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Creating Blind Photoarrays Using Virtual Human Technology

A Feasibility Test

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This article examined the feasibility of a computer-based program that alleviates the human resource challenge associated with blind photoarrays (photoarrays in which the investigator is blind to the suspect's identity). Students watched videotaped crimes and attempted to identify the perpetrators from photoarays conducted by a "virtual officer" who responds to simple voice commands or by research assistants playing the role of investigators. The student investigators and virtual officer produced comparable identification performance and student reactions to the photoarray procedures. Results of this evaluation study are encouraging, and the authors recommend further laboratory and field testing of the virtual officer technology for conducting blind lineups.

Keywords: *eyewitness identification; lineup; photoarray; virtual reality*

Growing national and international attention to wrongful conviction has led to investigations of the causes and consequences of these miscarriages of justice. For example, investigations conducted by the Innocence Project, an organization started at Cardozo Law School in New York City by Attorney Barry Scheck and colleagues to investigate claims of actual innocence using DNA testing, have now led to exonerations of over 220 citizens convicted of serious felonies (see

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www.innocenceproject.com). An analysis of their first 130 exonerations revealed that mistaken eyewitness identification was a contributing factor in 101 (77%) of those cases (www.innocenceproject.org/understand). This finding is not unique to the Innocence Project cases. In a classic study published more than 75 years ago (Borchard, 1932), Law Professor Edwin Borchard named mistaken eyewitness identification as the leading cause of convictions of the innocent in the 65 cases that he uncovered.

Recognizing the role that mistaken identification plays in conviction of the innocent, many police departments have either begun or completed the process of reforming the procedures by which they obtain eyewitness identifications. This reform movement begun in May of 1998 when U.S. Attorney General Janet Reno assembled a working group of prosecuting attorneys, defense attorneys, police officers, and psychologists with expertise in eyewitness identification and tasked them with creating a set of guidelines for best practices. These guidelines were published in 1999 (*Eyewitness Evidence: A Guide for Law Enforcement*). Around that time, a group of psychologists (including some who participated in the aforementioned working group) authored an influential article describing best practices in identification procedures based on the research (Wells et al., 1998). Since the publication of the U.S. Department of Justice's guide, reform of identification procedures has taken place in the states of New Jersey, North Carolina and Wisconsin, and the cities of Boston and Minneapolis. Other states and police departments around the United States are investigating or planning reforms.

What are these reforms? Although the specific reforms adopted vary somewhat among the sets of guidelines and best practices, they generally involve some combination of (a) the instructions given to the witness, (b) the selection of "fillers" or photos of known innocents for the photoarray, (c) the manner in which the photos are presented to the eyewitness, (d) whether or not the investigator who conducts the photoarray knows which photo is that of the suspect, (e) the assessment of the witness' confidence in his or her identification decision, and (f) the documentation of the identification procedures. For more detailed explanations of the rational and research underlying the recommended practices, see Wells, Memon, and Penrod (2006).

Several of the "best practice" recommendations are not controversial. For example, witnesses should be instructed that the perpetrator might not be in the photoarray and that the witness should not feel obligated to make a positive identification. Indeed, many departments have been instructing witnesses in this manner for years. Guidelines typically recommend that, where practical and sensible, fillers should be selected based on their match to the description of the perpetrator as provided by the witness rather than on their resemblance to the suspect. The witnesses' confidence in the identification decision should be assessed immediately after the identification is made and before the witness is provided with confirming or disconfirming feedback. The investigator should create and preserve a complete and accurate record of the identification procedure and results.

By contrast, several of the recommendations have been controversial. There is considerable, ongoing debate about whether photos should be presented simultaneously, where the suspect's and fillers' photos are presented all at once, or sequentially, where the suspect's and fillers' photos are presented individually (McQuiston-Surrett, Malpass, & Tredoux, 2006; Steblay, Dysart, Fulero, & Lindsay, 2001). More relevant to the current study, there is also debate about the use of a "blind" photoarray—a photoarray in which the investigator conducting the identification procedure does not know which photo in the photoarray is that of the suspect.

