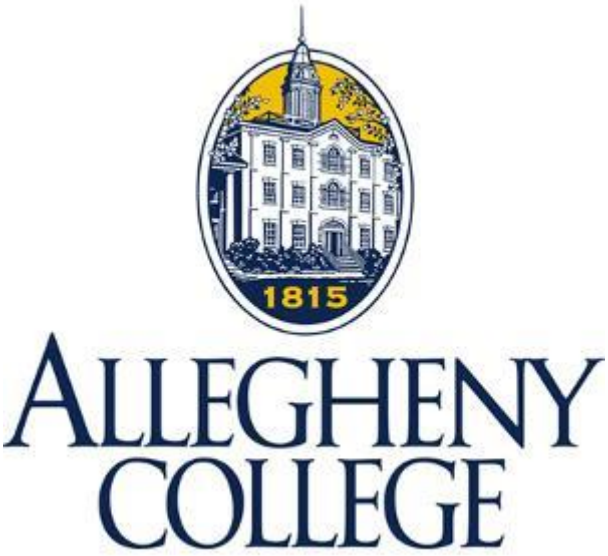
The effects of the verbal overshadowing effect and independently creating composite sketches on eyewitness identification accuracy



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Abstract

Eyewitnesses play a pivotal role in the criminal justice system, and often, it takes drastic evidence such as DNA from a crime scene to cause a jury to second-guess an eyewitness' testimony. However, previous research has found that eyewitnesses are notoriously poor at identifying perpetrators from police lineups. This study aimed to increase the accuracy rate of eyewitnesses by having participants create a criminal composite sketch independently to overcome the verbal overshadowing effect, which is known to alter the eyewitness' memory of the perpetrator. This was a within-subjects study in which each participant completed a filler task created a composite sketch, and described the perpetrator. The hypothesis was that the participant would be best at identifying the perpetrator from a lineup after creating a composite sketch because the visual components of the sketch should overcome the verbal overshadowing effect. This hypothesis was not supported.

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Introduction

As the sophistication of DNA testing increases, so do the number of exonerations of previously convicted individuals who were innocent. Many of these individuals had verified alibis, but the psychological phenomenon of false eyewitness identifications sent them to prison for years. False eyewitness identifications are the leading cause of known wrongful convictions (Costanzo, 2015; Wells & Quinlivian, 2009). Together with psychologists, the legal system has been searching for ways to improve the accuracy of eyewitness identification through research (Lane, 2008; Pozzulo, Reed, Pettalia & Dempsey, 2016).

Manson or Biggers criteria

The legal system developed criteria to evaluate the accuracy of a witness's testimony, which are referred to as the *Manson* criteria or *Biggers* criteria (Costanzo, 2015; Lane, 2008, Wells & Quinlivan, 2009). It is important to note that the *Manson* criteria were the result of two cases in the 1970's *Neil v. Biggers* and *Manson v. Braitwaite,* and these criteria are not a result of psychological research. The *Manson* criteria include the following: the certainty of the witness that their identification is accurate, the quality of the witness' view of the perpetrator, the amount of attention paid to the suspect, how much the witness' description matched the suspect they selected, and, lastly, the amount of time between viewing the suspect and making the identification (Lane, 2008; Pozzulo et al., 2016; Wells & Quinlivan, 2009).

Psychologists have completed research to explore the validity of the five *Manson* criteria, as well as many other factors which may play a role in the accuracy of eyewitness identification. There are some complications in these criteria, however. It is very difficult to quantify the amount of attention the witness paid to the suspect after the fact because courts must rely on the witness to self-report this information. The quality of the view of the suspect that the witness

experienced could potentially be measured by detectives and specialists at the scene, but many of these other criteria are difficult to determine.

It has been argued that the certainty of the witness is not, in fact, a strong supporting factor of the accuracy of the identification because certainty is often inflated by validation by police, prosecutors, and many other individuals in the process. Wells and Bradfield's (1998) study examined the evolution of the witness' certainty with three feedback conditions. Participants who made false identifications were given either confirming feedback, nonconfirming feedback, or no feedback. Participants who received confirming feedback experienced an increase in certainty as time progressed. This is important to note because of its practical usage in the justice system. Positive feedback compromises the integrity of the witness' certainty (Lane, 2008; Wells & Bradfield 1998). In some cases, the individual may need to alter their own sense of certainty. For example, often in court proceedings, police officers are called upon to identify perpetrators. It would be detrimental to their career to state that they made have made a mistake in their identification, even if they began to doubt their identification later (Wells & Quinlivan, 2009).

The *Manson* criterion concerning "the amount of attention paid to the suspect" can be problematic when the crime involves a weapon. Carlson (2016) has shown that the weapon focus effect causes eyewitnesses to be worse at recalling or identifying a culprit when a weapon is present. Even with longer exposure times to the perpetrator, the witness' attention to the criminal is often compromised in the presence of a weapon.

Many other factors besides the *Manson* criteria have been found to influence the accuracy of eyewitness identifications. These include lineup procedures, the facial recognition ability of the witness, race of the witness and perpetrator. Also what the individual does and thinks about

during the period of time between the crime and the identification can affect the accuracy of the identification.

Lineup procedures

A criminal lineup is a tool utilized by criminal investigators to identify a perpetrator. There are various procedures, but the reality is that each come with their own deficits. Mikulak (2017) quoted findings of a meta-analysis of 11 field-studies of real investigations, "…researchers found that in about 41% of 6,734 lineups, the eyewitnesses identified the suspect; in about 35% of the lineups, the eyewitnesses made no identification, and in about 24% of lineups the eyewitness identified a known innocent person as the perpetrator" (Mikulak, 2017, p. 27). These data infer than an innocent person in a lineup has a 1 in 4 chance of being mistakenly identified as the perpetrator.

The study by Pozzulo et. al (2016) was the first to examine the effectiveness of the four most used lineup procedures at once. The four most used lineup procedures are: simultaneous, sequential, elimination, and wildcard. The simultaneous lineup procedure is the most common in the United States. In a simultaneous lineup, all of the suspects matching the description are shown at the same time, whether on paper or in a physical lineup behind a one-way mirror. This lineup procedure has experienced some criticism because it is thought to allow for relative judgement. Relative judgement occurs when the witness compares the members of the lineup to each other and selects the one which looks most like the culprit, but the witness pays less attention to how much the individual suspect matches their memory of the culprit (Pozzulo, et. al., 2016). This can be dangerous if the true culprit is not present in the lineup. If the witness were to select someone who looks like the culprit, but the true culprit is not present, the true culprit is still free to commit more crimes, and the innocent suspect is tried, and possibly

convicted, for a crime they did not commit.

The sequential lineup is very popular in Canada and was developed by researchers Lindsay and Wells (1985). This lineup procedure shows each lineup member individually, and the witness is asked if each suspect is the culprit. The witness may not ask to see a previous member again, and is instructed that they may not move on to the next member in the lineup until they have made a decision about the suspect they are currently viewing. This lineup procedure forces the witness to use absolute judgement, rather than relative judgement, meaning they must compare the suspect to their memory of him/her, not to other suspects in the lineup. This procedure reduces the number of false identifications, compared to simultaneous lineups, but the amount of positive identifications are consistent with that of the simultaneous lineup.

