The Jury Persuaded (and Not): Computer Animation in the Courtroom

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In two experiments, we examined the persuasiveness of computer animation on juror decision making by comparing animation to diagrams in two mock trials— a plane crash case and a car accident case. The persuasiveness of the animation on verdicts was dependent on the case; in the plane crash case, participants rendered verdicts in favor of the side presenting the animation. In the car accident case, the animation had no effect on verdicts. The role of familiarity with the depicted scenario is discussed as a possible explanation for the differing impact of animation. Additionally, jurors' expectations about the persuasiveness of animations were discrepant with the animations' actual influence on jurors' verdicts.

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. Attorneys use animated displays to bolster their arguments in court because they believe such displays are more persuasive than traditional diagrams and photographs.

To produce an animation sequence, graphic designers create three-dimensional computer models of the objects that are to be depicted. These objects are then set in motion through the use of computer-generated algorithms that determine the precise location and the relative path of each object at specific moments in time (Ellenbogen 1993). The result is a cartoon-like recreation of the scene that can be transferred to videotape or laser disc for presentation in the courtroom.

Animations are most often offered in court as demonstrative evidence, similar to charts or diagrams (Fielder 2004; Federal Judicial Center (FJC) & National Institute for Trial Advocacy (NITA) 2001), and are meant to illustrate a witness's testimony or aid the jury in understanding testimony. To be admissible in these circumstances, the animation must meet certain foundational requirements; the accuracy of the animation and the information used to create it must be established (Kemper 2003), and the animation's probative value must be shown to outweigh any possible prejudicial effects. Animations are ripe with the potential for objections from opposing attorneys, most of which concern the choices made by the animators such as the point of view portrayed and the speed at which the animation runs (FJC & NITA 2001).

Trial judges evaluate both the animations and the objections to them before deciding whether they meet admissibility standards; as a result, the jury is not guaranteed to see an animation, even if one has been created for trial (Fielder 2004). 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 animations are far more persuasive than either traditional forms of demonstrative evidence or verbal descriptions of the same information. The expense of including an animation is thought to be justified by common knowledge and bolstered by anecdotal evidence. Attorneys believe that a society so heavily reliant on television is predisposed to believe visual media, and the law review literature is full of clichés such as "a picture is worth a thousand words" (Fiedler 2004; Kelly 1995; Powell 1996; Simmons & Lounsbery 1994; Turbak 1994) and "seeing is believing" (Bennett, Leibman & Fetter 1999; Bulkeley 1992; Ellenbogen 1993; Powell 1996; 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 basic psychological theory. The assumption that animations are persuasive because they present information in a vivid, attention-getting manner has its roots in the vividness effect, the idea that information has a greater impact on social judgment when it is highly imaginable than when it is pallid (Bell & Loftus 1985, 1988, 1989; Nisbett & Ross 1980; Reyes, Thompson & Bower 1980; Shedler & Manis 1986; Taylor & Thompson 1982). Visual aids are more persuasive to jurors than verbal descriptions of that same evidence, regardless of whether the visual aid is a photograph (Douglas, Lyon & Ogloff 1997), a videotape (Kassin & Garfield 1991), or the actual object itself (Wasserman & Robinson 1980). Lawyers are familiar with this phenomenon, and often rely on visual aids to illustrate their oral arguments. The research examining the persuasiveness of demonstrative evidence such as photographs and videotapes 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 it is to jurors.

One reason vivid presentations have an impact on social judgments is because they help individuals visualize the scenario described. In the classic vividness studies (Bell & Loftus 1985, 1988, 1989), the vivid descriptions presented to participants provided information that made it easier to imagine the scene. Thus, animations may be persuasive courtroom tools because they help jurors visualize what is being described by witnesses.

The study of narratives also offers clues as to why jurors may be persuaded by computer-animated displays. In order to make sense of the events described in the trial, jurors construct a narrative story to fit the evidence presented (Pennington & Hastie 1986). Jurors order and incorporate the unorganized trial presentation into a narrative story that allows for better comprehension, and match that story with the verdict alternatives provided in the judge's instructions to arrive at a final verdict.

Pennington and Hastie's (1986, 1988) research indicates that computer-animated displays may impact jurors' cognitive organization of the evidence presented at trial. Without the aid of computer animation, jurors are forced to organize the various strands of evidence into a coherent, plausible narrative. The introduction of computer animation alters that process, removing the juror's effortful contribution. When an attorney introduces a computer-animated display, the jury is provided with a ready-made narrative account of the event in question. Because jurors are no longer required to construct their own narratives when confronted with computer animation, they may be unusually willing to accept the scenario depicted by the animated display, especially when the scenario is an unfamiliar one.

