THE EFFECTS OF LINEUP STYLE AND INSTRUCTIONS ON EYEWITNESS ACCURACY AND CONFIDENCE

A Thesis
by
SAMANTHA CATHERINE SHIREMAN

Submitted to the School of Graduate Studies
at Appalachian State University
in partial fulfillment of the requirements for the degree of
MASTER OF ARTS

December 2019
Department of Psychology

THE EFFECTS OF LINEUP STYLE AND INSTRUCTIONS ON EYEWITNESS ACCURACY AND CONFIDENCE

A Thesis
by
SAMANTHA CATHERINE SHIREMAN
December 2019

APPROVED BY:

Twila Wingrove, J.D., Ph.D.
Chairperson, Thesis Committee

Lisa Emery, Ph.D.
Member, Thesis Committee

Christopher Dickinson, Ph.D.
Member, Thesis Committee

Rose Mary Webb, Ph.D.
Chairperson, Department of Psychology

Mike McKenzie, Ph.D.
Dean, Cratis D. Williams School of Graduate Studies

Abstract

THE EFFECTS OF LINEUP STYLE AND INSTRUCTIONS ON EYEWITNESS ACCURACY AND CONFIDENCE

Samantha Catherine Shireman
B.S., Appalachian State University
M.A., Appalachian State University

Chairperson: Twila Wingrove

Eyewitness misidentifications are the leading cause of known wrongful convictions (The Innocence Project, 2012). System variables like instructions at the time of a lineup presentation and lineup style can impact both eyewitness confidence, which can be measured as average confidence and perpetrator confidence, and accuracy. However, very few studies have combined these system variables to test accuracy and confidence. Charman, Carol, and Schwartz (2018) introduced a novel measure of average confidence with the typical perpetrator confidence measure to gather data from both choosers and non-choosers. The current study extended Charman et al.'s (2018) study that looked at one system variable, instructions, and its effect on both types of confidence. I examined the impact of two system variables, instructions and lineup style, on both measures of eyewitness confidence and accuracy. In my study (N=180), I found that participants in the simultaneous lineup condition were the most accurate (59.21%) compared to the sequential condition and those in the simultaneous and biased instruction condition were more accurate (72.22%) than all other conditions. No significant differences were found for effects on eyewitness confidence.

Keywords: eyewitness identification, confidence, accuracy, instructions, lineups

Acknowledgements

Thank you to the Appalachian State University Department of Psychology for supporting my undergraduate and graduate education in psychology. Thank you to my thesis mentor, Dr. Twila Wingrove, and my committee members, Drs. Lisa Emery and Christopher Dickinson, for their support throughout the completion of this thesis.

Dedication

This thesis is dedicated to my mom, Kim, and my sister, Michelle. You two have been my support system throughout my academic career and never once questioned my ability to finish what I have started, even when I did. Your unwavering love and support kept my focused in troubled times. I couldn't have done this without you both.

Table of Contents

List of Figures

The Effects of Lineup Style and Instructions on Eyewitness Confidence and Accuracy

Samantha Catherine Shireman

Appalachian State University

Abstract

Eyewitness misidentifications are the leading cause of known wrongful convictions (The Innocence Project, 2012). System variables like instructions at the time of a lineup presentation and lineup style can impact both eyewitness confidence, which can be measured as average confidence and perpetrator confidence, and accuracy. However, very few studies have combined these system variables to test accuracy and confidence. Charman, Carol, and Schwartz (2018) introduced a novel measure of average confidence with the typical perpetrator confidence measure to gather data from both choosers and non-choosers. The current study extended Charman et al.'s (2018) study that looked at one system variable, instructions, and its effect on both types of confidence. I examined the impact of two system variables, instructions and lineup style, on both measures of eyewitness confidence and accuracy. In my study (*N*=180), I found that participants in the simultaneous lineup condition were the most accurate (59.21%) compared to the sequential condition and those in the simultaneous and biased instruction condition were more accurate (72.22%) than all other conditions. No significant differences were found for effects on eyewitness confidence.

Keywords: eyewitness identification, confidence, accuracy, instructions, lineups

The Effects of Lineup Style and Instructions on Eyewitness Accuracy and Confidence

According to The Innocence Project (2012), eyewitness misidentifications are the leading cause of known wrongful convictions and they approximate that 70% of all exoneree cases involved eyewitness misidentifications. Eyewitness identification reliability was not subjected to testing until empirical studies were conducted by psychologists in the 1970s. It wasn't until the 1990s, with the introduction of DNA testing, that the U.S. legal system began to take eyewitness identifications and their potential pitfalls seriously (Wells, 2014). To date, there have been 362 completed DNA exonerations in the United States of innocent suspects who averaged 14 years served and totaled 5,014 years incarcerated for crimes they did not commit. One hundred and thirty DNA case exonerations were for murder and 40 of these cases (31%) involved misidentifications.

Consistent with the data linking many exonerations to an eyewitness misidentification, research has also found high error rates in identifications (Lindsay, Ross, Read, & Toglia, 2007; Wells & Loftus, 1984). For example, field studies also show that 33% of witnesses choose known innocent fillers (people displayed in the lineup who were not perpetrators) from a police lineup (Wells, Steblay, & Dysart, 2015).

Many factors can influence the efficacy of eyewitness identifications, including estimator variables and system variables. Wells (1978) explained that estimator variables encompass aspects of the situation that cannot be controlled, such as race and sex of the eyewitness and potential suspects. System variables, on the other hand, can be controlled by those who oversee the identification procedures and the criminal justice system as a whole. In this study, I investigated the impact of two system variables — lineup structure and instruction content — on identification accuracy and confidence.

Traditional Experimental Paradigm in Eyewitness Research

Most experimental studies of eyewitness identification have common methodological features. Researchers typically have participants watch a video of a mock-crime event for a short duration of time and then present to them either a target-present or target-absent photo lineup. The target-present lineup includes the photo of the mock-suspect along with an additional five filler photos, whereas the target-absent lineup does not include the mock-suspect and displays six filler photos. In addition to whether the target is present, researchers often manipulate instructions and lineup types to test their questions.

