. 2d 1172, 1173 (D. Colo. 2011).

130. *Id.*

131. *Id.*

132. *Compare* discussion of *People v. Mitchell supra* subsection II.C.1 (discussing an animation created based on a forensic expert's examination and reconstruction of the physical evidence at the scene), *and Jones*, 1998 WL 1184107, at *1 (discussing an animation created based solely on eyewitness testimony), *with Bullock*, 819 F. Supp. 2d at 1176 (quoting CHRISTOPHER B. MUELLER & LAIRD C. KIRKPATRICK, FEDERAL EVIDENCE § 9:26 (3d ed. 2010)).

> Simulations . . . are created by entering known data into a computer program, which analyzes those data according to the rules by which the program operates (e.g., the laws of physics or mathematics) to draw conclusions about what happened and to recreate an event at issue. The program itself, rather than witness testimony, is the source of the visual images depicted and may actually serve as the basis for opinion testimony. Simulations are therefore usually classified as substantive evidence . . . .

Bullock, 819 F. Supp. 2d at 1176 (quoting CHRISTOPHER B. MUELLER & LAIRD C. KIRKPATRICK, FEDERAL EVIDENCE § 9:26 (3d ed. 2010)).

133. *Bullock*, 819 F. Supp. 2d at 1177.

134. *Id.* at 1177–78.

illustrates one possible path to admissibility—animations that are inadmissible as substantive evidence might nonetheless be presented to the jury as demonstrative evidence.[135] The judge issued a limiting instruction to the jury, explaining that the animation was solely a visual representation of expert opinions and did not constitute a determination of fact.[136] Despite the clarification about the value of demonstrative evidence, and the fact that the jurors were prohibited from viewing the animation during deliberation, the potential for undue prejudice may not have been entirely eliminated.[137]

4. Pierce v. State of Florida

The appellant in *Pierce* challenged the admission of a computer-generated animation depicting a deadly car accident.[138] After a jury trial, the appellant was found guilty of vehicular homicide and "leaving the scene of an accident involving death as to the six-year-old child."[139] The facts indicated that the appellant fled the scene after hitting three children with his pickup truck in a residential neighborhood.[140] At trial, the prosecution presented a computer-generated animation that purported to illustrate the reconstruction of the accident as determined by the lead traffic homicide investigator.[141]

Prior to the start of trial, the prosecution filed a notice of intent to offer the animation and the court held a pretrial hearing to determine admissibility.[142] At the hearing, the prosecution offered three expert witnesses to testify as to the validity and accuracy of the computer-generated animation.[143] The prosecution offered the animation as both substantive and demonstrative evidence.[144] The trial court ruled that the computer animation was "merely a device or means to express an expert's opinion" and was therefore admissible as a demonstrative exhibit only.[145]

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135. *See id.*

136. *Id.*

137. *See infra* notes 226–239 and accompanying text.

138. Pierce v. State, 718 So. 2d 806, 807 (Fla. Dist. Ct. App. 1997).

139. *Id.*

140. *Id.*

141. *Id.*

142. *Id.*

143. *Id.* at 807–08.

144. *Id.* at 808.

145. *Id.*

The appellate court balanced the probative value with the potential for undue prejudice to decide whether the trial court's admission of the animation constituted an abuse of discretion.[146] The court took the necessary additional steps for evaluating undue prejudice.[147] In her opinion, Associate Judge Brown examined the animation's content:

> Although evidence in this case indicated a bloody scene with screaming victims, the computer animation videotape demonstrated no blood and replicated no sound. Further, the mannequins used in the computer animation videotape depicted no facial expressions. Moreover, we find there was no undue emphasis placed upon the computer animation videotape, which was shown to the jury for a total of approximately six minutes during the course of an eleven-day trial.[148]

The Florida Appellate Court's analysis in this case represents a clear example of the analysis necessary to ensure adequate evaluation of the potential for undue prejudice.

5. Commonwealth v. Serge

The *Serge* court considered the use of computer-generated evidence in a murder trial.[149] The prosecution filed a motion in limine seeking to introduce computer-generated animations demonstrating the theory of the case as determined by the crime scene reconstructionist and forensic pathologist.[150] In the motion, the prosecution asserted that it intended to introduce a demonstrative aid that would "accurately reconstruct the shooting of [the decedent] using the autopsy report, firearm report, crime scene photographs and crime scene measurements."[151]

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146. *Id.* at 808–09. The appellate court considered Section 90.403 of the Florida Statutes, which parallels the standards set forth in Federal Rule of Evidence 403. *See id.*; *see also* FED. R. EVID. 403.

147. *Pierce*, 718 So. 2d at 809–10.

148. *Id.* at 810.