Another popular justification for the inclusion of computer-animated displays is the belief that jurors are willing to believe what they see on television. Although some of this confidence in the persuasive power of visual media can be attributed to the vividness effect, the remainder may be explained by American attitudes toward the news media. Many attorneys believe that jurors who have been raised in an era with television as the dominant media form are more likely to be persuaded by something presented on television than merely spoken by a witness (Berkoff 1994; Borelli 1996; Filter & Johnson 1997; Fulcher 1996; Murphy 1990; Selbak 1994). Trial lawyers profit from jurors' reliance on visual media when arguing cases—the more a trial presentation incorporates familiar media forms, the more persuasive it is likely to be. Because animations are similar to television presentations (or at least more similar than oral testimony), jurors may endow them with greater credibility.

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, the technology both clarified the physical evidence and biased verdicts in the direction of the animation (Kassin & Dunn 1997). Participants who saw neutral animated depictions of an event were more likely to render a verdict consistent with verbal descriptions of the physical evidence. When those neutral animations were replaced by animations

depicting partisan theories of the event, however, participants increasingly made judgments in accordance with the animations and contrary to the physical evidence. Taken together, these results indicate that computer animation can have a powerful persuasive effect on mock jurors, to the extent that jurors ignore physical evidence in favor of the theory presented in an animated sequence.

Not all empirical evidence, however, supports the theory that computer animation is highly persuasive to jurors. A later study 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 are further explored in this research program. 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 animations to more traditional diagrams. These studies represent the first attempt to identify the mechanisms underlying the persuasiveness of computer animations. Whereas Kassin and Dunn (1997) and Bennett, Leibman, and Fetter (1999) investigated whether animations are persuasive to jurors, we also seek 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 by presenting the material in a vivid manner, computer animation would increase the ease with which participants were able to visualize the scene and that animations would be persuasive because they enable mock jurors to more easily visualize the scenario described. Lastly, we attempted to address 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.

I. EXPERIMENT 1

A. METHOD[1]

One hundred and ten Yale College students (48 male, 63 female; mean age = 18.8 years) fully participated in this experiment; all participants were jury eligible. Participants were randomly assigned to one of four cells produced by the 2 (plaintiff animation, plaintiff diagram) × 2 (defendant animation, defendant diagram) factorial design.

Participants watched a forty-minute videotaped simulation of a civil trial resulting from a plane crash on individual color television monitors, and listened to the dialogue through headphones. At the conclusion of the tape, all participants completed a questionnaire.

The videotaped trial was based on an actual case in which a pilot was killed when his single-engine plane crashed in the woods. During the crash, the electronic locator transmitter (ELT) designed to alert authorities to the location of the crash and to dispatch a search and rescue team malfunctioned. As a result, although he was not seriously injured in the crash itself, the pilot died of exposure waiting to be rescued. His widow sued the designer and manufacturer of the mechanism. The plaintiff argued that flaws in the latching mechanism designed to hold the ELT in place caused the ELT to malfunction in precisely the type of crash for which it was intended, and ultimately led to the death of the pilot. The defendant countered with the argument that no ELT could have survived such a severe crash, regardless of the number or placement of latching mechanisms.

Plaintiff and defense lawyers presented opening statements, summaries of witness testimony, and closing arguments. The presentation concluded with instructions from the judge on the applicable law, the standard of proof, and the elements of negligence.

Inserted at the end of the witness testimony was the crucial independent variable: either a computer-animated display of the crash or diagrams showing the position of the ELT relative to the wreckage. The inclusion of the animation or diagram by the plaintiff or defendant was varied factorially, and resulted in four videotaped versions of the trial: plaintiff animation/ defendant animation; plaintiff animation/defendant diagram; plaintiff diagram/ defendant animation; or plaintiff diagram/defendant diagram.

Each side's animation lasted two minutes, and showed the crash in both real time and in slow motion. The animated sequences were accompanied by attorney voiceovers, describing the scene of the crash, the position of the wreckage, and location of the ELT. The final animation segment for both the plaintiff and the defendant illustrated the opposing arguments, with the plaintiff's segment emphasizing design flaws and the defendant's emphasizing the severity of the crash.

The diagrams used in the control conditions were adapted from the original trial materials. As with the animations, the plaintiff's diagrams emphasized the design flaws and the defendant's diagrams emphasized the severity of the crash.

B. RESULTS

1. *Manipulation Check*

To ensure that participants found the animations more vivid than the diagrams, they were asked to rate the vividness of the plaintiff's and defendant's
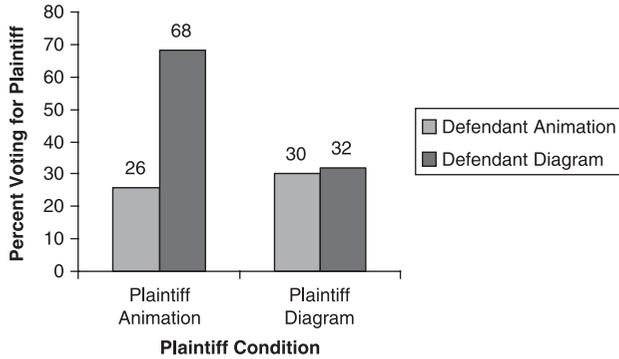
Figure 1. Percentage of participants in Experiment 1 who rendered a verdict in favor of the plaintiff.

visual displays; analysis confirmed that the manipulation was successful. Participants found the plaintiff animation ($M = 4.99$) more vivid than the plaintiff diagrams ($M = 3.46$), $F(1,106) = 29.40$, $p < 0.0001$. They also found the defendant animation ($M = 4.52$) more vivid than the defendant diagrams ($M = 3.66$), $F(1,106) = 8.65$, $p < 0.005$.

