Computer Simulations in Litigation: Are Television Generation Jurors Being Misled?

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COMPUTER SIMULATIONS IN LITIGATION: ARE TELEVISION GENERATION JURORS BEING MISLED?

I. INTRODUCTION

A two-minute video, if well made, will make a greater impression on the minds and emotions of jurors than the world’s best expert. Once jurors see the video, the images will be graven on their minds. In fact, opponents of videotapes argue that a jury will never be able to evaluate intellectual criticism of a video’s validity, no matter how devastating the cross-examination of the sponsoring expert. The familiar power of television will shoulder everything else aside. The very value of using the videotape—its ability to impress and explain—is thus the source of the most persuasive argument against its use.¹

The invention of television has inexorably altered the manner in which our society receives information. Generations have grown to adulthood accompanied by this medium, making it a familiar and trusted presence by those who partake of its monologue. Add to this the advent of computer technology and the video screen has now become an interactive tool capable of incomprehensible power. In so many aspects of life, society has become dependent upon the power and facility of the computer. The newest frontier upon which the computer has staked its claim is the courtroom.

By virtue of someone feeding data into a system that uses specialized software programs, a computer can generate a re-creation of an event that simulates what might have happened at a particular time and place. The computer synthesizes complex and voluminous data, which would otherwise require a painstaking and potentially confusing explanation to the jury, and presents it in a coherent, effective, familiar package. In short, the jury can sit back and watch a video re-creation of the scenario in question, rather than having to digest a necessary but nonetheless tiresome and confusing string of statistics and facts.

Such an application has incredible potential for constructive use, but as with any other innovation with such potential, the possible misuse and misunderstanding could be disastrous. In today’s “television age,” are jurors simply seeing these re-creations as what “must have happened,”

believing it to be reality simply because its derivation is a computer and the medium is television? What are the potential misuses associated with computer simulations? Are current standards of admissibility effectively screening these simulations?

This Comment will first discuss the facts and history behind computer simulations in the courtroom. Next, the current standards of admissibility governing these simulations will be examined. An analysis of the psychological and emotional impact of computer graphic simulations on jurors will follow. Finally, this Comment will examine the great potential for misuse and misunderstanding with regard to computer simulations and argue that courts should be more wary with respect to the admission and use of these simulations because their effect on jurors might well outweigh their basis in fact.

II. The Mechanics of Computer Simulations

At the outset, a critical distinction must be made between computer simulation and computer animation. Computer animation involves an artistic rendering of an image that is altered slightly frame by frame in order to mimic actual movement, and that which is displayed on the screen is the totality of the exhibit. Computer simulation, on the other hand, involves the input of many sophisticated rules of physics (such as friction coefficients, effects of gravity, laws of acceleration, etc.), which form the parameters within which the facts of the particular scenario operate. The exhibit that is presented to the jury, therefore, involves infinitely more than the simple image displayed on the screen. As one author noted, "[w]ith animation, viewers see a car moving; with a simula-

2. C. Caverhill Schaefer et al., Computer Simulations in Court, TRIAL, July 1987, at 69, 70.
3. Id. at 70. Some authorities draw a further distinction between computer simulations and computer reconstructions. One author states:
   A computer simulation is 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 . . . A computer-generated accident reconstruction, on the other hand, is an explanation of what in fact happened. In computer reconstruction, known parameters, data, and facts derived from the accident investigation are entered into a computer. Based on this input, the computer may be able to supply missing information.
   Kathlynn G. Fadely, Use of Computer-Generated Visual Evidence in Aviation Litigation: Interactive Video Comes to Court, 55 J. AIR L. & COM. 839, 842-43 (1990). Computer simulation and reconstruction are similar, she concedes, in that they both "fill in the blanks." Id. For the purposes of this Comment, the term "simulation" will be used.
tion model, they see an accurate portrayal of the movements of the car under specified conditions and in compliance with the laws of physics.5

The first step in the creation of a computer simulation model is inputting the three-dimensional coordinates of the objects that were present at the accident scene.7 The next step involves calculation of the motions of each object that played a significant role in the accident.8 The testimony and observances of eyewitnesses and accident reconstructionists also are taken into account, but since this testimony is relevant “only for certain ‘benchmark’ moments, . . . the computer must otherwise fill in the gaps.”9 Therefore, while the laws of science provide the rules by which the evidence of the specific incident must abide, the computer provides the best fit within these rules for the complex data handed to it.

After the data is fed into the computer, the product is recorded in either videotape or laser disk format. While a videotape production

4. The use of the term “accurate” is somewhat colored and should be taken as such, as the accuracy of computer simulations is questioned by many in the field. “‘These models accept data which is representative of actual events, manipulate this data according to sets of rules which represent how the world works, and present results which are an approximation of the actual results.’” Craig Murphy, Comment, Computer Simulations and Video Re-enactment: Fact, Fantasy and Admission Standards, 17 OHIO N.U. L. REV. 145, 147 (1990) (quoting Martha M. Jenkins, Computer-Generated Evidence Specially Prepared for Use at Trial, 52 CHI.-KENT L. REV. 600, 601 (1976)).

5. Schaefer et al., supra note 2, at 70.

6. This presupposes that the simulation is created in three dimensions. Two-dimensional simulations are used as well.


8. Id.

9. Id. A good example of how such data is used to create an accident simulation is in the case of an airline disaster, as explained in the following excerpt:

Since aviation accidents involve the analysis of the movements of many objects in a three dimensional world with critical events occurring at known times, it is an area particularly well suited to the computer reconstruction technique . . . . The computer is programmed with aircraft velocity, heading and rates of climb or descent or, conversely, the entering of known physical locations and times from which the computer will determine the aircraft velocity, heading, and rate of climb or descent. The computer program already has built into it all of the physics associated with banks and turns so that if a bank angle is specified the computer determines the rate of turn and the turn radius, or, conversely, the entering of aircraft headings at known times from which the computer computes the bank angle, rate of turn and turn radius. These geometrical time and space computations are a prerequisite to any analysis of human visual performance, because it is only in this way that we are able to determine the conditions of observation.

takes less time and is significantly less expensive, laser disk technology offers many advantages. In addition to having a higher degree of resolution, the laser disk format allows for nearly instantaneous recall of any of the 54,000 frames stored on a single side of one disk. This "interactive video," as it is referred to, allows an attorney the luxury of avoiding time-wasting fast-forwarding and rewinding that is necessary in a videotaped simulation.