However, one may criticize this lineup when comparing it to Signal Detection Theory because of the needed certainty of the witness. This lineup raises the decision criterion to make an absolute judgement. The decision criterion is the amount of information one requires in order to make a judgement. If the witness is uncertain of whether another lineup member, which they have not seen, looks more like their memory of the culprit, they may be hesitant to identify the true culprit, which may lead to a "miss," meaning that the target was present in the lineup, but the witness answered that they were not present.

The elimination lineup procedure was created by Lindsay and Pozzulo (1999) to attempt to combine the positive qualities of the simultaneous and sequential lineups. The elimination line-up is a two-step process. The first step consists of a simultaneous lineup, in which the witness makes a relative judgement by selecting the suspect which looks most like their memory of the culprit. Once the witness selects this suspect, they view that suspect only, whether in photo or in person. Then they are asked to make an absolute judgement by determining if the remaining

suspect is the culprit (Pozzulo et al., 2016). This procedure overcomes the decision criterion issues associated with the sequential lineup because the witness has the opportunity to view all of the suspects in the lineup, but is also required to make an absolute decision. When Pozzulo compared all of these procedures, the elimination lineup produced a significantly greater correct rejection rate than the simultaneous lineup, meaning the participants were better at accurately determining if the culprit was not present in the lineup, but there was no significant difference in the amount of correct rejections, positive or false identifications when compared to the sequential lineup (Pozzulo, et al., 2016).

The final lineup procedure is the wildcard lineup, which is most commonly used for children. The wildcard lineup is similar to the simultaneous lineup, in which all suspects are shown, but there is an addition. This lineup includes a visual option to indicate that the culprit is not present, such as a silhouette with a question mark. This allows for more accurate identifications in children. The wildcard lineup, sequential, and simultaneous lineup produced similar correct rejection rates throughout Pozzulo's (2016) study.

Face perception

Another crucial component to understanding why false identifications occur so frequently in the criminal justice system is understanding the strengths and limitations of face perception. The perception of faces is multifaceted. When perceiving faces, more information is obtained than just the identification of the person. The observer of a face obtains information about the person's emotion, health, age, and social information such as movements of the face coordinated with speech, and attention cues coinciding with the person's gaze. The ability to identify a person by their face is a remarkable ability because all faces are comprised of the same essential features such as a pair of eyes, a nose, a mouth, in the same configuration, but we are able to

identify others based on subtle, minute variations in facial construction (Leopold & Rhodes, 2010).

Face perception is a product of integration of multiple areas located in the brain. The most recognizable of these is a region in the lateral fusiform gyrus, the fusiform face area (FFA), which is commonly believed to be the center of perceiving faces (Ishai, et. al., 2005). However, the FFA does not stand alone. Face perception is believed to utilize the FFA, the inferior occipital gyrus, the fusiform gyrus, the superior temporal sulcus, amygdala, insula, and hippocampus (Ishai et al., 2005; Leopold & Rhodes, 2010) The inferior occipital gyrus and the fusiform gyrus are believed to be responsible for the recognition of individuals. Perception of social information such as gestures used for communication and attention, as well as facial expression are attributed to the superior temporal sulcus, and the perception of emotional facial expressions, particularly fear, anger, and disgust, are attributed to the amygdala, insula, and hippocampus (Ishai, et al., 2005; Leopold & Rhodes, 2010). These neural networks may have begun forming early on in evolution, as primate fMRI studies which have found that the superior temporal sulcus is highly activated in primates' facial perception (Ishai, et al., 2005).

Researchers have also found that human participants exhibit greater responses in neural networks to famous or familiar faces than to unfamiliar faces (Ishai et al., 2005). The way people comprehend familiar and unfamiliar faces differs as well. Unfamiliar faces are perceived from the "outside-in," meaning details about the outer features, such as hair style, hair line or color, and shape of the head is memorable at first. When an individual perceives a familiar face, they perceive the whole face, beginning with the internal parts like eyes, nose, and mouth (Bruce & Young, 2012).

Prosopagnosia and super-recognizers

Face perception ability lies along a continuum of varying abilities, which can be incredibly helpful or detrimental to a police investigation. Some individuals have a condition called prosopagnosia, which is the inability to recognize or perceive faces when the individual has normal recognition or perception of other objects, (Bobak, Bennett's, Parris, Jansari, & Bates, 2016; Russell, Chatterjee, & Nakayama, 2012). This condition is typically a result of neurological injury or illness, which affects brain areas previously mentioned along the face perception network. However, some individuals experience prosopagnosia without brain injury or illness. This is known as developmental prosopagnosia and may be caused by irregular development of face-specific neural networks (Russell, Chatterjee, & Nakayama, 2012). These individuals would complicate the criminal investigation because of their inability to identify or describe the culprit.

Contrary to prosopagnosia, some individuals are known as super recognizers, who are much better than the average person at recognizing faces. Researchers are currently unsure of the brain differences between the average person and super-recognizers that gives them this ability (Bobak, et al, 2016; Russel, Chatterjee, and Nakayama, 2012). These individuals would be a critical assistance to an investigation because of their ability. Individuals who are not diagnosed with either of these neurological differences rest on a continuum between them, and it is important to remember that every individual will have a different level of ability when it comes to recognizing a culprit from a lineup.

Own-race bias

Own-race bias is the phenomenon of human memory that members of one race are not as good at differentiating between faces of another race as they are at differentiating between faces

of their own (Meissner & Brigham, 2001). A meta-analysis conducted by Meissner and Brigham (2001) reinforced the reliability of the own-race bias by reviewing over three decades of research that compiled a pool of 5,000 participants. However, this bias may be made less extreme by increasing exposure to other faces. Children and adolescents living in ethnically diverse neighborhoods recognized other-race faces more than individuals who did not live in diverse neighborhoods (Meissner & Brigham, 2001).

Verbal overshadowing effect

Other researchers have examined how tasks completed by witnesses between the time of viewing the crime and the time of their identification influences their identification accuracy. Schooler and Engster-Schooler (1990) coined the term "verbal overshadowing effect" after exploring participants' memory ability in six experiments. The verbal overshadowing effect is the phenomenon that when one provides a verbal description of a non-verbal stimulus (i.e. a visual stimulus), it becomes harder to later recall that non-verbal stimulus, and one's memory may even be distorted after attempting to put it into words. Non-verbal stimuli are anything that is hard to describe with words, such as colors or faces. Schooler and Engstler -Schooler (2009) found that when participants described what they had seen, participants were significantly worse at recognizing faces compared to control groups.

Lane's (2008) study examined the verbal overshadowing effect and the accuracy of eyewitness identifications. Participants watched a video clip of a man stealing from a garage sale. Afterwards the participants either completed a filler task, described the man in spoken or written form, or described the whole scene of the crime in spoken or written form. Lane hypothesized that the participants who were asked to provide only a description of the culprit would have more difficulty in identifying the culprit in a simultaneous photo lineup than would

the participants that described the whole scene due to the verbal overshadowing effect. She expected there to be a worse identification rate for those who described the only man's face rather than describing the whole scene because the verbal overshadowing effect was expected to warp the participants memory of the man more in that condition. Lane's hypothesis was supported, and she found that the participants who provided spoken descriptions of the full scene had the highest accuracy (Lane, 2008).

