

*Comment**Digital Litigation: The Prejudicial Effects of Computer-Generated Animation in the Courtroom**John Selbak* †**Table of Contents**

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I. Introduction

On August 2, 1985, the crew of Delta Flight 191 tried to abort a landing after a wind shear tossed the plane into a violent wind pattern.¹ The plane, caught in a powerful wind vortex, was thrown to the ground a mile from the runway.² It crashed into a field, skidded onto a highway, hit a car and killed the driver. It then traveled another 1700 feet before smashing into a water tower.³ One hundred and twenty-eight passengers, eight Delta crew members, and one person on the ground died.⁴

The Delta 191 crash led to a legal battle over who would pay the \$150 million to \$200 million of claims for wrongful death, loss of aircraft and other damages.⁵ Litigants filed suit, claiming that Federal Aviation Administration and National Weather Service employees should have advised the crew of the weather disturbances and warned the crew to change its landing approach.⁶ The core of the government's defense presentation at trial was a computer-generated animation illustrating its theory of the events that took place on August 2. Ultimately, the forty-five minute simulation was a key factor convincing U.S. District Court Judge David Belew to rule for the United States.⁷

While the use of computer-generated animation have become more common in litigation during the past several years, the Justice Department's presentation at the Delta 191 trial was truly monumental in terms of the length and sophistication of the technology used.⁸ The trial marked the beginning of a new era for the use of computer-generated animations as demonstrative evidence in litigation settings, and it prompted wider acceptance of the technology by other judges and courts.⁹

Nevertheless, this enticing technology with all of its much-touted advantages creates a significant potential for misuse and prejudice. Judges unfamiliar with the mechanics of computer-generated animation may not adequately evaluate questions of preliminary facts regarding the simulation, as they are required to do before admitting it into evidence.¹⁰ Similarly, juries are especially prone to believe evidence which is presented visually, regardless of its veracity.¹¹ Furthermore, juries may discard common sense when confronted with computer evidence, and instead accept as proven fact whatever the computer proposes as the calculated result or outcome.

This Comment argues that computer-generated animations should be allowed in the courtroom only under close scrutiny from the courts. Part II briefly discusses the existing technology and its use in the courtroom. Part III describes the admissibility requirements under the current Federal Rules of Evidence and analyzes case law regarding novel scientific evidence introduced at trial. Part IV addresses problems with computer-generated animations' application in the courtroom. Part V discusses this author's proposed methods to reap the benefits from the technology without sacrificing justice. Finally, Part VI offers an outlook towards future technologies and their potential for prejudice.

II. The State of Computer Animation in Litigation

A. Existing Technology

Computer-generated animation is the primary type of computer demonstrative evidence that has been used in the courtroom.¹² Computer animation consists of two-dimensional, animated images projected either on a computer screen or on a larger-screen video monitor. Animations can include syntheses of images, text, and sound to create a fanciful visual aid, or can be used to demonstrate concepts otherwise indescribable in still pictures. It has been used to vividly recreate crimes and to explain to the jury concepts and theories that can best only be illustrated through demonstrative visual evidence. Without computer animation the concepts often would be difficult to bring into the courtroom.

There are two principal categories of computer animation: (1) demonstrative animations used as visual aids or enhancements and (2) scientific animations. Scientific animation differs from demonstrative animation in two important ways. First, scientific animations are more mathematically accurate.¹³ Second, the motion in scientific animations attempts to follow the laws of physics rather than track the imagination of an artist.¹⁴

Despite technological advances in recent years, computer animations are still in their infancy. The concept, as presented in popular descriptions, is far more advanced than the actual capability of the technology.¹⁵ Current limits of computer speed and disk storage create this lag between concept and actual practice.¹⁶

Nevertheless, the current capabilities of computer animation are advanced enough to be useful in many courtroom circumstances. The simulation operator can easily shift viewpoints within the animation during the presentation so that the audience can see objects and events from any vantage point.¹⁷ Motion can also be altered to hypothetical variants to illustrate relationships between objects in the simulation. An airplane crash, a seat belt injury or the movement of a complex engine can be shown in slow motion so that the action can be understood frame by frame.¹⁸ These valuable advantages have encouraged lawyers to present computer-generated animations at trial.

B. Judicial Review of Computer-Generated Animation

Since appellate courts review a trial court's decision regarding the admissibility of evidence on an abuse of discretion standard, it is

unlikely that a trial judge's evidentiary determination regarding the admissibility of a computer-generated animation will be overturned.¹⁹ To date, very few appellate cases have directly addressed the admissibility of computer animation as either demonstrative or substantive evidence. The wide latitude trial judges are afforded in making evidentiary decisions may help explain the lack of appellate review.²⁰ Therefore, it seems that the standard of review of a judge's decision on the admissibility of an animation would create a difficult burden for an appellant to overcome.²¹

C. Examples of Computer-Generated Animations Used at Trial

Computer-generated animation's growing use,²² coupled with its increasing affordability,²³ has made it the buzz word of the litigation community.²⁴ Computer animations have been used in cases involving such diverse areas as toxic spills, building collapses, transportation accidents, building ordinance reviews and criminal prosecutions.²⁵ The following cases illustrate the various situations in which attorneys have made use of computer animation to bolster their presentations.

Perhaps the most widely publicized use of computer animation in California occurred in the State's prosecution of James Mitchell following the death of his brother Artie Mitchell.²⁶ At trial, James claimed that he shot his brother in self defense.²⁷ A forensics expert worked with a criminalist to create an animated reconstruction of the events of the murder based on physical evidence gathered from the scene.²⁸ The animation was used at trial "to show the trajectory of the bullets and possible location of the victim when the shots were fired."²⁹ Mitchell appealed his conviction, claiming that the animation should not have been admitted.³⁰ The Court of Appeal noted the trial court's discretion in admitting expert testimony reconstructions so long as there is "preliminary proof that conditions are substantially identical and that the reconstruction is an accurate depiction."³¹ Ultimately, the court held that it was error to admit the reconstruction because the reconstruction relied upon inadmissible evidence.³² Nevertheless, the court affirmed the conviction because it held that the error was harmless.³³

In another trial, an attorney presented animated evidence of the mechanics of a printing press to support his client's claim that the defendant stole crucial design drawings of the press.³⁴ The attorney retained a firm whose engineers created detailed three-dimensional computer images of the printing press and its component parts. By animating these pictures, the firm demonstrated the workings of the press. The plaintiff also provided two expert witnesses who explained the importance of the plates by using the animated sequences. The jury returned a \$2.7 million verdict for the plaintiff and later explained that the "animation helped in giving them information they needed to decide the case."³⁵

An aviation attorney used computer animation to help a trial expert demonstrate the operation of a device that controlled aerodynamic flow over an airplane wing.³⁶ Since the device controlled particles the size of molecules traveling at supersonic speeds, the attorney suspected the jury would have a difficult time understanding the evidence.³⁷ After the attorney assembled an animation and introduced it to explain the mechanics of the device, the jury was able to follow the complex physics testimony, and found in favor of the attorney's client.³⁸

A Whatcom County, Washington prosecutor used computer animation to convict a husband of the murder of his wife.³⁹ The husband claimed that, while on a hunting trip, his wife was killed when she tripped on a log and accidentally dropped the gun, which discharged into her chest.⁴⁰ The computer animation, which used data from a survey of the crime scene, showed that the wound could not have been inflicted by any means other than the defendant facing his wife and shooting her at close range.⁴¹

A medical malpractice case involving a mother who died in childbirth was successfully defended with the help of computer animation.⁴² The child survived, but suffered serious brain damage. The computer video showed that the baby was too big to pass through the mother's pelvic bones, and that the crushing of those bones led to a rupture of part of the womb, allowing fluid to fill the mother's lungs which caused her death.⁴³

The animation of a proposed building presented to the Chicago City Council and Planning Commission convinced the two groups to issue the pending building permits.⁴⁴ The animation was designed to show the proposed development over time, as well as to replicate a shadow study using calculations of the sun's movement and resulting shadows.⁴⁵

III. Admissibility Requirements for Computer Animation

A. General Rule on Admissibility of Potentially Prejudicial Evidence

Federal Rule of Evidence 403 provides the best rationale for the exclusion of computer animation evidence, and will likely be the most

commonly cited rule for the exclusion of this type of evidence.⁴⁶ Rule 403 provides that, "[a]lthough relevant, evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury, or by considerations of undue delay, waste of time, or needless presentation of cumulative evidence."⁴⁷ Advocates seeking to use animation will attempt to demonstrate that the probative value of the evidence outweighs any danger of unfair prejudice.⁴⁸

B. Standards of Admissibility-Admitting the Animation into Evidence

The admission of computer animation evidence under the Federal Rules of Evidence, requires satisfying Rules 803(24), 901, 401, 402, and 702.

