

JOURNAL OF INFORMATION SYSTEMS APPLIED RESEARCH

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The New Tech Effect: Analyzing Juror Credibility In Cases Involving Digital Evidence

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Abstract

In recent studies, the "Tech-Effect" theory has replaced the "CSI-Effect" theory as a means to explain the potential impact of technology on jurors. In past studies, proponents of the CSI-Effect (Crime Scene Investigation Effect) proposed that jurors tend to acquit suspects when forensic evidence is not as prevalent as it is in television crime dramas. The newer "Tech-Effect" (Technology Effect) proponents argue that crime dramas do not influence jurors; rather, jurors have heightened expectations for technical and scientific evidence simply because technology is so widespread in society. This study surveyed 131 students in a medium-sized, private university to determine if a Tech-Effect truly exists, and if so, could it influence juror credibility. The survey attempted to answer two questions: 1) Will students in IS/IT degree programs demonstrate greater knowledge of forensic technology in cases involving digital evidence?, and 2) Will students in IS/IT programs demonstrate lower acquittal rates in cases involving digital evidence? The study found that students in IS/IT programs do demonstrate greater knowledge of forensic technology. However, the study failed to reveal a relationship between higher levels of digital forensic knowledge and higher rates of acquittal.

Keywords: Tech-Effect, CSI-Effect, Computer Forensics, Network Forensics, Digital Forensics, Digital Evidence, Information Security

1. INTRODUCTION

The "CSI-Effect" is a term that has been coined by the media to describe the potential impact that CSI (Crime Scene Investigation) –type television shows (i.e., those that depict forensic science as a major part of the fictional investigations) have on jurors in the U.S. criminal justice system. Some authors have argued that jurors who watch television crime shows tend not to convict suspects because procedures and forensic technology observed from the shows were not applied to the case (Heinrick, 2006). However, the actual impact (if any) of the CSI-Effect on the outcome of court trials continues to be a topic of dispute. Many researchers have attributed any noted influence on jurors to a much broader "Tech-Effect." Both the "CSI-Effect" and the more general, "Tech-Effect" are explored in the current research; the CSI-Effect is discussed first.

Many researchers have conducted studies on the CSI-Effect with mixed results. For example, A.P. Thomas surveyed 102 prosecutors and concluded that the prosecutors perceive the CSI-Effect to exist (Thomas, 2006). Of the prosecutors who were surveyed in the study, 38% believed that they had a trial that resulted in an acquittal or "hung" jury (i.e., a jury that is "deadlocked" and cannot reach a verdict) because forensic evidence was not available. The study recognized that is it common (after a verdict has been delivered) for attorneys to survey jurors on how the jurors came to their decision.

In 2008, G. Thomas conducted a study on the CSI-Effect that included 455 law enforcement agencies in North Carolina (Thomas, 2010). Out of the 264 (58% response rate) agencies that responded to the survey, a large majority (74.6%) agreed that CSI-type television shows are changing the way law enforcement collects evidence and conducts investigations. The results of this recent study show that ". . . the law enforcement respondents overwhelmingly claim that their agency has changed their law enforcement practices to overcome a perceived CSI effect" (Thomas, 2010).

While the above studies provide evidence for a CSI-Effect, other studies have found little to no evidence of the CSI-Effect. Schweitzer and Saks, for example, surveyed 48 university students to determine if watching television crime shows

had a marked impact on how a potential juror might decide in a case (Schweitzer & Saks, 2007). In this study, the researchers presented the 48 participants with a courtroom transcript from a hypothetical criminal trial. The simulated trial involved a hair sample that was left at the crime scene by the suspect. The transcript also contained simulated "testimony" typical of a hair identification expert. After reading the transcript, participants were asked how they would decide if they were serving on a jury for the case. The results of the study revealed that there were no statistically significant difference in conviction rates between participants who reported watching television crime shows and participants who did not watch such shows. The study revealed, however, that viewers of such shows did expect more forensic science to be available in court cases: ". . . people who watch such television programs regularly expect better science than what they are often presented with in courts" (Schweitzer & Saks, 2007).

