TECHNOLOGY IN THE COURTROOM:

AN EXAMINATION OF THE EFFECTS OF COMPUTER ANIMATION

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Computer animation technology is becoming increasingly common in courtrooms around the country, and has been used in cases ranging from plane crashes and car accidents to medical malpractice and murder. Because of the relatively new status of computer-generated evidence, there are few codified rules for introducing it in court. Although some judges have admitted animations as demonstrative evidence, others have ruled them inadmissible, fearing the displays would unfairly bias the jury.

The confusion surrounding the admissibility of computer-generated evidence means that the jury is not guaranteed to see an animated display, even if one has been created for the trial. Despite this uncertainty, many lawyers are willing to devote significant resources to developing an exhibit that may not be seen by the jury, in the belief that animated displays are far more persuasive than either traditional forms of evidence or verbal descriptions of the same information. The expense of including an animated display is often justified by common knowledge and bolstered by anecdotal evidence; the law review literature is full of clichés such as "a picture is worth a thousand words" (Kelly, 1995; Powell, 1996; Sherman, 1992; Turbak, 1994) and "seeing is believing" (Bennett, Leibman, & Fetter, 1999; Borelli, 1996; Plowman, 1996).

Another common assumption underlying the popularity of computer-animated displays in court arises from attorneys' beliefs that a society so heavily reliant on television is predisposed to believe visual media. Many attorneys believe jurors who have been raised in a era with television as the dominant media form are more likely to believe something presented on television than something merely spoken by a witness (Berkoff, 1994; Ellenbogen, 1993; Fulcher, 1996; Kousoubris, 1995; Selbak, 1994).

Although there has been little research directly addressing the influence of computer-animated displays on juror decision making, many of the intuitions about computer animation upon which attorneys rely are grounded in other, more general psychological concepts. For example, computer animations are thought to be persuasive because they present information in a vivid, attention-getting manner. This assumption is well-grounded in the psychological theory known as the vividness effect, which states that information has a greater impact on social judgments when it is vivid than when it is pallid (Bell & Loftus, 1985; Bell & Loftus, 1988; Bell & Loftus, 1989; Reyes, Thompson, & Bower, 1980; Shedler & Manis, 1986). Lawyers are familiar with the vividness effect, and rely on visual aids to illustrate their oral arguments. The research examining the persuasive effect of demonstrative evidence such as photographs and videotapes (Douglas, Lyon, & Ogloff, 1997; Kassin & Garfield, 1991) lends credence to lawyers' contentions that jurors will be influenced by computer-animated displays, suggesting that the more vivid the courtroom presentation, the more persuasive the jurors will find it.

As computer animation becomes more popular, researchers have begun to study it more directly, with mixed results. In one of the first experimental tests of computer animation, researchers showed that the technology can both clarify the physical evidence and bias verdicts in the direction of the animation (Kassin & Dunn, 1997). A later study, however, found that animations had no effect on damage awards or on the percentage of fault assigned to the plaintiff and defendants in a car accident trial (Bennett, Leibman, & Fetter, 1999).

In light of the mixed findings of previous studies, the effects of computer animation on jurors' verdicts were further explored in this program of research. Two mock jury experiments (one involving a plane crash case and one involving a car accident case) assessed the possible effects of computer-animated displays in the courtroom by comparing animation to diagrams. These studies represent the first attempt to identify the mechanisms underlying the persuasiveness of computer animations. Whereas Kassin and Dunn (1997) and Bennett et al. (1999) identified whether animations are persuasive to jurors, the current research seeks to explain why animations are persuasive.

We predicted that computer animations would be more persuasive than diagrams, and that participants would be more likely to render a verdict in favor of the side presenting the animation. Additionally, we expected that computer animation would increase the ease with which participants were able to visualize the scene. Finally, we addressed the assumption that animations are effective because people believe what they see on television: if jurors are persuaded by animations because they are accustomed to getting information from television, participants who believe more of the purportedly factual information they see on television would be most likely to be influenced by the animations.

Study One: Plane Crash

One hundred ten undergraduate students (48 men, 62 women) served as voluntary participants in this study. Each participant was randomly assigned to one of the four cells created by the 2 (plaintiff animation, plaintiff diagram) x 2 (defendant animation, defendant diagram) factorial design: plaintiff animation/defendant animation; plaintiff animation/defendant diagram; plaintiff diagram/defendant animation; plaintiff diagram/defendant diagram. All participants watched a 35 minute trial simulation of a plane crash trial, which included opening statements, summaries of witness testimony, closing arguments, and judge's instructions. At the conclusion of the trial simulation, all participants completed a questionnaire assessing their reactions to the trial and to the visual elements included in the trial.