1. Overcoming Hearsay Objections through the "Catchall" Exception

When computer animation evidence involves data generated through the computer's software, "[b]oth the data and the software (as out-of-court statements of the programmer) are subject to hearsay objections."⁴⁹ Hearsay is evidence comprised of an "out of court statement offered to . . . prove the truth of the matter asserted."⁵⁰ Rule 802 excludes hearsay from trial testimony unless it meets one of the exceptions listed in rules 803 or 804. Therefore, the process of admitting the animation begins by seeking an exception to the ban on hearsay evidence.

Proponents of computer animation often employ Rule 803(24), the so-called "catchall" exception, to avoid the hearsay prohibition because computer animations usually do not neatly fit into any of the enumerated hearsay exceptions. This Rule provides that exceptions may be found to the hearsay rule for evidence which has

equivalent circumstantial guarantees of trustworthiness, [and if] the court determines that (A) the statement is offered as evidence of a material fact; (B) the statement is more probative on the point for which it is offered than any other evidence which the proponent can procure through reasonable efforts; and (C) the general purposes of these rules and the interests of justice will best be served by admission of the statement into evidence.⁵¹

Rule 803(24) requires the party seeking to admit the evidence to notify the other side of the animation's existence, and counsel's intent to enter it into evidence.⁵² The drafters of the "catchall" rule appear to have foreseen the rule's role in adapting the system to new technologies. Specifically, the Advisory Committee Note for 803(24) states that the catchall is intended to

provide for treating new and presently unanticipated situations which demonstrate a trustworthiness within the spirit of the specifically stated exceptions. Within this framework, room is left for growth and development of the law of evidence in the hearsay area, consistently with the broad purposes expressed in Rule 102.⁵³

Due to computer animation's exceptional ability to explain important and complex issues easily to the jury, and the current trust placed in the technology by judges, Rule 803(24) appears to be a ready gateway to the animation's entry into evidence. As can be seen in the following sections, however, a larger problem lies in the ability of parties to completely bypass even the minimal safeguards afforded by Rule 803(24).

2. Overcoming Hearsay Objections by Passing Off the Animation as Demonstrative Evidence

The rationale for excluding hearsay often rests on the need for cross-examination of the person who made the statement that is being offered for its truth.⁵⁴ While most of what is labeled as hearsay is eventually admitted,⁵⁵ the admission occurs only after the statement meets a certain standard of trustworthiness established by the rules to ensure that it does not prejudice the party against whom it is offered.⁵⁶ This measure of trustworthiness inherent in the Rules is an important bar against unreliable evidence being admitted at trial.⁵⁷

By successfully classifying computer animation evidence as demonstrative evidence, rather than as opinion or inference evidence, the party seeking its admission avoids the hearsay prohibitions entirely.⁵⁸ For example, demonstrative evidence such as graphs, charts, diagrams, sketches and illustration are not offered for their truth and therefore are not hearsay.⁵⁹ The hearsay objection provides little protection against this type of demonstrative evidence, and most attorneys seeking admission of evidence can invoke another exception under Rule 803 or 804 if the court rejects their arguments based on 803(24).⁶⁰ The opposing party may suffer prejudice if the court too freely admits a computer animation as demonstrative evidence, thus entirely avoiding hearsay concerns.

A leading case concerning the admissibility of computer animation as demonstrative evidence is *People v. McHugh*.⁶¹ In *McHugh*, the

defendant sought to introduce a computer reenactment illustrating his alternative theory of the accident.⁶² Upholding the reenactment's admission, the court ruled that "[t]he evidence sought to be introduced here is more akin to a chart or diagram than a scientific device. Whether a diagram is hand drawn or mechanically drawn by means of a computer is of no importance."⁶³

The view of the *McHugh* court is the one most often subscribed to in deciding admissibility issues regarding computer animation.⁶⁴ However, elements of *McHugh's* reasoning may conflict with the reality of computer programming. For example, the *McHugh* court stated that "[c]omputers are simply mechanical tools-receiving information and acting on instructions at lightning speed."⁶⁵ The idea that computers are mindless machines ignores the programmers' assumptions and algorithms embedded in the software which produces the animation itself.⁶⁶

3. Admitting the Animation as Scientific Evidence

Another alternative to avoid hearsay objections is to admit the animation as scientific evidence. Scientific evidence is expert testimony created by or with an expert as an explanatory aide. This method avoids the hearsay prohibition by reclassifying the animation as a visual interpretation of the testimony offered by an expert in court. Since computer animation is a new technology that most courts have not explicitly addressed, the animation likely will be treated as novel scientific evidence if it is presented in that way.

If the animation is admitted as scientific evidence, an expert must testify alongside it.⁶⁷ This requirement ensures that the jury will be able to understand the nature of the evidence presented, and allows the opposing party to cross-examine the expert as a means of countering the evidence presented.

Under the Federal Rules' requirement that evidence be both relevant and authenticated, sufficient guarantees that the evidence is trustworthy must be shown.⁶⁸ Since the Federal Rules do not explicitly address the admissibility of novel forms of evidence,⁶⁹ a few courts have developed judicial tests.

a. Test for novel scientific opinion evidence

Until June of 1993, the accepted test for determining the reliability and admissibility of novel scientific evidence under the Federal Rules was the test expressed in *Frye v. United States*.⁷⁰ *Frye* involved an attempt to admit evidence from a systolic blood pressure machine, an early precursor of the polygraph ("lie detector") test.⁷¹ Prior to trial the defendant passed the test and, at trial, defense counsel offered the scientist who conducted the test as an expert to testify to the results obtained.⁷² Excluding the evidence, the court stated that:

[j]ust when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognized, . . . [but] the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.⁷³

Frye therefore announced the general acceptance test, which required that any scientific evidence which "has not yet gained such standing and scientific recognition among physiological and psychological authorities" should be excluded.⁷⁴

Most jurisdictions accepted the *Frye* standard as the dominant standard for determining admissibility of novel scientific evidence at trial.⁷⁵ However, the Supreme Court addressed the issue and reversed the standard in June 1993 in *Daubert v. Merrell Dow Pharmaceutical, Inc.*⁷⁶ In *Daubert*, the Court was asked to rule on the issue of whether the adoption of the Federal Rules of Evidence superseded the *Frye* test.⁷⁷ A unanimous Court held that the rules had in fact superseded *Frye*.⁷⁸

Daubert involved expert testimony regarding the effects of the drug Bendectin on unborn children and its relation to birth defects.⁷⁹ To counter Merrell Dow's expert testimony that Bendectin did not cause birth defects, the petitioners submitted the affidavits of eight qualified experts who concluded that Bendectin can cause birth defects.⁸⁰ The district court excluded the plaintiff's evidence and granted summary judgment for Merrell Dow,⁸¹ and the Ninth Circuit Court of Appeals affirmed the decision.⁸² Both courts disallowed petitioner's evidence on the basis that the expert testimony proffered failed the general acceptance test of *Frye*.⁸³ The petitioner's expert testimony was not sufficiently established to have general acceptance in its field because the opinions were not based on current methods and peer review.

Recognizing the debate whether the *Frye* test remained valid after the adoption of the Federal Rules of Evidence,⁸⁴ the Supreme Court

heard the *Daubert* case and concluded that the Federal Rules had indeed superseded the *Frye* standard.⁸⁵ The Court asserted that "[i]n principle, under the Federal Rules no common law of evidence remains. . . . In reality, of course, the body of common law knowledge continues to exist, though in the somewhat altered form of a source of guidance in the exercise of delegated powers."⁸⁶ Since "[n]othing in the text of [Rule 702] establishes 'general acceptance' as an absolute prerequisite to admissibility . . . [and] . . . the drafting history makes no mention of *Frye*," the Court found that a rigid general acceptance requirement would be at odds with the liberal thrust of the Federal Rules in favoring opinion testimony.⁸⁷

With the *Frye* test repudiated, seven of the nine justices⁸⁸ joined in the second part of Justice Blackmun's majority opinion in his interpretation of the Rules of Evidence.⁸⁹ Parsing Rule 702 into its essential elements, Blackmun concluded that the "subject of an expert's testimony must be based on 'scientific . . . knowledge.'"⁹⁰ Realizing that the mere words "scientific knowledge" left federal judges with little guidance on what types of evidence Rule 702 allowed, the Court articulated four criteria for acceptability: (1) whether the theory can be tested or falsified; (2) whether the theory or technique has been subjected to peer review and publication; (3) the potential rate of error; and (4) the existence and maintenance of standards controlling the technique's operation.⁹¹

In summary, the *Daubert* court's rejection of *Frye* and its interpretation of Rule 702 expanded the scope of admissible scientific evidence. Rather than subjecting the evidence to a general acceptance showing, the evidence need only be based on "scientific knowledge." The Court determined that this interpretation of Rule 702 was more consistent with the Federal Rules' general trend in removing evidentiary constraints on novel evidence and moving more towards a liberal standard admitting opinion evidence.⁹²

b. Implications of *Daubert*

At the outset it is clear that *Daubert* lessened the barriers to the admission of novel scientific evidence by rejecting the general acceptance test of *Frye*. *Daubert* also highlighted the Federal Rules' broad acceptance of opinion evidence.⁹³ Both of these developments have increased the probability that most courts will admit computer animation into the courtroom under the current standards. However, animations created from inadmissible hearsay evidence remain inadmissible unless they are justified under an exception to this prohibition.⁹⁴ If the animation is classified as mere opinion evidence, this safeguard in the Federal Rules is bypassed. In this regard, the *Daubert* Court's liberalization of the standards for scientific and opinion evidence will naturally lead to greater use of these classifications in an attempt to evade any potential hearsay objections.