The rationale behind use of the blind photoarray is that when the investigator knows which photo is that of the suspect, there is a risk that he or she can inadvertently convey the suspect's identity to the eyewitness and thereby taint the identification procedure. A good identification test is one that allows the investigator to conclude that the witness' identification of the suspect is the product of his or her memory and not the result of inadvertent influence by the investigator who conducted the procedure. By using an investigator who does not know which photo is that of the suspect and by informing the witness that the investigator lacks this knowledge, investigator influence can be ruled out as a cause of the eyewitness identification. Thus, the use of a blind procedures increases both the investigator's confidence in the eyewitness identification and the credibility of the identification process in subsequent decision making (e.g., by prosecuting attorneys) and judicial proceedings. The use of blind photoarrays is not merely a matter of appearance. There is empirical evidence that the use of blind photoarrays can reduce the risk of false identifications (Greathouse & Kovera, 2009; Haw & Fisher, 2004; Phillips, McAuliff, Kovera, & Cutler, 1999; Russano, Dickinson, Greathouse, & Kovera, 2006).

The use of blind testing is curiously absent from the recommendations contained in the aforementioned Department of Justice guide for best practices in identification procedures. Wells et al. (2000) recounted the rationale for excluding blind lineups from the recommendations. The police members of the working group, though quite receptive to the improvements suggested in the course of discussions, had reservations about blind testing. First, they were concerned that their peers would be offended by the recommendation for blind testing because such a recommendation could convey a lack of trust of the investigators. The trust problem can be overcome by noting that it is in the investigator's interest to avoid even the possibility that an identification can be blamed on investigator influence (a routine occurrence in criminal trials) and that blind identification procedures will make identifications less vulnerable to attack by criminal defense lawyers. Of more concern to the current research, the officers further cited practical concerns: Blind testing requires the involvement of another officer, and this requirement puts yet another strain on scarce human resources. Wells et al. (2000) suggested that technology might eventually solve the human resource problem believed to be associated with blind photoarrays.

Will a technological solution solve the human resource challenges associated with blind photoarrays? What would a technological solution look like? Some eyewitness researchers have already developed computer-based photoarray programs, for example, PC Eyewitness (MacLin, Zimmerman, & Malpass, 2005). A commercial firm developed photoarray software that was used in a recently conducted field study of eyewitness identification with the Charlotte-Mecklenburg (North Carolina) Police Department. A photoarray software program can be self-guided. The program can draw on existing databases of photos and can be tailored to provide the witness with specific instructions (through text, audio, or video), present the photos in a predetermined manner and order, and record and preserve the witness' responses (again, in text, audio, or video). A well-constructed program, therefore, has the potential to eliminate the need for a blind investigator. The North Carolina legislature recognized this idea and incorporated it into its 2007 Eyewitness Identification Reform Act. The Act specifies the use of blind identification procedures but allows the use of computer programs in lieu of blind procedures.

Given the growing interest in the reform of identification procedures and the human resource implications of blind photoarrays, it seems inevitable that self-guided computer programs will provide a viable method for securing identifications and bolstering their credibility in court. With this possibility in mind, the current research takes aim at one additional challenge that could affect the viability of computer-based photoarray programs: Eyewitnesses who have little or no experience with standard computers, that is, programs that use a mouse and keyboard for data entry. Computers, keyboards, and mice are becoming ubiquitous in educational settings and in many occupations, and many citizens have no difficulty with operating computers. Yet many eyewitnesses are not educated, not employed in occupations that require computer skills, or not employed at all. For these eyewitnesses, a self-guided computer program that relies on a mouse and keyboard may be unrealistic and may compromise a criminal investigation.

Computer scientists have developed new technologies that enable citizens to interact with computers through voice commands and without the aid of a mouse and keyboard. We assembled a team of computer scientists with expertise in developing "virtual humans" and interactive computer programs and psychologists with expertise on eyewitness memory and photoarrays. Under team guidance, team member Brent Daugherty developed "Officer Garcia," a virtual human program designed to conduct photoarrays in accordance with established guidelines. We report below a laboratory experiment designed to assess the effectiveness of the virtual officer program. Using commonly accepted methods for studying eyewitness identification, we exposed university students to a video of a simulated crime and asked them to identify the perpetrator. We randomly assigned each participant to view a photoarray guided by either the virtual officer or a live officer (with students playing the role of officer). We also randomly assigned each participant to view one of two perpetrators and to view a perpetrator-present or perpetrator-absent photoarrays. Perpetrator-present photoarrays model the scenario in which the suspect is the perpetrator and enable us to examine factors affecting the rate of correct identifications.

Perpetrator-absent photoarrays model the scenario in which the suspect is not the perpetrator (i.e., an innocent suspect) and enable us to examine factors affecting the rate of false identifications. We expected comparable performance among witnesses in the virtual and live officer condition.

Method

Participants

We recruited, as research participants, 259 undergraduate students at a large, metropolitan state university in the Southeast United States. These students were enrolled in an Introduction to Psychology course, were recruited using a Web-based experiment sign-up system, and received course credit for their participation. Participants were predominantly women and of traditional college age. Of the 259, most (180) were women.