The end product of these processes is a coherent re-creation of anything from an automobile accident to a homicide. At the appropriate moment, such a simulation would be shown to a jury as the proponent's theory of how the events in fact occurred. The proponent even has the ability to present many possible theories with this technology—including that of the opponent. All that is required is for the proponent to take the data upon which the opposition bases its theory and input that data into its own simulation model. The consequences for the opposition would be disastrous if the events played out on screen, based on the opponent's theories and data, lent credibility to the proponent's theory of the accident.

There are several situations in which the use of a computer simulation is particularly valuable:

1. If the visualization of an event or an object is complicated by the dynamics of the situation;
2. If the "real time" of the event is a crucial factor;
3. If a physical re-creation of the event is made impracticable due to expense or danger;
4. If the situation is too complex for an expert to clearly explain or a layperson to clearly understand; or
5. If other visual representations of the event would not yield a worthwhile presentation (the example given is the situation where "the elapsed time is too short for any other medium to show the details").

11. Id.
12. See generally Fadely, supra note 3, at 853.
14. The uses of computer simulations in the legal field are not limited to in-trial display. In some cases, such simulations are used in depositions and have been effective tools in encouraging settlement prior to trial. Schaefer et al., supra note 2, at 73-74.
15. Id. at 72; see infra text accompanying note 126.
16. Id. at 70-72.
Computer simulations provide tremendous presentation advantages, such as stop-action, varied perspectives, and slow motion, yet each of these advantages is accompanied by a concomitant disadvantage and potential misuse, as this Comment will explore in a later section.\(^{17}\)

III. CURRENT STANDARDS OF ADMISSIBILITY

There are several routes an attorney can take in attempting to get a computer simulation admitted at trial. While the most common technique, and often viewed as the most simplistic, is to bring the simulation in through expert testimony, it is only one of the many options available.

The standards of admissibility in this area are a hodgepodge of evidentiary rules, including: Federal Rules of Evidence, common-law standards, and other general admissibility standards. The standard or combination of standards used depends on the particular jurisdiction and court in which the case is tried. Although the United States Supreme Court attempted to resolve some of these evidentiary questions in its recent decision in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*,\(^{18}\) the holding applies to computer simulation admissions only in limited circumstances.

A. Significant Cases Laying the Groundwork for the Admissibility of Computer Simulations

Although the number of cases discussing the admissibility of computer simulations is sparse, there are some cogent examples that demonstrate a concrete trend in the direction of wider acceptance of computer simulations. In *Perma Research & Development v. Singer Co.*,\(^{19}\) the Second Circuit of the United States Court of Appeals affirmed a seven million dollar judgment against Singer Company where a computer simulation was relied on by an expert to determine whether an anti-skid device of an automobile's braking system could be perfected.\(^{20}\) Since the experts claimed that the computer simulation was their work product and was, therefore, confidential information, an evidentiary hearing regarding its technical bases was considered "tangential," and the simulation was not shown during trial.\(^{21}\) The verdict, however, was obviously

\(^{17}\) *Id.* at 72-73; *see* discussion *infra* part V.

\(^{18}\) 113 S. Ct. 2786 (1993).

\(^{19}\) 542 F.2d 111 (2d Cir.), *cert. denied*, 429 U.S. 987 (1976).


\(^{21}\) *Perma*, 542 F.2d at 115. Furthermore, the appellate court held that:
influenced by expert opinion that was based on a computer simulation. Perma laid the original foundation for the use of computer simulations in a trial setting, even though the simulation was never seen by the jury.\textsuperscript{22}

One year later, in 1977, the Supreme Judicial Court of Massachusetts in \textit{Schaeffer v. General Motors Corp.}\textsuperscript{23} heard a case involving an automobile collision in which an expert's testimony was based on a computer simulation.\textsuperscript{24} The plaintiff claimed that his Cadillac, manufactured by the defendant, malfunctioned due to an optional device called the "controlled differential."\textsuperscript{25} This device allegedly:

caused the rear of his car to sway from side to side (to fishtail) on the wet highway until the right rear wheel encountered the rough macadam surface of the breakdown lane at which point the differential transferred traction to that wheel. The car then shot left across the road, went over the median, and into the eastbound lane where it was struck.\textsuperscript{26}

This appellate court reversed and remanded the matter to the trial court due to, among other things, a wrongful admission of expert testimony based upon a computer simulation.\textsuperscript{27} In so doing, the court attempted to establish criteria for the trial court to follow when determining the admissibility of computer simulations. The standard dictated by the \textit{Schaeffer} court is that the trial judge should conduct a hearing outside the presence of the jury to determine "whether the tests

\begin{itemize}
\item While it might have been better practice for opposing counsel to arrange for the delivery of all details of the underlying data and theorems employed in these simulations in advance of trial to both avoid unnecessarily belabored discussion of highly technical, tangential issues at trial, Fed.R.Civ.P. 26(b)(4)(A), and protect truly proprietary aspects of the programs... The trial judge did not abuse his discretion in allowing the experts to testify as to this particular basis for their ultimate conclusion that the Perma device was indeed perfectible.
\end{itemize}

\textsuperscript{Id.}

\textsuperscript{22} \textit{See infra} part III.A-C.
\textsuperscript{23} 360 N.E.2d 1062 (Mass. 1977).
\textsuperscript{24} \textit{Id.} at 1064.
\textsuperscript{25} \textit{Id.}
\textsuperscript{26} \textit{Id.} The controlled differential was described in the owner's manual as: always direct[ing] the major driving force to the wheel having the greater traction. The Controlled Differential makes driving safer and more economical by providing additional traction in snow, ice, mud, sand and gravel, particularly when one rear wheel is on a surface providing poor traction. During normal driving and cornering, the controlled unit functions as a standard differential. When one wheel encounters a slippery surface, however, the Controlled Differential allows the wheel with the greater traction to drive the car.

\textsuperscript{Id.}

\textsuperscript{27} \textit{Id.} at 1062.
conducted and results ascribed thereto meet the prescribed standards for the admissibility of such evidence," and that the judge's findings of fact regarding the admission or exclusion of evidence should be put on record.28

In *People v. McHugh*,29 a 1984 case, the Supreme Court of New York ruled that a computer simulation should be admitted without a separate evidentiary hearing. The defendant, Michael McHugh, was charged with four counts of second degree manslaughter and intoxicated driving after four teens died as a result of an automobile accident.30 McHugh maintained that he was neither intoxicated nor speeding. He asserted that the weather caused his automobile to leave the road and hit an electrical box, which in turn caused a tire blowout sending the car into the embankment. The court allowed McHugh to use a computer simulation that visually demonstrated his theory of the accident. The court stated:

A computer is not a gimmick and the court should not be shy about its use, when proper. Computers are simply mechanical tools—receiving information and acting on instructions at lightning speed. When the results are useful, they should be accepted, when confusing, they should be rejected. What is important is that the presentation be relevant to a possible defense, that it fairly and accurately reflect the oral testimony offered and that it be an aid to the jury's understanding of the issue.31

In addition, the court required McHugh's attorney to give a copy of the computer software used in the simulation to the District Attorney to expedite the trial process.32 This decision opened the door to the admission of computer simulations in trials.

