Illustration and Clarification

Computer Generated Demonstrative Evidence

by Kim S. Magyar

Plaintiff's counsel in a complicated patent infringement case needs to convey to the jury exactly how its client's complex product works to prevent electrocution in a hair dryer when exposed to water. In the past, the most common method to accomplish this task was to use a blow-up of the patent's schematic drawing. Thanks to the advent of computer generated evidence ("CGE"), plaintiff's counsel has another option. Through CGE, the patent schematic is colorized, with the relevant parts "lifted" out of the drawing and animated, to show the effect of water on the patented part. Evidence of how the patent works, which was once boring, technical, and perhaps even beyond the comprehension of the average lay juror, is instead clearly, succinctly, and vibrantly shown.

Defense counsel in a personal injury action desires to communicate to the jury the sequence of events leading up to, and causing, the automobile accident. Instead of relying merely on the oral testimony of its accident reconstructionist, CGE is used to create a simulation of the collision, using data inputted from the accident reconstructionist's opinion. The jury not only hears the testimony of the defendant's expert, but also sees the accident simulation with its own eyes, from multiple vantage points.

These hypotheticals reflect the growing trend toward the use of computer generated visual demonstrative evidence in the courtroom. In general, judges look upon demonstrative evidence with favor because it helps the jury to quickly and concisely understand the issues raised at trial. See *Burke v. Toledo, Peoria & Western Railroad Co.*, 148 Ill.App.3d 208, 213, 498 N.E.2d 682, 686 (1986). As noted by Senior District Judge (and former Director of the Federal Judicial Center) William W. Schwarzer: "Much evidence becomes more comprehensible when presented with visual aids, such as a chart summarizing data, a chronology, an enlarged picture of an object, a diagram of a building, or a map." Schwarzer, "Reforming Jury Trials," 132 F.R.D. 575, 588 (1990). In fact, recent research shows that the use of visual aids increases jury retention and understanding by as much as 65 percent. Butera, "Seeing is Believing: A Practitioner's Guide to the Admissibility of Demonstrative Computer Evidence," 46 *Clev.St.L.Rev.* 511 (1998).

The escalating trend toward high-tech computer generated demonstrative evidence is largely a result of the steadily decreasing costs associated with this type of evidence. In the mid-1980s, a typical computer reconstruction cost $100,000 and up. By 1989, the same simulation cost between $30,000 to $60,000. By 1993, the cost for the same simulation had decreased again, to $4,000 to $8,000. Tynan, "Evidence in Motion," *Cal.Lawyer* 85 (13 Oct. 1993).

Computer animations and simulations are valuable tools when complex opinions or technical facts must be clearly and succinctly explained to a jury. Moreover, computers can do what would be difficult and even impossible in the physical world. They can modify time, stopping and starting where convenient, focus or highlight important elements, and show evidence from different vantage points and angles. Where physical recreation would be impracticable, due to cost concerns or dangers, computers are an excellent, and often superior, substitute.

Another advantage of computer generated evidence is its flexibility. Computers can replace many different forms of demonstrative evidence that would otherwise require multiple media applications to present. A courtroom full of cumbersome blow-ups, unwieldy televisions, unreliable videocassette recorders, and noisy overhead projectors may all be replaced with a single computer. The computer can demonstrate and display to the jury charts, graphs, documents, photographs, videotaped evidence, animations, and simulations. The computer can "virtually" do it all.

What is Demonstrative Evidence?

Demonstrative evidence is defined by Black's dictionary as "that evidence addressed directly to the senses without intervention of testimony. Such evidence is concerned with real objects that illustrate some verbal testimony and has no probative value in itself." Examples of demonstrative evidence include maps, diagrams, photographs, models, charts, medical illustrations, x-rays, and computer animations.

Demonstrative evidence illustrates, clarifies, or explains other relevant, substantive evidence (testimonial, documentary, or real) that is introduced at trial. Therefore, pure demonstrative evidence is generally created for trial and is not admissible into evidence. Because it is not generally admissible, demonstrative evidence will also typically not be given to the jury during deliberations in order to avoid the risk that the jury will use the demonstrative evidence to unduly emphasize the testimonial, documentary, or real evidence that it illustrates or clarifies.