Another task which is often completed by a witness after viewing a crime is describing the culprit to a forensic artist, or sketch artist. Very little research has been conducted on how a witness' role in forensic art increases or decreases identification rates.

Forensic Art

The field of forensic art uses art to assist in the identification of both criminals and victims, aid in the location of these individuals, and also aids in court proceedings (Birdwell, 2015). Forensic artists use multiple tools, both on paper and digitally, to assist in criminal investigations, and they should be knowledgeable about victim psychology, memory, facial anatomy, and aging trends (Mancusi, 2010). The common tasks a forensic artist completes include image modification, such as age progressions of missing children, postmortem reconstruction of deceased victims whose faces have deteriorated, creating demonstrative evidence for court proceedings, facial image comparison analysis between videos and photographs, and, most important for this study, composite sketches (Birdwell, 2015; Brooks, 2012; Mancusi, 2010).

To complete a composite sketch, a forensic artist takes a great deal of time and patience with victims and witnesses. The artist listens to their descriptions of the criminal and also provides them with images of parts of the face and asks for their feedback (Mancusi, 2010). The

verbal overshadowing effect may influence the witness' description overtime and alter their memory of the perpetrator and, therefore, alter the sketch the forensic artist creates.

In spite of this effect, composite sketches are crucial for criminal investigations. Forensic artist, Stephen Mancusi (2010) explains that these sketches are not intended to be like a photograph of the culprit, but, instead, are utilized to spark a recognition of the person. For example, Mancusi worked on the New York Police Department's case of the Sty Town Rapist in 1994. A young woman who lived in a neighborhood in Manhattan returned home and, as she entered her apartment, was attacked by a man who had broken in early that evening. Mancusi met with the woman and drafted a composite sketch which was released to the public and posted in police stations in the area. An Assistant District Attorney (ADA) noticed the sketch on the wanted poster and recognized that the sketch had a shocking resemblance to her half-brother, Anthony, who she knew had been convicted for rape in Florida and had recently been in New York. Thanks to this ADA calling the police to notify them of the resemblance and the pattern of Anthony's location, he was tracked and arrested for multiple rapes (Brooks, 2012; Mancusi, 2010).

Research question and hypothesis

Due to Lane's (2008) findings that witnesses struggle to explain the face of criminals and then show poorer identification, a research project should address the consideration of the police composite sketch. Would a witness be better at identifying the culprit from an elimination lineup if they were to sketch the face of the culprit themselves rather than to explain the scene? Allowing the participant to sketch the culprit on their own should eliminate the potential verbal overshadowing effect they may experience when describing the culprit to a forensic artist. Therefore, it would be hypothesized that these witnesses would have an increase in positive

identifications compared to witnesses who explained the whole scene aloud.

This study will examine describing the whole scene aloud rather than describing just the perpetrator to attempt to find a procedure that will better the criminal justice system, rather than compare it to describing the face of the culprit, which researchers have already determined has a negative effect on the identifications. This will also account for participants who naturally begin to describe parts of the culprit during the verbal condition as they describe the whole scene aloud.

Method

Design

This study was a repeated-measures within-subject experimental design, in which the dependent variable examined was the witness's ability to accurately identify the culprit. The independent variable was the recall manipulation condition, which had three levels: a word search filler task, describing the scene aloud, and sketching the culprits face on a computer program. Demographic information was collected regarding race, age, and sex as quasi-independent variables, as well as information about the participants' previous experience with technology, specifically a sketching software on a touch-screen tablet.

Participants

The study included 35 participants. Participants for this study were voluntary and were recruited through Allegheny's SONA system. Participants consisted of college students between the ages of 18 to 23 years old. This sample is a rather diverse sample, and demographic information was collected regarding sex, race, degrees of social activity, and the participants' perceptions of how well they learned names of new individuals.

Materials

The materials for this project consisted of a computer screen, which played three silent videos of three thefts. The videos were shot in a park at midday. Two young men with hats and sunglasses threw a ball back and forth in the background, while a third young man in a black shirt stood at the upper right of the screen, leaning against a sign, as he watched the two other young men throw the ball. A mother waited on a park bench in the forefront of the video, occasionally glancing over to a playset where her child was assumed to be playing. After about fifteen seconds, she left the bench to attend to her child, leaving her purse behind. The man in the black shirt noticed she left her purse behind and slowly began to make his way over to the bench, scanning to see if anyone was watching. He grabbed the purse and exited the view of the camera to the left. The videos lasted one minute each and the criminal was visible the entire time, but his



Figure 1. An image of the videos utilized in the study. The individual labeled **A** was the culprit. In videos 2 and 3, a different individual stood in this spot. Individuals **B** and **C** threw a ball back and forth. Individual **D** left her purse on the bench after about 40 seconds to exit to the left of the screen. The culprit then slowly walked over, looking around to ensure he was not being watched, and then grabbed the purse and exited to the left of the screen.

face was closer to the camera and more visible around the forty-second mark, when he moved

towards the purse. A screen-capture of the first video is shown in **Figure 1**.

The scenario was the same throughout the three films, however the man who played the criminal rotated. In the videos where he was not the criminal, he changed his shirt and covered his head and face with a ballcap and sunglasses and became one of the young men throwing the ball in the background. The young man throwing the ball on the left always wore a white shirt in the three videos, and the young man on the right who also threw the ball wore a gray shirt consistently throughout the three videos. The videos were filmed within a thirty-minute window of time during the afternoon on a clear, sunny day. Lighting and weather, as well as camera position remained constant between the three videos.

A touchscreen tablet with the composite sketching software, PN Bros Sketch Artist Male (https://play.google.com/store/apps/details?id=com.rnbrospaid.sketchartist&hl=en), was necessary for the project, on which the participant sketched the culprit. This composite sketching software compiles pre-drawn parts of the face, which are divided into separate categories: hair, head, eyebrows, glasses, eyes, nose, moustache, mouth, jaw, and beard. This simple system also includes buttons which allow the user to alter the existing, pre-drawn facial components by elongating, widening, and rotating them (PN Bros, 2016).

Multiple word searches, a timer, a demographics survey, and a post-test questionnaire about the participants' technology history were utilized as well. Three 2x3 photospreads, correlating to the videos were necessary to determine the participant's ability to identify the suspect, as well as individual photos of each suspect, which were utilized during an elimination lineup procedure (Appendixes A, B, and C). Enlarged photos of each suspect were also utilized in order to complete an elimination lineup procedure. The photospreads and enlarged images were arranged in a page marked binder.