2. *Measures of Persuasion*

All participants individually completed a questionnaire in which they were asked to render a verdict in favor of the plaintiff or defendant, and to indicate their confidence in that verdict. Across all conditions, 61 percent of participants rendered a verdict in favor of the defendant and 39 percent of participants rendered a verdict in favor of the plaintiff, indicating that the trial was slightly skewed in favor of the defendant.[2] An examination of verdicts by condition, presented in Figure 1, revealed strong support for the persuasiveness of animations $\chi^2(3) = 13.23$, $p < 0.01$. Specifically, the plaintiff animation increased verdicts for the plaintiff. When both the plaintiff and the defendant presented diagrams, 32 percent of participants voted in favor of the plaintiff. When the plaintiff presented an animation, however, that number increased significantly; 68 percent of participants voted for the plaintiff when they saw the plaintiff present an animation and the defendant present a diagram $\chi^2(1) = 7.14$, $p < 0.01$.[3]

The defendant animation, however, did not significantly increase the number of verdicts for the defendant, most likely because the trial facts were already skewed in the defendant's favor. Of the participants who saw the defendant present an animation and the plaintiff present a diagram, 70 percent voted for the defendant, compared to 68 percent who saw both the plaintiff and defendant present a diagram, which is not a significant difference $\chi^2(1) = 0.04$, n.s.[4]

Table 1. Means and Standard Deviations for Ease of Visualization in Experiment 1.

Variable	Plaintiff animation		Plaintiff diagram	
	Def. animation	Def. diagram	Def. animation	Def. diagram
Defendant version	5.41 (0.29)	4.00 (0.29)	5.48 (0.29)	4.39 (0.29)
Plaintiff version	5.00 (0.29)	5.75 (0.29)	3.26 (0.29)	4.88 (0.29)
Crash sequence	4.54 (0.31)	5.14 (0.30)	4.63 (0.31)	4.61 (0.30)
ELT position	5.56 (0.30)	5.71 (0.29)	4.74 (0.30)	5.79 (0.29)
ELT latch	4.78 (0.64)	5.18 (0.35)	3.37 (0.36)	4.61 (0.35)
Crash severity	3.07 (0.28)	3.64 (0.28)	3.96 (0.28)	2.89 (0.28)

To obtain a more sensitive measure of verdicts, a continuous variable was created by combining participants' verdicts with their confidence ratings.[5] Analysis of this variable indicated that participants were more confident that the defendant's argument was correct when the defendant presented an animation ($M = -3.41$) than when the defendant presented the diagrams ($M = -0.48$), $F(1,106) = 5.54$, $p < 0.05$. More importantly, however, participants expressed the most confidence in plaintiff verdicts when the plaintiff's presentation of an animation was countered by the defendant's presentation of a diagram.[6]

Lastly, participants awarded more money to the plaintiff when the plaintiff's attorney presented a diagram ($M = \$3.2$ million) than when the plaintiff's attorney presented an animation ($M = \$1.9$ million), $F(1,95) = 4.99$, $p < 0.05$. There was no difference in awards whether the defendant presented an animation ($M = \$2.7$ million) or diagrams ($M = \$2.3$ million).

3. *Ease of Visualization*

To test the hypothesis that animations are persuasive because they present an attorney's theory in a vivid, easy-to-visualize narrative package, participants rated on a seven-point scale how easy they found key aspects of the case to visualize, with low scores indicating that the item was difficult to visualize, and high scores indicated the item was easy to visualize. Means and standard deviations for these scales by condition are presented in Table 1. Overall, the animations increased the ease with which participants were able to visualize the version of the case presented. Regardless of whether the plaintiff showed diagrams or an animation, 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 ($M = 4.20$), $F(1,106) = 18.45$, $p < 0.0001$. 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 ($M = 4.04$), $F(1,106) = 21.58$, $p < 0.0001$, regardless of whether the defendant showed diagrams or an animation.

Table 2. Means and Standard Deviations for Self-Reported Importance of Trial Aspects in Experiment 1.