The Tenth Circuit Court of Appeals noted the implications of *Daubert* for animated evidence in *Robinson v. Missouri Pacific Railroad Co.*⁹⁵ In *Robinson*, a video animation of stop motion photography recreated an accident between a car and a moving train⁹⁶ After holding that the trial judge did not abuse his discretion by allowing the video animation,⁹⁷ the court cited *Daubert* as defining the "trial court's special role as gatekeeper with respect to expert evidence and opinion."⁹⁸ Although the *Robinson* court felt the case was "a close one,"⁹⁹ the opinion relied on the standards articulated in *Daubert* to find that the crash movements depicted in the animation could have been explained on scientific principles, even though the simulation presented certain assumptions made outside the realm of scientific knowledge.¹⁰⁰ The court concluded that the *Daubert* standard was a "flexible one," at least in terms of admitting evidence and of the "trial court's consideration of objections to scientific evidence."¹⁰¹ The court believed that *Daubert's* flexibility combined with liberal pretrial discovery rules provided the best solution to the situation:

[C]oncerning future similar issues under Rule 702, we suggest that as "gatekeeper" the district court carefully and meticulously make an early pretrial evaluation of issues of admissibility, particularly of scientific expert opinions and films or animations illustrative of such opinions. Recent amendments to the federal discovery rules will permit an early and full evaluation of these evidentiary problems.¹⁰²

4. Additional Requirements for Admitting Computer Animation Evidence

a. Rule 901-Authentication

Following introduction at trial, Rule 901(a) requires that the proponent of the evidence provide "authentication or identification . . . to support a finding that the matter in question is what its proponent claims."¹⁰³ Thus as with other evidence, the animation must be properly authenticated and presented to the court. Rule 901(b) provides, by way of illustration only, the following as an example of authentication: "[e]vidence describing a process or system used to produce a result . . . [may be authenticated by] showing that the process or system produces an accurate result."¹⁰⁴ Most computer animation evidence could be authenticated in this way by presenting expert testimony as to the process used to develop the simulation, accompanied with an explanation of the assumptions, variables and programs the developers used.¹⁰⁵

Since all evidence presented must meet the relevance test, Rule 401 requires the court to consider the relevance of the animation.¹⁰⁶ The party seeking to utilize the computer evidence must show its relevance to the facts that need to be established. Once relevance is established, the evidence is easily admissible through Rule 402, which declares that "all relevant evidence is admissible."¹⁰⁷ The burden then shifts to the opponent of the evidence to show why the evidence should not be admitted once it has been established as relevant.

IV. The Prejudicial Effects of Computer Animation as Evidence

Rule 403 states, "[a]lthough relevant, evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury."¹⁰⁸ The Advisory Committee's Note following the rule states that "[s]ituations in this area call for balancing the probative value of need for evidence against the harm likely to result from its admission."¹⁰⁹ The Note also defines "unfair prejudice" as a "tendency to suggest decision on an improper basis, commonly, though not necessarily, an emotional one."¹¹⁰

Some of the objections to admitting computer-animated evidence, for fear of prejudicial effects, include: (1) it can escape clear classification; (2) it confuses the jury and misleads them in their fact-finding role; (3) it creates a handicap to opponents who cannot afford to use the technology; and, (4) it can be readily manipulated in the courtroom, at least for "real time" computer-animated evidence. Taken individually, these objections to admitting computer-animated evidence may not be enough to tip the balancing test against the admission of such evidence. But when considered together, such objections may outweigh the probative value provided by computer-animated evidence. Each objection is discussed separately below.

A. Confusion over the Nature of Computer Evidence

In some circumstances, computer animation is prejudicial because it lacks a definitive evidential classification. Attorneys seeking to properly introduce their animations may classify their presentations as either demonstrative, scientific, or opinion evidence. These alternative classifications by proponents further obscure the nature of the evidence. This potential confusion as to the nature of the evidence increases the danger of confusing the jury and blurring lines between an expert's opinion of the facts and a presentation of the facts themselves.

As mentioned above, hearsay evidence is often admitted after meeting one of the recognized exceptions.¹¹¹ However, if this evidence is of a scientific or technical nature, it must also satisfy Rules 702, 703 and the *Daubert* test. On the other hand, if the animation is classified as demonstrative evidence, no such test is required.¹¹² Therefore, the *Daubert* test of ensuring the reliability of novel scientific evidence, discussed *supra* in section III.B.3., is completely by-passed, removing one more measure of the evidence's reliability.

Federal Rule 702 also opens the door to allow expert testimony that is in a form other than traditional opinion evidence.¹¹³ Rule 702 admits "scientific, technical or other specialized knowledge" if it will "assist the trier of fact to understand the evidence or determine a fact in issue."¹¹⁴ The important allowance of Rule 702 is that it allows testimony "in the form of an opinion *or otherwise*."¹¹⁵ This inclusive standard appears to permit the admission of most computer graphics, whether the animations themselves represent expert conclusions or merely illustrate the basis of opinion by expert testimony.¹¹⁶

Consequently, an animation's probative value is compromised by the jury's inability to ascertain what type of evidence it is evaluating. Not only is the line between demonstrative and actual scientific evidence blurred, but the possibility that the animation is nothing more than opinion testimony raises the question of whether the animation is evidence at all. The Rules do not require that the attorneys or the court disclose to the jury the nature of the presented evidence. Without direction, the jury may wrongly assume that whatever the computer shows them is the correct, scientifically-validated answer to the inquiry. This conclusion, of course, may be far from the truth, and essentially removes from the jury their fact-finding role.¹¹⁷

Some courts are beginning to address the misclassification techniques proponents have used to introduce computer animations into evidence. For example, the Court of Appeals of Arizona in *Bledsoe v. Salt River Valley Water Users' Assoc.*¹¹⁸ held that the trial court had erred in permitting counsel to employ a computer animation during closing argument because it was misclassified.¹¹⁹ At trial, the proponent argued that the evidence was for demonstrative purposes, and the trial court agreed, although it was "a more sophisticated way of presenting his theory as to how the accident happened."¹²⁰ However, the Court of Appeals ruled that the animation should not have been classified as demonstrative evidence because it was more like a depiction of a computer expert's opinion of how the

accident happened.¹²¹ Therefore, the court held that counsel was required to lay the foundation for those opinions prior to their introduction, and opposing counsel should have been permitted to cross-examine the expert about them.¹²²

Misclassifying the nature of computer evidence prejudicially affects the judicial process in several ways. First, it unduly confuses the jury as to whether the evidence is demonstrative or scientific. Secondly, it allows an astute party to avoid the trustworthiness requirements of the hearsay rule by entering substantive evidence under the guise of demonstrative evidence. Lastly, it completely avoids the evidentiary requirements established to ensure the reliability of the novel scientific evidence presented.