In 2007, Kim, Barak, and Shelton surveyed 1,027 people who had been called for jury duty. Jurors' television viewing habits was compared to expectations that forensic evidence would be introduced during the course of the trial (Kim, Barak & Shelton, 2009). Similar to the Schweitzer and Saks study, this study also found that jurors had increased expectations regarding forensic evidence. Unlike the Scheitzer and Saks study, however, the Kim, et al. study did not find a link between the viewing of television crime shows and heightened expectations regarding forensic evidence.

Recently, the forensic expert, Max Houck, noted that the verdict is still out on the CSI Effect and suggested the need for more conclusive studies on the phenomenon. Houck wondered if there is, in fact, a *quantifiable* influence: "Whether the CSI-Effect truly exists as a quantifiable influence on courtroom behavior is still a subject of debate" (Houck, 2006).

In order to conduct a more conclusive study, the authors of the current research explored the CSI-Effect in a 2010 study (Davis, Paullet, Swan, & Houck, 2010). Like many others in this field, however, the researchers in the 2010 study found indications of a CSI-Effect on the beliefs of participants, but failed to find a correlation between these beliefs and actual courtroom behavior. The lack of conclusive findings led the

authors to explore what some have called the "Tech-Effect." The Tech-Effect dismisses the notion that television crime dramas alone can alter juror expectations. Rather, this newer, more general theory surmises that any potential juror influence arises from the much broader impact of modern scientific and technological advances (Kim, Barak & Shelton, 2009).

The possible effect of modern technology on jurors has prompted the current, follow-up study, which aims to determine if a Tech-Effect truly exists, and if so, whether or not this phenomenon impacts juror credibility in the U.S. Criminal Justice System.

Since the Tech-Effect has numerous definitions and applications in current research, the authors of the current study chose to isolate a previously unexamined aspect of the Tech-Effect, namely, the influence of technology education resulting from instruction in an Information Systems/Information Technology (IS/IT) degree program. Research participants (discussed in Methods and Procedures) included college students enrolled in IS/IT degree programs and in non-IS/IT programs. Statistical tests were performed to identify any significant difference between the experimental group (i.e., IS/IT students) and the control group (i.e., non-IS/IT students).

2. RESEARCH QUESTIONS

The current study attempted to gather and analyze data concerning a specific aspect of the Tech-Effect by asking the following research questions:

1. Do students in IS/IT degree programs demonstrate greater knowledge of forensic technology (than students in non-IS/IT degree programs) in cases regarding digital evidence?
2. Do students in IS/IT programs demonstrate lower acquittal rates (than students in non-IS/IT degree programs) in cases involving digital evidence?

3. RELATED RESEARCH

The Tech-Effect (i.e., Technology Effect) is a generic term with countless definitions and applications. In its broadest sense, the Tech-Effect is the impact which advances in science and technology have on various aspects of

culture. In this sense, the "Tech-Effect" has been used to describe the impact of technological innovations on everything from motion pictures to men's disposable razors (Bittar, 1999).

In terms of academic research, the Tech-Effect has typically been studied to determine its impact on education and student learning. For example, numerous studies have been conducted to determine whether or not investments in classroom technology have a positive impact on traditional K through 12 learning. In a 2000 study, researchers from Morehead University and Iowa State University studied the impact of computerized dissection on middle-school biology classes. The researchers found that students who used computerized dissection software in addition to physical dissection learned significantly more about a frog's anatomy than students who only performed the physical dissection (Akpan & Andre, 2000). A similar, 2001 study compared grade school students who had read CD-ROM storybooks to students who had read traditional hard-bound books. As in the previous study, the 2001 study revealed that the students who had used the technology-enabled CD-ROM books scored significantly higher on examinations regarding reading comprehension (Doty, Poppowell & Byers, 2001).