Variable	Plaintiff animation		Plaintiff diagram	
	Def. animation	Def. diagram	Def. animation	Def. diagram
Plaintiff animation	3.93 (0.34)	4.71 (0.33)	—	—
Plaintiff diagram	—	—	2.41 (0.26)	3.18 (0.26)
Defendant animation	4.15 (0.38)	—	4.96 (0.38)	—
Defendant diagram	—	3.68 (0.34)	—	3.71 (0.34)
Pathologist	4.78 (0.32)	5.46 (0.31)	5.67 (0.32)	4.75 (0.31)
Defendant expert	5.33 (0.35)	4.71 (0.35)	5.04 (0.35)	5.36 (0.35)
Flight qualification	4.85 (0.39)	5.00 (0.37)	4.26 (0.38)	4.54 (0.37)
Plaintiff expert	4.48 (0.32)	4.64 (0.32)	4.70 (0.32)	4.43 (0.32)

To determine whether the ease with which participants were able to visualize the plane crash moderated the effect of the animation, an overall ease of visualization variable was created. Chi-square analyses[7] indicated that the animation was slightly more effective for people who found it hard to visualize the plane crash: participants who found the crash difficult to visualize were more persuaded by the animation ($\chi^2(3) = 13.27$, $p < .01$) than participants who found the crash easy to visualize ($\chi^2(3) = 3.87$, n.s.). A logistic regression analysis, on the other hand, revealed that ease of visualization had no effect on verdicts, $\beta = .07$ Wald $\chi^2 = 0.23$, n.s.

4. *Self-Reported Importance of Items of Evidence*

When asked to rate the importance of the visual displays, participants stated that the animations were more important to their verdicts than the diagrams. Participants who saw the plaintiff's animation 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, $t(108) = 4.98$, $p < 0.001$). The same was true for the defendant's visual displays: participants who saw the defendant's animation rated it as significantly more important to their verdict ($M = 4.55$) than participants who saw the defendant's diagrams rated the diagram ($M = 3.69$), $t(108) = 2.40$, $p < 0.02$.

Participants also indicated the importance of certain trial aspects to their final verdicts. Means and standard deviations of these items by condition are presented in Table 2. 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.[8]

We also examined in the effect of the animation on perceptions of argument convincingness and case strength. Participants found the defendant's argument somewhat more convincing when the defendant presented an

animation ($M = 3.50$) than when the defendant presented the diagrams ($M = 3.09$), $F(1,106) = 3.82$, $p < 0.06$. In addition, participants rated the plaintiff's case as somewhat stronger when the defendant presented a diagram ($M = 4.32$) than when the defendant presented an animation ($M = 3.85$), $F(1,106) = 3.73$, $p < 0.06$. The perception of the strength of the plaintiff's case, however, was unaffected by the plaintiff's visual display, $F(1,106) = 0.03$, n.s. In other words, participants believed the defendant's animations made the defendant's case somewhat stronger (although the defendant's animations did not affect verdict preferences), whereas participants did not believe the plaintiff's animation made the plaintiff's case stronger (although the plaintiff's animations did affect verdict preferences). The animations had no effect on participants' ratings of the strength of the defendant's case.

5. *Media Credibility*

Participants indicated on seven-point scales how credible they believed reports presented by six different news sources (newspapers, local and national television news programs, cable news channels, weekly news magazines, radio, and the Internet) to be. An overall measure of media credibility (Cronbach's alpha = 0.80) was created from the means of the six specific media sources ($M = 4.46$), indicating that all of the participants rated the media as relatively credible. Analyses performed in order to determine whether media credibility moderated the effect of computer animation on verdicts revealed that media credibility, whether televised news presentation ($\beta = 0.08$, Wald $\chi^2 = 0.18$, n.s.) or written news presentations ($\beta = 0.16$, Wald $\chi^2 = 0.50$, n.s.) had no effect on verdicts. Additionally, analyses of covariance[9] on verdict confidence revealed that including televised news credibility and written news credibility as covariates did not alter either the original plaintiff condition by defendant condition interaction, or the main effect for defendant condition. Participants who saw the plaintiff present an animation and the defendant present a diagram were more likely to vote in favor of the plaintiff than were participants in other conditions, regardless of how much they tended to believe what they saw in televised news presentations.

C. DISCUSSION

The findings from Experiment 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, as opposed to a diagram of that crash. When the defendant countered with an animation of its 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, a pattern that 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 other key items of evidence. It appears that participants underestimated the effects of the animation on their judgments about the case.

II. EXPERIMENT 2

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, Leibman, and Fetter (1999) study. The purpose of Experiment 2 was to test whether animations are less useful and persuasive in trial with more familiar subject matter. Because the subject matter of the trial was more familiar to participants, we predicted that animations would have less of an influence on verdicts, and that they would not likely increase the ease with which participants were able to visualize the event.

A. METHOD

Seventy-six Yale College students (39 men, 37 women; mean age = 19.0 years) served as voluntary participants in this experiment; all participants were jury eligible. Each participant was randomly assigned to one of the four cells created by the 2 (plaintiff animation, plaintiff diagram) × 2 (defendant animation, defendant diagram) factorial design.

With the exception of the specific trial presented, the procedure in Experiment 2 was identical to that used in Experiment 1. Participants watched one of four 35-minute videotaped trial simulations, and completed a questionnaire similar to that completed by participants in the first experiment.