As will be explored in the following section, admission standards for computer simulations have become more lenient as the technology has become more commonplace. Admission of evidence is generally reviewed under an abuse of discretion standard and, therefore, appellate courts often leave the admission of computer simulations within the "sound discretion" of the trial court.33 What is evident throughout the opinions is that computer simulations, like computers themselves, are now given a wider berth with respect to admissibility than they were in

28. *Id.* at 1067.
30. *Id.* at 722.
31. *Id.* at 722-23.
32. *Id.* at 723
the past. They were originally viewed with trepidation, but are now seen as benign tools. This view may be a bit too trusting.

B. Common-Law and Other General Standards of Admissibility

Apart from the Federal Rules of Evidence, though often intermingled with the Rules for purposes of admission, there are certain common-law standards utilized by courts to analyze whether to permit computer simulations in the courtroom. The first of these is the so-called "Frye Standard," based on a 1923 case in which the admissibility of a prototype polygraph machine's data testified to by an expert witness was brought into question.\(^{34}\) Although the Supreme Court expressly overruled the Frye Standard in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*,\(^{35}\) its impact upon evidentiary standards in both state and federal trials is still quite significant.

The *Frye* court held that "while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, 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."\(^{36}\) While some courts still utilize this older "general acceptance" test,\(^{37}\) many have rejected it as archaic and vague,\(^{38}\) seeking more precise standards, while still others have used it as a component of a hybrid standard.\(^{39}\)

Backers of the *Frye* standard argue that its advantages are as follows:

The perceived benefits of Frye center on its conservative nature and the fact that it excludes evidence that is not proven to be sufficiently accurate. Proponents of the Frye standard assert that the principal justification for the standard is that it screens out unreliable scientific evidence, providing for greater accuracy and fairness at trial.\(^{40}\)

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34. *Frye* v. United States, 293 F. 1013 (D.C. Cir. 1923).
35. 113 S. Ct. 2786 (1993).
36. *Frye*, 293 F. at 1014 (emphasis added).
39. *See* Christophersen v. Allied-Signal Corp., 939 F.2d 1106 (5th Cir. 1991), *cert. denied*, 112 S. Ct. 1280 (1992); *see also* discussion *infra* part VI.
The opponents of the Frye standard cite the nebulous aspects of the "general acceptance" language, and the difficulty in pinpointing the "particular field" in which the expert should be judged.\(^4\)

In Daubert,\(^4^2\) the United States Supreme Court expressly overruled the Frye Standard for all federal cases.\(^4^3\) The Court held that the Federal Rules of Evidence, which were promulgated approximately fifty years after Frye, superseded the Frye Standard, which was established in 1923.\(^4^4\) The holding stated that the Federal Rules of Evidence present the appropriate standards by which expert scientific evidence should be examined for purposes of admission.\(^4^5\) In contrast, Frye's "rigid 'general acceptance' requirement would be at odds with the 'liberal thrust' of the Federal Rules and their 'general approach of relaxing the traditional barriers to "opinion" testimony.'"\(^4^6\) The "austere" general acceptance standard presented by Frye is "incompatible with the Federal Rules of Evidence" and "should not be applied in federal trials."\(^4^7\)

While Daubert clears up some of the confusion in federal cases, its impact upon state court decisions is not yet clear, and will not be for some time. Furthermore, Daubert adds new confusion because it provides little guidance to trial judges on how to rule on these issues, and it addresses only "scientific" evidence, and not technical or other specialized evidence (thereby bringing to the fore the question of what is "scientific"). Finally, the question arises of whether Daubert is simply a thinly veiled application of Frye.\(^4^8\) While Frye has taken quite a beating in the wake of this decision, it is not yet dead.

While the Frye Standard allows for a computer simulation to be admitted via expert testimony, independent bases of admissibility offer other advantages. An attorney would ideally want a computer simulation to be admitted as independent substantive evidence, as opposed to merely being shown once to the jury on the heels of an expert, or even worse merely being described through an expert's testimony rather than actually shown.\(^4^9\)

\(^{41}\) Id. at *36.
\(^{42}\) 113 S. Ct. 2786 (1993).
\(^{43}\) Id. at 2793.
\(^{44}\) Id. at 2794.
\(^{45}\) Id. at 2799.
\(^{46}\) Id. at 2794 (citing Beech Aircraft Corp. v. Rainey, 488 U.S. 153, 169 (1988)).
\(^{47}\) Id. (citation omitted). See infra part III.C for a discussion of the Federal Rules of Evidence and the concomitant admission standards.
In order for a computer simulation to be admitted as substantive evidence, it must comply with all of the rules of evidence used in the specific court, as opposed to the limited requirements of admission via an expert witness. Two of the more common challenges require that the demonstration be fair and accurate, as established through proper authentication, and that it satisfy potential evidentiary exclusions such as hearsay. With respect to a computer simulation, the former criterion, that of authentication, requires testimony to qualify the hardware and software used as fair and accurate. If the hardware is of a name brand, and the software is commercially available, not only will qualification be easy, but the court may even take judicial notice of its accuracy.

While admission of a computer simulation as substantive evidence may be desirable, this may not be possible, and fall-back admission techniques are necessary. Another avenue through which computer simulations may be admitted into evidence is as "demonstrative evidence." Demonstrative evidence "consists of things . . . which can convey a relevant firsthand sense impression to the trier of fact, as opposed to those which serve merely to report the secondhand sense impression of others." The admission of demonstrative evidence is justified because it "requires only that the item be sufficiently explanatory or illustrative of relevant testimony in the case to be of potential help to the trier of fact."