Study Design

We used a 2 (investigator: live vs. virtual) × 2 (photoarray: thief-present vs. thief-absent) × 2 (2 versions of the crime) between-subject design. We randomly assigned participants to conditions with the objective of equal cell sizes (we achieved nearly equal cell sizes). We included the Crime Version variable for situation sampling purposes, that is, to ensure that our results were not idiosyncratic to a single crime, perpetrator, and photoarray.

Materials

Crime version. We created two versions of a videotaped theft. Both videotaped crimes were filmed in a faculty office and showed an unguarded purse on a table. In both crimes the thief enters into view, rummages through the purse, looks briefly toward the camera lens, and exits the room. The crime lasted approximately 25 s. The thief was in view for most of that time. The two thieves were similar-looking, male, senior-year undergraduate students in their 20s.

Virtual officer program. The virtual officer is a three-dimensional representation of a human, modeled to portray a plain-clothes detective, who converses by identifying keywords from the witness's speech and responding appropriately in a speech-synthesized voice. The virtual officer framework combines speech, graphics, discourse modeling, and planning to guide the witness through the identification procedure. The virtual officer, named Officer Garcia, uses verbal and nonverbal cues in addition to normal communication protocols such as turn-taking, feedback, and repair mechanisms to communicate effectively with eyewitnesses. We created Officer Garcia using an iterative process for improvement that included consultation with other computer scientists, psychologists, and law enforcement officers. For detailed information about the creation and technical aspects of the virtual officer framework, see Daugherty et al., 2008. A demonstration of the virtual officer program may be viewed at http://www.youtube.com/watch?v=SEhcLQmwtjQ. The program was administered on a standard, 19” flat-panel monitor along with a microphone and stereo speakers.

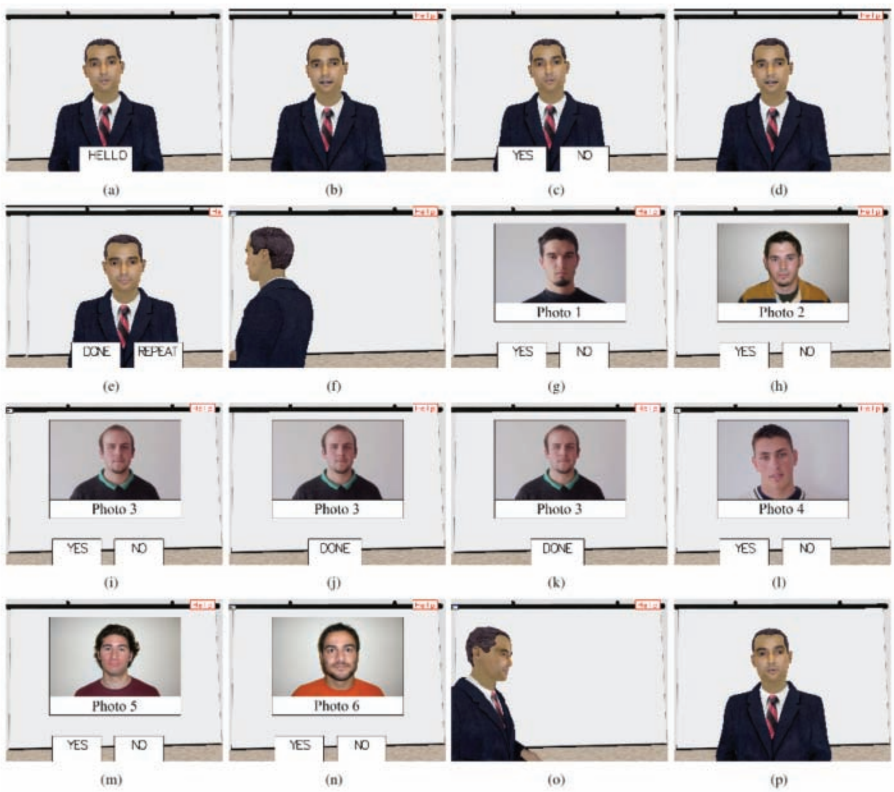
Photoarrays. Thief-present photoarrays contained the thief and five fillers who resembled the thieves in physical appearance. The fillers were other undergraduate and graduate students from the campus. In the thief-absent photoarrays, we replaced the thief with an innocent suspect who resembled the thief in physical appearance and used the same five fillers as in the thief-present photoarrays. Each thief served as the innocent suspect for the other thief in the thief-absent photoarrays.