The photospreads were generated through the use of Georgia Tech's Facial Database (Georgia Tech, n.d.) and a website that compiles all mugshots for those arrested in Ocala, Florida for the previous 60 days (Mugshots Ocala, 2017). The Georgia Tech database was utilized to compile the photospreads for the culprits of the first and final videos (Appendixes A and C). These actors appeared older than the perpetrator in the second video, even though all three were on the same age. If was easier to find realistic age-matched individuals from the Georgia Tech Facial Database for these two actors. The researcher sifted through the database and selected images where the person pictured had light hair color, was a white male, and seemed to be either in their teens or early twenties. Photos that met these requirements were listed in the order of the numbers the database had given them, and every second photo was chosen to create the lineup until the total photos chosen reached five.

The photospread which corresponded to the second video (Appendix B) required a different approach. The Mugshots Ocala website carried a unique feature that was very beneficial in this case—date of birth of the arrested individual. Using the date of birth of the arrested individual, the researcher was able to better match for age, while still being able to match race and dark hair color. Photos chosen for this photospread were limited to no more than three years difference from the birth year of the actor in the second video. The same process as above was carried out for the selection of the five lineup photos, except that they were arranged in terms of most to least recent date of arrest, rather than a numerical order.

A survey (Appendix D) was also used to collect demographic information as well as to assess the participants' social habits and their own opinions of their ability to recognize faces. A questionnaire was utilized to examine the participants' previous experiences with technology and drawing on a touch-screen device.

Procedure

When participants enter they were given informed consent (Appendix F). The researcher asked the participants to complete the demographics survey (Appendix D) with the following instructions, "Please complete this short questionnaire regarding your demographic information." After the survey was completed, the participant was given instructions for viewing the first video, "Please watch this short video, pay attention to all aspects of the video, but, in particular, please watch the movements of the man in the black shirt." The video was then followed by one of the three treatment conditions—the word search filler task, the verbal condition in which participants described the scene aloud, or creating their composite sketch on the touch-screen tablet. Because this study was a repeated measures within-subjects design, the participant completed all three conditions, but was randomly assigned the order in which they completed the condition. Using a Latin Square and a random list generator, the participants were assigned to one of the following orders of conditions: ACB, BAC, or CBA. "A" represented the control condition, the word search filler task, "B" represented the verbal condition, and "C" represented the sketching condition. This process of watching videos was complete three times. Each

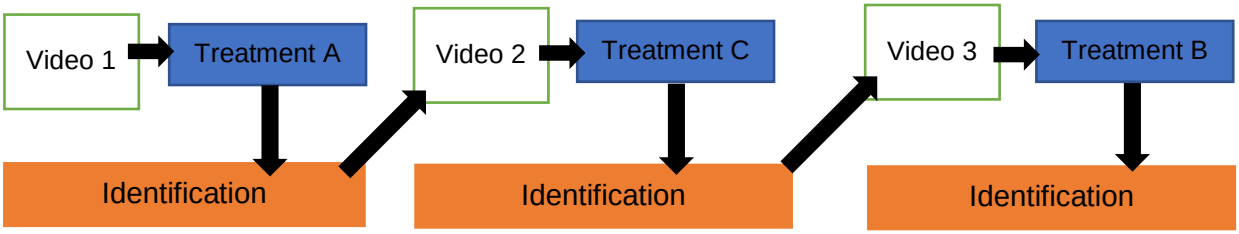

Figure 2. This figure shows the procedure for a participant assigned to the ACB order of conditions. First, the participant watched the Video 1, then they spent three minutes completing Treatment A, which was the word search filler task. Once the participant completed the three-minute condition, they were asked to identify the culprit from the first video. The participant then viewed Video 2, which had a different actor as the culprit. Then the participant spent the next three minutes completing Treatment C, which was the verbal condition, in which they described the entire scene aloud. After completing this condition, the participant identified the culprit from the second video. The participant then watched the final video, Video 3, and spent three minutes completing Treatment B, in which they created a composite sketch on a touch-screen tablet. Once the three minutes concluded, the participant was asked to identify the culprit from the final video.

treatment condition lasted three minutes. **Figure 2** shows a visual representation of the process researchers followed.

The control condition consisted of completing word searches for three full minutes. Participants were prompted, "Please complete as many word searches as you can in the next three minutes." The second treatment was the verbal condition, in which the participant described the entire scene. They were prompted, "Please describe the entire scene you just witnessed. Please provide as much detail and information as possible. You have three minutes to complete this task. Please share all the details you can." Participants were prompted and instructed on how to use the composite sketch program, "Please use this composite sketch program to create a sketch of the culprit you witnessed. You have three minutes to complete this sketch, and you may compile the sketch in any order. Use the purple buttons to increase or decrease the length of your lines, use the blue buttons to increase or decrease the width, and the red buttons to rotate the lines. Your sketch does not have to be complete, but please sketch as much as you can. You have three minutes to complete this task, but you do not have to use all three minutes."

After the three-minute treatment condition was completed, participants were then asked to identify the culprit using and elimination lineup procedure. Photospreads were encased in a three-ring binder and were displayed in a landscape orientation as a 2x3 grid. After the first page of the 2x3 grid, six pages followed, each with a larger copy of an individual image from the grid. The grid was numbered 1-6 under the photo beginning in the top left and ending in the bottom right. The images were labeled with tabs that were visible from the right of the pages. Each video was color coded. The first video's 2x3 photospread (Appendix A) had a tab labeled "A," and the following pages were numbered 1-6, corresponding to the number of the suspect on the 2x3

photospread. The tabs were necessary to allow the researcher to quickly and easily turn to the page containing the larger image of the suspect the participant selected and to avoid the participant from seeing another suspect's blown up photo, which they did not select. This was done to remain constant with the elimination lineup procedure.

The suspects on each photospread looked similar with similar backgrounds in their images. The researcher asked the participant, "Which of these men looks the most like the man you recall from the video?" After the participant answered the researcher flipped to the number page which contained only a photo of the suspect the participant identified. The researcher then asked, "Is this the man from the video?" The participant was not told if their identification was correct or incorrect because this would potentially influence their second and third trials.

After the participant completed the first trial, they were shown the second video and completed one of the conditions for three minutes and then were asked to identify another culprit using the same elimination lineup procedure, but with a different photospread with different individuals. They watched the final video, completed the remaining treatment condition, and then made their final identification. The participants were then asked to complete the post-test technology questionnaire. When the participant had completed their final questionnaire, they were given a debriefing handout (Appendix G), which thanked them for their time and their participation in the study. The debriefing handout also included contact information of the researcher, the faculty advisor, the IRB chair, and relevant articles the participant could read if they were interested in the topic of eyewitness identifications or lineup procedures.

The object of this study was to search for an effect of the treatment conditions of the participant's ability to positively identify the culprit. Statistical analyses were conducted to examine the relationship between the treatment conditions and the participants' identification

ability, as well as the quasi-independent variables collected from the demographics survey.

Results

This study was designed with the purpose of examining the use of criminal composite sketches to combat the verbal overshadowing effect and ultimately to potentially attempt to benefit the eyewitness identification process. The independent variable was the recall manipulation condition, which had three levels: the control word search task, the verbal description of the scene, and the independent composite sketch. The dependent variable was the accuracy of the eyewitness' identifications from the lineup. The hypothesis of this study was that the participants would be best at identifying the subject after completing the composite sketch of the culprit. Overall, participants had a correct identification rate of 81%.