B. Problems Inherent in the Process and the Technology

The problems in the animation process affect the judicial system in two ways. First, the fact-finder is often unaware of the unconscious biases and necessary assumptions made by the animation's creator and, therefore, the fact-finder cannot reach a fully informed decision.¹²³ Second, juries may surrender their role as fact-finder by accepting computer evidence as a factual conclusion.¹²⁴

1. The biases inherent in the animation process

Far from the simple input/output decisions that the *McHugh* court used to characterize computer-generated evidence, computer animation is a long process that involves human speculation and assumptions at each stage of development.¹²⁵ Even the most conscientious animator must make assumptions in order to provide for a continuous simulation of the events alleged to have taken place.¹²⁶

The animation process generally involves six steps. The first step is to collect the data for the animation.¹²⁷ The developer gathers data from a wide variety of sources, some more accurate than others. These sources include police reports, public records, witness interviews, depositions, expert investigations, and photographs.¹²⁸ The second step is to storyboard each frame, "a process by which key events are sketched out and words are added to the still images to describe the motion that is proposed for animation."¹²⁹ The third step involves actually drawing, composing or building the image models that will be used in the animation on the computer.¹³⁰ Once these images are complete, the animator next must script the movement of the images on a time line that marks the occurrence of certain events.¹³¹ The fifth step is rendering, in which the computer fills out the images appearing in each frame of the animation by incorporating the variables established in the program.¹³² The frames are then assembled to form a continuous animation which is placed onto either videotape or laser disc.¹³³

Assumptions, speculation and opinions by experts are accepted by the rules of evidence,¹³⁴ but should be closely scrutinized nonetheless. Within the confines of thirty frames for each second of videotape animation, there is room for tampering with the evidence.¹³⁵ To a certain degree, cross-examination of the expert animator will alleviate this problem, but intentional tampering easily can be hidden within the 1800 frames contained in just one minute of animation. However, absent any bad faith attempt to alter the evidence, there still remains a great deal of data collection, human judgment and speculation at each step of the animation process. Therefore, the contention that the computer's process is an objective one is not tenable.¹³⁶ Parties seeking to object to the admission of computer evidence at trial should keep this fact in mind, as well as the fact that if the animation is admitted as anything-as for example demonstrative or illustrative evidence-other than substantive evidence, much of the hearsay evidence that underlies the animation will be admitted as well without any scrutiny by the court¹³⁷

The case of *Sommervold v. Grevlos*¹³⁸ illustrates the inaccuracies that animations can contain. In *Sommervold*, the Supreme Court of South Dakota affirmed a trial court's decision to exclude the computer animation evidence because of its prejudicial nature and the inaccuracies which it contained.¹³⁹ The court found that the animation, recreating an accident involving two bicycles, was not similar enough to the actual events or the testimony to be admissible.¹⁴⁰ In upholding the exclusion of the evidence based on prejudice, the court echoed the trial court's decision that "[a] video recreation of an accident . . . stands out in the jury's mind. So it emphasizes that evidence substantially over . . . ordinary . . . spoken testimony."¹⁴¹

As stated above, problems with the process and technology in creating computer animation may create prejudicial effects. First, because computer animation involves assumptions, speculations, and opinions at each step of the process, it really should not be classified as either demonstrative or scientific evidence. Second, computer animation easily may be tampered with, and the detection of a tampered animation is difficult. While computer animation is impressive and most likely the wave of the future, its foundations remain the people who design the animation; these foundations retain a collage of prejudicial elements capable of evading the Federal Rules of Evidence if courts do not subject them to proper scrutiny.

2. Risk of Jury Mistaking All Computer Evidence As Fact

Some courts have viewed computer evidence as merely a "mechanical tool"¹⁴² for the presentation of evidence. For example, the Supreme Court of New York in *McHugh* found that computers were only "receiving information and acting on instructions at lightning speed"¹⁴³ in the presentation of factual evidence. As popular as this view may be, it is misinformed. This view encourages jurors to surrender their role in factual determinations and allow the computer to resolve the factual disputes in the case.

People v. Mitchell,¹⁴⁴ provides an example of the risk in adopting such a view. In the case, James Mitchell was convicted for the murder of his brother, Artie Mitchell, despite James's claim that he acted in self-defense.¹⁴⁵ The prosecution used computer animation to show that, because of Artie's location behind a wall, James could not have seen any threatening gestures made by Artie.¹⁴⁶ The original animation portrayed Artie walking down the hallway with his hands at his sides.¹⁴⁷ Upon defense counsel's objection, the judge ordered that the animation be altered several times, ultimately replacing the human-like figure representing Artie with that of a geometric shape to avoid the risk that the jury might assume as proven fact the position of Artie's hands in the animation.¹⁴⁸ The *Mitchell* case illustrates that computers do not merely spit out factual information "acting on instructions at lightning speeds."¹⁴⁹ Instead, they reflect the theories and opinions advanced by counsel, based on assumptions and speculation.¹⁵⁰

The Federal Rules of Evidence were primarily drafted because of a mistrust of unrestrained juries and the methods they might utilize in reaching a decision.¹⁵¹ They were also drafted to "ensure accurate fact-finding."¹⁵² If evidence were allowed without considering these concerns, it would violate the primary purpose of the Federal Rules.

C. Sensory Impact on Jury

The fact that computer-animated evidence is gaining acceptance reflects its influence on juries. Jurors respond almost uniformly in favor of computer animation in the courtroom.¹⁵³ Exposed to computer animation on television and in the movies, jurors are accustomed to receiving information through this medium.¹⁵⁴ Studies measuring jurors' information retention have shown that jurors were able to recall sixty-five percent of the evidence presented three days earlier if the evidence was presented through a combination of oral and visual evidence.¹⁵⁵ Where only oral evidence was presented at trial, jurors were able to retain only ten percent of the evidence.¹⁵⁶ Studies also have shown that jurors focused primarily on the visual evidence used during trial.¹⁵⁷

The findings from these studies prompted at least one court to preclude the use of computer-animated evidence. In *Racz v. R.T. Merryman Trucking, Inc.*,¹⁵⁸ the district court held the risk of unfair prejudice to the plaintiff from the defendant's computer-animated recreation of the accident at issue in the trial outweighed the relevance of the evidence.¹⁵⁹ The court recited the old adage, "seeing is believing," in concluding that the jury might give undue weight to a computer recreation.¹⁶⁰ The court asserted, "[b]ecause the expert's conclusion would be graphically depicted in a moving and animated form, the viewing of the computer simulation might more readily lead the jury to accept the data and premises underlying the defendant's expert's opinion, and, therefore, to give more weight to such opinion."¹⁶¹

Critics contend that computer animation encourages juries to suspend their skepticism. Brian Stonehill, the director of media studies at Pomona College in Claremont, California, found that computer animation "works on a visceral level that quite easily bypasses skeptical, rational faculties."¹⁶² Computer animation "creates pseudo-memories of the event" and the "memorability of having witnessed the crime itself [or event in dispute], but [with] no validity in fact."¹⁶³

The powerful impact of computer animation on juries is not enough reason by itself to declare such evidence prejudicial because courtroom advocacy often demands that a powerful impact be made. The Federal Rules of Evidence, however, define "unfair prejudice" as evidence resulting in the undue tendency to suggest decision on an improper basis, commonly, though not necessarily, an emotional one.¹⁶⁴ This would certainly apply to evidence which is more convincing merely because it appeals to jurors on a visceral level. A decision based on visceral impact is arguably just as bad as a decision based on emotion.

D. Prejudicial Effects of Not Using the Technology

The visceral influence of computer-animated evidence on jurors is compounded when an opposing party does not use animation at trial. Studies have found:

[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.¹⁶⁵

Thus, a party opting to present a traditional case will often be prejudiced by the use of computer-animated evidence by the other side.

Cost is often the reason parties forego the use of computer-animated evidence. While computer animation has become more affordable in recent years,¹⁶⁶ the technology remains relatively expensive and is primarily used only by wealthier parties to a lawsuit or criminal trial.¹⁶⁷ In criminal cases, the prohibitive cost of computer-animated evidence will favor the prosecution, which has the state's resources at its disposal against usually less wealthy defendants.¹⁶⁸ A related concern is that litigants with limited budgets may be compelled to settle rather than seek a trial on the merits when facing opponents who are able to afford animated graphics.¹⁶⁹

The sure winners from the use of computer-animated evidence are the engineering and computer design firms that produce the technologically enhanced evidence. If counsel on one side decides to use computer animation, opposing counsel will feel compelled to present its own animation. At a minimum, a party facing an opponent presenting computer-animated evidence will seek out an expert witness to rebut such evidence. Not surprisingly, the same firms that create computer-animated evidence also provide expert witnesses challenging the accuracy of such evidence.

E. The Expansion Into "Real-Time" Animation

The powerful appeal of computer animation to jurors' sensory perceptions combined with an opposing party's lack of such technology begins to tip the scale against admitting such evidence. These effects are true for even the most basic "pre-recorded" computer animation. Such evidence is produced before trial, recorded on videotape and played back to the jury in an immutable form.

Computer-animated evidence, however, has become increasingly more sophisticated with the advent of "real-time" animation. Real-time animation allows counsel to manipulate the visual images in the court room, so that jurors can be shown an animated sequence from a variety of viewpoints and configurations.¹⁷⁰ With real-time animation, counsel is able to instantly perform these manipulations with a device such as a joystick or mouse.