Procedures

Crime simulation. Each participant was greeted in the psychology laboratory by one of six undergraduate or graduate student research assistants who served as experimenter. The experimenter consented the participant according to institutional review board-approved procedures, sat the participant before the computer monitor, and asked the participant to pay close attention to the video to be shown. The participant then viewed one of the two crime videos while the experimenter waited outside of the lab room.

Live and virtual photoarray administration. In both photoarray conditions, the identification procedure was modeled after the protocol established by a progressive, urban police department in the Southeast United States. The protocol included instructing the witness that the perpetrator might not be present in the photoarray and presenting photos sequentially. In the live officer condition, the role of the officer was played by one of five research assistants. In an attempt to simulate blind identification procedures, the research assistant who portrayed the investigator did not know which of the two perpetrators a given witness had viewed. We took two additional precautions to blind the live investigators. First, during the presentation of the lineup, we seated the investigator behind the monitor on which the photoarray was shown to the witness. Second, we randomized the order of the photos in the sequential photoarray presentation for each trial. Thus, even if the investigator was able to figure out which suspect was the perpetrator (or that the perpetrator was absent) in a given session, the investigator could not have effectively cued the witness because the investigator could not tell which photo the witness was viewing at any one time. The virtual officer condition had the same features of the live investigator condition

Figure 1
Depiction of the Photoarray Procedure Conducted by the Virtual Officer



Note: Officer Garcia (a) waits for the witness to respond with "hello" before (b, c) introducing the virtual human interface via an example yes/no question. Garcia (e) continues through the recommended identification procedures and then (f) leaves the viewing area prior to (g-n) the 6-photo lineup. In this sample interaction, the witness (i) identifies photo 3, (j) records why she recognizes the person, and (k) states her confidence in the identification. Officer Garcia then (o) returns to the viewing area and (p) completes the procedures and thanks the witness.

with several exceptions. There was only one virtual officer (Officer Garcia). Before the photoarray, Officer Garcia gave a brief introduction about the virtual officer program and tested the voice recognition component of the program. Also, after each voice response by the witness, Officer Garcia verified the response by repeating it and asking the witness to confirm the response. A sample frame-by-frame depiction of an interaction between a witness and Officer Garcia is shown in Figure 1.

Table 1
Identification Performance by Condition

	Investigator	
	Virtual	Live
Perpetrator-present conditions		
% Correct identifications	31.1	19.2
% Filler identifications	31.1	33.3
% Incorrect rejections	37.7	47.4
Perpetrator-absent conditions		
% False identifications	7.9	7.0
% Filler identifications	42.9	35.1
% Correct rejections	49.2	57.9

Additional outcome measures. After attempting an identification, witnesses rated their comfort with the identification procedures on various dimensions (details of the items and rating scales are presented below).

Results

Identification Performance

Our primary objective was to compare identification performance in live and virtual photoarrays. Table 1 summarizes identification performance in perpetrator-present and perpetrator-absent photoarrays. In perpetrator-present photoarrays, three identification outcomes are possible: the witness can correctly identify the perpetrator ("correct identification"), incorrectly identify a filler ("filler identification"), or incorrectly indicate that the perpetrator is not present ("incorrect rejection"). Although the virtual officer condition produced slightly more correct identifications than did the live officer condition (virtual = 31.1% vs. live = 19.2%), this difference was not statistically significant, χ^2 (1, N = 139) = 1.339, p = .165, ϕ^2 = .01. The percentage of filler identifications was nearly identical across conditions (virtual = 31.1% vs. live = 33.3%), and the difference in incorrect identifications was also not statistically significant (virtual = 37.7% vs. live = 47.4%). Three outcomes are likewise possible in perpetrator-absent photoarrays. The witness can incorrectly identify the designated innocent suspect ("false identification"), incorrectly identify a filler ("filler identification"), or correctly indicate that the perpetrator is not present in the photoarray ("correct rejection"). The virtual and live officers produced virtually identical rates of false identifications (virtual = 7.9% vs. live = 7.0%). The percentage of filler identifications was slightly though nonsignificantly higher in the virtual officer condition (virtual = 42.9% vs. live = 35.1%). The live officer condition produced slightly more correct rejections than did the virtual officer condition (virtual = 49.2% vs. live = 57.9%), but again, this difference was not statistically significant, χ^2 (1, N = 120) = 2.290, p = .092, ϕ^2 = .02.