The videotaped 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. The driver of the car, Thomas Jackson, was killed in the accident, and his

widow sued the company employing the driver of the truck. According to Mrs. Jackson, who had been in the passenger seat at the time of the accident, her husband had come to a complete stop before pulling out of the parking lot. As Mr. Jackson pulled out of the lot, the defendant's semi broadsided the Jackson car. The plaintiff argued that the defendant's semi had been speeding when it struck the car, and that Mr. Jackson would have safely completed the turn if the defendant had been driving at or below the speed limit. In contrast, the defendant argued that the truck driver had been traveling at the legal speed limit just prior to the accident and therefore was not at fault for the collision. To support this claim, both the driver and a witness in an oncoming car testified that Mr. Jackson did not stop before exiting the parking lot.

As in Experiment 1, either animated sequences or diagrams were edited into the trials at the end of the witness testimony. The animated sequences for both plaintiff and defendant were made up of three segments, each depicting the accident from a different perspective. The final segment illustrated the opposing arguments; in the plaintiff's version, Mr. Jackson's car stopped before exiting, whereas in the defendant's version, Mr. Jackson exited the parking lot without stopping.

The diagrams were black-and-white drawings depicting an overhead view of the scene. Each side presented two diagrams; the first depicting the position of the vehicles as Mr. Jackson began the left turn, and the second depicting the position of the vehicles at the time of the collision.

B. RESULTS

1. *Manipulation Check*

As in Experiment 1, participants felt the animations were significantly more vivid than the diagrams. Participants rated the plaintiff's animation ($M = 5.57$) as more vivid than the plaintiff's diagrams ($M = 3.53$), $F(1, 54) = 32.12$, $p < 0.0001$. Similarly, the defendant's animations ($M = 5.31$) were more vivid than the defendant's diagrams ($M = 3.64$), $F(1, 54) = 21.15$, $p < 0.0001$.

2. *Measures of Persuasion*

Analysis of the primary measures of persuasion revealed that the computer animations did not affect jurors' evaluations of the case. Collapsing across all conditions, 63 percent of participants rendered a verdict in favor of the defendant, and 37 percent rendered a verdict in favor of the plaintiff, indicating that the evidence in the case was slightly skewed in favor of the defendant.[10] A chi-square analysis of verdict by the four conditions indicated that animation did not significantly affect verdicts, $\chi^2(3) = 0.66$, n.s.[11] Participants were more likely to render a verdict in favor of the defendant, regardless of whether they saw an animation or the diagrams.

Table 3. Means and Standard Deviations for Ease of Visualization in Experiment 2.

Variable	Plaintiff animation		Plaintiff diagram	
	Def. animation	Def. diagram	Def. animation	Def. diagram
Plaintiff version	5.28 (0.34)	6.32 (0.33)	4.55 (0.32)	5.58 (0.33)
Defendant version	5.28 (0.38)	5.37 (0.37)	5.55 (0.36)	5.10 (0.37)
Car exiting lot	5.33 (0.34)	5.89 (0.33)	6.16 (0.33)	5.74 (0.33)
Trucker's wave	4.83 (0.43)	5.37 (0.42)	4.55 (0.41)	5.39 (0.43)
Collision	5.67 (0.35)	5.95 (0.34)	5.75 (0.33)	5.89 (0.34)
Eyewitness view	3.89 (0.43)	4.63 (0.41)	4.05 (0.40)	3.74 (0.41)
Overall layout	5.17 (0.33)	5.89 (0.32)	5.10 (0.32)	5.79 (0.32)

As in Experiment 1, a continuous variable of verdict confidence was created, and analysis of this variable revealed no significant effects for animation. Again, participants were confident in their verdicts for the defendant in all four conditions ($M = -2.22$ for plaintiff animation/defendant animation; $M = -2.33$ for plaintiff animation/defendant diagram; $M = -2.65$ for plaintiff diagram/defendant animation; $M = -0.95$ for plaintiff diagram/defendant diagram). Compensation for the plaintiff also showed no effect of animation.

3. *Ease of Visualization*

As in Experiment 1, the animations affected the ease with which participants were able to visualize aspects of the case, although to a lesser extent. Means by condition are reported in Table 3. The plaintiff's animation made it easier for participants to visualize the plaintiff's version of the accident ($M = 5.80$ for plaintiff animation and $M = 5.06$ for plaintiff diagram, $F(1, 72) = 4.84$, $p < 0.05$), but the defendant's animation had no impact on participants' ability to visualize the defendant's version of the accident ($M = 5.43$ for defendant animation and $M = 5.24$ for defendant diagram, $F(1, 72) = 0.22$, n.s.). Additionally, participants who found the accident difficult to visualize were not any more likely to be affected by the animation ($\chi^2(3) = 2.02$, n.s.) than participants who found the accident easy to visualize ($\chi^2(3) = 0.40$, n.s.).[12]

4. *Self-Reported Importance*

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 animation 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, $t(74) = 3.33$, $p < 0.001$). The same was true

Table 4. Means and Standard Deviations for Self-Reported Importance of Trial Aspects in Experiment 2.