Studies analyzing the Tech-Effect on the legal system, however, are not as common. The literature regarding the Tech-Effect and the criminal justice system has focused on jurors texting and tweeting during trials. The "Twitter-Effect" or "Google-Mistrials," which involves the use of hand-held computing devices during legal proceedings, has become a serious problem through all levels of the court system (Schwartz, 2009). In a 2010 study, law professor Thaddeus Hoffmeister analyzed juror behavior with portable computing devices and discussed several possible remedies. In an attempt to minimize the use of electronic devices during trials, Hoffmeister's study proposed a draft model of jury instruction (Hoffmeister, 2010). Douglas Keene, president of the American Society of Trial Consultants, identified various categories of jurors who use portable devices during trials. Like Hoffmeister, Keene also made suggestions for instructing jurors and for imposing penalties on defiant jurors (Keene, 2010).

Although they did not set out initially to analyze the Tech-Effect, Baskin and Sommers discussed the Tech-Effect in their follow-up study on the CSI-Effect. When they failed to find statistically-significant evidence of the CSI-Effect in their 2010 study, the authors presented the following explanation:

. . . the general public has had, over the past thirty years, increasing exposure to and experience with such a wide range of scientific and technological advances that they "naturally" expect the trial venue to be similarly affected and, therefore, rely on scientific evidence wherever appropriate (Baskin & Sommers, 2010).

To date, there are no comprehensive or conclusive studies on the Tech-Effect--its existence and whether or not it affects juror credibility. Clearly, more research is warranted to determine whether or not it exists, and, more importantly, whether or not such an effect influences the decisions of jurors in the U.S. criminal justice system.

Judge Donald E. Shelton, along with Gregg Barak and Young Kim (2007) surveyed 1027 people who had been called for jury duty in the Washington Circuit Court in 2006. The survey was administered to potential jurors prior to jury selection. Participants were asked about their television viewing habits of crime related shows and whether or not they believed the programs accurately portrayed the criminal justice system. The study showed that jurors who watch CSI also watched other law related programs. The more frequently the juror viewed a particular crime-related program, the more accurately they perceived the program to be. Forty-six percent (46.3%) of those surveyed expected the prosecution to present more scientific evidence. CSI watchers as a group have higher expectations about scientific evidence than non CSI watchers. The study did not find that watching crime related television shows had a significant impact on whether jurors were likely to acquit a defendant without scientific evidence (Shelton, Kim & Barak, 2007). The researchers concluded that the CSI effect is not to blame; rather, a broader phenomenon, which they called the "Tech Effect," was to blame.

In 2008, Shelton, et al. conducted a comparison study in Wayne County, Michigan which was similar to the 2006 study. This revised study used the above questions with slight

modifications. Questions were modified to reflect changes in television programming and to test whether or not participants believed in the existence of a tech-effect. Additional questions were added to determine the jurors' level of computer usage, cell phones, GPS devices, etc. The results of the new study were merged for a total of 2,246 jurors taking the survey from both counties. Jurors' expectations that the prosecution would present scientific evidence were higher than anticipated. Over 58% of jurors expect to see some type of scientific evidence; 42% expect to see DNA and 56% expect to see fingerprint evidence in every case (Shelton, 2009). In spite of these expectations, both studies found no evidence of the existence of a CSI-Effect.

The data collected from the Wayne County study showed that 87% of jurors had a computer in their home, 92% had cell phones, and over 40% could access the Internet through their phones. The study indicated that the more sophisticated jurors were with their use of technological innovations, the more they expected the prosecution to use scientific evidence to present its case (Shelton, 2009). The researchers concluded from the combined study (Washtenaw County, 2006 and Wayne County, 2009) that jurors generally expect the use of scientific evidence in criminal trials. These expectations result, largely, from what the researchers called the tech-effect, a general awareness of and regular use of technological innovations, with a resulting expectation to see these and other innovations used in the criminal justice system. Shelton et al. believe that the increased juror expectations for scientific/technological evidence are grounded in a mass-mediated tech-effect, which is now ingrained in the criminal justice culture (Shelton, 2009).