Table 1

	Mean	Std. Deviation
Control	.89	.323
Verbal	.89	.323
Sketch	.69	.471

Table 1. Means and standard deviations across the three conditions show that the sketching condition had the worst performance of correct identifications.

Figure 3

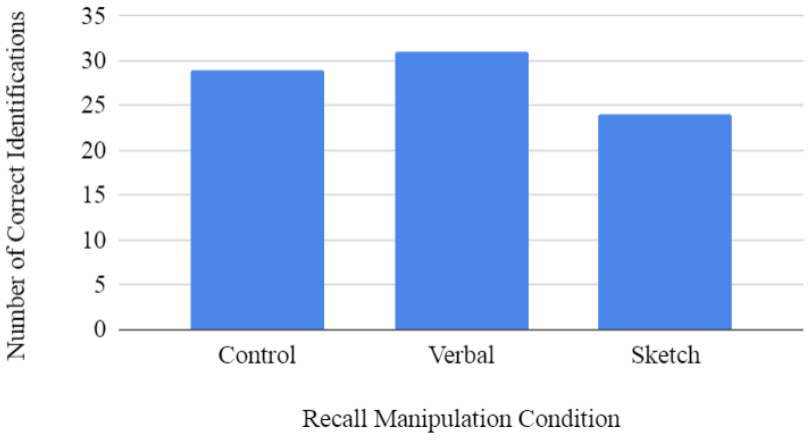

Figure 3. Across recall manipulation conditions, 29 participants correctly identified the culprit after the control condition, 31 after the verbal condition, and 24 after the sketching condition. Participants had the fewest correct identifications in the sketching condition. The hypothesis of this study was that participants would perform best after the sketching condition. This hypothesis was not supported.

Descriptive statistics for the three recall manipulation conditions are shown in **Table 1**, in which signifies that the hypothesis that participants would be best at identifying the culprit after the sketching condition was not supported.

Participants had the fewest correct identifications after completing the sketching condition. **Figure 3** shows the total number of correct identifications for each of the conditions.

A one-way repeated measures ANOVA found that condition had a statistically significant effect on the participants' identification accuracy at the $p<.05$ level [$F(2, 32)=3.5$, $p=.036$, $\eta_p=.093$]. Follow-up paired t-tests found that the effect of sketching was statistically significant at the $p<.05$ level, and had a negative effect on the participants' identification ability [$t(34)=-2.503$, $p=.017$].

A separate one-way repeated measures ANOVA found that the trial order was statistically significant at the $p<.05$ level [$F(2,32)=4.424$, $p=.020$]. Participants performed best on Trial 2. **Figure 4** shows the total number of correct identifications per trial.

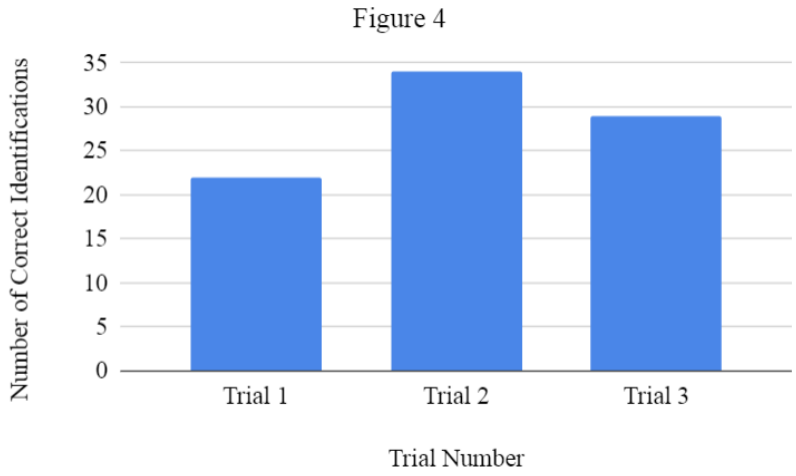

Figure 4. Participants performed best on Trial 2, which had 34 correct identifications. 22 participants correctly identified the culprit in the first trial. 29 participants correctly identified the culprit in the third trial.

Independent t-tests for sex [$t(33)=-.836$, $p=.670$] and race [$t(33)=-.758$, $p=.088$] showed that these quasi-independent variables did not have an effect on the participants accuracy. Race was coded into two groups: Caucasian and non-Caucasian because so few participants identified as the latter, and because own race bias would, in theory, be prevalent in non-Caucasian participants because the three culprits were also Caucasian.

Discussion

This study aimed to examine the use of creating a composite sketch of a perpetrator to potentially overcome the verbal overshadowing effect and ultimately increase the accuracy of eyewitness identifications. However, after examining the data, it was evident that independently creating a composite sketch made eyewitnesses significantly worse at identifying these perpetrators, meaning the hypothesis for this study was not supported.

The surprising results surrounding the sketch condition could be for multiple reasons. It has been theorized that people think with an internal speech, meaning they have verbal thoughts more than they have visual thoughts. This is described as "inner speech" in the cognitive psychology literature (Alderson-Day, 2015). Baddeley and Hitch (1974) proposed that a person's working memory is comprised of multiple parts, including a central executive, a phonological loop, and a visuo-spatial sketchpad. The phonological loop is responsible for visual thinking. It was expected that the participant would utilize the visuo-spatial sketchpad when sketching the perpetrator, but it is possible that in doing so, participants also thought through the process verbally, using the phonological loop, which may have contributed to an internal verbal overshadowing effect.

This study also yielded surprising results when the participants race and correct identification rate were examined. The results of an independent t-test [$t(33)=-.758$, $p=.088$] did not yield a support for own-race bias, which is the phenomenon that people tend to recognize faces of their own race more than faces of another. It was expected that Caucasian participants would be better at recognizing the culprits of the videos than non-Caucasian participants because the actors who portrayed the culprits were also Caucasian. This may be due to the small sample size. Only 10 of the 35 participants in this study identified as races other than Caucasian. This

study may have generated support for own race bias if I had generated more participants. It is also possible that these 10 individuals lived in ethnically diverse neighborhoods as children, and, according to Meissner and Brigham's (2001) study, individuals who have lived in ethnically diverse neighborhoods tend to see less of an own race bias effect.

The three-minute period participants waited in the present study between viewing the crime and making their identification is not consistent with the time periods true witnesses face after seeing a crime. The average response time for police to reach the scene of the crime after a 911 operator dispatches them is eighteen minutes in the United States (National Sheriff's Association, 2016). It may take hours or even a few days for the witness to describe the culprit to a Forensic artist (Mancusi, 2010). The fallibility of memory was evident in the responses of the participants, and if the waiting time had been increased beyond the three minutes, more false identifications may have been recorded, and it would be expected that false identifications would increase as time increased.

Particularly in the verbal condition, participants began warping their memory of the video they had watched. One participant reported seeing a large tattoo on the perpetrators arm, although none of the actors had tattoos. Another participant recalled a green shirt on the culprit, but the culprits of every video wore black shirts. This participant also recalled seeing a blonde lady on a bench wearing a cheetah-print top, but the video portrayed a brunette wearing a blue and white striped shirt. Future studies should consider modeling the waiting period after the national average police response time in order to uncover truly relevant findings.