	Plaintiff animation		Plaintiff diagram	
Variable	Def. animation	Def. diagram	Def. animation	Def. diagram
Plaintiff animation	4.83 (0.36)	5.71 (0.35)	—	—
Plaintiff diagram	—	—	3.65 (0.43)	4.26 (0.44)
Defendant animation	5.00 (0.38)	—	4.95 (0.36)	—
Defendant diagram	—	3.58 (0.46)	—	3.79 (0.46)
Plaintiff expert	4.78 (0.35)	5.32 (0.34)	4.80 (0.33)	4.94 (0.35)
Defendant expert	4.56 (0.38)	4.74 (0.37)	4.50 (0.36)	5.11 (0.37)
Defendant's record	4.28 (0.41)	4.21 (0.40)	3.65 (0.39)	4.90 (0.40)
Eyewitness	4.67 (0.42)	3.79 (0.41)	3.40 (0.39)	3.32 (0.41)
Trucker's wave	3.61 (0.44)	3.17 (0.44)	3.85 (0.41)	3.58 (0.42)
Plaintiff's record	3.11 (0.42)	3.42 (0.41)	2.65 (0.39)	2.95 (0.41)

for the defendant's visual displays: participants who saw the defendant's animation rated it as significantly more important to their verdict ($M = 4.97$) than participants who saw the defendant's diagrams rated those diagrams ($M = 3.68$), $t(74) = 3.17$, $p < 0.005$.

Additionally, and contrary to the findings in Experiment 1, the animations were rated among the most important factors to participants' verdicts, and were perceived to be as important as the testimony of key witnesses, despite having no apparent effect on verdicts.[13] Means and standard deviations for these variables are presented in Table 4.

5. *Media Credibility*

As in Experiment 1, an overall measure of media credibility was created from the mean of the six specific media sources, and statistical analyses of it showed that media credibility had no effects on verdicts and verdict confidence. That is, it had no effect on whether participants were influenced by the computer-animated display.

6. *Comparison of Results Across Both Cases*

A comparison between Experiment 1 and Experiment 2 helped narrow the possible explanations for the differing results. Although it is difficult to compare the effects of anything across different types of cases without introducing confounds, we tried to keep several key factors as constant as possible across both cases. First, perceptions of argument convincingness, attorney credibility, and case strength were similar across the two experiments, making it unlikely that these variables were responsible for the differences.[14]

The strength of each party's case was also similar across both studies. These findings reduce the chance that the different effects of animations on verdicts were a result of the trial-specific details of case strength and argument convincingness. Additionally, a comparison of damage awards between the two cases suggested that participants viewed the seriousness of the plaintiff's loss to be equal in both cases.[15]

Second, a comparison between the ease with which participants in Experiment 1 were able visualize the plane crash and the ease with which participants in Experiment 2 were able to visualize the car accident suggested that car accidents are easier to visualize than plane crashes. Collapsing across all conditions, both the plaintiff's version of the car accident ($M = 5.42$) and the defendant's version of the car accident ($M = 5.33$) were easier to visualize than the plaintiff's version of the plane crash ($M = 4.72$) and the defendant's version of the plane crash ($M = 4.81$); $t(184) = 2.82$, $p < 0.01$ for plaintiff's version and $t(184) = 2.15$, $p < 0.05$ for defendant's version. When coupled with the findings that animation influenced verdicts in the plane crash case but not the car accident case, this comparison suggests that the ease with which participants are able to visualize a particular scenario may exert some influence on the effectiveness of the animations.

C. DISCUSSION

The results of Experiment 2 replicated those of Bennett, Leibman, and Fetter (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 Experiment 1, participants who viewed animated reconstructions of the car 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 potential persuasive power of the animation, but then corrected for its influence, resulting in verdicts that appear unaffected by the animations.

The apparent ineffectiveness of the animations on verdicts may be a result of the type of case in which the animations were embedded. As in Bennett, Leibman, and Fetter (1999), mock jurors in Experiment 2 were asked to render a verdict in a trial involving a car accident, a situation with which most of the college-age participants are quite familiar. This familiarity may have rendered the animated sequences superfluous and counteracted their persuasive effect.

III. 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). As already noted, one explanation for the differing results across the two studies is the familiarity of the situation. 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.

Mayer and Sims (1994) demonstrated that participants without prior knowledge of a system were better able to understand a presentation when an animation simultaneously accompanied the narrative explanation. Participants with prior knowledge about the system, however, performed equally well when the animation was presented concurrently with the narrative and when it was presented successively. These findings closely parallel the results of the current studies. For the participants in our studies (and likely for those in the Bennett, Leibman & Fetter 1999, studies), driving a car, with its attendant risks, is a common occurrence. Like the participants with prior knowledge in the Mayer and Sims (1994) work, they may have been able to visualize the car accident in Experiment 2 as it was described verbally, and therefore not need the animation to understand what had occurred.