Real-time animation also gives counsel the ability to change the animation at any time during testimony so that it may be used to test out an opposing party's claims.¹⁷¹ For example, if an attorney presenting computer animation depicts a witness standing thirty-five feet from the scene of an accident and opposing counsel contends the witness was fifty feet away, the attorney can adjust the animation so that it depicts the witness fifty feet from the accident. The manipulation may be made in a matter of seconds through the use of a computer. This powerful tool, however, can certainly lead to prejudicial results. Since real-time animation allows counsel to instantaneously change the nature of the evidence before the jury, there is no opportunity for the judge to decide whether to exclude a particular viewpoint or construction because it is prejudicial. Similarly, opposing counsel will be unable to view the evidence before it is shown to the jury, and can only object after harm has occurred.

The Advisory Committee's notes to Rule 403 noted that "[i]n reaching a decision whether to exclude [evidence] on grounds of unfair prejudice, consideration should be given to the probable effectiveness or lack of effectiveness of limiting instruction[s]."¹⁷² Courts have specifically found that limiting instructions fail to eliminate the egregious prejudicial effect from evidence such as codefendant confessions.¹⁷³ Courts may also be persuaded that limiting instructions are inadequate for screening out the prejudicial effects of computer-animated graphics.

V. RECOMMENDATIONS

Computer animation is a hybrid of scientific, demonstrative, and opinion evidence. It does not fit comfortably into any one category, though it shares elements with each of these categories of evidence. Such technology, however, should not be kept out of the courtroom simply because it does not fit into the existing scheme of evidentiary rules. Instead, the judiciary should accommodate computer technology and design new rules for dealing with this new and unique form of evidence.

Most courts have attempted to fit computer animation into existing categories of evidence, but such an approach clearly fails to safeguard against the prejudicial effects of this new form of evidence. For example, in *Kudlacek v. Fiat*,¹⁷⁴ the Supreme Court of Nebraska treated computer-generated models and simulations like other scientific tests, conditioning their admissibility on a sufficient showing that "1) the computer is functioning properly; 2) the input and underlying equations are sufficiently complete and accurate (and disclosed to the opposing party, so that they may challenge them); and 3) the program is generally accepted by the appropriate community of scientists."¹⁷⁵

The flaw in this approach is that computer animation is an entirely different method of presenting testimony. Judges are quite capable of ruling on complicated issues arising from oral testimony. Computer animation, however, is a visual form of testimony that has

unique psychological effects not associated with other forms of evidence. Computer animation thus requires an evidentiary standard that takes into account these unique effects.

Such a standard should be expressly articulated in the Federal Rules of Evidence, making courts across the nation aware of the special problems associated with evidence in the form of computer animation. Explicit inclusion in the rules of evidence will help the courts respond to the increasing use of such evidence.

A. Developing Guidelines for the Use of Animation

While the structure of the Federal Rules is flexible enough to apply to new types of evidence,¹⁷⁶ the special challenges that computer-animated evidence presents, as well as its hybrid nature, suggest that it should be treated separately from other types of evidence. To achieve such a goal, the following guidelines, standards and limitations should be adopted whenever dealing with computer animation.

1. Formulating a Standardized Classification for the Evidence

Whether computer animation is classified as either strictly demonstrative, scientific or opinion, the animation should be classified uniformly among all jurisdictions. For example, if computer animations are defined as scientific evidence, then all jurisdictions should require experts to testify alongside the animation in court. If computer animation cannot be classified uniformly, then judges should deal with each piece of computer evidence in a motion in limine at the start of the trial. However, judges should be knowledgeable enough to recognize when a crafty attorney is trying to admit scientific evidence under the guise of mere "visual aids." Whatever is done, it is clear that future attempts to standardize criteria for defining computer-animated evidence will bolster the legitimacy of using the technology in the courtroom.

2. Preliminary Evidentiary Decisions on Admissibility

A computer animation should be submitted before trial both to the judge for review and approval, and to the opposing counsels to examine the animation, consider its admissibility, and object if necessary. Regardless of how computer animation is classified, judges will be the ultimate authority on the admissibility of the animation. Therefore, judges should be knowledgeable enough to distinguish among the various types of computer animations presented to them before ruling on the matters in a motion in limine.

Among the guidelines and criteria that should be considered to ascertain an animation's admissibility are the following: (1) the danger of misleading or confusing the jury pursuant to Rule 403, or causing them to make a decision merely on a sensory basis; (2) the prejudicial effect of the animation, including its similarity to alleged or actual events, places and persons; (3) the harm to the opposing party if the animation is admitted; (4) the harm to the proponent of the animation if the animation is excluded; (5) the accuracy and reliability of the assumptions used in the animation; and (6) the trustworthiness of the process employed to create and present the animation.

Animations that are capable of being altered or run in a "live" format-real-time animations-should not be allowed unless there is a showing by clear and convincing evidence that the possibility of altering the image will not unduly prejudice the opposing side. Since juries are strongly affected by visual evidence, the prejudicial effect of an improper viewpoint shown live in the courtroom cannot be undone. In these instances, a limiting instruction by the judge, instructing the jury to disregard the highly-prejudicial image would be largely ineffective.

3. Instructions to the Jury About Computer Evidence

To ensure the reliability of a jury trial, judges should forewarn jurors of the nature of the computer evidence being presented. If the evidence is being offered strictly as a visual aid, the jurors should be aware of such a fact. If an expert or other witness intends to use the animation as an illustration of her testimony, this too should be made clear to the jury. Also, if the animation is a true scientific animation, one which uses the laws of physics, engineering and mathematics, then the jury should be informed of the assumptions that are inherent in the animation. Thus, just as a jury is cautioned that a closing argument is partly the attorney's opinion and not necessarily factual evidence, a jury viewing a computer animation should be forewarned about the use of such evidence.

B. Meeting these Goals at the Present Time

Until these evidentiary standards, guidelines and limitations can be drafted into the Rules, the burden of ensuring fairness in trial proceedings rests on the judges who preside over them. If an animation is admitted, current practice still mandates that an expert testify alongside the evidence, and vigorous cross-examination of that individual is necessary to ensure that the animation is what it

purports to be.¹⁷⁷ During cross-examination, the opponent of the animation should be allowed to demonstrate to the jury that the events portrayed in the animation are based, at least partially, on assumptions and conjectures, and not on purely objective, scientific factual determinations.

Computer technology has revolutionized such diverse areas as telecommunications, document production, education, household appliances, automotive engineering, movie, making and office automation. The next frontier seems to be the courtroom, and the technology is rapidly taking root. At a time when trials are becoming more complex, and both the public and other government entities are pressing to speed up the pace of the judicial system, computer animation technology can be very useful in expediting the process of presenting evidence to the jury. However, the American judicial system does not sacrifice fairness and proper safeguards to produce efficiency gains, and it should not start now.

VI. Future Technologies and the Continued Growth of the Prejudicial Effect

This Comment has primarily focused on computer animation. The greatest opportunities for attorneys using digital demonstrative evidence, however, lies in future technologies being developed by virtual reality innovators.¹⁷⁸ Computer programmers work constantly to both utilize and master this new technology to help construct a new world which they envision.¹⁷⁹ Advances in the quality and quantity of computer animation and virtual reality will likely come as computer speeds increase and new media storage devices become more readily accessible and adaptable to personal computers.

This developing technology seeks to actually project the viewer into a separate "reality."¹⁸⁰ The computer senses the viewer's movements and readjusts the entire reality to reflect the movement. In the courtroom of the future, virtual reality could transport the jury into any setting the attorney wishes, and it can replace verbal testimony with visual recreation of any "reality" the attorney or expert witness conjures up. With these leaps in animation technology, many litigators are waiting for the day when "jurors will be transported back to the scene of an accident simply by wearing a special helmet."¹⁸¹

Today's impressive computer animations will be no match for tomorrow's ability to travel in time or space through a man-made version of the facts. The coming technology could allow jurors to actually become fact "investigators" in the true sense of the word, rather than fact determiners.¹⁸² In the least, it will provide such a realistic experience for the jury that concerns about the veracity of the proffered testimony will become secondary to the juror's sensory experiences. If the rules on prejudicial testimony, such as Rule 403, are to have any meaning in our evidentiary systems, then the judiciary and the bar must begin to recognize and address the problems that are inherent in the present and future state of computer animation technology.

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1. Paul Marcotte, *Animated Evidence: Delta 191 Crash Re-created Through Computer Simulations at Trial*, ABA JOURNAL, Dec. 1989 at 52.

2. *Id.*

3. *Id.* at 53.

4. *Id.*

5. *Id.*

6. *Id.*

7. *Id.* at 53-54.