4. METHODS AND PROCEDURES

Approach and Sample

This study involved the administration of a survey to 131 undergraduate, graduate, and post-graduate students enrolled in IS/IT-related degree programs and students in non-IS/IT programs. The non-IS/IT programs included Biology, Business, Communications, Journalism, Nursing, Psychology, et al. Students completed an online survey on their own time and submitted anonymous results directly into an electronic database for analysis. The students who participated in the study were attending a

private, Mid-Atlantic University and were eighteen years of age or older. The survey was administered using Vovici Feedback, an online survey tool. The survey link was active from March 26, 2011 through June 30, 2011. The participants included residential and non-residential students.

The survey instrument replicated a similar research survey developed by Campbell (Campbell, 2006) and features of an earlier study by the authors. Anecdotal accounts of the CSI-Effect were represented in the survey by creating additional data collection variables. In addition, Deputy District Attorney Tom Swan, Allegheny County District Attorney's Office and Blase Kraeer, City of Pittsburgh Mobile Crime Unit, assisted in creating crime scenarios based on actual cases from the criminal justice system. Survey questions were then developed from the crime scenarios.

The survey results were analyzed using SPSS (Statistical Package for the Social Sciences) statistical software. A Pearson Chi-Square and Independent Samples T-Test were run to determine whether or not a technology education received in an IS/IT degree program might affect a potential juror's decision in a criminal case. Statistical frequencies were used to determine the difference between participants enrolled in IS/IT-related programs and those not enrolled in IS/IT-related programs.

Survey Instrument

The survey instrument was designed to measure two things: 1) the participants' knowledge regarding forensic evidence, and 2) the participants' tendency to acquit a suspect (i.e., find "not-guilty"). The survey also asked participants to report their area of study in school. The area of study (i.e., degree program) was used to divide the participants into groups for comparison. The two groups consisted of students who were IS/IT majors and those who were Non-IS/IT majors.

The survey instrument consisted of forty-two closed-ended questions in which five of the questions allowed students to type their own response. The first question asked participants if they had ever served as a juror in a criminal court. Questions two through five addressed the participants' television viewing habits, including whether or not the participants had watched fictional television crime shows or non-fictional (i.e., documentary) television crime shows.

Participants were also asked how many hours per week they watched such shows. Questions six through twelve solicited demographic information from the participants, such as age-range, gender, and enrolled degree program. Questions thirteen and fourteen asked whether or not participants owned a mobile computing device (e.g., smart phone, laptop, or tablet PC) and if so, which mobile device. Questions fifteen through twenty-three queried the participants' knowledge of the criminal justice system. In order to answer questions twenty-four through forty-one, participants were instructed to respond as if they had been selected to serve on a jury in a criminal court. Finally, participants were asked to read each crime scenario and respond as if they were sitting on a jury that was assigned to the case. Participants were to use their current knowledge of U.S. law and the U.S. criminal justice system. The final question addressed participants' knowledge of the criminal justice system (i.e., experience, fictional television crime shows, non-fictional documentaries, serving as a juror, giving testimony, or from formal education).

5. RESULTS

Knowledge of Forensic Technology

In order to address the first research question (i.e., will students in IS/IT degree programs demonstrate greater knowledge of forensic technology than students in non-IS/IT degree programs in cases regarding digital evidence?), the survey questions were designed to gauge the participants' knowledge of forensic evidence. In particular, the survey asked the following questions concerning forensic knowledge: 1) If a person is fingerprinted for the military, a job, or security will that person's fingerprint be found in a criminal fingerprint database?, 2) Can a picture or video that is "pixilated" become a perfect photograph or perfect video image?, and 3) Is digital evidence subject to the same evidence laws as blood spatters, shell casings, and fingerprints? The results from the responses to these questions are summarized in APPENDIX A – Tables 1 through 3.

The Pearson Chi-Square was used to determine whether or not statistically significant differences in responses existed between participants enrolled in IS/IT programs and those students not enrolled in IS/IT degree programs. As explained in the METHODS AND PROCEDURES section, non-IS/IT programs represented

included Biology, Business, Communications, Journalism, Nursing, Psychology, et al. Participants completed the online survey on their own time and submitted their anonymous results directly into an electronic database for analysis.

