Examining Lineup Identification as a Function of Foil Similarity and Lineup Procedure

by

Keltie J. Pratt

A thesis submitted to the Faculty of Graduate and Postdoctoral

Affairs in partial fulfillment of the requirements

for the degree of

Master of Arts

in

Psychology

Carleton University
Ottawa, Ontario

Abstract

The current study examined the effect of lineup procedure and foil similarity on identification accuracy. This study presented adults (N = 287) with either a modified lineup procedure, referred to as the elimination-plus procedure, or the simultaneous procedure. The level of similarity between the foil photographs and the target photo was manipulated (i.e., high similarity or low similarity) in addition to whether the target was present or absent in the lineup. Results from the current study indicate higher rates of correct identification for the simultaneous rather than the elimination-plus procedure and comparable rates of correct rejection across the two lineups. Additionally, similar to previous research, identification accuracy was highest in low similarity conditions compared to high similarity conditions. No interactions were found. The elimination-plus procedure is beneficial as it provides an additional confidence rating, taken after judgment 1. Implications of these findings and suggestions for future research are discussed.

Acknowledgements

The completion of this thesis would not have been possible without the support of a number of individuals. First, I would like to thank my supervisor, Dr. Joanna Pozzulo. Your guidance, support, and enthusiasm were immeasurable throughout this entire process. Thank you for taking the time to teach me how to be a better writer and for teaching me how to have faith in my own abilities.

I would also like to thank my lab mates, Chelsea Sheahan and Emily Pica. Your continued advice, feedback, and support were essential to the completion of this thesis. I am so lucky to have met you.

Thank you to my committee members Dr. Craig Bennell and Dr. Shelley Brown for your thoughtful feedback and valuable advice.

To my family, thank you for providing me with unwavering support and continuous encouragement throughout my years of study and through the process of researching and writing this thesis. Thank you for inspiring me to follow my heart and to take chances.

Finally, to my wonderful partner Steve. Thank you for encouraging me when I needed to be encouraged, for supporting me when I needed to be supported, and for loving me through all of the chaos that is academia. Because of you, this part of my life has been a wonderful adventure.

Table of Contents

List of Tables

List of Appendices

Examining Lineup Identification as a Function of Foil Similarity and Lineup Procedure

Eyewitness misidentification has been found to be the leading cause of wrongful conviction (Innocence Project, 2015). In fact, in Canada, out of the 21 wrongful conviction cases reported, 33% that have been overturned by DNA evidence cite faulty eyewitness identification as a contributing cause of the wrongful conviction (Innocence Canada, personal communication, September 28, 2016). Additionally, in the United States, out of the 349 wrongful conviction cases, 72% have been attributed to eyewitness misidentification (Innocence Project, 2015). Clearly, juries often place a great deal of emphasis on eyewitness testimony during deliberation and sentencing (Malpass & Devine, 1981; Wells, 1993). While research regarding eyewitness identification has been of great interest for many years, much of the past 30 years has focused on differences across lineup procedures (e.g., Pozzulo, Reed, Pettalia, & Dempsey, 2015; Wells, Steblay, Dysart, 2015). However, one aspect of the lineup procedure literature that has been largely understudied relates to lineup construction, more specifically, foil similarity (Fitzgerald, Oriet, & Price, 2015).

When constructing a lineup, the researcher (or police officer) has to keep in mind multiple variables that can influence the likelihood and accuracy of an identification decision. Factors such as lineup size, lineup fairness, lineup procedure, target presence, foil/target similarity and selection, for example, all play a role in identification accuracy. To further complicate matters, different jurisdictions employ different standards for lineup construction and lineup identification procedures. For example, in Canada, photographic lineups are most commonly presented sequentially (i.e., one at a time; Beaudry & Lindsay, 2006), whereas in the United States the simultaneous lineup procedure (i.e., all photos are shown at the same time) is most commonly used (Police

Executive Research Forum, 2013). Furthermore, in the United Kingdom live lineups or video lineups are often employed, however in both Canada and the United States the use of photographic lineups is more common. Interestingly, each of the countries previously mentioned have founded their decisions based on empirical evidence and case law. However, as is demonstrated by these few examples, it is evident that there is a discourse throughout the literature regarding which practices and procedures are considered superior. Thus, researchers continue to examine the multitude of factors that can influence eyewitness identification accuracy in an attempt to find empirical support for the best practices related to eyewitness identification. Therefore, the purpose of this study is to examine the influence of lineup procedure, target presence, and one factor relating to lineup construction, specifically foil similarity, on eyewitness identification accuracy.