8. *Id.* at 53. Four attorneys and six experts worked with Z-Axis Corp. of Denver, Colorado, for nearly two years to create the animation. The animation used forty different parameters to recreate the plane's flight, such as acceleration, roll, pitch and heading. *Id.*

9. Roy Krieger, *Sophisticated Computer Graphics Come of Age - And Evidence Will Never Be the Same*, ABA JOURNAL, Dec. 1992, at 92. The bench decision favoring the United States included more than a dozen references to the computer-generated animation in support of key findings of fact. *In re Air Crash at Dallas/Fort Worth Airport on Aug. 2, 1985*, 720 F. Supp. 1258 (N. D. Tex. 1989), *aff'd*, 919 F.2d 1079 (5th Cir. 1991), *cert. denied sub nom.* Connors v. United States, 112 S. Ct. 276 (1991).

10. *See* FED. R. EVID. 104(A). Federal Rule of Evidence 104(a) states in relevant part:

QUESTIONS OF ADMISSIBILITY GENERALLY. Preliminary questions concerning the qualification of a person to be a witness, the existence of a privilege, or the admissibility of evidence shall be determined by the court . . . In making its determination it is not bound by the rules of evidence except those with respect to privileges.

Id. Judges determine whether evidence should or should not be admitted, and play an integral part in the outcome of the trial through this determination. However, as the Rule mentions, judges are generally not bound by the rules of evidence when determining preliminary questions of fact and may find evidence admissible without support from the rules. *Id.*

11. Krieger notes that "the 'Weiss-McGrath Report' found a 100 percent increase in juror retention of visual over oral presentations and a 650 percent increase in juror retention of combined visual and oral presentations over oral presentations alone." Krieger, *supra* note 9, at 93. *See also* Jennifer E. King, *Animation Seizes Jury, Judge's Attention*, ILLINOIS LEGAL TIMES, May 1993, at 1 (quoting David Weinberg, director of litigation services at Engineering Animation, Inc. in Chicago, stating that "[w]e have polled juries, and in every case [the jurors] have said that the animation played an important factor in their decision").

12. Computer animation has been described as follows: "[A] special type of motion picture that is generated with the aid of a computer. It is an extension of CAD/CAM, or computer-aided design and computer-aided manufacturing." James W. Dabney, *Animation Is Invading Courtrooms*, NEW YORK LAW JOURNAL, Apr. 6, 1993, at 4. The newer animation technology created by CAD attempts to picture images through the illusion of three-dimensional arrays for a more realistic rendering of the object that is animated. *Id.*

13. David Weinberg, *Seeing is Believing With Scientific Animation*, MASSACHUSETTS LAWYERS WEEKLY, Sept. 13, 1993, at S1.

14. *Id.*

15. *Id.*

16. The two most important hardware capabilities of the personal computer in terms of animation are computer chip speed and hard disk size. The faster the computer chip speed, the more frames can be drawn, erased and reprocessed in a single second. Krieger, *supra* note 9, at 94. As the number of frames processed increases, the animation becomes smoother, more accurate, and reflects greater detail. *Id.* The hard disk of a computer is the main storage medium. Since a single frame can use, at a minimum, anywhere from 100 to 500 kilobytes of memory, a limited, standard-issue hard drive of 120 megabytes can be filled with between 240 to 1200 frames, which is only enough to create between eight to forty seconds of rough animation.

17. Weinberg, *supra* note 13, at S1.

18. *Id.*

19. CHRISTOPHER B. MUELLER AND LAIRD KIRKPATRICK, EVIDENCE UNDER THE RULES; TEXT, CASES AND PROBLEMS, 1993, at 54.

20. *See generally, id.* at 53-54.

21. *Id.* at 54. *See also* Wheeler v. John Deere Co., 935 F.2d 1090, 1099 (10th Cir. 1991) (the admission or exclusion of evidence lies within the sound discretion of the trial court and cannot be reversed absent an abuse of discretion).

22. A study by the American Bar Association in 1992 reported that 13 percent of medium-sized law firms have used computer animation in cases, and that 45 percent of them planned to use it in the future. King, *supra* note 11, at 1.
23. The costs of creating computer-generated animations have decreased due to the drop in software prices, hardware prices and the increased accessibility of the technology. What once cost \$1,500 to \$5,000 per second of animation now can be processed on a personal computer for as little as \$100 per second. Jeanette Borzo and Kelley Damore, *Low-cost 3-D Animation Earns Its Day in Court; Makes Evidence Come Alive for Jury*, INFOWORLD, Sept. 13, 1993, at 1. More importantly, by purchasing a \$3,500 program such as AutoDesk 3D Studio, many law firms can do the work in-house and save even more money. *Id.* For a similar discussion regarding the cost of animation, see Krieger, *supra* note 9, at 94.
24. See, e.g., James W. Dabney, *Animation is Invading Courtrooms*, NEW YORK LAW JOURNAL, Apr. 6, 1993, at 4, for a discussion of the uses of computer animation.
25. Krieger, *supra* note 9, at 93.
26. People v. Mitchell, (Cal. App. First Dist. Div. 2), Marin County Superior Court No. SC-12462-A (1994).
27. *Id.* at 1.
28. *Id.* at 11.
29. *Id.*
30. *Id.* at 1-2.
31. *Id.* at 27.
32. *Id.*
33. *Id.* at 32.
34. Weinberg, *supra* note 13, at S1.
35. *Id.*
36. *Id.*
37. *Id.*
38. *Id.*
39. Eric Dawes, *Washington State Prosecutor*, BUSINESS WIRE, Aug. 13, 1993.
40. *Id.*
41. *Id.*
42. Roger Harris, *A Picture is Worth a 1,000 Words: Computer Animation Used in Courtrooms*, BUSINESS FIRST - LOUISVILLE, June 14, 1993, at 1.
43. *Id.*
44. King, *supra* note 11, at 1.

45. *Id.*
46. Roy Krieger, *Getting It Admitted*, ABA JOURNAL, Dec. 1989, at 96.
47. FED. R. EVID. 403.
48. Since the focal point of this Comment is the prejudicial nature of computer animation evidence, the balancing test found in Rule 403 warrants further analysis and is discussed in greater detail in Part IV, *infra*.
49. David Siegel and Brian Pass, *High Technology at Trial: Use It or Lose It*, PLI Order H4-5138, Mode 444 PLI/Lit 605 (1992).
50. MUELLER & KIRKPATRICK, *supra* note 19, at 115.
51. FED. R. EVID. 803(24).
52. *Id.*
53. FED. R. EVID. 803(24) advisory committee's note.
54. MUELLER & KIRKPATRICK, *supra* note 19, at 116-17.
55. *Id.* at 116.
56. FED. R. EVID. 803(24).
57. *Id.* at advisory committee's note. The Advisory Committee Notes following 803(24) state that the rule does "not contemplate an unfettered exercise of judicial discretion, but [it does] provide for treating new and presently unanticipated situations which demonstrate a trustworthiness within the spirit of the specifically stated exceptions." *Id.*
58. Siegal and Pass offer the following description of the lower threshold applied to demonstrative evidence:
- A lesser showing is needed to introduce computer generated evidence such as charts, diagrams and simulations that are offered as demonstrative evidence. Because this type of evidence lacks independent probative value, generally all that is required is a demonstration that the evidence is fair and accurate. In short, demonstrative evidence avoids hearsay problems because it is not offered for its truth. Demonstrative evidence can be used independently or in connection with the testimony of an expert witness. Facts or data relied on by experts need not otherwise be admissible into evidence if the information is "of a type reasonably relied upon by experts in the particular field." Fed. R. Evid. 703.
- Siegel & Pass, *supra* note 49, at 605.
59. *Id.* at 605. Since demonstrative evidence is illustrative by nature, nothing more is asserted which is not already contained in the verbal testimony previously admissible in the case.
60. Usually, the other exceptions that are best suited for overcoming hearsay objections to computer data evidence are Rule 803(6), the business records exception and Rule 803(8), the public records exception. *See id.*
61. 476 N.Y.S.2d 721 (1984).
62. *Id.* at 722.
63. *Id.* At the time of the *McHugh* test, the test most commonly used for novel scientific evidence was that enumerated in *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923). However, even under the modern test of *Daubert v. Merrell Dow Pharmaceutical, Inc.*, 113 S. Ct. 2786 (1993), the holding would have been the same since *Daubert* provides an even broader test for admissibility. For a

fuller discussion, see *infra* notes 70-102 and accompanying text.

64. Siegel & Pass, *supra* note 49, at 605.

65. *McHugh*, 476 N.Y.S.2d at 722-23.