A higher percentage of participants in IS/IT programs answered the finger-printing question correctly, 45%, (i.e., "No" being the correct response) as compared to 29% of non-IS/IT students (Appendix A, Table 1). (If a person is fingerprinted for the military, a job, or security will that person's fingerprint be found in a criminal fingerprint database?) Although a statistically significant difference did not exist, the value approached statistical significance ($\chi^2 = 3.344$, $p = .067$).

The results from the second knowledge question (i.e., Can a picture or video that is "pixilated" become a perfect photograph or perfect video image?), are striking. (Appendix A, Table 2). Among students enrolled in IS/IT programs, 74%, answered the question correctly, compared to Non-IT/IS students, of which 33% answered the question correctly. This difference revealed a strong statistical correlation ($\chi^2 = .20.832$, $p = .000$).

The final knowledge question in the survey concerned whether or not digital evidence is subject to the same evidence laws as blood spatters, shell casings, and fingerprints? Seventy-seven percent of participants enrolled in IS/IT programs answered this question correctly. Seventy-six percent of Non IS/IT participants answered this question correctly. Based on these results the difference between IS/IT and Non-IS/IT was not statistically significant at the .05 threshold ($\chi^2 = 0.23$, $p = .879$). (Appendix A, Table 3)

Impact on Potential Jurors' Decisions

In order to address the second research question (i.e., Will students in IS/IT programs demonstrate lower acquittal rates than students in non IS/IT degree programs in cases involving digital evidence?), the survey asked participants to read and then respond to various crime scenarios. Participants were asked to respond as if they were jurors assigned to the case in question. The survey asked participants to respond to the following two crime scenarios: 1) a drive-by shooting case that hinged on modern surveillance technology, and 2) a murder case that hinged on digital evidence recovered from a

computer and from the Internet. (Tables 4 and 5)

The Independent Samples T-Test was used to determine whether statistically significant differences existed in the responses from the two groups: 1) those enrolled in IS/IT programs and 2) those not enrolled in IS/IT programs. A Likert-like scale was used to solicit participants' responses concerning the guilt or innocence of the suspects in the crime scenarios. The response scale for each crime scenario ranged from a value of 1 ("I am VERY CONFIDENT that the suspect is guilty") to a value of 6 ("I am VERY CONFIDENT that the suspect is Not Guilty").

For the drive-by shooting scenario, participants enrolled in IS/IT programs reported a higher number of "Not Guilty" judgments) than those enrolled in Non IT/IS programs. The mean rate of acquittal among participants who were enrolled in IS/IT programs was 3.19. Alternatively, the mean rate of participants enrolled in Non IS/IT programs was 3.00. No statistically significant differences were identified ($t = -1.027$, $p = .306$). (APPENDIX B, Table 4)

The final crime scenario involved a murder, which was planned using computers and the Internet. As in the previous scenario, participants were asked to weigh the evidence involved and decide whether the suspect is guilty or innocent. As with the drive-by shooting scenario, there was little difference in the rates of acquittal between IS/IT ($\chi = 3.05$) and Non-IS/IT students ($\chi = 3.13$). Consistent with the results from the other crime scenarios, the difference in participant groups regarding the murder scenario were not statistically significant ($t = .455$, $p = .650$). (APPENDIX B, Table 5.)

6. CONCLUSIONS

The present research surveyed undergraduate, graduate and post-graduate students various college degree programs to examine the following questions: 1) Will students in IS/IT degree programs demonstrate greater knowledge of forensic technology (than students in non-IS/IT degree programs) in cases regarding digital evidence? and 2) Will students in IS/IT programs demonstrate lower acquittal rates (than students in non-IS/IT degree programs) in cases involving digital evidence?

For this study, three survey questions were analyzed to gauge the participants' knowledge of forensic evidence. All three of the questions showed that participants in IS/IT degree programs did have greater knowledge of digital forensic evidence. However, only one of the three questions showed a difference between the two participant groups, which was statistically significant. A second question concerning the participants' digital forensic knowledge approached statistical significance. It is not surprising that students in IS/IT programs performed better (than students in non-IS/IT programs) on the knowledge questions, since digital topics would in all likelihood be discussed in their programs of study. The almost negligible difference observed in question #38 (i.e., is digital evidence subject to the same evidence laws as blood spatters, shell casings, and fingerprints?) is also not surprising, since most IS/IT programs only cover a limited amount of digital evidence and other legal topics.