149. Commonwealth v. Serge, 58 Pa. D. & C.4th 52, 54 (Pa. C.P. Lackawanna Cnty. 2001). The court evaluated the admissibility of the computer-generated exhibit under the Pennsylvania Rules of Evidence rather than the Federal Rules of Evidence. *Id.* at 73–74. This distinction is insignificant because the state rules conform to the federal rules with respect to the relevant provisions. *Compare* FED. R. EVID. 403, *with* PA.R.E. 403.

150. *Serge*, 58 Pa. D. & C.4th at 54.

151. *Id.* at 57.

The animation in question was a three-dimensional action scene that depicted generic physical representations of the parties, physical settings, and highlighted bullet paths representing trajectories.[152] The Pennsylvania Supreme Court found that the animation was reliable, relevant, and admissible.[153] The court's analysis of the animation reveals a thorough exploration of the risk of undue prejudice. The court concluded that the computer-generated animation did not rise to unfair prejudice because it "did not include: (1) sounds; (2) facial expressions; (3) evocative or even life-like movements; (4) transition between the scenes to suggest a story line or add a subconscious prejudicial effect; or (5) evidence of injury such as blood or other wounds."[154] The court further noted that limiting instructions warning the jury of the demonstrative exhibit's evidentiary weight reduce the possibility of undue prejudice.[155]

III. APPLIED PSYCHOLOGY RESEARCH

It is undisputed that the use of computer-generated animations impacts the perceptions of jurors.[156] "Both animations and simulations can be highly influential upon a jury, well beyond [their] reliability and materiality, due to [their] documentary-type format presented in a 'television' like medium."[157] What is under debate is the exact impact of the animation. The use of animated displays of demonstrative evidence may serve a facilitative or a prejudicial purpose in the trial setting.[158] If it is true that seeing is believing,

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152. Commonwealth v. Serge, 896 A.2d 1170, 1175 (Pa. 2006).

153. *Id.* at 1187. Although it is outside the scope of this Note, the author would be remiss to ignore the additional constitutional issue raised in the present case. The high cost and unique, persuasive value of computer-generated animations raise an issue of undue prejudice resulting from the one-sided presentation of computer-generated animation. *Id.* at 1183–86. The court here, however, determined that the defendant waived the constitutional issue because he did not raise it in the lower courts. *Id.* at 1184.

154. *Id.* at 1183.

155. *Id.* at 1186.

156. *See* Morande, *supra* note 23, at 1081 (discussing the versatility of computer-generated animations, which "can just as easily distort potentially complex issues as clarify them").

157. *Id.* at 1075–76 (quoting Van Houten-Mayhard v. ANR Pipeline Co., 89 C 0377, 1995 U.S. Dist. LEXIS 7046, at *12 (N.D. Ill. May 23, 1995)).

158. *See generally* Saul M. Kassin & Meghan A. Dunn, *Computer-Animated Displays and the Jury: Facilitative and Prejudicial Effects*, 21 LAW & HUM. BEHAV. 269 (1997) (using empirical research to determine the facilitative and prejudicial impact of animations on mock jurors' evaluation of a civil trial).

"'the jury [might] give undue weight to an animated reconstruction of the accident'" in either a facilitative or prejudicial manner.[159]

Research performed by Kassin and Dunn has demonstrated support for both the facilitative hypothesis of impact and the prejudicial hypothesis of impact.[160] Participants in each variation of the study were asked to determine if the death of an individual was the result of a slip-and-fall accident or a suicide attempt.[161] Across both studies, results indicated that the animation was a stronger determinative factor than the oral testimony provided.[162] The impact of the animation depended in each case on the characteristics of the display.[163]

Computer-generated animations can have a facilitative effect on jurors, thereby increasing understanding and evaluation of particular evidence.[164] This facilitative effect was achieved in Kassin and Dunn's experiments when the animation conformed to the conclusion presented by the physical evidence in dispute.[165] The participants in the study were significantly more likely to discriminate between the "slip-and-fall" condition and the "suicide" condition when the evidence was presented through an animation rather than solely through oral testimony.[166]

Building upon this research, social psychologists have endeavored to determine the cognitive processes through which jurors are impacted by computer-generated animations.[167] The predominant theory of Dual-Coding suggests that the learning ability of an individual is amplified by the presentation of verbal narratives as well as pictorial or graphical illustrations.[168]

The Dual-Coding Theory, developed by Mayer and Sims and applied initially in the context of education, has been extended to the field of law through empirical studies on mock jurors.[169] Linda Morell

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159. James T. Clancy Jr., Note, *Computer Generated Accident Reenactments: The Case for Their Admissibility and Use*, 15 REV. LITIG. 203, 212 (1996) (quoting Racz v. R.T. Merryman Trucking, Inc., Civ. A. No. 92–3404, 1994 WL 124857, at *5 (E.D. Pa. Apr. 4, 1994)).

160. Kassin & Dunn, *supra* note 158, at 278–79.

161. *Id.* at 273.