Although the live and virtual officer conditions produced nonsignificantly different identification performance rates, there was a trend toward more correct identifications and fewer correct rejections in the live as compared to the virtual officer condition. Conventional statistical reasoning would lead us to attribute this difference to random variation. Power to detect an effect-size of medium magnitude (ω = .30; α = .05) was .896 for the perpetrator-present condition and .846 for the perpetrator-absent condition, suggesting a high likelihood of detecting a significant difference if present in the population. This trend in identification performance differences is nevertheless worth examining in future research.

Other Outcomes

Participants rated their identification procedures on a variety of dimensions. Generally, the procedures were rated similarly across these dimensions. We summarize a few of these key findings here. Several items were rated on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Mean responses to the item "I found the identification procedure easy to complete" were 4.70 for the virtual and 4.36 for the live officer conditions, respectively, t (233) = 1.42, p = .158. Mean responses to the item "I found the identification procedure to be awkward" were 3.99 for the virtual and 3.81 for the live officer conditions, respectively, t (233) = .78, p = .434. Mean responses to the item "The identification procedure made me uncomfortable" were 2.62 for the virtual and 2.72 for the live officer conditions, respectively, t (233) = .451, p = .261. The conditions did produce significant differences with respect to reported confusion. Mean responses to the item "I found the identification procedure confusing" were 2.52 for the virtual and 3.47 for the live officer conditions, respectively, t (233) = 2.65, p = .009, η^2= .02. Interestingly, witnesses found the virtual officer condition to be less confusing than the live officer condition.

Discussion

Our initial investigation of the effectiveness of the virtual officer program was successful. The student-witnesses to our simulated crimes performed comparably on photoarrays conducted by the virtual officer and students portraying investigators (the "live officer" conditions). We assessed several dimensions of identification performance, including correct identifications, filler identifications, false identifications, and correct and incorrect nonidentifications, and in each case the rates were comparable for the live and virtual officer conditions. The witnesses seemed no less comfortable with the virtual officer than with our live officers.

Although encouraging, our conclusions must be tempered by several limitations associated with this experiment. First, the study uses crime simulation methodology. Crime simulation methodology has several benefits, including experimental control, random assignment to conditions, systematic manipulation of key variables, and certainty about whether the identifications are correct or incorrect. Nevertheless, as other observers have noted (e.g., Mecklenburg, Bailey, & Larson, 2008), crime simulations differ in important ways from actual crimes. In recognition of these concerns, we recommend the investigation of the virtual officer program in a field setting. Second, the manner in which we created blind procedures for the live investigator condition was not ideal. We would have preferred to have a larger set of suspects and investigators available to ensure blind live investigators, but we did not have the resources to do so. Nevertheless, through the use of two versions of the trial (with different perpetrators), having the investigator blind to the trial version viewed by a given witness, randomizing the order of photos for each trial, and seating the investigator in a position so that he or she could not see which photo was presented to a witness, we believe that we effectively created blind conditions. Third, participants in this study were 1st-year university students. Students are in some ways representative of crime victims. Many robberies and other crimes take place on or near university campuses (including the one where this experiment was conducted). University students, however, are not representative of the population of victims and witnesses who are computer illiterate. On the contrary, most of our students are quite comfortable with computers, and their abilities to negotiate the virtual officer program do not surprise us. A more pointed test of the effectiveness of the virtual officer program would involve samples of citizens with minimal or no computer skills. Fourth, concluding that conditions produced comparable performance (i.e., null effects) is always risky given the many reasons for null effects. In this case, statistical power was adequate. Further research is needed to ascertain whether the null results are reliable or the product of sampling error.

Limitations notwithstanding, we are strongly encouraged by the technology itself and the results of our initial evaluation of it. Computer-based photoarrays have the potential to solve the human-resource challenges associated with blind photoarrays, and the virtual officer program has the potential to solve the problem of how to use a computer-based photoarray with witnesses who have little or no experience with computers.

We recommend several avenues for further technological development and research. The developer of the virtual officer program has continued to refine the program and the platform on which it operates. He is currently investigating a Web-based version of the program and seeking police departments that are willing to pilot the program. Although the program is currently designed with certain parameters (the instructions given to the witness, the use of sequential presentation), these parameters can easily be changed and adapted to other preferred photoarray protocols. With respect to research, we recommend additional laboratory and field testing of the virtual officer program. We specifically recommend assessing the program's effectiveness with witnesses who have little or no computer experience.

More generally, we urge more field and laboratory research geared toward increasing the rate of correct identifications and reducing the risk of false identification. Given the prominent role that mistake identification has in convictions of the innocent, preventing eyewitness errors will help conserve scarce police resources (e.g., fewer false leads to investigate), improve the credibility of identification procedures, and reduce the risk of miscarriages of justice.

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