The primary dependent variables in this paradigm are accuracy and confidence. Accuracy can be tested once an identification is made or a lineup is rejected and can be measured using a Signal Detection Theory quadrant including hits, misses, false alarms, and correct rejections. In the case of eyewitness identifications, hits are identifying the correct suspect, misses are not identifying the suspect when the suspect is present in the lineup, false alarms are when an eyewitness identifies a filler, and correct rejections are when an eyewitness does not identify a suspect when the suspect is absent from the lineup (Colloff, Wade, Wixted & Maylor, 2017; MacMillan, 2002). This Signal Detection Theory model can inform the evaluation of system variables by distinguishing discriminability, the ability to tell the difference between innocent and guilty suspects, from response bias, the tendency to choose an individual as the perpetrator in eyewitness identifications (Wixed & Mickes, 2014). For the purpose of the current study, my methodology will mirror these typical paradigms with the exception of using a target-absent condition. With only a target-present lineup, I measured hits, misses, and false alarms.

Confidence may be measured immediately after the lineup viewing or later in order to measure the impact of system variables on confidence over time. Historically, confidence has been measured by asking participants to indicate how confident they are that their specific choice is correct, which makes it impossible to include non-choosers (i.e., those who reject the lineup) in confidence analyses. To combat this problem, Charman et al. (2018) suggested a novel measure of confidence for each lineup member. This measure of confidence considers average confidence of all lineup members rather than simply perpetrator confidence in the specific choice. Essentially, this is a measure of confidence that the lineup contains the perpetrator rather than confidence that the witness's choice is the perpetrator. Using this method, non-choosers can still indicate confidence in the lineup members, allowing researchers to include them in studies and analyses of eyewitness confidence. In this study, I used both measures of confidence — average and perpetrator confidence. Using both of these measures, I was able to draw conclusions about whether certain system variables impacted confidence generally, indicating a response bias, or confidence in choice specifically.

Altogether, the current study examined the impact of eyewitness instructions and lineup style on eyewitness accuracy and confidence. It extended the literature by examining the additive impact of two system variables, instructions and lineup style on an eyewitness' confidence. It also extended Charman et al.'s (2018) test of lineup confidence in an additional context by adding in differing lineup types: simultaneous and sequential.

Biased Instructions

Before an eyewitness makes an identification, an officer gives instructions regarding the lineup. These instructions can be leading — suggesting that the true perpetrator is there

— or not. Biased instructions during the commission of a lineup may affect an eyewitness's accuracy and confidence (Malpass & Devine, 1981; Steblay, 1997). One of the most common recommendations for effective lineups is that the lineup administrator should indicate to the eyewitness that the suspect may or may not be in that lineup (Charman et al., 2018; Clark, 2005; Malpass & Devine, 1981), regarded as "unbiased instructions." If these instructions are not present, and the eyewitness is told only to identify the suspect who committed the crime, they are considered "biased." Research indicates that these biased instructions drive eyewitnesses to choose a suspect more often even when the suspect is not present, producing both increased hits and false alarms (Clark, 2005).

The legal system aims to maximize hits, or correct identifications. An earlier study by Malpass and Devine (1981) found that the number of eyewitnesses who make identifications greatly increases if the lineup instructions imply that the suspect is in the lineup. In their study, half of the eyewitnesses were given biased instructions that indicated that the suspect was in the lineup while the other half were presented with unbiased instructions and given the explicit opportunity to indicate that the suspect was not present in the lineup. When the offender was present in the lineup, 100% of the eyewitnesses in the biased instructions condition made an identification that included both hits and false alarms, with a 75% hit rate. In the unbiased condition, there was an 83% hit rate.

The legal system also aims to minimize incorrect identifications in order to reduce the threat to innocent suspects. Signal Detection Theory would label this as reducing "false alarms," that is, not choosing an incorrect perpetrator or identifying a filler. According to research in Signal Detection Theory, early studies found that unbiased instructions reduced identifications when the perpetrator was absent from the lineup, reducing false alarms, while

having no effect on the rate of identification of the perpetrator when in the lineup, giving to a seemingly stable hit rate (Clark, 2012; Steblay, 1997; Wells et al., 1998). However, more recent research has shown correct identifications might be slightly decreased as well as the false identifications, giving to a response bias tendency (Scheck, Edwards, & McNamara, 2010). Clark (2012) averaged a number of false and correct identification rates comparing biased and unbiased instructions and found that, overall, false identification rates were lower with unbiased instructions than with biased instructions, but correct identification rates are also lower. This may suggest that in an unbiased instruction condition, responding becomes more conservative overall.

While the research indicates that biased instructions seem to lower both false alarm and hit rates, the use of unbiased instructions in the commission of a lineup still remains the "best practice" (Charman et al., 2018; Clark, 2005; Malpass & Devine, 1981). Recommendations given by the Innocence Project (2017) in regards to eyewitness lineup procedures include requiring the lineup administrator to present instructions to the eyewitnesses that the perpetrator may or may not be in the lineup.

An American Psychology Law-Society white paper also outlined recommendations for eyewitness lineups that included (Wells & Quigley-McBride, 2016):

1. Pre-lineup instructions should warn the witness that the culprit might not be in the lineup
2. Witnesses should be asked to indicate how certain they are in any identification that is made.

As of 2017 (Innocence Project), there are 18 states that have reformed their eyewitness identification instructions through legislation, including North Carolina.

Though the impact of instructions on accuracy is clear, the impact of them on confidence has not been studied as much. One reason biased instructions impact eyewitness confidence is suggested by the cue-belief model that, according to Leippe, Eisenstadt, and Rauch (2009), says biased instructions may shift an eyewitnesses' decision criterion and make them infer that their initial inclination is correct, creating a response bias in their decisions. This ultimately increases the eyewitness's confidence that they have chosen the correct suspect, leading to the belief that they were correct all along.

Charman et al. (2018) also found that biased lineup instructions inflated witnesses' average confidence in the guilt of the fillers compared to unbiased instructions, supporting the extrinsic cue model (Leippe et al., 2009). By measuring both average and perpetrator confidence, Charman and colleagues were able to differentiate between confidence in the choice and confidence in the fillers. They found that witnesses were more confident that the suspect was included in the lineup when he was completely absent, however, confidence was not inflated in terms of perpetrator choice. These biased instructions inflated the confidence of the eyewitness independently of their choosing status, meaning they were more confident in the biased condition that someone in the lineup was the actual perpetrator.

Instructions may have a measurable impact on eyewitness accuracy and confidence in identifying a suspect of a crime; therefore, it is vital that we study these instructions and how they impact these variables. While unbiased instructions are considered best practice (Charman et al., 2018; Clark, 2005; Malpass & Devine, 1981), the impact of instructions has not been systematically tested in the context of other system variables, such as lineup styles.