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However, most courts now allow demonstrative evidence to be used substantively, meaning that it may be used "for the purpose of proving a fact in issue, as opposed to evidence given for the purpose of discrediting a witness… or of corroborating his testimony." *Black's Law Dictionary*, at 1429 (6th ed. 1990). Most courts also now allow demonstrative evidence, including both pure and substantive demonstrative evidence, to be admitted into evidence. Therefore, the term demonstrative evidence is also often frequently, and rather confusingly, used to describe *any* evidence that demonstrates or is illustrative, including both pure and substantive demonstrative evidence.

Modern History of Demonstrative Evidence

Using technology for the presentation of demonstrative evidence in the courtroom is not new. Generally, as the forms of demonstrative evidence have changed, the evidentiary principles have evolved as well, to incorporate the new and changing technologies. In the mid-19th century, photographs were introduced as evidence for the first time, using the then-novel technology of photography, in a case involving a dispute over the boundaries of a land grant. See *United States v. Fossat,* 25 F.Cas. 1157, 1159 (C.C.N.D.Cal.), *rev'd on other grounds*, 61 U.S. 413 (1858) (the photographs were pictures of the land).

As technology advanced outside the courtroom, so did the visual demonstrative evidence presented inside the courtroom. Maps, charts, documents, graphs, blow-ups, and videotapes were all later introduced as demonstrative aids. In the 1970s, with the invention of the modern computer, animations and simulations were introduced into the courtroom and, like other forms of demonstrative evidence that had come before them, including photography, were initially controversial.

The foundation for the current use and admissibility of computer generated evidence is found, at least partially, in *Perma Research & Development v. Singer Co.,* 542 F.2d 111 (2d Cir. 1976). Perma assigned Singer a patent for perfecting, manufacturing, and marketing an antiskid braking device for automobiles. Perma claimed that Singer breached its contractual obligation to use its best efforts to perfect the device. Singer countered that the device was not perfectible. The court allowed Perma to use a computer program simulation to illustrate and complement its expert testimony that the device was perfectible, resulting in an award of nearly seven million dollars for Perma.

In 1988, CGE gained further legitimacy, when a computer simulation was admitted into substantive evidence, in *Connors v. United States*, No. 657, CA-4-87-060-K (N.D.Tex.). Airline attorneys argued that the Federal Aviation Administration and the National Weather Service were responsible for the crash of Delta flight 191, for failing to warn the aircraft crew of a dangerous thunderstorm. The Department of Justice, representing the FAA and the NWS, used a computer generated simulation of the crash to support its defense that the crew had as much or more information than was available on the ground and should not have flown into the storm. See Krieger, "Now Showing at a Courtroom Near You," 87 *Amer.Bar Assn. J.*, Dec. 1992, at 92 (the case is unreported due to settlement). Since *Connors*, CGE has continued to be admitted into evidence both demonstratively and substantively. However, the evidentiary requirements for the admissibility of substantive demonstrative evidence are more stringent than those for pure demonstrative evidence, because, as indicated earlier, pure demonstrative evidence has no probative value beyond the testimony it illustrates and is not generally allowed to be viewed by the jury during its deliberations.

In general, judges look upon demonstrative evidence with favor because it helps the jury to quickly and concisely understand the issues raised at trial.

Admissibility of Pure Demonstrative Evidence

Pure demonstrative evidence is generally made for use at trial and is merely illustrative, visually portraying other relevant, admitted evidence to clarify, explain, or make the other evidence more understandable. Thus, pure demonstrative evidence is not traditionally admissible, because it has no probative value, in and of itself.

However, most courts today do allow admission of pure demonstrative evidence, including computer generated demonstrative evidence, if certain requirements have been met. In general, demonstrative evidence is admissible if the item fairly and accurately explains or illustrates relevant testimony, is of potential assistance to the trier of fact, and any deficiencies are made known to the fact finder. See *McCormick on Evidence* §212 (1972); see also, *United States v. Williams*, 657 F.2d 199, 203 (8th Cir. 1981). That is, pure demonstrative evidence may be admitted, within the trial court's discretion, if it relates to other relevant, competent, and material testimonial, documentary or real evidence, fairly and accurately reflects the other evidence to which it relates, and it aids the trier of fact in understanding or evaluating the other related evidence.