66. The computer animation process, discussed *infra* at notes 127-137 and accompanying text, is a multi-step process which includes collection of data, storyboarding the events, creation of computer models, scripting the animation motion, rendering the frames, and editing the animation before copying it to a storage medium. See generally David W. Muir, *Debunking the Myths About Computer Animation*, PLI Order No. H4-5138, Mode 444 PLI/Lit 591 (1992).

67. Rule 702 provides that, "[i]f scientific, technical or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training or education, may testify thereto in the form of an opinion or otherwise." FED. R. EVID. 702. The admissibility requirements for computer animation are actually more detailed, and include "(1) qualification of the expert who produced or supervised the animation; (2) qualification of the computer hardware; (3) qualification of the computer software; (4) qualification of the input data and assumptions; and (5) qualification of the computer output." Muir, *supra* note 66.

68. MUELLER & KIRKPATRICK, *supra* note 19, at 2.

69. The federal rules do, however, seem to lean towards a liberal acceptance of such technologies. See FED. R. EVID. 803(24) Advisory Committee's Note.

70. 293 F. 1013 (D.C. Cir. 1923). While this Comment will discuss on the Court's eventual move away from *Frye*, it is important to note that a majority of states still adhere to *Frye's* admissibility requirements.

71. *Id.* The test was based on the theory that "[t]ruth is spontaneous, and comes without conscious effort, while the utterance of a falsehood requires a conscious effort, which is reflected in the blood pressure." *Id.*

72. *Id.* at 1014.

73. *Id.*

74. *Id.*

75. See E. GREEN & C. NESSON, PROBLEMS, CASES AND MATERIALS ON EVIDENCE 649.

76. 113 S. Ct. 2786 (1993).

77. *Id.* at 2793.

78. *Id.* at 2791, 2793. The Court's decision with regards to the superseding effect of the Federal Rules was unanimous. However, Chief Justice Rhenquist, joined by Justice Stevens, dissented in part because they felt that the majority's attempt to interpret the federal rules was premature and should be left for development in future cases. *Id.* at 2799-2800. The case was remanded for further proceedings consistent with the Court's holding. *Id.* at 2799.

79. *Id.* at 2791.

80. *Id.*

81. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 951 F.2d 1128 (9th Cir. 1991).

82. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 727 F. Supp. 570 (S.D. Cal. 1989).

83. *Daubert*, 113 S. Ct at 2792. The District Court relied on *United States v. Kilgus*, 571 F.2d 508 (9th. Cir. 1978), which was the version of *Frye* adopted in the Ninth Circuit. *Daubert*, 727 F. Supp. at 572.

84. *See, e.g.*, Roger S. Hanson, *James Alphonso Frye Is Sixty-Five Years Old; Should He Retire?*, 16 W. St. U. L. Rev. 357 (1989); *Proposals for a Model Rule on the Admissibility of Scientific Evidence*, 26 JURIMETRICS J. 235 (1986).

85. *Daubert*, 113 S. Ct at 2793. However, the Court was aware in making its decision that there were arguments on both sides as to *Frye's* survivability. *Id.* at 2794. Compare *United States v. Williams*, 583 F.2d 1194 (2nd Cir. 1978), *cert. denied*, 439 U.S. 1117 (1979) (holding that *Frye* is superseded by the rules of evidence); with *Christopherson v. Allied-Signal Corp.*, 939 F.2d 1106, (5th Cir. 1991) (en banc), *cert. denied*, 112 S.Ct. 1280 (1992) (holding that *Frye* and the rules combined provide a framework for determining admissibility of expert testimony).

86. *Daubert*, 113 S. Ct. at 2794 (quoting *U.S. v. Abel*, 469 U.S. 45, 51-52 (1984)). *See also* *Bourjaily v. United States*, 483 U.S. 171 (1987) (holding that the common law rule is superseded where the Court is unable to find it in the Rules).

87. *Id.*

88. *Id.* at 2791. Justice Blackmun's opinion was fully joined by Justices White, O'Connor, Scalia, Kennedy, Souter and Thomas. Chief Justice Rhenquist, joined by Justice Stevens, filed an opinion concurring with the decision to find that the Federal Rules superseded *Frye*, but dissenting from further defining any new tests or interpretations of Rule 702.

89. *Id.* at 2795.

90. *Id.* at 2795. The Court further defined "scientific knowledge" through an analysis of the words and their denotation:

The adjective "scientific" implies a grounding in the methods and procedures of science. Similarly, the word 'knowledge' connotes more than subjective belief or unsupported speculation. The term "applies to any body of known facts or to any body of ideas inferred from such facts or accepted as truths on good grounds." (citations omitted).

91. *Id.* at 2797-98. Relating back to *Frye*, the Court recognizes that general acceptance did have a role to play in the evidentiary determination: "Widespread acceptance can be an important factor in ruling particular evidence admissible, and a 'known technique that has been able to attract only minimal support within the community' . . . may properly be viewed with skepticism." *Id.* (citations omitted).

92. *Id.* at 2794. The Court specifically states that the "rigid 'general acceptance' requirement would be at odds with the Federal Rules and their 'general approach of relaxing the traditional barriers to opinion testimony.'" *Id.* (quoting *Beech Aircraft Corp. v. Rainey*, 488 U.S. 153, 169 (1988)).

93. *Daubert*, 113 S. Ct. at 2794.

94. Generally, animations are based on data that would normally be classified as inadmissible hearsay unless an exception could be found for admitting the evidence. Siegel & Pass, *supra* note 49, at 605. However, Rule 703 allows the admissibility of much that would be inadmissible if it is admitted as expert opinion testimony. FED. R. EVID. 703. For a more detailed discussion, *see infra*, part IV.A. and accompanying notes.

95. 16 F.3d 1083 (1994).

96. Stop-motion photography involves moving actual models by hand and videotaping each scaled movement so that each second is composed of ten frames. The simulation in *Robinson* resulted in a two-minute silent color video reenacting the accident that was the subject of the litigation.

97. *Id.* at 1088.

98. *Id.*

99. *Id.* at 1086.

100. *Id.* at 1089.

101. *Id.*

102. *Id.*

103. FED. R. EVID. 901(a).

104. FED. R. EVID. 901(b)(9).

105. Krieger, *supra* note 46, at 96.

106. Under Rule 401, " '[r]elevant evidence' means evidence having any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence." Most interpretations of the rule have found that if the evidence advances the inquiry in any way, it will be deemed relevant. MCCORMICK ON EVIDENCE § 185 (E. Cleary ed., 3d ed. 1984).

107. The exact language of Rule 402 states, "All relevant evidence is admissible, except as otherwise provided by the Constitution of the United States, by Act of Congress, by these rules, or by other rules prescribed by the Supreme Court pursuant to statutory authority. Evidence which is not relevant is not admissible." FED. R. EVID. 402.

108. FED. R. EVID. 403.

109. *Id.* Advisory Committee's Notes.

110. *Id.*

111. *See supra* notes 49-53 and accompanying text.

112. *See supra* notes 54-66 and accompanying text.

113. Krieger, *supra* note 9, at 96.

114. FED. R. EVID. 702.

115. *Id.* (emphasis added).

116. Krieger, *supra* note 9, at 96.

117. If computer animation is presented as a scientific process in which the laws of physics and science are incorporated, the jury may look to the computer for the answer, rather than view the animation as a visual depiction of counsel's opinions or theories about the case.

118. 880 P.2d 689 (Ariz. Ct. App. 1994).

119. *Id.* at 691.

120. *Id.*

121. *Id.*

122. *Id.*

123. *Id.*

124. *See infra* notes 142-152 and accompanying text.

125. J. Stratten Shartel, *Caution is Warranted in Use of New Technologies in Court*, PRENTICE HALL LAW AND BUSINESS, May 1992, at 3.

126. *Id.*

127. Muir, *supra* note 66 at 591.

128. *Id.* The list of sources is not exhaustive. However, from just this list, it is clear that the evidentiary basis of the animation immediately subjects it to hearsay analysis. Further, the danger in classifying the evidence as "demonstrative" is evident since a collage of potentially inadmissible evidence may be admitted without meeting any of the hearsay exclusions or exceptions. *See* discussion, *supra*, at Part IV.A.