162. *Id.* at 278–79.

163. *Id.* at 279.

164. *Id.* at 271.

165. *See id.* at 279.

166. *Id.* at 274.

167. Linda C. Morell, *New Technology: Experimental Research on the Influence of Computer-Animated Display on Jurors*, 28 SW. U. L. REV. 411, 412 (1999).

168. *See id.* at 414.

169. *Id.*

performed empirical research on mock jurors to measure free recall and understanding of expert witness testimony under conditions of different levels of information presentation.[170] The different levels included testimony without visual aids, testimony with diagrams, testimony with a computer animation, and testimony with diagrams and a computer animation.[171]

Morell's empirical research demonstrated the cognitive foundations of the effectiveness and impact of computer animations and displays on jurors.[172] Statistical analyses revealed significant interaction between the viewing condition and subsequent recall and understanding of presented information.[173] Participants who viewed only the computer animation showed significantly greater recall than those participants who did not view the animation.[174] Morell's research expanded the Dual-Coding Theory to the legal context and further emphasized the cognitive connections between verbal and visual cues.[175] Dual-Coding of presented information functions to increase retention because "[p]roviding the animation with verbal narration reduces the processing demands on listeners' short-term memory and maximizes the likelihood of their successful and accurate encoding into long-term memory."[176] As with the research performed by Kassin and Dunn, Morell's study has extended understanding of computer animation's effectiveness. While it is clear that computer animations may serve an important function in juror understanding, it is also abundantly clear that this understanding can be manipulated through the use of partisan animations and demonstrative exhibits.[177]

The impact of computer-generated animation on juries varies greatly based on the specific content of the animation and other less obvious presentational factors.[178] The motion quality of images and

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170. *See id.* at 413–14.

171. *Id.* at 413.

172. *See id.* at 414–15.

173. *Id.* at 414.

174. *Id.*

175. *See id.* at 414–15.

176. *Id.* at 415.

177. *See id.*

178. *See* Karl F. MacDorman et al., *Gender Differences in the Impact of Presentational Factors in Human Character Animation on Decisions in Ethical Dilemmas*, 19 PRESENCE 213, 215–16 (2010). This particular study involved the use of moral dilemmas in a medical context as an evaluative measure. *Id.* at 214. Despite the difference from a study in which participants are mock jurors, the present study still involved empirical research conducted on the formation of a moral

the level of human photorealism impact the persuasiveness and effectiveness of computer-generated animations.[179] The "excessive jerkiness, rigidity, or wobble" of an animation can make the actions depicted appear to be "unnatural or unintentional."[180] Additional neuroimaging research has revealed that viewing a mechanical form and viewing a more human-like animation activate different processing centers in the brain; viewers are more likely to reason about the intentions of a character in an animation when it is more human-like in appearance.[181] People are better able to relate to more human-like images and, consequently, they are more apt to be persuaded by such human-like images.[182] The legal implication of these findings indicates that artists and lawyers can manipulate characters in computer-generated animations to present either a human-like or a mechanical image depending on the desired implications and outcome of the animation presentation.

The predominant theory of jury decision making is the Story Model as developed by Pennington and Hastie.[183] The Story Model is founded on the supposition that, when dealing with trial information, jurors organize information into a narrative story based on the "causal and intentional relations between events."[184] Application of the Story Model suggests that, in dealing with trials where the body of evidence presented to jurors is varied, complex, and

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decision based on computer-generated evidence. *See id.* at 217. The formation of a moral decision and the mental processes involved can be likened to the deliberation and verdict processes of a jury. This study also revealed the potential for gender differences in the impact of presentational factors. *Id.* at 223. Further research applied to the legal context should consider the implications of the present study showing that men negatively perceived the character under conditions of low photorealism and jerky motions. *Id.* Depending on the results of further research, the judge's evaluation of the potential for prejudice may be reduced where there is a predominantly, or entirely, female jury. As an initial case study, it may be pertinent to take a deeper look at the Zimmerman trial jury comprised of six female jurors. *See* Morande, *supra* note 23.

179. MacDorman et al., *supra* note 178, at 214–16.

180. *Id.* at 215 (citing Karl F. MacDorman & Hiroshi Ishiguro, *The Uncanny Advantage of Using Androids in Social and Cognitive Science Research*, 7 INTERACTION STUD. 297 (2006)).

181. *Id.* at 216 (citing Sören Krach et al., *Can Machines Think? Interaction and Perspective Taking with Robots Investigated via fMRI*, 3 PLoS ONE 1 (2008)).

182. *Id.* at 216.

183. *See* Brian H. Borenstein & Edie Greene, *Jury Decision Making: Implications for and from Psychology*, 20 CURRENT DIRECTIONS IN PSYCHOL. SCI. 63, 64–65 (2011) (discussing the types of studies that have been conducted on the jury decision process).