Lineup Style

Police use a variety of lineup procedures and these lineups vary throughout countries, states, and municipalities within the United States. For instance, the simultaneous photo lineup, in which all suspects' and fillers' (innocent persons) photographs are displayed at the same time, is most commonly used in the United States (Police Executive Research Forum, 2013). Sequential photo lineups, those that show each suspect's or filler's photograph one at a time in sequence, are most commonly used in Canada (Beaudry & Lindsay, 2006). Although current practice in the United States favors simultaneous lineups, there is still debate among researchers about which structure is the most effective.

Criminal justice and police protocol previously recommended the use of sequential lineups due to literature reporting significant findings in a laboratory setting favoring correct identifications and correct rejections in sequential lineup presentations (Lindsay et al., 1991; Lindsay & Wells, 1985); however, a debate has emerged on whether sequential lineups are actually superior and guidelines have pulled back that recommendation. An introductory study conducted by Lindsay and Wells (1985) found that sequential lineup presentation reduced false identification rates, presumably by reducing relative comparisons against additional suspects and fillers presented in the typical simultaneous lineups. This article introduced sequential lineups as superior to simultaneous lineups in that people would use "absolute judgements" rather than comparisons against others in a lineup. Lindsay et al. (1991) continued the program of research with a study comparing simultaneous and sequential lineups in staged-crime conditions. They also found that the sequential lineup presentation yielded significantly reduced false identifications. The researchers in turn

recommended police use these sequential lineups to reduce the chance of mistaken identification.

More current literature has challenged these sequential recommendations on the account of various methodological fallacies, including the ecological validity of the crime as well as the lineup itself. In a meta-analysis compiling research on these lineup structures, Steblay, Dysart, Fulero, and Lindsay (2001) found trends demonstrating that participants in simultaneous lineup simulations were more likely to choose a suspect, whether the person was the correct suspect or not, than those who were given the sequential lineup. Hits and false alarms were both higher in this condition, providing increased correct identifications, but also negating that positive finding with higher filler identifications, giving to a response bias shift. In an updated meta-analysis involving 72 tests of simultaneous and sequential lineups, Steblay, Dysart, and Wells (2011) found similar results to those in 2001. They found that sequential lineups were less likely to result in an identification including both hits and false alarms. Nonetheless, in the most realistic simulations of crimes and police procedures compared to laboratory scenarios, the differences between the correct identification rates and false alarms for simultaneous lineups and sequential lineups were small or nonexistent (Gronlund et al., 2012; Mickes, Flowe, & Wixted, 2012), suggesting no advantage for either style.

The effects of lineup style exclusively on eyewitness confidence is less researched. Earlier studies indicated that the mode of lineup, simultaneous versus sequential, did not significantly influence eyewitness confidence. Researchers also found that the mode of lineup did not interact with other variables to influence confidence (Lindsay & Wells, 1985). In another study looking at simultaneous and sequential lineups, Sporer (1993) came to a

somewhat different conclusion. They parsed out choosers and non-choosers in their analyses and found that they were both equally confident in the simultaneous lineup condition. However, in the sequential lineups, non-choosers were more confident than the choosers.

While Sporer (1993) was able to parse out choosers and non-choosers and lineup style, they only measured participant's confidence that their identification was accurate with no regard to average confidence of the lineup members. Charman et al.'s (2018) addition of this average confidence amongst all lineup members allowed confidence measures for choosers and non-choosers in simultaneous and sequential lineups, and tested the combined effect of instruction types and lineup styles. This gave a better overall view of eyewitness confidence.

The question of which method of lineup presentation produces the most accurate identifications still remains unanswered. The current study contributed to the literature by comparing these styles to determine whether simultaneous or sequential lineups impact accuracy and confidence. In addition, this study addressed a gap in the literature by testing for the combined effect of both lineup style and instruction content.

While the effects of lineups and instructions on accuracy and confidence have been researched for years, very few studies combined manipulations of both the variables. Typically, when researchers study the effects of instructions on confidence and accuracy, they use only a simultaneous lineup (e.g., Brewer & Wells, 2006; Charman et al., 2018; Malpass & Devine, 1981; Paley & Geiselman, 1989). Similarly, studies that mainly look at the effects of lineups on confidence and accuracy typically use unbiased instructions in their procedures (e.g., Lindsay & Wells, 1985; Meissner, Tredoux, Parker, & MacLin, 2005; Sporer, 1993).

Current Study

While research looking at eyewitness lineup procedures has found conflicting results in regards to best practices to improve accuracy, there is clear evidence that the system variables selected can and do impact both accuracy and confidence. Most evidence suggests using biased instructions creates a response bias, increasing hits and false alarms and inflating confidence. On the other hand, evidence regarding lineups and their impact on accuracy and confidence is less clear. Confidence measures, while consistently studied in terms of system variables, are taking on new forms to include average and perpetrator confidence.

Previous literature mainly tested instructions and lineup style using one of each category, i.e., only using biased instructions and testing lineups or using both instructions and only one lineup (Lindsay et al., 1997; Meissner et al., 2005). Given previous research, the current study brought together instruction presentation and lineup style and measured eyewitness accuracy and confidence in a single study to explore whether biased and unbiased identification instructions and differing lineup structures impact eyewitness accuracy in correctly choosing a perpetrator. In addition, I examined the impact of these variables on both average and perpetrator eyewitness confidence.

Participants saw either a simultaneous or sequential target-present photo lineup and were given either biased or unbiased written instructions. I asked for their confidence rating of each lineup member, their identification, and their confidence that the identification they made was correct. I measured hits, false alarms, and misses for each condition to determine accuracy and compare that to the confidence rates recorded.

Using this design in the current study, I predicted a main effect of instruction type on eyewitness accuracy. That is, I predicted that participants in the unbiased instruction condition would produce lower hit rates, fewer false alarms, and more misses in their identifications due to a response bias created by mentioning the suspect may or may not be in the lineup. In regards to lineup structure, I predicted that participants in the simultaneous condition would have higher hit rates and false alarm rates, and lower rates of misses due to previous meta-analyses that suggest this response bias (Steblay, 1997; Steblay et al., 2011).

In terms of confidence, I predicted a main effect of instruction type on perpetrator confidence; specifically, those who were presented biased instructions would be more confident in their choosing the perpetrator, because of the response bias noted above. I also expected those in the biased instruction condition to be more confident in the average lineup, which corresponded to the findings of Charman et al. (2018). Since there is not much research regarding lineup style and confidence, I did not have a specific prediction for the effect.