Due to the within-subjects design, it is possible that some of the participants began to blend memories of different perpetrators. One participant recalled seeing the culprit from the third video wearing a cross necklace, but in fact, the culprit from the second video wore a cross

necklace. The culprit from the third video did not wear any form of necklace. Another participant reported that the scene took place in front of a lake and that "…the water was beautiful…" when, in fact, the scene took place at a park in front of a playground. Minute details were also altered in the participant's descriptions, such as the color of the purse. Details like the color of the purse or a tattoo on a perpetrators arm may seem small and unimportant, but if the police were instructed to track down a man with a tattoo on his arm holding a red purse, they might arrest an individual holding his wife's purse instead of the true culprit.

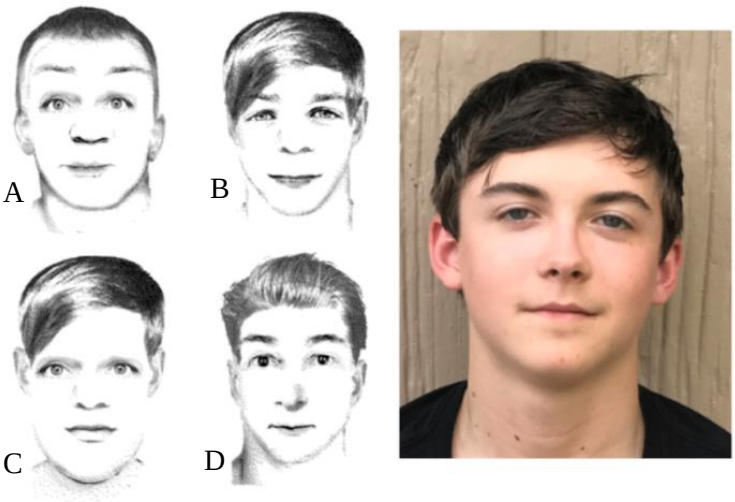

Figure 5. Participant sketches for the culprit of Video 2. Participants B and C were able to recall the actor's distinctive haircut, but participants A and D were not. Participant A and D's memory of the culprit of Video 2 may have been distorted through an internal verbal overshadowing effect or by possibly combining their memory of the culprit of Video 2 with the culprit of Video 1. The short hairline of participant A's sketch combined with the jaw features has a resemblance to the actor from the first video.

Participants also showed the possibility of altered memories in their sketches. Only seven of the 35 participants completed their sketches in the three minutes. Of those seven, four participants were responsible for sketching the second perpetrator, two for the first perpetrator, and only one participant was able to complete their sketch for the third perpetrator. **Figure 5** shows participant sketches of the second perpetrator. In this case, two of the four participants remembered the perpetrator's distinctive haircut, which set him apart from the actors of the other videos. The other two participants, however, were unable to recall this distinction. It is also possible that, like in the verbal condition, participants' memory of the culprit from one video blended with that of another. For example, as shown in **Figure 5**,

participant A's sketch had a resemblance to the culprit from Video 1, even though this participant was instructed to sketch the culprit from Video 2. The culprits of all three videos are portrayed in **Figure 6**. Future researchers could test this theory by including images of the culprit from Video 1 in the photospreads of Video 2 alongside the culprit from Video 2. If the participant is remembering the culprit from the first video, they may select that culprit from the lineup, rather than the culprit from Video 2.



Figure 6. Pictured are the culprits from Video 1, Video 2, and Video 3. It is possible that participants' memories of culprits from later videos morphed with their memories of culprits from earlier videos, which was evident in the previously mentioned sketches. These images were also taken with a different camera in different lighting than the other images used to make the photospreads.

Another factor which may have affected the sketches of the participants is the composite sketch program itself. The program may not have included enough relevant facial components that matched the culprits of the videos. A proposed solution to this problem for future research would be to have a forensic artist sketch individual parts of the face which matched the actors' faces and also create sketches of other facial components, so that the researcher could be sure that relevant facial components were included in the participants' options.

The photospreads themselves may have also created a flaw in the study that led to a correct identification rate of roughly 81%. It is possible that because the photos of the actors

were taken with a different camera in different lighting, participants were able to spot these differences and, therefore, had additional assistance in detecting the culprit. The photos in **Figure 6** were newer than the photos from the Georgia Tech Face Database, and the images from Mugshots Ocala were taken indoors with artificial lighting, but the image of the culprit from Video 2 was taken outdoors with natural sunlight. Future studies should create their photospreads by using the same camera to photograph many potential suspects in consistent lighting.

Another potential improvement that could be made to this research model is the implementation of a script during the verbal description condition, in which the researcher could ask including open-ended questions about the actor's clothing, if the participant could remember the words on the bench, the setting of the scene, or other details to provide better uniform data for analyses. Many participants remembered information like this and reported it themselves in their descriptions. It is possible, however, that other participants recalled this information but needed a prompt.

Conclusion

Continued research is vital to overcome many factors that interfere with eyewitness identifications. In particular, a solution to the Pandora's box of the verbal overshadowing effect is essential. Police and other law enforcement personnel are desperate to obtain perpetrator descriptions and other evidence to help lead to the arrest and trial of criminals, but the eyewitness process must be improved.

Based on the evidence resulting from this study, criminal composite sketches are not an alternative solution to the verbal overshadowing effect. In fact, it may be possible that sketching created an internal verbal overshadowing effect as the participants described the individual verbally to themselves. This is problematic because of the currently accepted process of creating

a criminal composite sketch. When creating a sketch, a forensic artist talks to the witness to uncover their perception of the criminal (Brooks, 2012; Mancusi, 2010) In doing so, the verbal overshadowing effect would be prominent. The forensic artist also asks the witness to look at multiple images of facial components, which the present study has shown to be problematic. Because this study showed that the sketching condition caused participants to perform so poorly, it may have significant implications on the composite sketch validity. These findings suggest that the system for creating composite sketches in unreliable. Because the current study suggests that participating in the creation of a composite sketch makes the witness worse at identifying the suspect, eyewitnesses should not be relied upon to make an identification if they have assisted in the creation of a composite sketch. While this undoubtedly places strains on criminal investigations, it is a necessary step to ensure that innocent individuals are not tried and convicted for crimes that they did not commit, and true perpetrators are placed behind bars.