184. Nancy Pennington & Reid Hastie, *Explaining the Evidence: Tests of the Story Model for Juror Decision Making*, 62 J. PERSONALITY & SOC. PSYCHOL. 189, 189 (1992) [hereinafter *Tests of the Story Model*] (citations omitted).

interdependent, the cognitive processes of the jurors are explanation based.[185] This explanation-based approach consists of the formation of various causal models that may be used to explain the facts as they are presented and to provide a foundation for further causal verdict decisions.[186] When forming these stories, jurors assign probative value and significance to evidence based on its fit into a particular causal explanation.[187] The components of the Story Model include the following: "(a) evidence evaluation through story construction, (b) representation of the decision alternatives by learning verdict category attributes, and (c) reaching a decision through the classification of the story into the best-fitting verdict category."[188]

During the trial, jurors are engaged in an active and recurring process through which they attempt to construct a coherent and comprehensive mental representation of the theory of the case.[189] This process includes evaluation of several types of information: case-specific knowledge gained through evidence presentation, general knowledge of similar or related events, and knowledge of what generally constitutes a complete story.[190] Jurors use these sources of information to create a story that can be represented as a causal chain of events.[191] These causal chains are formed either by inferences that a juror makes or suggestions made by lawyers during the presentation of their case.[192] During the presentation of evidence in a trial, the lawyers are able to, in effect, control the creation of the explanation-based models for evaluating the evidence and associated verdict categories.[193] Using knowledge of these stories, jurors search for the most likely causal relationships and evaluate verdict decisions.[194]

The creation of explanation-based models in the Story Model of decision making is modified and controlled by several certainty

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185. *Id.*

186. *Id.* at 189–90.

187. *Id.* at 190.

188. *Id.*

189. *Id.*

190. *Id.*

191. *Id.*

192. *Id.*

193. *See generally* Meghan A. Dunn et al., *The Jury Persuaded (and Not): Computer Animation in the Courtroom*, 28 LAW & POL'Y 228 (2006) (examining the impact of computer-generated animations in varying simulated case situations).

194. *Tests of the Story Model*, *supra* note 184, at 190.

principles that guide the selection of the final verdict category.[195] These principles are "coverage, coherence, uniqueness, and goodness-of-fit."[196] Each juror will construct more than one story and, therefore, each story must be evaluated to determine which is the most acceptable.[197] With regard to coverage, the greater the level of evidence encompassed within the story, the more likely it is that the juror will be more accepting of the story.[198] Additionally, the juror must be able to determine the level of coherence of a particular story based on an evaluation of "consistency, completeness, and plausibility."[199] An incoherent story, in the mind of a juror, is unacceptable and will cause the juror to exhibit lower levels of confidence in that particular story as the best-fit alternative.[200] If more than one story fits these requirements, the level of uniqueness will be significantly lower and confidence levels will drop.[201] The ideal explanation-based story construction is coherent, comprehensive, and unique. Jurors will not only accept such a story, but will also demonstrate high levels of confidence in the fit of the explanation.[202]

Empirical research, applied to the legal context, has demonstrated the viability of the Story Model as an explanation for juror decision making.[203] Initial research demonstrated that a juror's mental representations of evidence were presented in a story structure.[204] Furthermore, when jurors came to divergent verdict conclusions, they had created different story structures from the same evidence.[205] Additionally, research has demonstrated the impact of story construction on perceptions of evidence and memory recognition tasks.[206] In recognition memory tasks, mock jurors were more likely

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195. *Id.* at 190–91.

196. *Id.* at 190.

197. *Id.*

198. *Id.*

199. *Id.* at 191.

200. *See id.*

201. *Id.*

202. *Id.*

203. *See generally* Nancy Pennington & Reid Hastie, *Evidence Evaluation in Complex Decision Making*, 51 J. PERSONALITY & SOC. PSYCHOL. 242 (1986) [hereinafter *Evidence Evaluation in Complex Decision Making*] (providing general empirical support for the Story Model of decision making hypothesis).

204. *Id.* at 254.

205. *Id.*

206. *See generally* Nancy Pennington & Reid Hastie, *Explanation-Based Decision Making: Effects of Memory Structure on Judgment*, 14 J. EXPERIMENTAL PSYCHOL.: LEARNING, MEMORY & COGNITION 521 (1988) [hereinafter *Explanation-Based Decision Making*] (finding that jurors

to recall evidence that was consistent with their verdict story.[207] They were also more likely to rate evidence items related to their chosen verdict story as significantly more important.[208]

The most significant finding regarding the Story Model, as it relates to computer-generated evidence presentation, is the impact of evidence-presentation order and ease of story construction. With regard to evidence presentation at trial, the order in which the evidence was presented led to significant interactions—resulting in the easier-to-construct story as the dominant decision.[209] Presenting evidence in a story format and adding in causal story supplements, through the use of computer-generated animations or other forms of complete story presentation, caused jurors to make more global judgments.[210] In making these global judgments, jurors may forget particular pieces of information that do not accurately fit into the dominant story construction.[211] Ultimately, this research concluded that the narrative story sequence—the most effective form of evidence presentation to jurors—will result in a greater number of verdicts in favor of that particular story construction.[212]