The hurdles for admission of demonstrative evidence are not very high. One article expands upon the admission standards for 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,

51. Id.
52. Id.
demonstrative evidence avoids hearsay problems because it is not offered for its truth.55

In addition to proof that the evidence is fair and accurate, the proponent of the simulation must demonstrate its authenticity, which is "the process that identifies a given piece of evidence, links it to the controversy, and provides an appropriate basis for admission."56 Once an adequate foundation for its admission has been laid, the computer simulation is entered into evidence.57

The pivotal criterion for the admission of this type of evidence is that it pass the "substantial similarity" test; the simulation must be "substantially similar to what it represents" in order for it to be admitted.58 The substantial similarity test has been applied inconsistently by different courts,59 however, and some of this inconsistency may relate to the artificial difference between tapes introduced to illustrate expert testimony, and tapes introduced as accident recreations. Tapes that illustrate expert opinion or demonstrate a litigation theory or scientific principle, are generally admissible without any requirement that the depiction be substantially identical to the actual incident. However, if a judge believes a tape is an attempt to re-create an accident, rather than illustrate expert testimony, it is much more likely to be excluded. If a videotaped reenactment is to be admitted, the conditions under which the tape is made must be substantially similar to those prevailing at

55. Siegel & Pass, supra note 50, at *15-16. The fact that it is not offered for its truth, however, is one of the most elusive factors involved in computer simulations. The later sections of this Comment will examine the potential for misunderstanding by a jury, and this element goes to the heart of the issue. Juries may believe that a computer simulation is indeed offered for its truth, and not merely as a theoretical examination of the circumstances around which the case arose.

56. Murphy, supra note 4, at 154. The Federal Rule of Evidence upon which the authenticity requirement is based is Rule 901(a):

   Rule 901. Requirement of Authentication or Identification
   (a) General provision. The requirement of authentication or identification as a condition precedent to admissibility is satisfied by evidence sufficient to support a finding that the matter in question is what its proponent claims.

FED. R. EVID. 901.

57. Murphy, supra note 4, at 154.

58. Id. at 154.

59. See Hale v. Firestone Tire & Rubber Co., 756 F.2d 1322 (8th Cir. 1985), rev'd in part, 820 F.2d 928 (8th Cir. 1987) (trial court admitting videotaped reconstruction and appellate court reversing on grounds that differences in actual accident and reconstruction were not substantially similar); Pittman v. Mississippi Power & Light Co., 368 So. 2d 238 (Miss. 1979) (trial court admitting film, reasoning that lack of substantial similarity went to weight of evidence as opposed to issue of admissibility; appellate court reversing).
the time of the accident, and the judge may need to give special jury instructions.\textsuperscript{60}

The substantial similarity test presents the threshold issue for a court's consideration. If the simulation is too attenuated with respect to the incident it is re-creating, it is likely that a court would refuse to admit it. It is still possible, however, that even an attenuated simulation would be admitted if it was brought in via expert testimony, since it would likely bypass the substantial similarity test.\textsuperscript{61}

The lingering question is whether courts will be able to decipher the foundations of computer simulations to the degree necessary to make an accurate determination as to whether the simulation is substantially similar to the event it is re-creating. The resounding fear is that judges simply will assume that the simulation is based on accurate data that is substantially similar to the actual event, and not actually screen the simulation with respect to the substantial similarity question.

Ultimately, the decision of whether to admit demonstrative evidence lies exclusively in the broad discretion of the trial court.\textsuperscript{62} In other words, the admission standards under this method are only as stringent as the court wants them to be. In the majority of courts, then, assuming one has laid the proper foundation for its admission, a computer simulation would be admitted as demonstrative evidence.

C. Admission Standards Under the Federal Rules of Evidence

The Federal Rules of Evidence provide a coherent set of rules governing evidentiary questions, and they are present in one form or another in most, if not all, courtrooms. In the wake of \textit{Daubert}, these rules are of particular importance in federal cases involving expert scientific evidence, which impacts significantly on computer simulations.

The first of the Federal Rules of Evidence that provides a basis for admission of expert testimony is Rule 702, which states, "[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."\textsuperscript{63} This stan-

\begin{footnotesize}
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\item \textsuperscript{60} Panian, \textit{supra} note 1, at 1213-14 (citations omitted).
\item \textsuperscript{61} \textit{Id.}
\item \textsuperscript{62} \textit{Id.;} Fadely, \textit{supra} note 3, at 879.
\item \textsuperscript{63} \textit{FED. R. EVID.} 702. The advisory committee's note clarifies the posture of the rule: An intelligent evaluation of the facts is often difficult or impossible without the application of some scientific, technical, or other specialized knowledge. The most
\end{itemize}
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standard is quite liberal, and the court must simply judge whether or not that particular expert is qualified to testify as an expert based upon the criteria set forth in Rule 702. If that expert is then determined to have less than superior credentials, the expert's testimony is not barred, but merely given less weight by the trier of fact. Since such technical knowledge needs to be diffused to a jury through the explanatory abilities of a qualified expert, the admission standards with respect to Rule 702 are rather liberal.

The door to admissibility swings wide open, however, through Rule 703. The rule allows experts to base their opinions on material that need not be admissible into evidence, as long as it is "of a type reasonably relied upon by experts in the particular field." Under Rule 703, experts could even base their testimony on hearsay (frequently inadmissible), due to the assumption that experts are able to properly sift through the hearsay and weigh it accordingly. The reason courts liberally allow

common source of this knowledge is the expert witness, although there are other techniques for supplying it.

Most of the literature assumes that experts testify only in the form of opinions. The assumption is logically unfounded. The rule accordingly recognizes that an expert on the stand may give a dissertation or exposition of scientific or other principles relevant to the case, leaving the trier of fact to apply them to the facts. Since much of the criticism of expert testimony has centered upon the hypothetical question, it seems wise to recognize that opinions are not indispensable and to encourage the use of expert testimony in non-opinion form when counsel believes the trier can itself draw the requisite inference. The use of opinions is not abolished by the rule, however. It will continue to be permissible for the experts to take the further step of suggesting the inference which should be drawn from applying the specialized knowledge to the facts.

FED. R. EVID. 702 advisory committee's note (emphasis added).

64. Aldous, supra note 20, at 54 (citation omitted); see also Fadely, supra note 3, at 870.
65. Fadely, supra note 3, at 869-70.
66. FED. R. EVID. 703. The rule, in its entirety, is as follows:

Rule 703. Bases of Opinion Testimony by Experts

The facts or data in the particular case upon which an expert bases an opinion or inference may be those perceived by or made known to the expert at or before the hearing. If 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.