Computer generated pure demonstrative evidence generally requires no additional evidentiary hurdles, because it is no different from traditional, non-computerized demonstrative evidence, such as charts, graphs, and diagrams. Computer generated animations, such as the animation of the hair dryer patent schematic in the first hypothetical, generally fall under the category of pure demonstrative evidence, because they merely combine illustrations to produce an image of motion when sequentially placed. "We view them [animations] as a mechanized version of what a human animator does when he or she draws each frame of activity, based upon information supplied by experts, then fans through the frames, making the characters drawn appear to be moving." *People v. Hood*, 53 Cal.App.4th 965, 969, 62 Cal.Rptr.2d 137, 140 (1997). In the patent schematic hypothetical, the color and animation of the patent schematic merely illustrate and clarify the underlying substantive evidence of the patent schematic.

Some courts, however, when admitting animations and other computerized pure demonstrative evidence, also require a cautionary instruction to be given to the jury, informing it that the animation is only a recreation of the proponent's version of the event, should not be deemed an actual recreation of the event, and may be accepted or rejected in whole or in part. See *Hinkle v. City of Clarksburg*, 81 F.3d 416, 425 (4th Cir. 1996). This additional instruction, as one commentator interestingly notes, appears to be a double standard, applicable to CGE only. For example, judges do not find such limiting instructions necessary for other situations that might similarly affect an unsophisticated jury. Jurors are not warned to be wary of a slick-talking, charismatic lawyer

as compared to an inarticulate, boring one, nor are they warned not to be swayed by the fact that one lawyer uses large, professionally printed, and clear demonstrative exhibits, while opposing counsel uses illegible handwritten notes on butcher block paper. See Galves, "Where the Not-So-Wild Things Are: Computers in the Courtroom, the Federal Rules of Evidence, and the Need for Institutional Reform and More Judicial Acceptance," 13 *Harv.J.Law & Tech*. 161 (Winter 2000).

Admissibility of Substantive Demonstrative Evidence

Substantive demonstrative evidence may be used to prove a fact at issue in the trial and is therefore admissible as evidence. Attorneys may use substantive demonstrative evidence during closing, and the jury may use it during deliberations. Substantive evidence, including computer generated substantive evidence, must add new facts to the case and have independent probative value. Moreover, it must meet four main federal evidence requirements.

First, the CGE must be properly authenticated under Rule 901 of the Federal Rules of Evidence. That is, there must be a sufficient showing that "the matter in question is what its proponent claims." Rule 901(b)(9) further provides that the offering party must produce evidence describing the process or system used to produce the CGE and "showing that the process or system produces an accurate result." This authentication typically requires a showing that (1) the computer equipment is accepted in the field as standard and competent and was in good working order, (2) qualified computer operators were employed, (3) proper procedures were followed in connection with the input and output of information, (4) a reliable software program was utilized, (5) the equipment was programmed and operated correctly, and (6) the exhibit to be admitted is properly identified as the output in question. See Mueller & Kirkpatrick, *Evidence* §9.1, at 1123 (1995).

Second, the substantive CGE must be relevant. Under Rules 401 and 402 of the Federal Rules of Evidence, the proponent of the evidence must show that the evidence has "any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence." In other words, the offered evidence or CGE must tend to prove something that legally matters in the case.

Third, the substantive CGE must pass the balancing test found in Rule 403. Even relevant evidence may be excluded if the party opposing the admission of the evidence proves that "the danger of unfair prejudice, confusion of the issues, or misleading the jury" substantially outweighs the exhibit's probative value. See Additional Issues: Prejudice, *infra*. Some courts will use limiting instructions to counteract the potential to confuse, mislead, or prejudice the jury. Limiting instructions provide guidance to the jury regarding the specific purpose for which they may use the particular demonstrative evidence. In *Gonzalez v. Digital Equipment Corp.*, 8 F.Supp.2d 194 (E.D.N.Y. 1998), the court allowed videotapes produced by keyboard manufacturers other than the defendant into evidence, with a limiting instruction that the jury was to analyze these videos only with regard to determining the state of mind of keyboard producers in the industry. *Id.* at 197–98.