In conjunction with the advancements made by Pennington and Hastie in the development of the Story Model, Carlson and Russo researched a subset of decisional behavior in juries.[213] This subset of behavior is the presence of predecisional distortion of case evidence through alignment and interpretation of evidence in accordance with the more prevalent verdict category or probable outcome.[214] Carlson and Russo studied the levels of predecisional distortion, or biased interpretation of evidence, in mock jurors to determine if jurors favor, "predictably (and improperly)," one side of the case based on the strength of the evidence previously presented.[215] Ultimately, predecisional distortion measures are used to determine if jurors distort new evidence toward their perceived leading story in

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spontaneously arrange information presented into a recognizable, often chronological, story construct).

207. *Id.* at 526.

208. *Id.*

209. *Tests of the Story Model*, *supra* note 184, at 193.

210. *See id.* at 201.

211. *See id.* at 199.

212. *Id.* at 203.

213. *See* Kurt A. Carlson & J. Edward Russo, *Biased Interpretation of Evidence by Mock Jurors*, 7 J. EXPERIMENTAL PSYCHOL.: APPLIED 91, 91 (2001).

214. *Id.* at 99.

215. *Id.* at 91.

the case and divert attention from the true probative value of new evidence.[216] The mock jury, comprised of college students, showed high levels of distortion and increased levels of confidence in tentative judgments during trial.[217] During a follow-up study using prospective jurors, results revealed that mock jurors in a courtroom environment exhibited "twice as much distortion on average, greater reliance on their prior beliefs, and more confidence in their tentatively leading verdicts."[218] The presence of predecisional distortion was statistically significant in the studies performed by Carlson and Russo.[219]

The predecisional distortion of jurors can be attributed to the goal of coherence.[220] While evaluating evidence, jurors are driven by a desire to develop a coherent account of the evidence presented.[221] The coherence-based distortion explanation can be applied to the Story Model of juror decision making that Pennington and Hastie developed.[222] "Driven by the goal of coherence, new evidence is distorted toward the currently leading verdict to make it more compatible with the currently dominant story."[223] Jurors harmonize the evidence presented at trial to conform to the story construction that is emerging.[224] Evidence of jurors' inclinations toward predecisional distortion demonstrates the importance of the Story Model and the creation of the dominant story construction.[225]

Social psychologists have studied the use of jury instructions and their impact on juror decision making and cognitive processes.[226] Judges may issue jury instructions to (1) delay final judgment until the conclusion of the trial,[227] and (2) limit the use of demonstrative

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216. *Id.*

217. *Id.* at 95–96.

218. *Id.* at 99.

219. *Id.* at 99–101.

220. *Id.* at 99.

221. *Id.*

222. *Id.*

223. *Id.*

224. *Id.*

225. *See id.* at 99–100.

226. *See generally* Joel D. Lieberman & Jamie Arndt, *Understanding the Limits of Limiting Instructions: Social Psychological Explanations for the Failures of Instructions to Disregard Pretrial Publicity and Other Inadmissible Evidence*, 6 PSYCHOL. PUB. POL'Y & L. 677 (2000) (exploring the empirical evidence associated with jury instructions and assessing theoretical explanations).

227. Carlson & Russo, *supra* note 213, at 93.

evidence to its intended evidentiary and probative value.[228] Empirical research in the field of limiting instructions has focused primarily on the use of prior-conviction evidence in jury trials and its associated impact on guilt or innocence rather than witness credibility.[229] Despite early evidence to the contrary, more recent research has demonstrated that limiting instructions are generally "unsuccessful at controlling jurors' cognitive processes."[230] Despite a judge's instructions to use prior-conviction information solely for the purpose of evaluating witness credibility, studies have shown that mock jurors are more likely to convict when the prosecution presents prior-conviction evidence.[231] However, the effectiveness of limiting instructions is not amplified by the use of the deliberative process with other jurors.[232]

In a related study, social psychologists determined that jurors selectively use evidence that has been deemed inadmissible or has been limited by the judge.[233] The study evaluated mock jurors' reactions to evidence of a telephone conversation in which a criminal defendant told his friend that he had committed murder.[234] The judge's ruling on the admission of the evidence constituted the conditions in the study.[235] The three conditions were as follows: (1) evidence was admissible; (2) evidence was inadmissible because it was illegally obtained; and (3) evidence was inadmissible because it was hard to decipher due to poor audio quality.[236] The results showed that mock jurors reacted in differing ways based on the justification provided for the instruction to disregard evidence.[237] Researchers attributed these reactions to jurors' ability to be impacted by the reasoning for the instruction as well as the instruction itself.[238] Presumably, if the

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228. Lieberman & Arndt, *supra* note 226, at 685.