As far as interactions go, there were multiple possibilities when it comes to instructions and lineup styles in terms of their effects on accuracy and confidence. For instance, previous literature shows that participants in unbiased instruction conditions are more conservative in their identifications due to response bias (Clark, 2012; Amendola & Wixted, 2014; Scheck et al., 2010). Research also points to those in sequential lineup conditions to also be more conservative due to lack of ability to discriminate against additional lineup members. Therefore, it might be that those in the condition with both biased instructions and sequential lineups would have even lower accuracy, that is, higher instances of misses and false alarms and fewer hits. Another possibility was that the strength of the

unbiased instruction condition may ultimately wash out the effects of lineup style. That is, lineup style may not influence accuracy or confidence in the unbiased condition because response bias may not be present.

Method

Participants

I recruited 180 Appalachian State University psychology undergraduates (66% cisgender female; 88% White, 3% Black or African American, 6% 'other,' 3% from multiple races), who received 1 ELC credit for their participation in the experiment. Participants (n = 26) were excluded from analyses due to failing a manipulation check in the survey which asked what type of instruction they received. My calculated power analysis revealed that the number of people I would need for 80% power with a medium effect size (f = .25) and an alpha of .05 was 179 people.

Design

A 2 (Instructions: biased vs. unbiased) x2 (Lineup: simultaneous vs. sequential) between-participants design was used. All participants were randomly assigned to conditions and viewed a target-present lineup. Dependent variables measured were perpetrator and lineup eyewitness confidence and accuracy in terms of hits, misses, and false alarms.

Materials

The principle investigator created an approximately 15 s color video of a white male mock suspect breaking into a car with full face shown for approximately 7 s. A full frontal picture of the suspect's face was taken and used as the lineup picture in lineup presentations. A group of participants (N = 11) provided individual descriptions of the perpetrator from the video on a plain sheet of paper. Characteristics that were mentioned by the majority of

participants were used to create a composite description of the perpetrator from the video. Characteristics described by the majority of the participants were: white, male, medium/heavy body build, facial hair, and age range in the 20s.

Matching aforementioned characteristics, the principle investigator collected six stock photos from The Delaware Pain Database (Mende-Siedlecki, Qu-Lee, Goharzad, & Drain, 2019). These photos were converted to black and white in order to match the initial photos of the suspect and keep uniformity across photos. A separate group of participants (N = 28) were given the characteristics of the mock suspect. These participants were asked to identify the person from the lineup who they believed to be the suspect based on the characteristics. Of the six photos presented with the characteristics description, five participants chose the perpetrator, five chose the first filler, five chose the second, five chose the third, four chose the fourth, and four chose the fifth. Thus, the perpetrator was not salient in the lineup.

Procedure

Participants entered the lab in groups of 10-12 and individually viewed the 15 s mock crime video in an online Qualtrics survey that was administered on a lab computer. Participants were randomly assigned to receive either the written biased instructions displayed on the computer screen, “your job will be to identify the person that you think committed the crime,” or the unbiased instruction, “keep in mind that the criminal may or may not be in the lineup. Your job will be to identify the person that you think committed the crime, or indicate that he is ‘not there.’”

Participants were also randomly assigned to receive a simultaneous lineup displaying all six pictures at once or sequential lineup displaying six pictures one after another. In the simultaneous lineup condition, three photo lineups were created with randomized photo

placement with each lineup member in a different location in the array. In the sequential lineup condition, photos were randomized in each trial using the Qualtrics randomize question feature, therefore each lineup member was in a different place in each survey. Participants pressed the next button after they recorded their confidence rating without an opportunity to go back through the lineup.

After the video was played and instructions were given, participants were informed on their computer screen that they were to indicate their confidence ratings on a response sheet, which paralleled the Charman et al. (2018) methodology. Participants were asked to circle their corresponding confidence rating for each lineup member on the response sheet as they viewed the lineup. A blank line was printed on the response sheet where participants were asked to write in their identification. Participants were then asked to circle the corresponding confidence rating that the lineup member they chose was the actual perpetrator in the video. In order to be sure participants actually read the instructions on the Qualtrics survey, I included a manipulation check that asked them to reiterate the instructions they received.

Measures

Whether participants were accurate in their identification is a dependent variable. The participants' accuracy was measured using hits, false alarms, and misses. When a participant was accurate, they "hit" on the correct perpetrator. When they were inaccurate, they created a "false alarm" on a filler from the lineup. I also measured "misses" when a participant failed to identify a perpetrator in lineup and wrote that the perpetrator was not in the lineup.

My second dependent variable was confidence, measured as "average confidence" and "perpetrator confidence." Participants rated their confidence that each member of the

lineup was the perpetrator in the mock-crime video on an 11-point scale from 0% (not confident at all) to 100% (completely confident). This score averaged across all lineup members was "average confidence." I also asked for ratings of perpetrator confidence, confidence that the person they had chosen was actually the same person from the mock-crime video, on the same scale.

Results

Before examining the hypotheses related to accuracy, I coded all participants' responses as either a hit (n = 80, 44.44%), miss (n = 23, 12.78%), or false alarm (n = 77, 42.78%). Since misses were infrequent (simultaneous/biased, n = 0, 0.00%; simultaneous/unbiased, n = 12, 23.08%; sequential/biased, n = 2, 4.76%; sequential/unbiased, n = 9, 17.65%), I was not able to test my hypothesis that there would be main effects for both instructions and lineup style on choosing.

However, since I did have a sufficient number of hits and false alarms, I was able to explore whether the manipulations impacted eyewitness accuracy. To do this, I used a dichotomous variable, with responses coded as either accurate (hit) or inaccurate (false alarm).

Prior research suggests an ANOVA yields similar results to a binary logistic regression (D'Agostino, 1971; Lunney, 1970). Therefore, I ran a 2 x 2 ANOVA to compare the effects of lineup style and instructions on accuracy, with accuracy combining hits and false alarms as a composite measure. There was a significant main effect of lineup style, $F(1,154) = 4.97$, $p = 0.03$ (simultaneous lineup 59.21%, n = 45; sequential lineup 42.69%, n = 35). There was no main effect of instructions on accuracy, $F(1,154) = 0.39$, $p = 0.53$.

There was also an interaction between the lineup structure and instructions, $F(1,154) = 6.50$, $p = 0.01$. A further χ analysis showed a significant relationship between instructions and accuracy in the simultaneous lineup condition χ (1, $n = 76$) = 4.80, $p = 0.03$ (Figure 1). However, there was no relationship in the sequential lineup condition $\chi(1, n = 82) = 1.88$, $p = 0.170$. Participants performed worse in the sequential/biased condition. Surprisingly, they performed best in the simultaneous/biased condition.