Fourth, if the substantive demonstrative evidence relates to expert testimony, then the underlying experts themselves must be qualified to testify under Rules 702 to 705. CGE created from inadmissible expert opinions will not be admissible, no matter how well authenticated or relevant.

Computer generated simulations, such as the automobile accident simulation described in the second hypothetical, are generally considered substantive evidence and will be admissible into evidence only if they add new facts to the case, have independent probative value, and meet the requisite evidentiary hurdles. This is because computer simulations are based on mathematical models and generally involve the input and manipulation of data, in addition to mere computer illustrations such as those found in purely demonstrative animations. In a computer simulation, the computer essentially becomes a witness, by not only illustrating the evidence but also presenting it.

Dealing with *Daubert*

Scientific evidence must cross additional barriers before it may be admitted. The traditional standard for admissibility of scientific evidence is whether the scientific community has "generally accepted" the evidence at issue. See *Frye v. United States*, 293 F.1013 (D.C.Cir. 1923). In 1975, the Federal Rules of Evidence were drafted, causing courts and commentators to disagree as to whether the *Frye* standard had been supplanted.

In 1993, the United States Supreme Court clarified the standard, in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993). *Daubert* outlined four non-exhaustive factors for "gatekeeping" trial courts to consider when determining whether scientific evidence is admissible. After determining that the evidence, based on scientific knowledge, will assist the trier of fact to understand the case or determine a fact in issue, the court must analyze: (1) whether the evidence can be (and has) been tested; (2) whether the theory or technique has been submitted for peer review; (3) whether the technique has a known or potential rate of error; and (4) whether the theory or technique has been generally accepted within the relevant scientific community. Six years later, in *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999), the Supreme Court expanded the four *Daubert* factors to the admissibility of technical and other specialized knowledge.

Although CGE is based on computer science, such fact itself is not usually an adequate reason to require compliance with *Daubert* considerations. This is especially true in the case of pure demonstrative CGE, such as animation. If the CGE is an animation created to illustrate a witness's testimony, the "computer science" involved is not relevant. The science in the animation is not proof of anything germane to the case and the witness's testimony does not rely on that science. Therefore, *Daubert* factors are generally inapplicable.

Substantive demonstrative evidence such as scientific computer simulations or recreations, on the other hand, must satisfy *Daubert* twice. First, the expert behind the data put into the computer must be qualified in a relevant field within *Daubert*. Second, the computer program that creates the CGE also must meet the requirements of *Daubert*. This second *Daubert* test becomes easier to meet each year, as computers and CGE are used more frequently and computer programs become more relied upon and generally accepted. Computer simulations or recreations of today can easily be tested, have been subject to peer review and publication for over 20 years, have a known potential rate of error, and are an accepted technology.

Additional Issues

Court's Control of Evidence

Rule 611 of the Federal Rules of Evidence em-

powers the trial judge with sole discretion to regulate the mode and order of the interrogation of witnesses and presentation of evidence. "The court shall exercise reasonable control over the mode and order of interrogating witnesses and presenting evidence so as to (1) make the . . . presentation effective for the ascertainment of the truth, [and] (2) avoid needless consumption of time. . . ." Therefore, the trial judge has broad discretion to regulate the timing, length, and even substance of pure and substantive CGE presentations; practitioners must be aware of this authority.

Pretrial Disclosure

Demonstrative evidence should be revealed to the opposing counsel, with adequate time for objections, before it is displayed to a jury. *ABA Civil Trial Practice Standards*, 15 (a). Rule 26 of the Federal Rules of Civil Procedure also requires pretrial disclosure of all exhibits, including demonstrations. Clear and convincing CGE requires the expenditure of vast amounts of time, energy, and money. After such a large investment, the exclusion of the evidence because of lack of timely pretrial disclosure is not only disastrous, but unnecessary. In fact, a skilled lawyer will consider the issue of the admissibility of planned CGEs, simulations, or reenactments before spending the time and money creating the CGE.