When presented with a plane crash trial, however, participants performed more like the participants without prior knowledge in the Mayer and Sims (1994) work. They used the animation, with its concurrent narration, to visualize an unfamiliar situation. In the absence of any pre-existing knowledge about plane crashes, participants were persuaded by the animated reconstruction.

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.

An alternate explanation for the differing results between the two experiments may lie in the information conveyed by the animated sequences. The animation in the car accident study (Experiment 2), depicted arguable "facts" (i.e., did the plaintiff's car stop before pulling out of the parking lot), whereas the animation in the plane crash study (Experiment 1) depicted more accepted information (i.e., the location of the ELT). The plane crash animation, therefore, may not have struck the participants as biasing, but rather, as providing more information. It is possible that participants who saw the animation of the car accident recognized that the animation could have been meant to bias them, and therefore discounted it when rendering a verdict, resulting in verdicts that were not affected by the animations.

Although this explanation is plausible, it seems unlikely that participants who were aware of the potentially biasing effects of the car accident animation would have indicated that the animations were important to their verdicts, as participants in Experiment 2 did. Instead, they should have discounted the animations entirely, and rated them as less important to their verdicts than other pieces of evidence.

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 Experiment 1 were influenced by the animation, yet participants indicated that the displays were not the most important factor in their verdicts. Participants in Experiment 2, on the other hand, ranked the animation as among the items most important to their verdict, although the verdicts did not reflect that importance. This type of discrepancy between what is influential and what people believe to be influential is not unusual in the social psychology literature. 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.

Contrary to our original hypothesis, the extent to which participants believed media presentations did not moderate the effect of the animations in either study. 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. This explanation is supported by high media-credibility scores across the board. Second, 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. Lastly, 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 present research is limited in a few important respects. First, it is possible that simplifying the presentation of facts increased the salience of the animations relative to oral testimony. Although research suggests that

abbreviated trials sometimes produce exaggerated effects (Bray & Kerr 1982), it seems unlikely that the two-minute animation segment, embedded in a forty-minute trial, was more salient than it would have been in an actual courtroom.

The lack of deliberation by participants presents another potential threat to external validity. Because we assessed the judgments of individual jurors who did not deliberate before rendering a verdict, it is possible that the deliberation process would produce different results, eliminating the persuasive effect of animations. However, this concern is offset by research demonstrating that not only do jurors initiate deliberations with their minds largely made up (Kalven & Zeisel 1966), but also that individual voting preferences are accurate predictors of final jury verdicts (Tanford & Penrod 1986).

Cross-examination of witnesses, an important aspect of real trials, was not included in either of the mock trial scenarios. Although this decision made the trial scenarios more artificial, it reduced the number of variables in the experiments and allowed for a more tightly controlled experimental design.

Lastly, as in many social psychological experiments, college students were used as participants. Although all participants in both experiments were jury-eligible, the average jury does not consist of college students and it is possible that a more representative sample of participants would have been affected differently by the animations. College students, for example, may be more familiar with computer technology than the general population; that familiarity may have made them more likely to interpret the animations with a skeptical eye, or, conversely, may have made them more likely to accept the animations as fact. Further research should be done using a more diverse pool of participants to simulate more accurately an actual jury.

Many of the external validity limitations mentioned above are shared with other psychological studies of courtroom procedures. However, an experiment in which all external validity concerns are addressed may be so large that it reduces the study's power to detect any effects at all (Bray & Kerr 1982). As a result, some sacrifices must be made. Once an effect has been obtained in preliminary experiments, it may fall to later studies to address some of the more pressing external validity concerns.

These studies represent another step in the investigation of the influence of computer animations on jurors. By demonstrating that animation can have a significant impact on juror decision making under certain circumstances, and by replicating the findings of Kassin and Dunn (1997), these studies open the door for further research. Identification of relevant individual differences may allow us to pinpoint the characteristics that predispose jurors to be persuaded by animation. Exploration of the role of familiarity on animation may allow us to predict better the types of cases that will benefit from animation. Future studies should manipulate participants' familiarity with the animated scenario to determine more accurately whether jurors' prior knowledge about a system influences the effectiveness of computer animation.

These results, as well as those of future studies, have important and obvious real-world applications. Understanding that the ease with which jurors are able to visualize an event can effect the persuasiveness of an animation may help lawyers decide on trial strategies, such as which events or concepts would be best to feature in an animation, or whether to include an animation at all. The same knowledge may also guide the *voir dire* process, if an animation is to be used, by leading lawyers to select jurors not already familiar with the subject matter.