229. *Id.* at 686.

230. *Id.*

231. *Id.* (citing A.N. Doob & H.M. Kirshenbaum, *Some Empirical Evidence on the Effect of s. 12 of the Canada Evidence Act upon an Accused*, 15 CRIM. L.Q. 88, 88–96 (1973)).

232. *See generally* Valerie P. Hans & Anthony N. Doob, *Section 12 of the Canada Evidence Act and the Deliberations of Simulated Juries*, 18 CRIM. L.Q. 235 (1976) (replicating previous research and testing for possible mitigating effects of deliberation).

233. *See* Saul M. Kassin & Samuel R. Sommers, *Inadmissible Testimony, Instructions to Disregard, and the Jury: Substantive Versus Procedural Considerations*, 23 PERSONALITY & SOC. PSYCHOL. BULL. 1046, 1051 (1997).

234. *Id.* at 1048.

235. *Id.*

236. *Id.*

237. *Id.* at 1049.

238. *See* Lieberman & Arndt, *supra* note 226, at 688.

jurors interpret the justification for the limitation as reasonable and legitimate, the jurors are more likely to follow the judge's limiting instructions.[239]

IV. UNDUE PREJUDICE: MANAGING THE IMPACT OF COMPUTER-GENERATED EVIDENCE

When making a determination as to the potential prejudice associated with a computer-generated animation, there are several factors that a judge should consider. Individual jurors are strongly influenced when evidence is presented in a manner that is easy to imagine, easy to envision, and easy to recall in memory.[240] When a juror observes a computer-generated animation, the information and the story construction are encoded in memory so that when the imagined events presented in the animation are recalled later, they appear to be "both probable and subjectively more likely to occur."[241] The ease with which jurors are able to construct and visualize a particular explanatory sequence is a primary factor in determining the persuasive nature of a computer-generated animation.[242] Jurors may be more likely to believe and to recall a partisan computer-generated animation, while potentially ignoring contradictory physical evidence.[243] This impact may be significantly more pronounced in complex trial situations where there is a larger delay between the presentation of evidence and the deliberation process.[244]

One factor influencing potential jury prejudice that judges should consider is the general public's relative familiarity with the type of incident in dispute.[245] As the Story Model indicates, jurors will base their decision on evidence presented at trial, general knowledge of the surrounding world, and personal knowledge about the type of incident in question.[246] Research has demonstrated that individuals who show a general lack of intuitive physics knowledge have difficulties imagining and constructing circumstances involving the

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239. *Id.*

240. Brad E. Bell & Elizabeth F. Loftus, *Vivid Persuasion in the Courtroom*, 49 J. PERSONALITY ASSESSMENT 659, 659–64 (1985).

241. Fiedler, *supra* note 4, at 303–04.

242. Dunn et al., *supra* note 193, at 237.

243. *See generally* Kassin & Dunn, *supra* note 158.

244. *See id.* at 279–80; *see also* Bell & Loftus, *supra* note 240, at 661–63.

245. *See generally Tests of the Story Model*, *supra* note 184 (explaining and testing the basic foundational principles for the Story Model of juror decision making).

246. *Id.* at 191.

basic principles of naïve physics.[247] When making a determination as to the potential prejudice of an animation, the level of familiarity with the type of event depicted may provide guidance as to the level of the juror's dependence on the animation to depict the true laws of physics.[248] Where jurors are unfamiliar with the event depicted, such as in an aviation or products liability case, the jurors may place undue evidentiary weight on an animation.

Aside from the persuasive nature of the computer-generated animation in general, the court should also consider the substance of the animation and associated presentational factors. If an attorney wants the jurors to remember a particular piece of physical evidence or a particular action, the use of color-coding can enhance juror recognition and recall.[249] The systematic and repeated use of a particular color scheme or colored object can attract the juror's attention and comprehensibility of a particular item.[250] The use of color in some circumstances is a necessary component to aid the jury's understanding of a particular event.[251] This may be appropriate, for instance, where color is necessary to distinguish between two objects, such as night and day, or the pertinent physical characteristics of an item. However, it is unacceptable to use color in a prejudicial manner to indicate blood spatter, to emphasize negative aspects, or in any other way to draw attention to a particular object or area without a legitimate purpose.[252]

Along with the strategic use of color, attorneys may also use repetition to increase juror retention of specific material. Repeated material is encoded into memory and easily accessible to the juror during deliberations.[253] The repetition of a particular sequence, much like the use of strategic television advertisements, can increase memory, evoke positive reactions, and encourage confidence in the depicted

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247. *See generally* Alfonso Caramazza et al., *Naive Beliefs in 'Sophisticated' Subjects: Misconceptions About Trajectories of Objects*, 9 COGNITION 117 (1981) (demonstrating a trend of confusion and persuasion as to general concepts of gravity and the expected path of falling objects).