The stimulus trial was based on an actual plane crash case, in which a pilot was killed when his single-engine plane crashed in the woods. Inserted at the end of the witness testimony was the crucial independent variable: either a computer-animated display depicting the sequence of the crash, or three diagrams adapted from the original trial materials. The animated sequences inserted in the trial summary were provided by Engineering Animation, Incorporated, a company that specializes in creating computer displays for use in litigation.

Results

Across all conditions, 61% of participants rendered a verdict in favor of the defendant and 39% of participants rendered a verdict in favor of the plaintiff, indicating that the trial was slightly skewed in favor of the defendant. An examination of verdicts by condition, presented in Figure 1, revealed strong support for the persuasiveness of

animated displays □□□ (3) = 13.23, p < .01). Specifically, the plaintiff animation increased verdicts for the plaintiff. When both the plaintiff and the defendant presented diagrams, 32% of participants voted in favor of the plaintiff. When the plaintiff presented an animation, however, that number increased significantly; 68% of participants voted for the plaintiff when they saw the plaintiff present an animation and the defendant present a diagram □□□(1) = 7.14, p < .01).

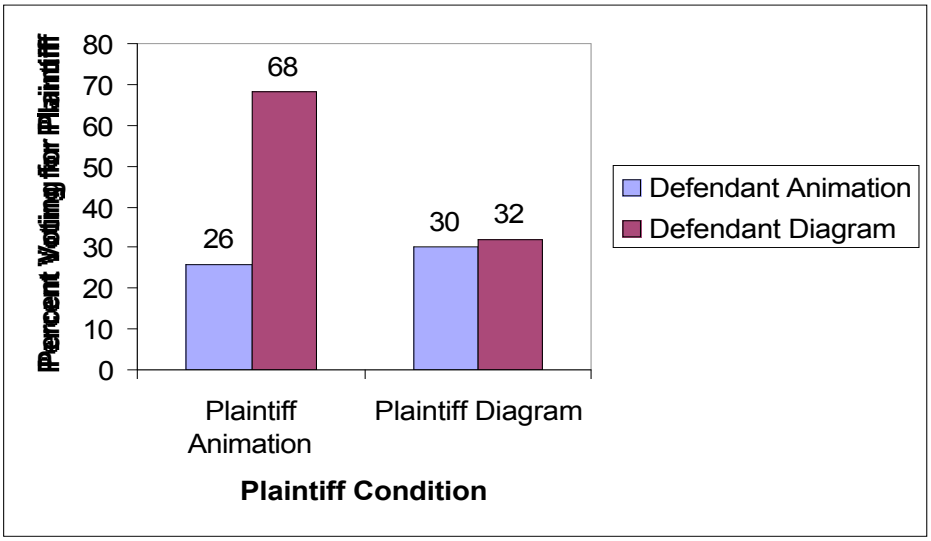

Figure 1.
Percentage of participants who rendered a verdict in favor of the plaintiff, by condition.

To obtain a more sensitive measure of verdicts, a continuous verdict-confidence variable was created by combining participant's verdicts with their confidence ratings. Positive confidence values were assigned to verdicts for the plaintiff, and negative values were assigned to verdicts for the defendant, resulting in a scale ranging from –10 (maximum confidence in a verdict for the defendant) to +10 (maximum confidence in a verdict for the plaintiff). Participants, in general, were more confident that the defendant's argument was correct when the defendant presented an animated display (M = -3.41) than when the defendant presented the diagrams (M = -0.48), F (1, 106) = 5.54, p < .05. More importantly, there was also a significant interaction between plaintiff condition and defendant condition, F (1, 106) = 4.29, p < .05, indicating that the plaintiff condition influenced verdicts when the defendant presented a diagram but not when the defendant presented an animation (See Figure 2).