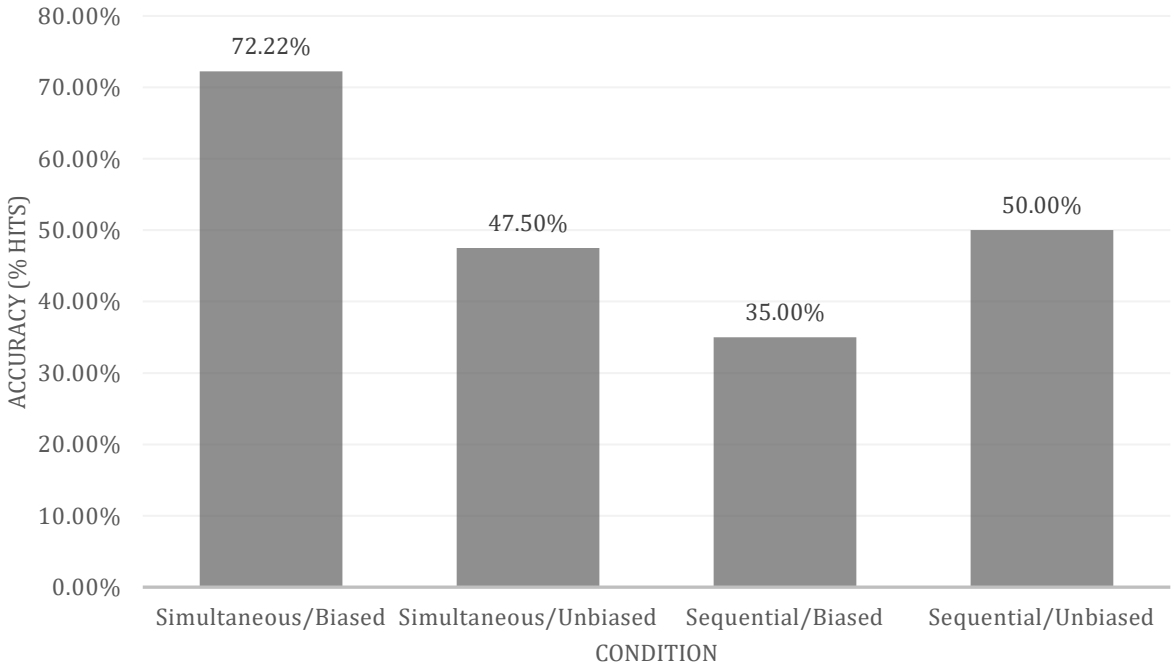

Figure 1. Interaction between lineup instructions and accuracy

To test the hypotheses about confidence, two between subjects ANOVAs were conducted to compare the effects of instructions and lineup style on average and perpetrator confidence. There was no main effect for lineup style, $F(1,154) = 1.00$, $p = 0.32$, or instructions on average lineup confidence, $F(1,154) = 0.62$, $p = 0.43$ (simultaneous/biased $M = 0.29$, $n = 35$; simultaneous/unbiased $M = 0.30$, $n = 40$; sequential/biased $M = .30$, $n = 40$;

sequential/unbiased M = .25, n = 42). This did not support my hypothesis. There was also no interaction between the two, $F(1,154) = 2.45$, $p = 0.12$.

I also did not find a main effect for lineup style on perpetrator confidence, $F(1,154) = 2.15$, $p = 0.15$, or instructions on perpetrator confidence, $F(1,154) = 0.01$, $p = 0.92$ (simultaneous/biased M = 0.65, n = 35; simultaneous/unbiased M = 0.68, n = 40; sequential/biased M = 0.63, n = 40; sequential/unbiased M = 0.58, n = 42). There was no interaction between lineup style and instructions, $F(1,154) = 1.11$, $p = 0.30$.

Discussion

The current study aimed to determine whether instruction and lineup type impacted the accuracy of eyewitness identifications and confidence in their perpetrator identification and lineup as a whole. Our identification rates: hit (n = 80, 44.44%), miss (n = 23, 12.78%), and false alarm (n = 78, 43.33%), differ from previous research measuring the same concepts. Studies vary widely and typically compare data from target-present lineups to target-absent lineups, so it is important to note that this study obtained data only from target-present lineups. These studies also typically have higher numbers of participants, and presumably better power. Steblay, Dysart, Fulero, and Lindsay's (2001) meta-analysis found overall correct decision rates in sequential and simultaneous lineups 56% and 48% respectively. Specifically, in target-present lineups, they found that sequential lineups had a 35% hit rate, 46% miss rate, and a 19% false alarm rate. In simultaneous lineup conditions they had a 50% hit rate, 26% miss rate, and a 24% false alarm rate. Additionally, other studies also find higher percentages of misses compared to false alarms (e.g., Memon & Gabbert, 2003). Our low number of misses may be attributed to the stimulus materials. Because misses can only occur in target-present lineups, perhaps our stimulus lineup left no

room for doubt when making an identification, or rejecting the lineup. Also, the lack of a distractor task may have contributed to this effect. The lineup was presented to participants only seconds after they viewed the mock crime video, that being said, they may have had no room for doubt in their confidence ratings, ultimately making their confidence judgements higher.

While I was unable to test my first three hypotheses due to the lower number of recorded misses (12.78%), I found that lineup style did impact eyewitness accuracy. Over half of the participants (59.21%) who were in the simultaneous lineup condition were accurate, or "hit" on the suspect from the mock video, while only 42.69% of the participants in the sequential lineup condition were accurate and hit on the correct suspect. As the debate pinning simultaneous and sequential lineups against each other continues, in this case, those in the simultaneous lineup condition were more accurate. However, since misses were not analyzed, it is difficult to say whether the higher hit rate was due to overall higher levels of choosing a perpetrator, something that was pointed out by Steblay et al., (2001). This finding ultimately further complicates the argument whether simultaneous or sequential lineups are superior.

I attempted to fill a gap in the literature by combining two system variables, lineup style and instructions, to see whether they had an interactive effect on accuracy and confidence. As far as interactions go, there was a significant effect between instructions and accuracy in the simultaneous lineup condition, but not in the sequential lineup condition. Participants in the simultaneous lineup condition who also were randomly assigned the biased instruction condition were more accurate than all other conditions (72.22%). Paralleling findings regarding instructions, biased instructions are said to increase the

likelihood of choosing a perpetrator from a lineup overall (Clark, 2012; Malpass & Devine, 1981). Again, since I did not analyze misses, I am not sure whether this is the case. Because the participants were not explicitly told the perpetrator may or may not be in the lineup, they may have assumed that the perpetrator was there, ultimately increasing overall choosing and hit rates. This finding contributes to the previous literature that instruction type affects choosing rates if an individual is made to believe the perpetrator is in the lineup.