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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NOTES

1. A more detailed description of the method and results of both Experiment 1 and Experiment 2 can be found in Dunn (2000).
2. Pre-testing of the trial did not reveal this bias; twelve participants voted for the plaintiff and twelve voted for the defendant. Pre-test participants appeared similar to actual participants; all were Yale undergraduate students, and were evenly divided between men and women.
3. These findings were confirmed by a logistic regression analysis, showing that the plaintiff's animation did influence verdicts, $\beta = 1.49$, Wald $\chi^2 = 6.82$, $p < 0.01$. Logistic regression is a statistical technique used to account for the unique properties of a dichotomous dependent variable. It enables one to engage in significance testing and estimate the strength of an effect (Howell 1997).
4. Again, this finding was confirmed in the logistic regression analysis, $\beta = 0.12$, $\chi^2 = 0.04$, n.s.
5. Positive confidence values were assigned to verdicts in favor of the plaintiff, and negative confidence values were assigned to verdicts in favor of the defendant. This procedure resulted in a scale ranging from -10 (maximum confidence in a verdict for the defendant) to $+10$ (maximum confidence in a verdict for the plaintiff).

6. $M = 1.54$, p < 0.05 via Newman-Keuls test, as compared to $M = -3.96$ when both sides presented animations; $M = -2.50$ when both sides presented diagrams; and $M = -2.85$ when the plaintiff presented diagrams and the defendant presented an animation. The plaintiff condition (i.e., animation or diagram) influenced verdicts when the defendant presented a diagram but not when the defendant presented an animation ($F(1,106) = 4.29$, $p < 0.05$).

7. The chi-square analysis is a statistical technique used to determine whether two groups differ significantly from each other. It is used with categorical variables that are not scaled or scored (Rosnow & Rosenthal 1993).

8. Specifically, the testimony of both the pathologist and the defendant's expert were rated as more important to participants' verdicts than either the plaintiff's animation ($t(54) = 2.57$, $p < 0.01$ for pathologist; $t(54) = 2.09$, $p < 0.05$ for defendant's expert) or the defendant's animation ($t(53) = 2.24$; $p < 0.05$ for pathologist; $t(53) = 2.16$), $p < 0.05$ for defendant's expert).

9. Analysis of covariance (ANCOVA) is a statistical technique in which the variance attributed to a covariate (in this case televised news credibility and written news credibility) is partialled out to provide a clearer test of the hypothesis (Howell 1997).

10. As in Experiment 1, the trial was pre-tested to be unbiased; thirteen participants rendered a verdict in favor of the plaintiff and twelve participants rendered a verdict in favor of the defendant. Again, pre-test participants were similar to actual participants.

11. This lack of effect of the animations on verdict was confirmed by logistic regression analysis, $\beta = 0.23$, Wald $\chi^2 = 0.25$, n.s.

12. These findings were confirmed by logistic regression, showing that ease of visualization had no effect on verdicts, $\beta = 0.25$, Wald $\chi^2 = 1.85$, n.s. Additionally, an analysis of covariance on verdict confidence revealed that including ease of visualization did not alter the original F value, $F(4,70) = 0.62$, n.s.

13. Specifically, the animations were rated as important to participants' verdicts as the testimony of the plaintiff's expert ($t(36) = 0.87$, n.s. for plaintiff animation; $t(37) = 0.49$, n.s. for defendant animation) and the testimony of the defendant's expert ($t(36) = 1.98$, n.s. for plaintiff animation; $t(37) = 1.41$, n.s. for defendant animation). However, the animations were seen as more important than eyewitness testimony ($t(36) = 2.54$, $p < 0.01$ for plaintiff animation; $t(37) = 3.03$, $p < 0.01$ for defendant animation), the plaintiff's own testimony ($t(36) = 4.48$), $p < 0.001$ for plaintiff animation; $t(37) = 3.61$, $p < 0.001$ for defendant animation), the defendant's driving record ($t(36) = 2.82$), $p < 0.01$ for plaintiff animation; $t(37) = 2.74$, $p < 0.01$ for defendant animation), and the plaintiff's driving record ($t(36) = 5.89$), $p < 0.001$ for plaintiff animation; $t(37) = 6.68$, $p < 0.001$ for defendant animation).

14. In both cases, participants found the defendant's argument to be slightly more convincing than the plaintiff's argument ($M = 3.29$ for Experiment 1; $M = 3.29$ for Experiment 2, on a five-point scale). Additionally, the plaintiff's attorney was seen as slightly more credible than the defendant's attorney in both cases ($M = 2.84$ for Experiment 1; $M = 2.66$ for Experiment 2, on a five-point scale), $t(184) = 1.29$, n.s. The plaintiff's case in Experiment 1 ($M = 4.09$) was as strong as the plaintiff's case in Experiment 2 ($M = 4.18$), $t(184) = 0.50$, n.s. Likewise, the defendant's case in Experiment 1 ($M = 4.67$) was as strong as the defendant's case in Experiment 2 ($M = 4.66$), $t(184) = 0.08$, n.s.

15. There was no significant difference between the damages awarded to the plaintiff in Experiment 1 ($M = \$2.54$ million) and those awarded to the defendant in Experiment 2 ($M = \$1.98$ million), $t(172) = 1.38$, n.s.

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