67. Aldous, supra note 20, at 55-56. In order to make the determination of whether or not experts "reasonably rely" upon such facts and data, the court must have a separate hearing outside of the presence of the jury. This affords opposing counsel the opportunity to obtain the otherwise protected facts and data supporting the computer simulation. There are two predominant views guiding this determination: the first involves an inquiry into both (a) whether or not the facts and data are reasonably relied upon in the field, and (b) whether or not the facts and data are trustworthy considering hearsay and other factors. The second inquiry merely requires an examination of the reasonable reliance in the expert's field, and does not require an inquiry into the trustworthiness of the underlying material. See id. at 57.
such expert testimony is to make complex material, which is not easily understood by a lay person, comprehensible to the trier of fact.\textsuperscript{68}

In the field of aviation litigation, for example, experts reasonably rely on computer simulations, "and these simulations should be admissible upon a showing that the degree of reliability of modeling technique employed is consistent with the state of the art."\textsuperscript{69} Furthermore, because testimony may be couched as a hypothetical question under Rules 703 and 704, a computer simulation may be shown as a graphical description of how the expert theorizes that the event in question "hypothetically" occurred.\textsuperscript{70} Rule 703, therefore, presents an attorney with a smooth avenue through which a computer simulation can be shown to a jury. As long as the facts and data underlying the simulation are those "reasonably relied upon" by experts in the field, the simulation is fair game.

Another way in which expert testimony may be used with respect to the admissibility of a computer simulation is under Rule 705: "The expert may testify in terms of opinion or inference and give reasons therefore without prior disclosure of the underlying facts or data, unless the court requires otherwise. The expert may in any event be required to disclose the underlying facts or data on cross-examination."\textsuperscript{71} In other words, experts may give testimony without having to disclose the underlying facts or data leading them to their opinion, unless required to do so by the court. This is another rule designed to make expert testimony more clearly understood by the triers of fact, because the expert need not bog down the testimony with technical details too complicated for the jury to digest.\textsuperscript{72} Furthermore, the facts and data supporting the expert’s testimony are open to cross-examination through Rule 403.\textsuperscript{73}

The corollary to Rule 402, providing that "all relevant evidence is admissible, except as otherwise provided,"\textsuperscript{74} is Rule 403, which states 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."\textsuperscript{75}

\textsuperscript{68} Fadely, \textit{supra} note 3, at 869.
\textsuperscript{69} Id. at 869-70 (citation omitted).
\textsuperscript{70} FED. R. EVID. 703 advisory committee's note.
\textsuperscript{71} FED. R. EVID. 705.
\textsuperscript{72} Aldous, \textit{supra} note 20, at 54.
\textsuperscript{73} FED. R. EVID. 403.
\textsuperscript{74} FED. R. EVID. 402.
\textsuperscript{75} FED. R. EVID. 403. The advisory committee's note states the following:
One author deftly examines how two scenarios demonstrate that Rule 403 can be used to exclude expert testimony which, although relevant under Rule 401, is confusing, misleading, or too time consuming:

One scenario is where an expert is not required to disclose the underlying basis for his simulation, misleading the jury as to the results of a severely flawed computer program. Computer simulations generally involve a degree of mathematical sophistication not easily comprehended by most jurors. Experts typically have impressive credentials and speak persuasively. In many cases, opposing counsel might have been able to expose the flaws in the simulation if permitted to cross-examine the expert about them.

A second scenario is where an expert is required to disclose the simulation in detail on cross-examination. The jury may be confused by the technical difficulty of the simulation, and may decide the facts based on inappropriate reasons. Some courts restrict cross-examination when the jury does not possess the requisite level of comprehension.\(^{76}\)

The amount of latitude allowed attorneys under Rule 403 is completely within the discretion of the trial judge and will not constitute a reversible error unless there is clear abuse of that discretion.\(^{77}\)

Finally, potential hearsay objections to computer simulations may arise under Rules 801\(^{78}\) and 802.\(^{79}\) However, the hurdles are not insurmountable. First, there are several hearsay exceptions under Rule 803,\(^{80}\)

\(\text{FED. R. EVID. 403 advisory committee's note.}\)

\(^{76}\) Aldous, \textit{supra} note 20, at 60-61 (citations omitted).

\(^{77}\) Fadely, \textit{supra} note 3, at 870.

\(^{78}\) \text{FED. R. EVID. 801.}

\(^{79}\) \text{FED. R. EVID. 802.} Rule 802 states: "Hearsay is not admissible except as provided by these rules or by other rules prescribed by the Supreme Court pursuant to statutory authority or by Act of Congress." \textit{Id.}

\(^{80}\) \text{FED. R. EVID. 803.} The applicable portions of the rule are as follows:

\textbf{Rule 803. Hearsay Exceptions; Availability of Declarant Immaterial}

The following are not excluded by the hearsay rule, even though the declarant is available as a witness: 

(6) Records of regularly conducted activity. A memorandum, report, record, or data compilation, in any form, of acts, events, conditions, opinions, or diagnoses, made at or near the time by or from information transmitted by, a person with knowledge, if kept in the course of a regularly conducted business activity, and if it was the regular practice of that business activity to make the memorandum, report, record, or data compilation, all as shown by the testimony of the custodian or other qualified witness, unless the source of information or the method or circumstances of preparation indi-
such as the Rule 803(8) public records and reports exception and the Rule 803(24) residual exception. For example, a computer simulation based upon third party testimony may involve hearsay problems. In contrast, a simulation based upon flight recorder data from a downed airliner would likely evade a potential hearsay objection because the flight recorder data would qualify under Rule 803(6) hearsay exception as a record of a regularly conducted activity.

Second, if the facts and data underlying the computer simulation were collected by the adverse party, they "may be admissible as an admission against that party's interest because of its trustworthiness" under the Rule 801 hearsay definitions. However, the simulation itself is not an adversary. It is the party collecting the data in this example who is adverse. Finally, because expert testimony can be based upon hearsay under Rule 703, this provides another "end around" for an attorney to bring in material otherwise objectionable due to hearsay conflicts. In other words, data used in a simulation which would otherwise be excluded under the hearsay rules could come in to evidence through an expert witness, thus evading the hearsay issue.

cate lack of trustworthiness. The term "business" as used in this paragraph includes business, institution, association, profession, occupation, and calling of every kind, whether or not conducted for profit...

(8) Public records and reports. Records, reports, statements, or data compilations, in any form, of public offices or agencies, setting forth (A) the activities of the office or agency, or (B) matters observed pursuant to duty imposed by law as to which matters there was a duty to report, excluding, however, in criminal cases matters observed by police officers and other law enforcement personnel, or (C) in civil actions and proceedings and against the Government in criminal cases, factual findings resulting from an investigation made pursuant to authority granted by law, unless the sources of information or other circumstances indicate lack of trustworthiness...