248. *See id.*

249. *See generally* Aura Hanna & Roger Remington, *The Representation of Color and Form in Long-Term Memory*, 24 MEMORY & COGNITION 322 (1996) (demonstrating the increased recall of color-coded items as compared to black and white images).

250. *See id.*

251. *See id.*

252. *See* Cope C. Thomas, *Computer Generated Animation: Identifying New and Subtle Prejudicial Special Effects*, 74 FLA. B.J. 52, 52–53 (2000).

253. *See id.* at 53.

images.[254] Yet, "the cumulative effect of the repeated portrayal may magnify the prejudicial effect of the [computer-generated animation] without improving its message"[255] and would therefore serve no legitimate purpose other than to overwhelm the juror's sense of reasoning.

In the case of limiting instructions for computer-generated evidence, the instruction is intended to reduce or prevent prejudice associated with the use of that evidence for unintended purposes.[256] The use of clear limiting instructions is a potential source of balance between the facilitative and prejudicial effects of computer-generated animations on the jury.[257] When attorneys introduce a computer-generated animation as a demonstrative exhibit, the court should ensure that the jury does not place independent evidentiary value on the animated depictions or conclusions.[258] The absence of such limiting instructions, or the presence of assertions by counsel to the contrary, are important factors in controlling the impact of animations.[259] The jury should be made aware that the probative value ascribed to a particular animation is only as valuable as the corresponding witness testimony.[260] These factors are applicable more often in the appellate process; however, the most important question in this analysis is whether the jury is fully aware that there is a difference "between a jury believing that they are seeing a repeat of the actual event and a jury understanding that they are seeing an illustration of someone else's *opinion* of what happened."[261]

The judge should also consider the relative inequities associated with the one-sided presentation of computer-generated animations or other demonstrative computer exhibits. The visceral and persuasive impact of a computer animation may be significantly increased when there is no opposing animation to activate the critical reasoning

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254. *See* Surendra N. Singh et al., *Enhancing the Efficacy of Split Thirty-Second Television Commercials: An Encoding Variability Application*, 24 J. ADVERTISING 13, 22 (1995) (discussing the efficacy and persuasive nature of repetition and associated factors in short television advertisements).

255. Fiedler, *supra* note 4, at 313 (alteration in original).

256. *See* Lieberman & Arndt, *supra* note 226, at 685–86.

257. *See id.* at 704.

258. Kousoubris, *supra* note 71, at 273.

259. *See* Fiedler, *supra* note 4, at 320.

260. Morande, *supra* note 23, at 1118.

261. Datskow v. Teledyne Cont'l Motors Aircraft Prods., 826 F. Supp. 677, 686 (W.D.N.Y. 1993).

faculties of jurors.[262] Research has demonstrated this amplified impact:

> [I]f there is any juror prejudice relating to the use of advanced graphics it appears directed against the party which does not use them. In a number of cases where advanced graphics were used by one side, in post-trial interviews the jury praised the use of video exhibits and . . . criticized the other side for not presenting similar materials.[263]

Despite the recognition that the failure to present computer-generated animations or displays can have a negative impact on verdict results, the cost in many cases, particularly criminal trials, is too prohibitive.[264] Judges should be aware of the relative inequities in finances between parties and consider whether the exclusion of evidence is warranted to reduce prejudice associated with the amplified impact of one party's animation or the potential for forced settlement by a party with lesser means.[265]

There is a distinct difference in the interest being protected in criminal and civil trials when considering the admissibility of computer-generated evidence. In a criminal trial, the value at risk is human liberty, as opposed to the financial risks associated with a civil trial. The trial-court judge should be aware of the type of interest to be protected and the relative impact of any undue prejudice. Psychological research has demonstrated the impact of vividness on juror perception[266] (which is especially relevant in violent or gruesome criminal trials) and the relative ineffectiveness of limiting instructions with regard to criminal activity.[267] When the risk of undue

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262. *See* Selbak, *supra* note 2, at 361. The court in *Serge* noted that the cost of creating a fifteen-second animation was said to be between $10,000 and $20,000. Commonwealth v. Serge, 896 A.2d 1170, 1183–84 (Pa. 2006) (noting the high cost of the animations as compared to the defense budget). The cost to prepare an adequate computer-generated animation can, in many cases, constitute the entire amount allocated for the defense of an indigent defendant. Mary Elizabeth McGinnis Hadley, *Access to CGAs and Justice: The Impact of the Use of Computer Generated Animations on Indigent Criminal Defendants' Constitutional Rights*, 22 GEO. J. LEGAL ETHICS 877, 878 (2009).