Participants in the biased instruction and sequential lineup conditions were the least accurate in identifying the correct suspect compared to all other conditions (35% hit rate). Studies, while varied, have found that biased instructions tend to increase both correct and incorrect identifications (Clark, 2005; Malpass & Devine, 1981). Additionally, studies looking at lineup types have found that participants in a sequential lineup may be more conservative in their choosing an individual from the lineup. In this study, participants in the sequential/biased condition were not more conservative in their choosing in that only two participants out of the 42 in that condition did not choose an individual. Perhaps the stimulus materials contributed to this finding. While we tested the lineup prior to the study, we did not measure participants' appearance similarity ratings of the lineup members. Participants also had the ability to choose when to move on in the sequential lineup condition. Because this timing was not consistent across participants, perhaps there was more room for interference in this condition. Maybe this would have shed light on why we found this condition to be the lowest in accuracy.

These findings add to the research looking at system variables and their effects on accuracy in eyewitness identification. Perhaps these findings demonstrate why law enforcement might prefer the simultaneous lineup and biased instruction combination when

the target is present as it may lead to more correct identifications. While some research has found negating evidence that overall higher choosing increases both hits and false alarms, maybe pairing this specific lineup with this specific instruction condition could continue to produce more accurate results.

One purpose of this study was to examine whether lineup style and instructions affected two differing measures of confidence, average and perpetrator. The results did not support my hypotheses regarding confidence. While I predicted a main effect of instructions on confidence based on findings by Charman et al. (2018) and Leippe et al. (2009), I did not see that in the current study. I predicted that those in the biased instruction condition would be more confident in the average lineup as well as choosing a perpetrator. As previously mentioned, average confidence measurements are a somewhat new concept proposed by Charman et al. (2018). While Charman et al. (2018) did find that biased instructions significantly increased eyewitness's average confidence, they did not find that effect in target-present lineups, which my study only tested.

While average confidence measures are relatively new, perpetrator confidence measures have been studied extensively for years. Some studies find an impact on confidence with similar variable manipulations, especially in regards to instructions (Charman et al., 2018; Sporer, 1993). Some reasons why I didn't find this effect could be due to the study design. Perhaps not including a distractor task between showing the mock crime video and the confidence ratings impacted accuracy and participants' confidence that they chose the correct suspect.

Limitations

Limitations of the current study mimic limitations of eyewitness identification research as a whole. First, watching a mock video of a crime is not inherently parallel to seeing a crime in person. In terms of mock crimes and actual crimes, it is also unlikely that someone in an actual eyewitness scenario did not interact with more people during the identification procedure, including officers, detectives, and lineup administrators. In my study, participants interacted only with me as they entered the room and I did not technically administer the lineup as would typically happen in reality. I was also unable to mimic a delay in seeing the crime and identifying a suspect as real crimes would provide. Ultimately, having a participant identify a suspect immediately after watching a crime is improbable and potentially affects accuracy and confidence that is not apparent in real crime events. As I look back, creating a distractor task, like many studies often do, would somewhat mimic this, however, it would still not be able to compare to a real crime scenario.

In terms of confidence, I also consider a potential issue with asking for multiple confidence judgements. That is, when asked first to rate confidence for each individual in the lineup, I can see how this may affect the later perpetrator confidence judgement, even though this is the same paradigm Charman et al. (2018) used in their study and found effects on confidence. In the current study, participants were first asked to rate their confidence in each lineup individual, always including the perpetrator given all lineups were target-present. They then made an identification, or not, and rated their perpetrator confidence in their identification. The act of requiring participants to indicate confidence of the perpetrator two times in the questionnaire might have created confusion on their part or caused them to alter

their response. In future analyses, I will analyze whether participants' first confidence rating of the perpetrator in the lineup was the same as their second perpetrator confidence rating.

The study design as a whole may also pose some limitations. While I tested the lineup with a subgroup of participants, I did not measure study participants' similarity ratings for lineup members like other studies often include in order to determine whether perceived similarity among lineup members mediates an increase in confidence. Perhaps this could have shed light on why I didn't find what I was expecting in regards to my hypotheses. Additionally, I did not include target-absent lineups, which would have made for some interesting comparisons with my current data. Another aspect of the study methodology that may have posed an issue is the numbering of the stimulus photos and the paper response sheet. I numbered each individual in the lineup with the same number throughout trials. That is, the perpetrator was always number one, but didn't always appear first in the lineup. The paper response form always had confidence ratings for lineup member number one first, but maybe during the commission of the lineup, participants only went in order of the lineup showing, disregarding the member numbers under each photo.

While there are limitations to the current study, and studies in this field, it is vital to continue this work to further research and propose practical implications for the legal system. The goal of the legal system is to maximize the correct identification of suspects in order to reduce the threat to society, and to minimize incorrect identifications in order to reduce the threat to innocent suspects. Without consistent research, we are unable to do this effectively.

References

Amendola, K. L., & Wixted, J. T. (2014). Comparing the diagnostic accuracy of suspect identifications made by actual eyewitnesses from simultaneous and sequential lineups in a randomized field trial. *Journal of Experimental Criminology, 11*, 263-284. doi:10.1007/s11292-014-9219-2

Beaudry, J. L., & Lindsay, R. C. L. (2006). Current identification procedure practices: A survey of Ontario police officers. *The Canadian Journal of Police and Security Services, 4*, 178-183.

Charman, S. D., Carol, R. N., & Schwartz, S. L. (2018). The effect of biased lineup instructions on eyewitness identification confidence. *Applied Cognitive Psychology, 32,* 70-82. doi:10.1002/acp.3401

Clark, S. E. (2005). A re-examination of the effects of biased lineup instructions in eyewitness identification. *Law and Human Behavior, 29,* 575-604. doi:10.1007/s10979-005-7121-1

Clark, S. E. (2012). Costs and benefits of eyewitness identification reform: Psychological science and public policy. *Perspectives on Psychological Science, 7*, 240-243.

Colloff, M. F., Wade, K. A., Wixted, J. T., & Maylor, E. A. (2017). A signal-detection analysis of eyewitness identification across the adult lifespan. *Psychology and Aging, 3,* 243-258. doi:10.1037/pag0000168

D'Agostino, R. (1971). A second look at analysis of variance on dichotomous data. *Journal of Educational Measurement, 8*, 327-333.