(24) Other exceptions. A statement not specifically covered by any of the foregoing exceptions but having equivalent circumstantial guarantees of trustworthiness, 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. However, a statement may not be admitted under this exception unless the proponent of it makes known to the adverse party sufficiently in advance of the trial or hearing to provide the adverse party with a fair opportunity to prepare to meet it, the proponent's intention to offer the statement and the particulars of it, including the name and address of the declarant.

Id.
81. Id.
82. See id.
83. Fadely, supra note 3, at 867.
84. See supra text accompanying notes 77-82.
85. See supra text accompanying note 67.
The Federal Rules of Evidence, therefore, offer quite liberal admission criteria for computer simulations. The bases of such rules are well founded because their purpose is to facilitate jury comprehension of complex issues. In a later section the dangers of such lenient standards will be examined, as will an argument favoring more judicial scrutiny of computer simulations.

The common thread laced throughout the many standards of admission regarding computer simulations is the ease with which it may be accomplished. Depending on one's view of computer simulations, this could be good or bad news. Whatever the prevailing attitude regarding these simulations may be, the odds favoring admission greatly outweigh the odds against it.

IV. Computer Simulations' Impact on Juries

The purported advantage of computer simulations is that they make a stunning impression on the minds of jurors. However, this can also be viewed as a terrible disadvantage. One author explains: "The major problem facing an opponent of a computer simulation is its impact on the jury. Typically, the jury will think "I saw it on the TV" or "it says it on that paper, therefore it must be true." Whether or not one sees such an impact as beneficial or detrimental to the judicial process, one cannot argue that computer simulations do leave a substantial imprint on the minds of jurors.

As the complexity of the issues presented to a jury increases, the amount of interest, comprehension, and retention will decrease. For a party presenting such complex issues to a jury, the object is to present them in the most comprehensible, succinct, and attention-getting method possible. The best way to accomplish this goal is by combining verbal communication with other forms of communication, primarily visual. One study pointedly demonstrates the advantages of using visual communication:

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86. Murphy, *supra* note 4, at 158 (quoting Mark A. Dombroff, *Dombroff on Unfair Tactics* § 14.37 (2d ed. 1988)).
87. Dombroff, *supra* note 9, at *3.
88. *Id.*
Method of Presentation | Retention After 3 Hours | Retention After 72 Hours
--- | --- | ---
1. Telling (verbal) | 70% | 10%
2. Showing (visual) | 72% | 20%
3. Telling and Showing | 85% | 65%

The study clearly shows that visual presentation is more effective than verbal communication, and that verbal communication is most effective when coupled with a visual presentation. As one professional photographer put it, "[pictures] are images, directly entering the bloodstream, bypassing the brain."90

The fact that a computer simulation is presented in the very comfortable medium of the television screen also affects jurors. One source estimates that by the time average high school students graduate, they have completed 11,000 hours of in-class work, yet have watched over 15,000 hours of television.91 One author comments:

Because of our physical makeup, acting in concert with the cultural traits we have evolved, we are essentially visual learners. For the members of our society, information is highly dependent on visual stimuli. In fact, we retain 87% of the information which is presented to us visually. When information is presented to us through audio means, we retain only 10% of what we hear. Thus, visual information does make an impact and is the most important way we learn.92

The conclusion that logically flows from these results is that a computer simulation—a visual presentation—will have a greater psychological impact on a trier of fact than will a purely verbal presentation. The following cases demonstrate what a powerful tool computer simulations have been in litigation.

The first use of a computer simulation at trial was entitled “Hexane Explosion,” and was utilized in a Kentucky case in which a gas leak triggered multiple explosions in Louisville.93 If a computer simulation would not have been used, “the jury would have had to digest cumbersome traditional forms of demonstrative evidence needed to make the same points: diagrams of the chemical plant, maps of the city sewer sys-

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92. Id.
COMPUTER SIMULATIONS IN LITIGATION

tern, eyewitness accounts of the explosion, and expert testimony on gas chemistry."94 Instead, with the use of a computer simulation, the jury was ostensibly able to "see" what happened.95 Two days after the jury was shown the computer simulation of the hexane explosion, the defendant settled the case for over $18 million.96

In Connors v. United States,97 both sides used computer simulations in a case surrounding the crash of Delta Flight 191 on August 2, 1985.98 The case involved the death of 136 passengers and crew members, as well as one person on the ground, after the airliner passed through a small-but-violent wind system called a "microburst," or "windshear."99

In the fourteen-month trial between Delta Airlines and the United States government, $150 million to $200 million in wrongful death claims hung in the balance.100 In its computer simulations, the United States Justice Department input 40 different parameters (including acceleration, pitch, roll, and heading) to create a three-dimensional image of the plane's last minutes, fused with the crew's recorded voices and weather conditions.101 Roy Krieger, one of the attorneys then working for the Justice Department, described the role of the computer simulations as "pivotal."102 The federal district judge found in favor of the United States in the Connors case.103

In Schmutz v. Boulder Community Hospital,104 the parents of Peter Schmutz, an epileptic, brought a products liability and negligence action against the hospital and surgeon responsible for injuries while in sur-
As a result of a fall and subsequent head blow caused by a seizure in February 1983, a blood clot formed in Peter's brain and required surgical removal. The surgeon used a device (manufactured by defendant Codman & Shurtleff) called a Smith perforator to drill a hole in Schmutz's skull. The drill was designed to stop when it no longer encountered solid matter, but it failed to do so during Schmutz's procedure. The drill perforated the protective brain membrane and severed branches of a brain artery which had wrapped around the drill bit. As a result, Peter Schmutz suffered a massive stroke, leaving him permanently brain damaged, paralyzed on the left side of his body, and partially blind.

Schmutz's parents sued Codman & Shurtleff alleging that the drill was defective and that they failed to warn of the danger of the drill not stopping. Schmutz's parents also sued the hospital, alleging that it had negligently assembled and cleaned the drill prior to surgery. Throughout the trial, counsel for plaintiff attempted to explain to the jurors exactly what had occurred, yet they offered only anatomical diagrams as visual illustration. The jury returned a verdict for the defendants, and that verdict was affirmed by the appellate court.