Analysis of the data did reveal some interesting findings regarding digital fingerprint databases. Students were asked "if fingerprints from the associated scenarios were run through a national fingerprint database system, what is the name of the system that would be used?" The correct answer to the question is the "Automated Fingerprint Identification System (AFIS)." Sixty-seven percent of IS/IT students answered the question correctly compared to 56% of Non-IS/IT students who answered the question correctly. Although difference in percentages between the two groups was slight, the result of the follow-up question was surprising. After answering the above question, students were asked what the acronym of the database (from their prior answer) stood for? Fifty-two percent of IS/IT students were able to correctly define the acronym compared to sixteen percent of Non-IS/IT students. This finding further suggests that students in IS/IT programs do indeed demonstrate greater knowledge of forensic technology.

As with past studies, the current study revealed that a "tech effect" may exist and does affect knowledge of digital evidence for a potential juror. Shelton, Barak, and Kim (2007) conducted a study to determine which factors increased jurors' knowledge of and expectations for forensic evidence. The study suggested that the changes in juror knowledge and expectations were indeed the result of a tech-effect. However, as with the current study, the Shelton

et al. study could not establish a relationship between increased juror knowledge (and expectations) and higher rates of acquittal. Clearly, additional research is needed to further explore the CSI-Effect and its potential (if any) effects on the American Criminal Justice System.

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APPENDIX A – CHI-SQUARE TEST RESULTS

Table 1: Chi-Square Test Results

Cross tabulation of Area of Study and "Military/Security in Fingerprint database?"

			X ²	Sig.
	Area of Study			
In Fingerprint Database	IS/IT	Non-IS/IT		
Yes	47 (-1.8)	32 (1.8)	3.344**	.067
No	39 (1.8)	13 (-1.8)		

*Note: ** = $p \leq .05$. Adjusted standardized residuals appear in parentheses below group frequencies.*

Table 2: Chi-Square Test Results

Cross tabulation of Areas of Study and "Pixilated Image Made Perfect?"

			X ²	Sig.
	Areas of Study			
Pixilated Image Made Perfect?	IS/IT	Non IS/IT		
Yes	22 (-4.6)	30 (4.6)	20.832**	.000
No	64 (4.6)	15 (-4.6)		

*Note: ** = $p \leq .05$. Adjusted standardized residuals appear in parentheses below group frequencies.*

Table 3: Chi-Square Test Results

Cross tabulation of Area of Study and "Digital Evidence and the Law?"

	Area of Study		X ²	Sig.
Digital Evidence and the Law?	IS/IT	Non IS/IT		
True	66 (.2)	34 (-.2)	.023**	.879
False	20 (-.2)	11 (.2)		

*Note: ** = $p \leq .05$. Adjusted standardized residuals appear in parentheses below group frequencies.*

APPENDIX B – T-TEST RESULTS

Table 4: Independent Samples T-Test Results

Independent Samples T-Test Results of Drive by Shooting Scenario

	Mean	Std. Dev.	t-test	df	Sig.
<i>Drive by suspect innocent</i> (1 = no confidence; 6 = very confident) – Area of Study = IS/IT	3.19	.964	-1.027**	129	.306
<i>Drive by suspect innocent</i> (1 = no confidence; 6 = very confident) – Area of Study = Non IS/IT	3.00	1.022			

Note: ** = $p \leq .05$.

Table 5: Independent Samples T-Test Results

Independent Samples T-Test Results of the AOL Murder Case

	Mean	Std. Dev.	t-test	df	Sig.
<i>Murderer suspects innocent</i> (1 = no confidence; 6 = very confident) – Area of Study = IS/IT	3.05	1.126	.455**	129	.650
<i>Murderer suspects innocent</i> (1 = no confidence; 6 = very confident) – Area of Study = Non IS/IT	3.13	.842			

Note: ** = $p \leq .05$.