Gronlund, S. D., Carlson, C. A., Neuschatz, J. S., Goodsell, C. A., Wetmore, S. A., Wooten, A., & Graham, M. (2012). Showups versus lineups: An evaluation using ROC

analysis. *Journal of Applied Research in Memory and Cognition,* 221-228. doi:10.1016/j.jarmac.2012.09.003

Innocence Project (2012). *Eyewitness misidentification.* Retrieved from http://www.innocenceproject.org/understand/Eyewitness-Misidentification.php

Innocence Project (2017). *Eyewitness misidentification.* Retrieved from https://www.innocenceproject.org/dna-exonerations-in-the-united-states/

Leippe, M. R., Eisenstadt, D., Rauch, S. M. (2009). Cueing confidence in eyewitness identifications: Influence of biased lineup instructions and pre-identification memory feedback under varying lineup conditions. *Law and Human Behavior, 33,* 194-212. doi:10.1007/s10979-008-9135-y

Lindsay, R. C. L., Lea, J. A., Nosworthy, G. J., Fulford, J. A., Hector, J., LeVan, V., & Seabrook C. (1991). Biased lineups: Sequential presentation reduces the problem. *Journal of Applied Psychology, 76,* 796-802. doi:10.1037/0021-9010.76.6.796

Lindsay, R. C. L., Pozzulo, J. D., Craig, W., Lee, K., & Corber, S. (1997). Simultaneous lineups, sequential lineups, and showups: Eyewitness identification decisions of adults and children. *Law and Human Behavior, 21,* 391-404. doi:10.1023/A:1024807202926

Lindsay, R. C. L., Ross, D. F., Read, J. D., & Toglia, M. P. (2007). *Handbook of eyewitness psychology: Memory for people.* Mahwah, NJ: Erlbaum.

Lindsay, R. C., & Wells, G. L. (1985). Improving eyewitness identifications from lineups: Simultaneous versus sequential lineup presentation. *Journal of Applied Psychology, 70,* 556-564. doi:10.1037/0021-9010.70.3.556

Lunney, G. (1970). Using analysis of variance with a dichotomous dependent variable: An empirical study. *Journal of Educational Measurement, 7*, 263-269.

MacMillan, N. A. (2002). Signal detection theory. In Stevens' Handbook of Experimental Psychology, H. Pashler (Ed.). doi:10.1002/0471214426.pas0402

Malpass, R. S., & Devine, P. G. (1981). Eyewitness identification: Lineup instructions and the absence of the offender. *Journal of Applied Psychology, 66,* 343-350.

Meissner, C. A., Tredoux, C. G., Parker, J. F., & MacLin, O. H. (2005). Eyewitness decisions in simultaneous and sequential lineups: A dual-process signal detection theory analysis. *Memory and Cognition, 33,* 783-792.

Memon, A., & Gabbert, F. (2003). Improving the identification accuracy of senior witnesses: Do prelineup and sequential testing help? *Journal of Applied Psychology, 88,* 341-350. doi:10.1037/0021-9010.88.2.341

Mende-Siedlecki, P., Qu-Lee, J., Goharzad, A., & Drain, A. (2018). The Delaware pain database: A set of painful expressions and corresponding norming data. *Open Science Framework.*

Mickes, L., Flowe, H. D., & Wixted, J. T. (2012). Receiver operating characteristic analysis of eyewitness memory: Comparing the diagnostic accuracy of simultaneous versus sequential lineups. *Journal of Experimental Psychology, 18,* 361-376. doi:10.1037/a0030609

Paley, B., & Geiselman, E. R. (1989). The effects of alternative photospread instructions on suspect identification performance. *American Journal of Forensic Psychology, 7*, 3-13.

Police Executive Research Forum (2013). *A national survey of eyewitness identification procedures in law enforcement agencies.* Retrieved from policeforum.org/library/eyewitness-identification/NIJEyewitnessReport.pdf

Scheck, B. C., Edwards, E. R., & McNamara, J. M. (2010). *Eyewitness identification science post-Manson: An explosion of robust and rigorous research.* State of New Jersey v. Larry R. Henderson, Remand Hearing.

Sporer, S. L. (1993). Eyewitness identification accuracy, confidence, and decision times in simultaneous and sequential lineups. *Journal of Applied Psychology, 78,* 22-33. doi:10.1037/0021-9010.78.1.22

Steblay, N. M. (1997). Social influence in eyewitness recall: A meta-analytic review of lineup instruction effects. *Law and Human Behavior, 21,* 283-297. doi:10.1023/A:1024890732059

Steblay, N. M., Dysart, J. E., & Wells, G. L. (2011). Seventy-two tests of the sequential lineup superiority effect: A meta-analysis and policy discussion. *Psychology, Public Policy, and Law, 17,* 99-139.

Steblay, N. M., Dysart, J., Fulero, S., & Lindsay, R. C. L. (2001). Eyewitness accuracy rates in sequential and simultaneous lineup presentations: A meta-analytic comparison. *Law and Human Behavior, 25,* 459-473. doi:10.1023/A:1012888715007

Wells, G. L . (1978). Applied eyewitness-testimony research: System variables and estimator variables. *Journal of Personality and Social Psychology, 36,* 1546-1557. doi:10.1037/0022-3514.36.12.1546

Wells, G. L . (2014). Eyewitness identification: Probative value, criterion shifts, and policy regarding the sequential lineup. *Current Directions in Psychological Science, 23,* 11-16. doi:10.1177/0963721413504781.

Wells, G. L., & Loftus, E. F. (Eds.). (1984). *Eyewitness testimony: Psychological perspectives.* New York, NY: Cambridge University Press.

Wells, G. L., & Quigley-McBride, A. (2016). Applying eyewitness identification research to the legal system: A glance at where we have been and where we could go. *Journal of Applied Research in Memory and Cognition, 5,* 290-294. doi:10.1016/j.jarmac.2016.07.007

Wells, G. L., Small, M., Penrod, S., Malpass, R. S., Fulero, S. M., & Brimacombe, C. A. E. (1998). Eyewitness identification procedures: Recommendations for lineups and photospreads. *Law and Human Behavior, 22*, 603-647. doi:10.1023/A:1025750605807

Wells, G. L., Steblay, N. K., & Dysart, J. E. (2015). Double-blind photo-lineups using actual eyewitnesses: An experimental test of a sequential versus simultaneous lineup procedure. *Law and Human Behavior, 39,* 1-14. doi:10.1037/Ihb0000096.