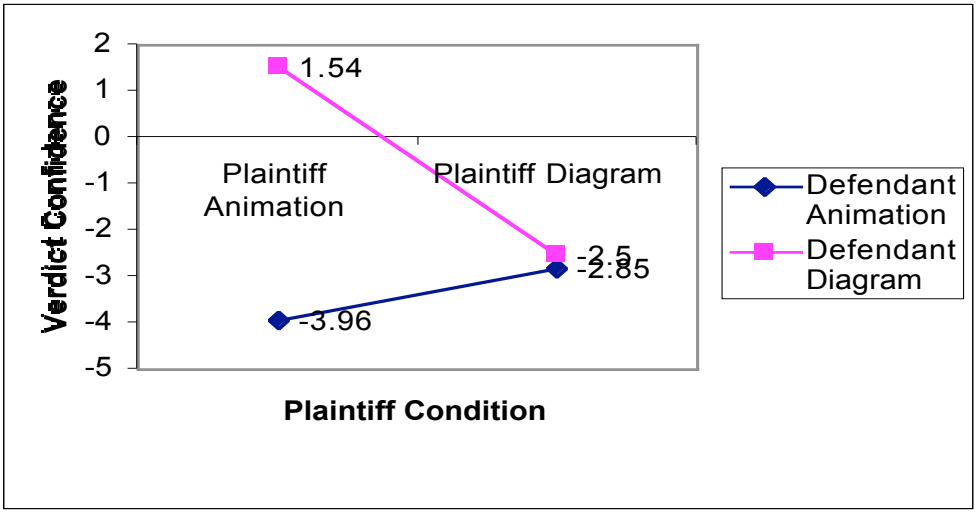

Figure 2.
Confidence in verdicts, by condition, with positive values representing confidence in plaintiff verdicts and negative values representing confidence in defendant verdicts.

Additionally, the animations increased the ease with which participants were able to visualize the version of the case presented. Participants who saw the defendant present an animated reconstruction of the crash found it significantly easier to visualize the defendant's version of the crash (M = 5.44) than did participants who saw the defendant present diagrams (M = 4.20), $F(1, 106) = 18.45$, $p < .0001$. Similarly, the plaintiff's version of the case was easier to visualize when the plaintiff presented an animation (M = 5.37) than when the plaintiff presented diagrams (M = 4.04), $F(1,106) = 21.58$, $p < .0001$.

Participants who saw the plaintiff's animated display rated it as significantly more important to their verdict than participants who saw the plaintiff's diagrams rated the diagrams (M = 4.33 for plaintiff animation and M = 2.80 for plaintiff diagram, $t(108) = 4.98$, $p < .001$). The same was true for the defendant's visual displays: participants who saw the defendant's animated display rated it as significantly more important to their verdict (M = 4.55) than participants who saw the defendant's diagrams rated the diagram (M = 3.69), $t(108) = 2.40$, $p < .02$. Unexpectedly, the animations were not seen as the most important contributor to verdict. Instead, participants rated the testimony of expert witnesses as more important than animations, and reported that, as compared to other evidence, the animations did not distinctly contribute to verdicts.

The extent to which participants believed media presentations did not moderate the effects of the animations. A logistic regression revealed that media credibility had no effect on verdicts □□□= -0.092, Wald □□ = 0.086, p = .78), and an analysis of covariance on verdict confidence revealed that including media credibility as a covariate did not alter either the original plaintiff condition by defendant condition interaction, or the main effect for defendant condition.

Discussion

The results of Study 1 demonstrate that animation can influence verdicts. In a case skewed in favor of the defendant, the majority of participants rendered verdicts in favor of the defendant. This trend was reversed when the plaintiff's case was supplemented with an animated reconstruction of the plane crash. When the defendant countered with an animation of his own, however, verdicts shifted back in favor of the defendant. Thus, plaintiff condition influenced verdicts when the defendant presented a diagram, but not when the defendant presented an animation, probably because the case was already skewed in that direction. This pattern was mirrored in the analysis of participants' confidence in their verdicts: participants were most confident in a verdict for the plaintiff when they saw the plaintiff animation and the defendant diagram.

Increasing the ease with which participants were able to visualize the entire sequence appears to be a primary factor behind the persuasiveness of animations. Participants found the plaintiff's version of the crash easier to visualize when it was accompanied by an animation than when it was accompanied by diagrams, and found the defendant's version of the crash easier to visualize when the defendant presented an animation.

When asked to rate the importance of various aspects of the trial, participants indicated that the animations were significantly more important to their verdicts than were the diagrams. Interestingly, although verdict preferences reflected the influence of the animations, participants found the animations less important to their verdicts than key items of evidence. It appears that participants were unaware of the effects of the animation on their judgments about the case.

Study Two: Car Accident

To determine whether the persuasive effects of computer animation generalized to a different situation, a second experiment was conducted. In addition to presenting a different scenario, Experiment 2 also presented more familiar subject matter. Instead of the plane crash trial shown in Experiment 1, participants in Experiment 2 were shown a car accident trial, similar to that seen by participants in the Bennett et al. (1999) study. The purpose of Experiment 2 was to test whether animations are less useful and persuasive in trial with more familiar subject matter.