The Colorado Supreme Court reversed the verdict, however, and ordered a new trial. The plaintiffs hired new counsel who presented a computer simulation to the jury that demonstrated a Smith perforator boring into a skull and severing the brain artery. In this second trial, the jury awarded the plaintiff $4.5 million in actual damages for negligence against the hospital and Codman, as well as $1.5 million in punish-
tive damages against Codman.116 While the plaintiffs' attorney maintains that he never made any claims to the jury that the simulation was an accurate representation of what actually had occurred, and that he warned the jury that the simulation was simply an attempt to illustrate their theory regarding the case, the judge still admitted the simulation.117

These are merely examples of how computer simulations have played an integral role in the outcome of jury trials in which significant damages are claimed, and there are many other analogous cases. These cases demonstrate that computer simulations are extremely powerful tools, which weigh heavily in the decision processes of a jury. One author states:

When people receive information from the television they take it as the truth. The reason for this is that television is the critical medium today for gaining information, including news. Thus, when evidence is presented in this format, it becomes "not only believable, but virtually unassailable." If an attorney is not prepared, a computer simulation . . . can become "an almost overwhelming piece of evidence."118

The following section will demonstrate that, for all of their advantages, a tremendous potential exists for misuse and misunderstanding of these "overwhelming piece[s] of evidence."

V. ABUSES, MISUNDERSTANDING, AND DISADVANTAGES

One author suggests six advantages of computer simulations with respect to an effective jury presentation: (1) varied perspectives; (2) real time or accuracy of timing; (3) slow and fast motion; (4) stop-action; (5) highlighted elements; and (6) modifications for analysis.119 Each of these advantages carries with it, however, a concomitant potential for abuse or unintentional misuse that could manipulate a juror's impression of a simulated event.

Varying perspectives allow the viewer of the computer simulation to see inside anything from the human skull to an automobile engine. Points of view can shift from any one of a multitude of angles, including overhead, front, side, bird's eye, etc.120 While this type of imaging can

116. Id. at *18-19.
117. Id. at *19.
118. Murphy, supra note 4, at 146 (quoting Feinerman, New Season for Video Law, 16 BARRISTER 15, 16 (1989)).
119. Schaefer et al., supra note 2; at 72.
120. Id.
be impressive, it also can be used to manipulate the events being shown, either intentionally or unintentionally. As one author explains, "[j]ust as a writer uses punctuation, the selective use of a zoom, closeup and fade-out can accent different points. A constantly moving object can appear to change speed or direction by merely changing the point from where it is viewed."\(^{121}\)

Because individual perceptions vary substantially with respect to time, "[c]omputer simulations show what happened in real time, so that each juror's perception is the same and accurate."\(^{122}\) The logical base that this assumption rests upon, however, is that the data being fed into the computer represents the actual time elapsed for the event to have taken place. With a digital flight recorder, this may be extremely precise, but with an accident reconstructed from automobile skids and trajectory estimates, this may be an unreliable piece of data. As the court in \textit{Schaeffer v. General Motors Corp.} explained, "[o]ur concern is not with the precision of electronic calculations, but with the accuracy and completeness of the initial data and equations which are used as ingredients of the computer program."\(^{123}\)

The advantage of slow and fast motion is that the event may be slowed down or sped up to more clearly demonstrate events that either transpired too quickly for a viewer to comprehend or too slowly to demonstrate a coherent flow.\(^{124}\) The corresponding disadvantage of slow and fast motion is that the time frame in which the event took place is distorted. The proponent can either elongate or truncate the elapsed time of the event through repeated use of slow or fast motion.

The advantage of stop-action is that it "allows the expert to focus on the most important moments while keeping them in the context of the event."\(^{125}\) The bias regarding which moments are important and which are not will be skewed in favor of the party presenting the computer simulation. With stop action, the proponent will be able to focus on the segments of the simulation that they want emphasized, while correspondingly de-emphasizing those portions that cast their stance in an unfavorable light. Furthermore, by stopping the action continuously, the aforementioned advantage of real time may be effectively distorted to

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122. Schaefer et al., \textit{supra} note 2, at 72.
124. Schaefer et al., \textit{supra} note 2, at 72.
125. \textit{Id.}
give the jury the conception that the action took longer than did its actual elapsed time.  

The advantage of highlighting important elements of the event allows the proponent "to focus on important physical phenomena, eliminating extraneous background details that detract from the action, without causing distortion or hindering admissibility." At the same time, however, this allows for the "lowlighting" of other details in the simulation. Often, admission of a simulation is contingent on the inclusion of specific details with respect to the scene. Computer simulations allow for the deemphasis of significant details by highlighting those details the proponent feels best demonstrate his or her position.

Finally, the advantage of modification for analysis allows for the reinput of data, creating a different visual presentation "based on conflicting testimony, eyewitness accounts, or opposing experts' analyses." A presentation displaying the opponent's position in a simulation that works to the advantage of the proponent could be devastating to the opponent's case. If the simulation is not completely accurate at its foundation, the opponent's position could be misrepresented. If the software was created with an initial bias favoring the proponent, good reason exists to believe that the opponent's "modified analysis" will also be skewed in the proponent's direction.

Many authorities caution of the potential abuses with respect to computer simulations:

While the computer may be used to generate, for use at trial, evidence that can aid in the "search for truth," it may also be used carelessly or in a biased fashion. Because the law on the admissibility of computer-generated evidence is still in the developmental stage, casual or greedy use of this tool may adversely affect its growth. Computer-generated evidence tends to mesmerize fact-seekers and relax their natural critical natures, yet there is great danger of it being erroneous, misleading, or unreliable. The underlying data may be full of errors or discrepancies, or it may, for

126. An analogous situation involving the manipulative use of stop-action in a videotape was that of the recent Rodney King trial. The Rodney King case involved several Los Angeles police officers who were unknowingly videotaped while beating Rodney King, a civilian motorist. The focal piece of evidence in this case was the videotape, and the defendants' attorneys were able to use stop-motion very effectively by dissecting every segment of the video. By virtue of this technique, the attorneys were able to de-emphasize the brutality of the event, slowing the real time to a snail's pace, and demonstrating the supposedly calculated safety precautions taken by the officers.