129. *Id.*

130. *Id.* There are three ways in which these images are constructed. One method is to use a digitizer, which is akin to an electronic drawing pad that senses the movement of an electronic pen and duplicates the images onto a computer, but in three-dimensional quality. The second instrument used is a three-dimensional digitizer. The object is placed on the digitizer and points are touched, with the computer drawing it based on its distance and depth from the last point touched. The third method is to employ a Computer Aided Design (CAD) program to draw a three-dimensional wireframe model on the computer, and then allow the computer to animate it. Whatever process is used, the animator can then apply textures and colors from the computer's library of characteristics. For example, once an object has been imaged, say a couch, the animator can then assign a plush cloth texture to it and color it gray. *Id.*

131. *Id.* This process of placing events on a time line usually is done by closely following the data collected as to times and locations of events or objects. The rendering process fills in the gaps between one occurrence and the other. *Id.*

132. *Id.* While the rendering process is a "hands-off" process for the animator, and one example of where the computer is "acting on instructions at lightning speed," *McHugh*, 476 N.Y.S.2d at 723, it is still completely dependent on the data input. Therefore, the potential for bias is still inherent in even the most computer-based step of the process.

133. *Id.* For real time animations, frames are kept in the computer's memory. The computer then readjusts viewpoints and positions by recalling from its large catalog of previously-rendered frames the correct one to place next in the animation sequence. Each second of animation contains thirty rendered frames. *Id.*

134. FED. R. EVID. 702. Rule 702 states that "[i]f scientific, technical or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise." *Id.*

135. Edmund B. Sabato, *Visuals for Expert Testimony 'Beyond the Blackboard,'* THE LEGAL INTELLIGENCER, July 26, 1993, at 4. Sabato, manager of Graphic Services, an engineering and consulting firm specializing in graphic design, technical illustration, and video presentation, states that even photographs can be digitally altered before being animated. He also states:

Although the technology has existed for years to airbrush, merge and alter photographs, the ability to do it quickly and undetectably has not. Image manipulation that used to require six-figure workstations and cost tens of thousands of dollars now cost hundreds. Still-video cameras allow a photographer to take pictures, edit their content, and display them on a TV monitor within minutes, without ever going to film.

Id.

136. Deciding a case that has been characterized as "[t]he leading case dealing with the independent use of a computer simulation," the

137. FED. R. EVID. 703. Rule 703 states in relevant part that, "[i]f of a type reasonably relied upon by experts in the particular field in forming opinions or inferences upon the subject, the facts or data need not be admissible in evidence." *Id.* In regards to the sweeping admissibility this Rule could offer, the Advisory Committee's Note states that "[i]f it be feared that enlargement of permissible data may tend to break down the rules of exclusion unduly, notice should be taken that the rule requires that the facts or data 'be of a type reasonably relied upon by experts in the particular field.'" *Id.* Advisory Committee's Note. Of course, what is reasonably relied on becomes a question of fact, and is most likely to be resolved by looking at the test for novel scientific evidence found in *Daubert*. But in regards to the data most relevant to computer animations, the Advisory Committee's Note goes on to say that "[t]he language would *not* warrant admitting in evidence the opinion of an 'accidentologist' as to the point of impact in an automobile collision *based on statements of bystanders*, since this requirement is not satisfied." *Id.* (emphasis added) This last point is of great importance since every animator, as an expert 'accidentologist' or reconstructionist, many times relies mostly on the facts and data supplied by witnesses. The Advisory Committee's Note therefore implies that this practice should not allow the party to evade the exclusionary rules, which in this case would be the hearsay doctrine.

138. 518 N.W.2d 733 (1993).

139. *Id.* at 738.

140. *Id.* The animation misrepresented the speed of the bicycles, wrongly depicted the light that was cast from a nearby streetlight, and showed the wrong location of the injuries to riders. *Id.*

141. *Id.*

142. *McHugh*, 476 N.Y.S.2d at 722.

143. *Id.* at 723.

144. No. 12462, Marin County Superior Court, California (1992).

145. *Id.*

146. *Id.*

147. Shartel, *supra* note 125, at 3.

148. *Id.* Defense counsel objected because there was no evidence as to how Artie positioned his arms or his body as he walked down the hallway. *Id.*

149. *McHugh*, 476 N.Y.S.2d at 723.

150. Shartel, *supra* note 125, at 3.

151. MUELLER & KIRKPATRICK, *supra* note 19, at 1. The authors state that "[it] sounds strange in a republic which places great faith in the jury system, but mistrust of juries is the single overriding reason for the law of evidence." *Id.*

152. *Id.* at 2.

153. 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).

154. *Id.*

155. Rebecca White Berch, *A Proposal to Amend Rule 30(B) of the Federal Rules of Civil Procedure: Cross-Disciplinary and*

156. *Id.*

157. Dennis Robert Anti and Susan Solomon Seif, *Demonstrative Evidence Can Be Most Effective When it is Kept Simple*, THE NATIONAL LAW JOURNAL, Aug. 2, 1993, at 32.

158. 1994 WL 124857 (E.D. Pa. 1994).

159. *Id.* at *5.

160. *Id.* At the same time, the court found biases in the way that the animation was created. The court was particularly concerned with a decision by the reconstructionist to discount the testimony of one of the witnesses who reported facts unsympathetic to the proponent of the animation. *Id.*

161. *Id.*

162. Claire Cooper, *Computer Animation on Trial*, THE SAN DIEGO UNION-TRIBUNE, Jan. 27, 1993 at E-1.

163. *Id.*

164. *Id.* (emphasis added).

165. Vanyo, *supra* note 153, at 409.

166. *See supra* note 23 and accompanying text.

167. Shartel, *supra* note 125, at 2.

168. *Id.* at 3.

169. *Id.* *See also* Gordon Walker, *Show Time: Courtroom Technology is Finally Hitting its Stride - And Litigators are Finding that it has a Potent Effect on Judges and Juries*, TEXAS LAWYER, May 24, 1993 at 7 ("because the technology is still so expensive, often one side can afford it while the other can't, giving one side a potential unfair advantage"). A related concern is that parties, faced with the need to produce a \$20,000 animation to meet the other side's presentation, will opt for settlement, preventing litigation of the issue for economic reasons.

170. Marshall S. Turner and Andrew T. Houghton, *In With the Old, In With the New; Interactive Animations Are Wave of the Future*, NEW YORK LAW JOURNAL, Feb. 16, 1993, at S-1. Real time animation is best illustrated by the following example:

At any point during the presentation . . . of an automobile accident, the visual depiction can be changed from an overhead view, to the driver's view, to the position of an eyewitness at the time of the accident.

Id.

171. *Id.*

172. FED. R. EVID. 403 Advisory Committee's Note (emphasis added).

173. *See Bruton v. United States*, 391 U.S. 123, 142 (1968) (holding that a limiting instruction did not effectively protect the accused against the prejudicial effect of admitting in evidence the confession of a codefendant which implicated him).

174. 509 N.W.2d 603 (1994). The case involved an automobile passenger who was injured. The plaintiff brought a products liability action against the manufacturer of the car, asserting defective design claims. A computer-generated model was used by the plaintiff at

trial and became the partial basis for the defendant's appeal. *Id.* at 607-08, 617.

175. *Id.* at 617.

176. For example, Rule 803(24) is expressly designed for this purpose. FED R. EVID. 803(24) Advisory Committee's Note. *See also supra* note 53 and accompanying text.

177. *See supra* note 67 and accompanying text.

178. Virtual reality has been defined in the following ways:

[A]n evolving technology that transports a person into a computer-generated, three-dimensional environment. A helmet with sensory devices and electronic goggles is the entryway to the artificial world. Once inside, players employ joysticks, backpacks, electronic pods and other equipment to interact with the simulated world.

Thomas Heath, *Shoppers Jump Headfirst Into the Nearly Futuristic; Mall Presents Virtual Reality in the Rough*, THE WASHINGTON POST, Aug. 29, 1993, at B-3. It has also been described as "[a]n interactive technology that creates an illusion, still crude rather than convincing, of being immersed in an artificial world. The user generally dons a computerized glove and a head-mounted display equipped with a TV screen for each eye." TIME, Feb. 8, 1993, at 58.

179. Miriam Horn, *Seeing the Invisible*, U.S. NEWS AND WORLD REPORT, Jan 28, 1991, at 56. This new world includes entire virtual reality cities where people can join through computer hookups to meet in this new digital world. *Id.* Virtual reality, when it comes into full fruition, will be used in such diverse areas as medicine, test piloting, entertainment and motion pictures, sports conditioning, military maneuvers, and space exploration. *Id.*

180. Persons venturing into virtual reality enter a computer-generated world in which humans can "walk" and "touch" things, interacting with the artificial environment. Mark Potts, *Future Fixtures, or Flops? Some Educated Guesses About Which of the New Consumer Technologies Will Survive*, THE WASHINGTON POST, Dec. 27, 1992, at H-1.

181. Walker, *supra* note 169, at 7.

182. Not since early common law England have jurors been allowed to investigate, ask questions, or participate in the presentment of a case. However, the coming technology of virtual reality will remove jurors from being passive viewers in the jury box, and transform them into active investigators and participants in the unfolding of each case.