Wixted, J. T., & Mickes, L. (2014). A signal-detection-based diagnostic-feature-detection model of eyewitness identification. *Psychological Review, 121*(2), 265. doi:10.1037/a0035940

Appendix A

IRB Approval

To: Samantha Shireman
University College
CAMPUS EMAIL

From: Robin Tyndall, IRB Administrator
Date: 3/20/2019
RE: Notice of IRB Exemption

STUDY #: 19-0236
STUDY TITLE: Eyewitness Identification

Exemption Category: 2.Survey, interview, public observation

This study involves minimal risk and meets the exemption category cited above. In accordance with 45 CFR 46.101(b) and University policy and procedures, the research activities described in the study materials are exempt from further IRB review.

All approved documents for this study, including consent forms, can be accessed by logging into IRBIS. Use the following directions to access approved study documents.

1. Log into IRBIS
2. Click "Home" on the top toolbar
3. Click "My Studies" under the heading "All My Studies"
4. Click on the IRB number for the study you wish to access
5. Click on the reference ID for your submission
6. Click "Attachments" on the left-hand side toolbar
7. Click on the appropriate documents you wish to download

Study Change: Proposed changes to the study require further IRB review when the change involves:

- an external funding source,
- the potential for a conflict of interest,
- a change in location of the research (i.e., country, school system, off site location),
- the contact information for the Principal Investigator,
- the addition of non-Appalachian State University faculty, staff, or students to the research team, or

- the basis for the determination of exemption. Standard Operating Procedure #9 cites examples of changes which affect the basis of the determination of exemption on page 3.

Investigator Responsibilities: All individuals engaged in research with human participants are responsible for compliance with University policies and procedures, and IRB determinations. The Principal Investigator (PI), or Faculty Advisor if the PI is a student, is ultimately responsible for ensuring the protection of research participants; conducting sound ethical research that complies with federal regulations, University policy and procedures; and maintaining study records. The PI should review the IRB's list of PI responsibilities.

To Close the Study: When research procedures with human participants are completed, please send the Request for Closure of IRB Review form to irb@appstate.edu.

If you have any questions, please contact the Research Protections Office at (828) 262-2692 (Robin).

Best wishes with your research.

Websites for Information Cited Above

Note: If the link does not work, please copy and paste into your browser, or visit https://researchprotections.appstate.edu/human-subjects.

1. Standard Operating Procedure #9: http://researchprotections.appstate.edu/sites/researchprotections.appstate.edu/files/IRB20SOP920Exempt%20Review%20Determination.pdf

2. PI responsibilities: http://researchprotections.appstate.edu/sites/researchprotections.appstate.edu/files/PI20Responsibilities.pdf

3. IRB forms: http://researchprotections.appstate.edu/human-subjects/irb-forms

Appendix B

Consent to Participate in Research

Information to Consider About this Research

Eyewitness Identification

Principal Investigator: Samantha Shireman Department: Psychology
Contact Information: Twila Wingrove
112C Smith-Wright Hall
828-262-8965

You are being invited to take part in a research study about eyewitness identifications. If you take part in this study, you will be one of about 200 people to do so. By doing this study we hope to continue to develop research materials for a future study.

The research procedures will be conducted at Appalachian State University, Boone, NC.

You will be asked to view a video of a suspect breaking into a car and then indicate who you believe to be the suspect in a photo lineup.

You cannot volunteer for this study if are under 18 years of age.

What are possible harms or discomforts that I might experience during the research?
To the best of our knowledge, the risk of harm for participating in this research study is no more than you would experience in everyday life.

What are the possible benefits of this research?
There may be no personal benefit from your participation but the information gained by doing this research may help others in the future by determining accurate and effective materials for a future study.

Will I be paid for taking part in the research?
You will not be paid for your participation in this study. However, you can earn 1 ELC credit for your participation. There are other research options and non-research options for obtaining extra credit or ELC's. One non-research option to receive 1 ELC is to read an article and write a 1-2 page paper summarizing the article and your reaction to the article. More information about this option can be found at: psych.appstate.edu/research. You may also wish to consult your professor to see if other non-research options are available.

How will you keep my private information confidential?
We will make every effort to prevent anyone who is not on the research team from knowing that you gave us information or what that information is. Participant's data and names will be kept separate at all times. Survey question will not ask for identifiable information from the participant.

Survey data will be kept on a locked computer for approximately three months in order to create additional future study material.

Who can I contact if I have questions?
The people conducting this study will be available to answer any questions concerning this research, now or in the future. You may contact the Principal Investigator at 828-262-8965. If you have questions about your rights as someone taking part in research, contact the Appalachian Institutional Review Board Administrator at 828-262-2692 (days), through email at irb@appstate.edu or at Appalachian State University, Office of Research and Sponsored Programs, IRB Administrator, Boone, NC 28608.

Do I have to participate? What else should I know?
Your participation in this research is completely voluntary. If you choose not to volunteer, there will be no penalty and you will not lose any benefits or rights you would normally have. If you decide to take part in the study you still have the right to decide at any time that you no longer want to continue. There will be no penalty and no loss of benefits or rights if you decide at any time to stop participating in the study. If you decide to participate in this study, let the research personnel know. A copy of this consent form is yours to keep.

Participant's Name (PRINT) Signature
Date

Appendix C

Qualtrics Surveys

- Simultaneous lineups: https://appstate.az1.qualtrics.com/jfe/form/SV_2fxh8S3CqfwvuUl
- Sequential lineups: https://appstate.az1.qualtrics.com/jfe/form/SV_1LHkmVmBGuBMMF7

Appendix D

Paper Response Sheet 4-digit number: __ __ __ __

1. Please circle how confident you are that each individual presented is the perpetrator in the video (0%: not at all confident - 100% completely confident):

Perpetrator 1:

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Perpetrator 2:

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Perpetrator 3:

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Perpetrator 4:

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Perpetrator 5:

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Perpetrator 6:

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

2. Please indicate your identification decision:

_____

3. Please circle how confident you are that the individual you identified was the perpetrator in the video (0%: not at all confident - 100% completely confident):

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

4. Please continue the online survey.

Appendix E

Photo Lineups

Vita

Samantha C. Shireman was born in Rochester, New York, to Kimberly Shireman. She graduated from Union Pines High School in June 2013. She attended Appalachian State University and earned Bachelor of Science degree in psychology with minors in Computer Information Systems and Criminal Justice in May 2017. In the fall of 2017, she remained at Appalachian State to earn her Master or Arts degree in Experimental Psychology. The Master of Arts degree was awarded in December 2019.