263. Selbak, *supra* note 2, at 361 (quoting Bruce G. Vanyo, *Communicating With 'Post Literate' Jury: Advanced Graphic Exhibits in Patent Trials*, PLI Order No. G4-3892, Mode 349 PLI/Pat 409 (1992)).

264. *Id.*

265. *See id.*

266. Bell & Loftus, *supra* note 240, at 659.

267. Lieberman & Arndt, *supra* note 226, at 686 (citing A.N. Doob & H.M. Kirshenbaum, *Some Empirical Evidence on the Effect of s. 12 of the Canada Evidence Act upon an Accused*, 15 CRIM. L.Q. 88, 88–96 (1973)).

prejudice is associated with loss of human liberty, the standards for exclusion and the judge's evaluation should reflect the value of that interest.

As Kassin and Dunn's research indicates, the use of computer-generated animations in a simulated courtroom environment has a significant impact on the decisions made by jurors.[268] The powerful impact of computer-generated animations demonstrates the greater need for regulation and understanding of such animations. When used correctly in a trial environment, computer-generated animations can increase juror retention of information, understanding of expert testimony, and synthesis of relevant trial information.[269] Issues related to the persuasiveness of computer-generated animations only arise when attorneys attempt to unduly influence the jury or take advantage of the psychological implications of persuasion to deceive.

The guidelines for evaluating computer-generated animations must be placed where they are likely to be applied—namely, in the Advisory Committee Notes under Federal Rule of Evidence 403. It is not enough simply to suggest guidelines and present a small number of state trial court cases that provide a full analysis of the issues. Practitioners rely on the Advisory Committee's Notes to resolve ambiguities and interpret the Federal Rules of Evidence.[270] The Advisory Committee's Note cannot be changed through legislative or judicial action.[271] There must be an amendment to accompany the revisions to the note.[272]

This Note proposes an amendment of Federal Rule of Evidence 403 to include a provision requiring, or at the very least suggesting, written opinions for admissibility determinations of new forms of computer-generated evidence. While it is not practicable to create a uniform standard for admissibility, it is possible to create a list of considerations of which judges should be aware when making these determinations. The Advisory Committee on Evidence Rules should also issue a note providing an analysis of the factors described in this Note as prejudicial. The Advisory Committee's Note should

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268. *See generally* Kassin & Dunn, *supra* note 158.

269. *See id.* at 270–71.

270. *See* Daniel J. Capra, *Advisory Committee Notes to the Federal Rules of Evidence That May Require Clarification*, FED. JUD. CENTER 1, 1 (1998), http://www.fjc.gov/public/pdf.nsf/lookup/capra.pdf/$file/capra.pdf.

271. *See id.* at 2.

272. *See id.*

indicate that the relevant considerations include the following: use of color, presence of sound, jurors' familiarity with the substance of the animation, time spent viewing the animation, the digital quality of the animation, use of repetition, and the potential inequities of one-sided animation presentations.[273]

CONCLUSION

Judges lack guidance in determining the admissibility of computer-generated animations due to the absence of clear standards in the Federal Rules of Evidence and the small number of controlling case law decisions. The present decisions are guided by judicial preference or opinion, a small number of precedential examples of case law, and Advisory Committee Notes drafted in 1972.[274] The creation of standards for admissibility is a necessary step to aid both judges and attorneys in reducing the issues inherent in using computer-generated animations. The previous decisions on admissibility or exclusion have been made at the trial court level and, therefore, are not controlling. Further, the Federal Rules of Evidence merely suggest a balancing test without providing any guidance as to which factors to consider when dealing with a computer-generated animation.[275]

Moreover, judges lack guidance on how to make a determination of undue prejudice under Federal Rule of Evidence 403 and its corresponding state evidentiary rules. Just as judges require more foundational and descriptive analysis factors, attorneys need to know what to expect from an opposing party. Clarity is necessary to allow attorneys to successfully object to an animation, to create an animation of their own, or to know the consequences of settling a case to prevent the jury from viewing a particular animation. Despite advancements in psychological research and technology, the Federal Rules of Evidence and admission standards have not evolved to incorporate the specific needs and questions presented by the use of computer-generated animations. The issue of admissibility of demonstrative evidence is important and has serious

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273. *See supra* Part II. The additional considerations as to the relative inequities in one-sided presentations are mentioned, but not developed, in this Note. Additional research should be completed to determine the impact of financial burden on the presentation of computer-generated animations.

274. *See, e.g.*, Berkoff, *supra* note 29, at 842–43 (discussing the standards for admission and the deference to judicial discretion in making admissibility determinations).

275. *See* FED. R. EVID. 403.

implications in the trial context due to the lack of evidentiary weight relative to the persuasive nature of such evidence. The proposed amendments to the Federal Rules of Evidence and corresponding Advisory Committee Notes are an initial step in understanding and managing the potential for undue prejudice associated with computer-generated animations.