Seventy-six introductory psychology students (39 male, 37 female) participated in this study. Participants were randomly assigned to one of four cells produced by the 2 (plaintiff animation, plaintiff diagram) x 2 (defendant animation, defendant diagram) factorial design. With the exception of the specific trial presented, the procedure in Study 2 was identical to that used in Study 1: participants watched one of four videotaped trial simulations, and completed a questionnaire similar to that completed by participants in the first study.

The stimulus trial was based on an actual case in which a car turning left across two lanes of traffic was struck by an oncoming semi truck. Engineering Animation,

Incorporated again provided the animated sequences, which depicted the accident sequence from a variety of angles and speeds. The diagrams used in the control conditions showed the positions of the vehicles before and after the collision.

Results

Analysis of the primary measures of persuasion revealed that the computer-animated displays did not affect jurors' evaluations of the case. Collapsing across all conditions, 63% of participants rendered a verdict in favor of the defendant, and 37% rendered a verdict in favor of the plaintiff, indicating that the evidence in the case was skewed in favor of the defendant. A chi-square analysis of verdict by the four conditions indicated that animation did not significantly affect verdicts, $\chi^2(3) = .66$, $p < .80$. Participants were more likely to render a verdict in favor of the defendant, regardless of whether they saw an animated display or the diagrams.

A continuous verdict-confidence variable was again created by combining participants' verdicts with their confidence ratings. A 2 (plaintiff condition) x 2 (defendant condition) ANOVA on this verdict-confidence scale revealed no significant effects for animation. Again, participants were confident in their verdicts for the defendant in all four conditions.

As in Study 1, the animations affected the ease with which participants were able to visualize aspects of the case, although to a lesser extent. Participants found it easier to visualize the plaintiff's version of the accident when the plaintiff presented an animated display ($M = 5.80$) than when the plaintiff presented diagrams of the scene ($M = 5.06$), $F(1, 72) = 4.84$, $p < .05$.

Although the animations did not influence verdicts, participants indicated that the displays were more important to their verdicts than were the diagrams. Specifically, participants who saw the plaintiff's animated display rated it as significantly more important to their verdict than participants who saw the plaintiff's diagrams rated those diagrams ($M = 5.28$ for plaintiff animation; $M = 3.94$ for plaintiff diagram, $t(74) = 3.33$, $p < .001$). The same was true for the defendant's visual displays: participants who saw the defendant's animated display rated it as significantly more important to their verdict ($M = 4.97$) than participants who saw the defendant's diagrams rated those diagrams ($M = 3.68$), $t(74) = 3.17$, $p < .005$.

Additionally, and contrary to Study 1, the animations were rated among the most important factors to participants' verdicts, and were seen as more important than the testimony of key witnesses, despite having no apparent effects on verdicts.

As in Study 1, the extent to which participants believed media reports had no effect on whether they were influenced by the computer animation. A logistic regression revealed that media credibility had no effect on verdicts ($= 0.151$, Wald $\chi^2 = 0.159$, n.s.). Additionally, chi-square analyses of verdict for both low and high media credibility participants revealed no significant effect of animation on verdicts for either high media credibility participants, $\chi^2(3) = 0.87$, n.s., or for low media credibility participants, $\chi^2(3) = 4.05$, n.s.

Discussion

The results of Study 2 replicated those of Bennett et al. (1999); the animated reconstructions of the car accident had no direct effect on mock jurors' judgments of the case. Analyses of participants' verdicts and their confidence in those verdicts indicated that the animations were not any more persuasive than the diagrams of the accident scene. Unlike participants in Study 1, participants who viewed animated reconstructions of the accident were not more likely to render a verdict in favor of the side presenting the animation. Instead, participants were more likely to vote in favor of the defendant, and to be confident in that verdict, regardless of whether they saw the animation or the diagrams.

However, although animations did not directly influence verdicts, participants indicated that the animations were important to their verdicts. Because the verdicts did not reflect this pattern, it may be that participants recognized the persuasive power of the animations, but then corrected for their influence, resulting in verdicts that appear unaffected by the animations.