Hearsay

Evidence Rule 801(c) defines hearsay as "a statement, other than one made by the declarant while testifying at the trial or hearing, offered in evidence to prove the truth of the matter asserted." Pure demonstrative computer evidence is not hearsay because it is not an out-of-court statement offered for the truth of the matter asserted. Instead, it is offered to illustrate or clarify the testimony, document, or other real evidence.

Substantive demonstrative evidence may technically be hearsay. However, it is usually admissible under the Rule 807 residual catch-all exception, which allows hearsay having equivalent circumstantial guarantees of trustworthiness to be admitted into evidence, if (1) the statement is offered as evidence of a material fact, (2) the statement is more probative on the point for which it is offered than any other evidence, and (3) the interests of justice and general purpose of the Federal Rules of Evidence will be served by admission of the statement into evidence. Importantly, this exception to the hearsay rule only applies if the proponent makes the alleged hearsay statement known to the adverse party sufficiently in advance of trial and the adverse party has an opportunity to object.

Another possibility for circumvention around the rule against hearsay is found in Rule 703, which allows an expert to base an opinion on inadmissible hearsay facts or data. However, the hearsay must be "of a type reasonably relied upon by experts in the particular field in forming opinions or inferences upon the subject." Again, prior to the expenditure of resources on CGE, all hearsay objections should be heard well in advance of trial.

Attorneys should be wary of spending an inordinate amount of time and money on computer generated evidence, especially where the case is not complex and the issues are not beyond the experience of an ordinary juror.

Prejudice

Seeing is believing. Because of this adage, opponents of computer evidence have protested that the use of CGE is unduly prejudicial, resulting in verdicts based on emotion rather than objective fact. That is, opponents argue that since the use of CGE carries with it such a strong presumption of infallibility and excessive persuasion that CGE should be excluded under Rule 403 of the Federal Rules of Evidence.

In *Salvatore v. ValuJet* (unreported because of settlement), the defendant airline company was persuaded to settle after a CGE animation was allowed to demonstrate the terror of the three-and-a-half minutes it took for the plane to crash, by animating the documented flight path of the plane with the cockpit voice recording. Clearly, the impact of this animation must have been extreme.

Generally, however, the fears of undue prejudice have not been substantiated. In fact, a 1999 study revealed that computer generated evidence may not influence juries at all. Bennett, Leibman & Fetter, "Seeing is Believing; Or Is It? An Empirical Study of Computer Simulations as Evidence," 34 *Wake Forest L.Rev.* 257 (1999). In this study, a presentation of a computer simulation of an automobile accident reconstruction, coupled with oral testimony, had no additional persuasive effect as compared with the oral testimony alone. Both the apportionment of fault and the damages awarded by the mock juries were equal, regardless of whether the jury viewed the CGE.

Therefore, perhaps the persuasive ability of CGE has been vastly overestimated. If so, attorneys should again be wary of spending an inordinate amount of time and money on computer generated evidence, especially where the case is not complex and the issues are not beyond the experience of an ordinary juror. In less complex cases, regular oral testimony may do the trick without the need for CGE. In fact, some practitioners have warned not to use CGE unless absolutely necessary, advising that CGE sometimes backfires, seen by the jury as a lawyer-created "hired gun," automatically viewed with a wary, skeptical eye.

Practical Considerations

Computer generated evidence, whether pure demonstrative or substantive, may be extremely helpful and persuasive to clearly and succinctly present one's case, if practical considerations are appropriately taken into account.

Prior to using CGE, make sure that the projection is well-planned, so that the jury and the judge can easily see and hear the demonstration. Take care to dim the lights and amplify the sound, if necessary. Keep graphics simple and easily understandable, without insulting the jury's intelligence. Do not bore or numb the jury by overusing demonstrative evidence. Instead, use CGE as an emphasis on the particular facts or evidence that you want to highlight.

Finally, practice, practice, practice. There is nothing worse than spending time, energy, and money on CGE, which, because of technical problems, cannot be shown on the day of trial. If you know that you are not technologically skilled, have an assistant available who can quickly fix any difficulties that may arise.

As much as some attorneys may try to resist change, and technology in particular, CGE is the way of the future. By understanding how to use CGE to one's advantage, the attorney practitioner may become a more successful and well-rounded lawyer along the way. FD