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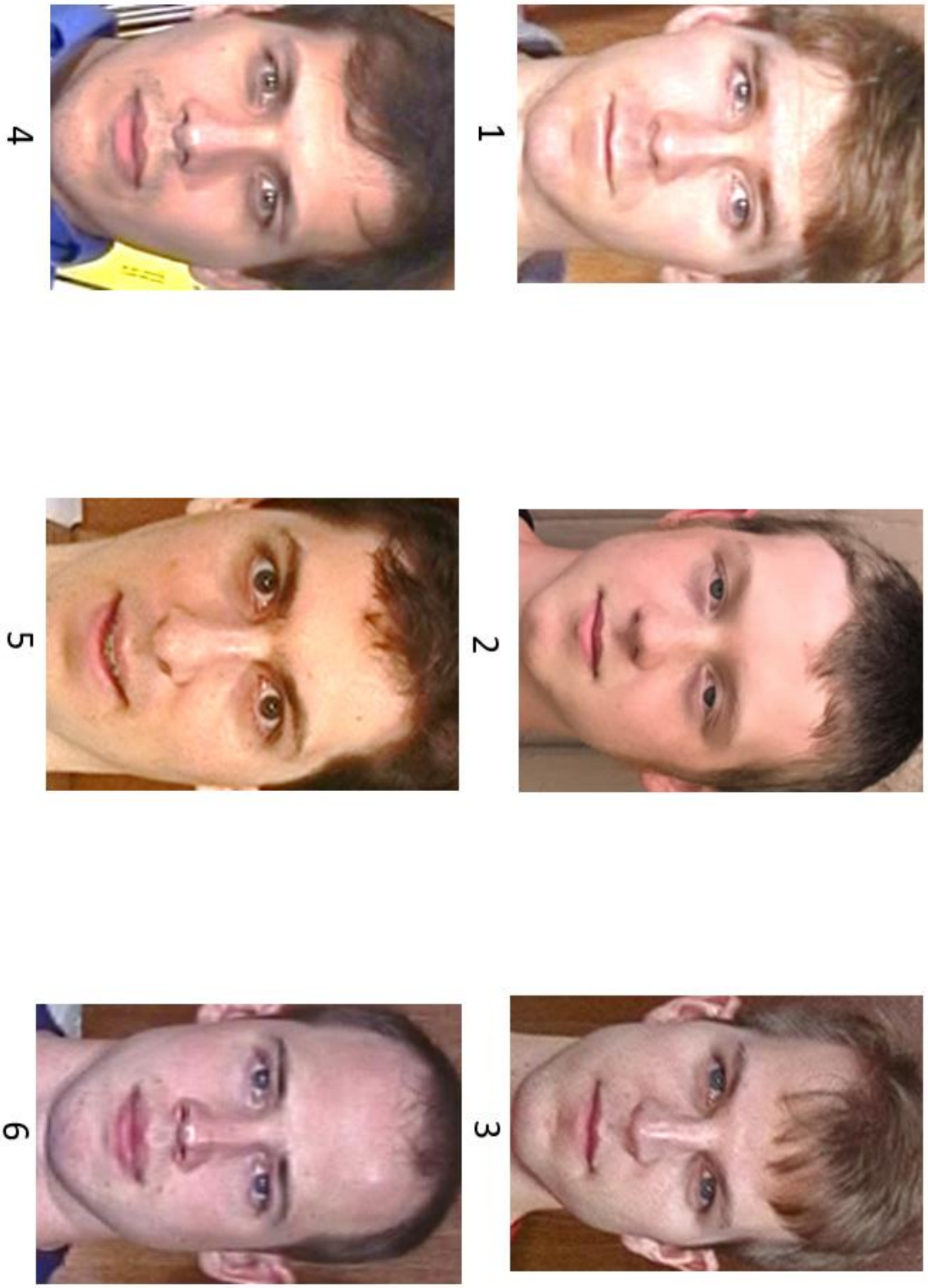
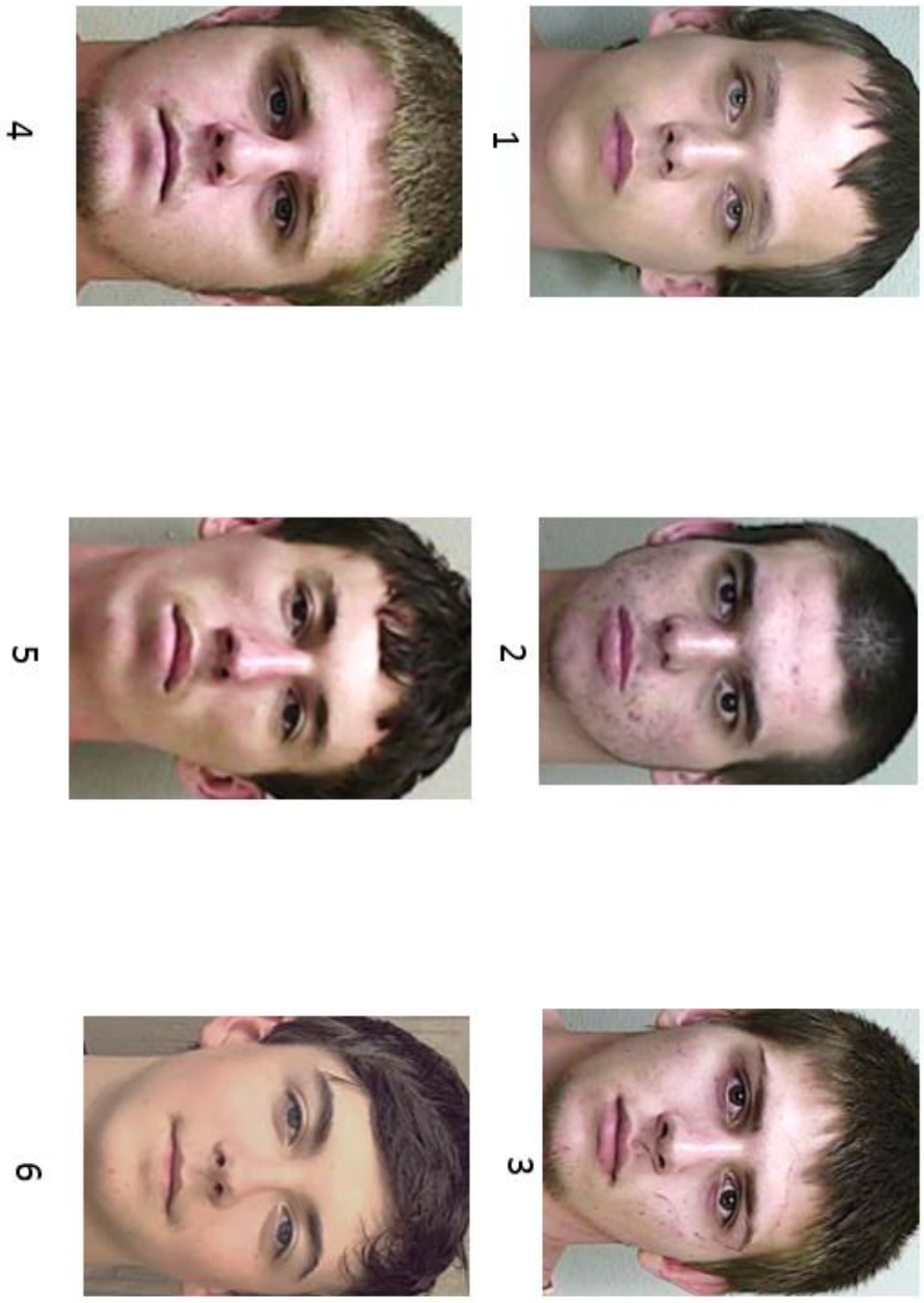
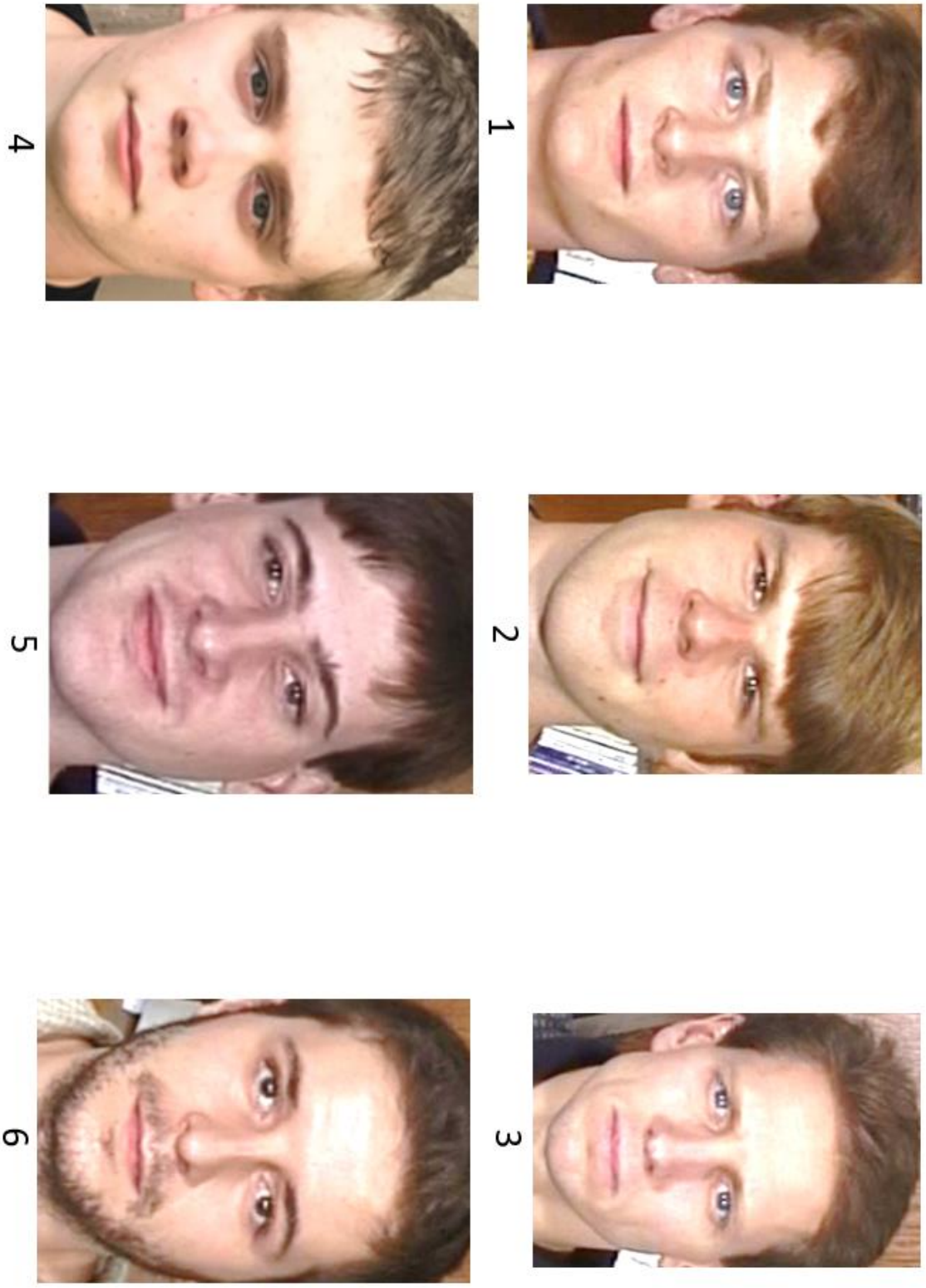
Appendix A