General Discussion

The differences between the effects of the animation in Experiment 1 and Experiment 2 indicate that the effects of animation vary depending on the type of trial. Animation influenced verdicts in the plane crash trial (Experiment 1), but not in the car accident trial (Experiment 2). One explanation for the differing results across the two studies is the familiarity of the situation (see Mayer and Sims, 1994). If the animation depicts a scenario with which participants are familiar, it may not have any effect on decision-making. If, however, the animation depicts an unfamiliar scenario, it can persuade jurors to render a verdict in favor of the side presenting the display. Participants may have been so familiar with the concept of a car accident that the animation used in Study 2 was superfluous, whereas participants in presented with the less familiar plane crash may have used the animation to help them visualize the scenario. In the absence of any pre-existing knowledge, participants in Study 1 were persuaded by the animation.

Because this explanation arose after both studies were completed, no direct measure of familiarity was included in the questionnaire. However, the ease with which participants were able to visualize each of the scenarios provides an indirect measure of familiarity, and supports this theory. Collapsing across all conditions, participants found the car accident easier to visualize than the plane crash, arguably because it was a more familiar scenario.

The findings from these two experiments suggest that one mechanism underlying the persuasiveness of animation may be its ability to increase the ease with which mock jurors are able to visualize the overall scenario described by the attorneys. Participants found it easier to visualize an attorney's version of the event when that version was presented in an animation. The increased ability to visualize the scenario in turn led to verdicts in favor of the plaintiff when the plaintiff presented the animation.

Not only did the animations influence verdicts in only one trial scenario, but there was a discrepancy between the effect mock jurors expected the animations to have on their verdicts, and the effect the animations actually did have on their verdicts. Verdicts in Study 1 were influenced by the animation, yet participants indicated that the displays were not the most important factor in their verdicts. Participants in Study 2, on the other hand, ranked the animation as the item most important to their verdict, although the verdicts did not reflect that importance. This type of discrepancy between what is influential and what people perceive to be influential is strongly grounded in traditional social psychology. Nisbett and Wilson's (1977) finding that people are not consistently aware of their own cognitive processes can be applied to evaluations of computer animation: mock jurors are not able to assess accurately the effect animation will have on their judgments.

In both experiments, the extent to which participants believed media presentations did not moderate the effect of the animations. Contrary to our original hypothesis, mock jurors who were classified as high media credibility participants were no more likely to be affected by the animations than were participants who reported they believed little of what they saw in the media. Several possible explanations for this result are possible. First, there may have been a ceiling effect, such that the college students who served as mock jurors were so immersed in the television culture that even participants who indicated they were less likely to believe media presentations did, in fact, believe most of what they saw on television. Second, the items used to measure media credibility may have been inappropriate. Participants may not be able to assess accurately their own beliefs about the credibility of the media, and a more implicit measure may be necessary in future research. Third, the experimental design may have masked the effects of media credibility. If participants are more likely to believe what they see on television, the presentation of the entire trial on a television screen may have concealed any persuasive effects of the animation. Finally, it may be that jurors in a trial situation recognize the underlying motives of the attorneys' presentations, and view the displays with a more critical eye than they view television and other media reports. Further research is necessary to determine the extent to which a potential juror's belief in what he or she sees on television accurately predicts his or her response to a computer-animated display, and to identify any individual differences that may determine whether a juror is predisposed to be persuaded by animations.

The findings of these two studies could prove highly useful to attorney who want to evaluate the impact of computer-generated animations in trial. Attorneys who seek to dazzle the jury with an animated reconstruction of an event may wish to save their money if the event is one with which most jurors are familiar. In that situation, the animations would be superfluous.

Additionally, attorneys may need to re-evaluate jurors' responses to animation. If attorneys believe jurors are susceptible to the persuasive powers of animations, they may be dissuaded from taking a case to trial when the opposition has an animated reconstruction, believing nothing he or she can say will be more persuasive than the opponent's visual depiction.

Finally, attorneys should be aware that jurors may not be able to accurately assess the extent to which animations influence their judgments. In both studies,

participants misjudged the importance of the animations to their verdicts: overestimating their impact in the car accident case, and underestimating their impact in the plane crash case. Because the effectiveness of animations is often measured by polling jurors about whether the animation influenced their decision (e.g., Bennett et al., 1999), attorneys who base their decision to use animation on these exit surveys should recognize they may not be receiving an accurate representation of the effects of animation.

The present research has demonstrated that computer animations can be persuasive to jurors in certain situations, and that animations may influence verdicts even when jurors are unaware of that influence. Further research is necessary to broaden our understanding of the influence of computer animations on juror decision-making. As the use of computer-animated displays becomes increasingly popular in the courtroom, an understanding of how the technology affects the findings of the jury will allow us valuable insight into the potential uses and abuses of animations in the trial setting.

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