127. Schaefer et al., supra note 2, at 72.

128. Id.; see supra text accompanying note 15.
one reason or another, be irrelevant or improper as evidence. The data may have been fed into the computer inaccurately. The computer may have been improperly programmed or not programmed to detect errors. The assumptions on which the program was based may be wrong, illogical, or simply irrelevant to the issues sought to be proved.129

As "[e]ach frame represents innumerable calculations and assumptions," each frame has the potential for intentional or unintentional miscalculation.130

As one accident-reconstruction expert explains, "[a]n animation artist can make a car fly. . . . There are some so-called experts out there who may be 50 percent or more off. Animation is only as good as the information put into it."131 Furthermore, the software is sometimes not sophisticated enough for the accurate depiction of the inputted technical data.132

While the most persuasive argument against the use of computer simulations may be potential abuses and jury misunderstanding, there are other disadvantages to computer simulations, one of which is their expense. The computer simulations in the Connors case cost the U.S. Government between $100,000 and $150,000.133 That figure would also double or triple if the costs of time and travel for expert witnesses were added.134 Prices can be upwards of $1,000 to $4,000 per second for a completed three dimensional computer simulation.135 As technology is advancing and demand is increasing, though, costs are dropping.136 The high cost will tremendously disadvantage less wealthy clients and will particularly favor prosecutors and wealthy defendants in criminal trials.137

Finally, computer simulations can backfire. If the computer simulation is too lengthy, its impact on the jurors may be lost.138 University of Southern California Law School Professor William J. Genego explains, "[h]igh-tech computer exhibits may cause a jury to be persuaded for the

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129. Martha M. Jenkins, Computer-Generated Evidence Specially Prepared for Use at Trial, 52 Chi.-Kent L. Rev. 600 (1976), quoted in Murphy, supra note 4, at 160 n.129.
130. Panian, supra note 1, at 1212 (quoting Chernow, supra note 1, at 4).
132. Id.
133. Id.
134. Id.
135. Id.
136. Id.
137. Shartel, supra note 104, at *3.
wrong reasons because the graphics are colorful or entertaining, and not because the facts are convincing."139 This may work to the advantage of the proponents, but it could also work to their disadvantage. As Robert Seltzer, director of LSI Graphic Evidence in Los Angeles put it, "[e]verybody comes back from lunch and you put the lights down. It's like watching a movie. You might spend $100,000 and the jury goes to sleep."140

Considering the potential for abuse and the many disadvantages surrounding computer simulations, they should not necessarily be seen as the panacea that many hold them out to be. The technology is fascinating, and it does have many advantages that have advanced litigation techniques several levels. The flip side is that there are problems associated with the use of computer simulations in the courtroom, and those who deal with them directly should be cognizant of this fact and should work to streamline the rough edges.

VI. SOLVING THE PROBLEMS

Now that the many facets of computer simulations have been explored and the problems associated with them have been fleshed out, the logical inquisitor asks what can be done to solve the problems? While there are no air-tight responses to this question, there are steps that can be taken to try to eradicate the abuses and make the use of computer simulations in the courtroom more equitable.

First, attorneys must take more care to guard against the potential abuses that they unknowingly commit, and more importantly that their opponents make either intentionally or unintentionally. They must look upon computer simulations as tools, but tools that require extremely fine tuning. They must take every opportunity to object to their opposition's biases and the incorrect factual foundations present in the computer simulations. Since this seems to be how many attorneys currently approach the problem, this will not be a solution, but this constant vigilance is necessary to keep the system in check.

Second, judges must delineate a stringent set of criteria through which computer simulations must pass muster. One approach that may tighten the gaps in the admissibility area would be to create a hybrid of the aforementioned standards, and some courts have already done this. For instance, the New York Supreme Court in People v. Daniels141 estab-

140. Marcotte, supra note 49, at 56.
lished a three-tiered addition to the evidentiary status quo: (1) the court may give the jury a cautionary instruction with respect to the computer simulation; (2) the court may inquire from the expert witness as to his or her qualifications, whether the technique used was reliable, and whether the opinion is probative and relevant; and (3) the opponent may be permitted to inquire as to the qualifications of the expert on cross-examination.\(^{142}\)

In *Christophersen v. Allied-Signal Corp.*,\(^ {143}\) the Fifth Circuit sitting en banc established a four-pronged test:

1. Whether the witness is qualified to express an expert opinion, Fed.R.Evid. 702;
2. Whether the facts upon which the expert relies are the same type as are relied upon by other experts in the field, Fed.R.Evid. 703;
3. Whether in reaching his conclusion the expert used a well-founded methodology, *Frye*; and
4. Assuming the expert's testimony has passed Rules 702 and 703, and the *Frye* test, whether under Fed.R.Evid. 403 the testimony's potential for unfair prejudice substantially outweighs its probative value.\(^ {144}\)

This notion of a hybrid standard, then, would force the proponent to exercise even greater care with respect to the foundational data, formulae, and factual circumstances used in computer simulations.

*Daubert's* further liberalization of the admission standards in some of these areas, though, signifies a movement in the opposite direction, leaning more towards inclusion rather than exclusion of this evidence.

Even with greater care on the part of attorneys and tighter admissibility standards, the problem of juror complacency still exists. The court must take great pains in instructing juries as to the exact foundations of computer simulations. The attorneys must be forced to make crystal clear the distinction between what is fact and what is theory. The court must play the role of educator and parent, as if one was dragging his or her child away from the television and introducing them to new sources of information and forcing them to think for themselves.

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142. *Id., quoted in Murphy, supra* note 4, at 159.
143. 939 F.2d 1106 (5th Cir. 1991) (en banc), cert. denied, 112 S. Ct. 1280 (1992).
144. *Id.* at 1110.
VII. Conclusion

In *Perma Research & Development v. Singer Co.*, a lone dissenter, Judge Van Graafeiland, vehemently argued that more care needs to be taken with respect to the admission of computer simulations:

As courts are drawn willy-nilly into the magic world of computerization, it is of utmost importance that appropriate standards be set for the introduction of computerized evidence .... Although the computer has tremendous potential for improving our system of justice by generating more meaningful evidence than was previously available, it presents a real danger of being the vehicle of introducing erroneous, misleading, or unreliable evidence ... Because of the complexities of examining the creation of computer-generated evidence and the deceptively neat package in which the computer can display its work product, courts and practitioners must exercise more care with computer-generated evidence than with evidence generated by more traditional means.145

As a tool, computer simulations have revolutionized much of today's tort litigation. They are here to stay, and those persons associated with computer simulations must take the necessary steps to solve the many problems surrounding them. It is too easy for a person steeped in the television age to look at such a critical piece of evidence with ignorant bliss and a dearth of skepticism. There is a great danger to our legal system if those individuals who decide the fate of our legal controversies do so "because a computer must be right." The phrase "garbage in, garbage out" applies here more than ever, and attorneys, judges, and jurors should be a bit more critical about what is fact and what is fiction.

ADAM T. BERKOFF

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