Appendix B



Appendix C



Appendix D

Survey

Sex: __ Male __ Female __Other/Wish not to provide
Class year: __ First Year __ Sophomore __ Junior __ Senior
Ethnicity:
__Asian
__African American / Black
__Caucasian / White
__ Hispanic / Latino
__ Native American
__ Prefer not to answer
__ Other, please specify

1.) I am a very social person.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree/Nor Disagree	Agree	Strongly Agree

2.) I have a few close friends.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree/Nor Disagree	Agree	Strongly Agree

3.) I can remember a person's face after meeting them once.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree/Nor Disagree	Agree	Strongly Agree

4.) I learn who my classmates are quickly.

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree/Nor Disagree	Agree	Strongly Agree

Appendix E

Post-Test Technology Questionnaire

1.) Describe your prior experience using a touch-screen device.

2.) Describe what prior experience you have, if any, of using a touch-screen device to sketch a picture.

3.) Describe your comfort level with technology.

4.) How frequently do you use technology in your everyday life? This includes, but is not limited to computer usage as well as touch-screen tablets or cell phones.

Appendix F

Informed Consent

This study is being conducted within the approved methodology of the Allegheny College Institutional Review Board. Participation in this study is voluntary. You may choose to terminate your participation in this study at any time with no consequences. If you are a student in an introductory psychology course, you will be compensated for your time in the form of SONA credit in order to meet the research participation requirements of your course. This study is a research study that could potentially benefit the legal system to better serve the people of the United States in cases which involve eyewitnesses to ensure that eyewitnesses are better able to identify true criminals. Your participation in this study should take roughly 20 minutes. You will be asked to watch a few videos and then you will be asked questions about the individuals in the video. These videos include nonviolent crimes, but if you should feel uncomfortable for any reason, you may terminate your participation in the study.

Your participation in this study will be kept confidential and in all data analyses, your involvement will remain anonymous.

If you have any questions about the study afterwards, you may contact Courtney Bedillion at bedillionc@allegheny.edu or Professor Connell Pensky at aconnell@allegheny.edu. If you have questions about human subjects research, please contact the Chair of the IRB Dr. Ryan Van Horn at rvanhorn@allegheny.edu.

I am at least 18 years old. ____ Yes ____ No

_____ _____

Signature Date

Appendix G

Debriefing

Thank you for your participation in this study. As a reminder, this study is being conducted within the approved parameters of the Allegheny College Institutional Review Board. If you should have any questions about your participation in this study, please do not hesitate to contact Courtney Bedillion at bedillionc@allegheny.edu. If you would like to receive the results of this study, please email Courtney Bedillion, and the results will be sent to you in late November. If you have questions about human subjects research, please contact the Chair of the IRB, Dr. Ryan Van Horn, rvanhorn@allegheny.edu.

The research hypothesis for this study is that the participants will be best at identifying the thief after completing the composite sketch on the tablet.

If you are interested in this topic, the following relevant sources may be of use to you:

Carlson, C. A., Young, D. F., Weatherford, D. R., Carlson, M. A., Bednarz, J. E., & Jones, A. R. (2016). The influence of perpetrator exposure time and weapon presence/timing on eyewitness confidence and accuracy. *Applied Cognitive Psychology. 30,* 898-910.

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