Eyewitness Identification

Eyewitness identification often occurs through the use of lineup tasks, primarily through the use of photographic lineups. The purpose of a photographic lineup is to gain information regarding the identity of the perpetrator (Wells, 1998), hence to maximize the likelihood of a correct identification of the perpetrator and minimize the likelihood of the false identification of an innocent suspect (Wells, Rydell, & Seelau, 1993). During this task, a witness is shown a number of photographs that may or may not include the perpetrator, as well as foil photographs (i.e., photos of individuals known to be innocent by the police; Lindsay & Wells, 1985; Zajac & Karageorge, 2009). The eyewitness is then required to examine the photographs and select the picture of the perpetrator should he or she be present in the lineup, or alternatively, reject the lineup if the perpetrator's photo is not present.

The eyewitness may be presented with one of two possible lineups: target-present or target-absent. A target-present lineup will include a picture of the perpetrator whereas a target-absent lineup will not include a picture of the perpetrator and will instead include a photograph of an innocent suspect. In the real world it is unknown to police whether the suspect they have apprehended is guilty or innocent of the crime in question. In controlled research studies, however, the presence of the guilty suspect can be experimentally manipulated by researchers to allow for a better understanding of the underlying processes involved in identification accuracy; namely correct identification and correct rejection.

Target-present. When viewing a target-present lineup an eyewitness can make one of three choices: a) a correct identification; b) a foil identification; or c) a false rejection (Wells, 1993). A correct identification involves the eyewitness correctly choosing the perpetrator from the lineup. Alternatively, an eyewitness might make a foil identification. In this situation, the eyewitness will incorrectly identify a known innocent person (i.e., foil) from the photos presented to them. While a foil identification is unhelpful in regard to identifying the perpetrator, the consequences of making this decision are less severe such that the individual that is selected will not face any repercussions, as they are known to be innocent (Zajac & Karageorge, 2009), however, making a foil identification can impact the credibility of the witness (Pozzulo & Lindsay, 1999). Finally, in a target-present lineup the eyewitness may make a false rejection wherein the eyewitness fails to recognize the perpetrator from the lineup and incorrectly rejects the lineup stating that the perpetrator is not present amongst the photos. The consequence of making such a decision is complex such that an incorrect rejection of a target-present lineup can lead to the perpetrator being released back into the community

with the potential to pose further danger. The only correct choice to be made in a target-present lineup is a correct identification of the perpetrator (Lindsay & Wells, 1980).

Target-absent. When viewing a target-absent lineup, three choices are possible for the eyewitness: a) a correct rejection; b) a foil identification; or c) a false identification. A correct rejection occurs when the eyewitness correctly states that a photograph of the perpetrator is not present in the lineup (i.e., they reject the lineup photographs). As mentioned previously, a foil identification occurs when the eyewitness incorrectly identifies a known innocent person as the perpetrator. Lastly, a false identification indicates a selection of the innocent suspect by the eyewitness. A false identification can have severe consequences as it can lead to a false accusation and conviction of an innocent person (Beal, Schmitt, & Dekle, 1995) and additionally, the perpetrator may never be caught (Malpass & Devine, 1981). Therefore, creating a lineup procedure that generates the highest rates of correct identification in target-present lineups, and correct rejections in target-absent lineups is crucial for the successful identification and prosecution of guilty individuals.

Lineup Presentation and Accuracy

Two of the most commonly used lineup procedures are the simultaneous lineup and the sequential lineup (Steblay, Dysart, Fulero, & Lindsay, 2001). The simultaneous lineup requires that all pictures be presented to the eyewitness at the same time and the eyewitness is asked whether the perpetrator is or is not present. This procedure allows the eyewitness to compare all pictures against one another (i.e., a relative judgment) before reaching a decision (Wells, 1993). Various researchers have criticized this lineup method because the relative judgment may perpetuate an incorrect identification of an innocent suspect in target-absent lineups, as the eyewitness may select someone because they look

most like the perpetrator, rather than selecting him or her because he or she *is* the perpetrator (Pozzulo & Lindsay, 1998; Wells, 1984). Alternatively, the sequential lineup procedure, developed by Lindsay and Wells (1985), was created in an attempt to increase an eyewitness' use of an absolute judgment rather than a relative judgment. An absolute judgment requires the witness to make a decision by comparing each lineup member to his or her memory of the perpetrator rather than comparing across photographs (Wells & Lindsay, 1985; Wells, Steblay, & Dysart, 2015). For the sequential lineup procedure, an eyewitness is required to view one photo at a time and compare that photo to his or her memory of the perpetrator (i.e., make an absolute, yes or no, judgment). The eyewitness is informed that he/she will not be able to reexamine any photos previously viewed and that each decision made cannot be changed (Lindsay & Wells, 1985).

There are conflicting findings regarding the rates of correct identification for adults when using different lineup procedures (e.g., Humphries, Holliday, & Flowe, 2012; Pozzulo & Lindsay, 1998). While some research has indicated no differences across lineup procedure for correct identifications (e.g., Parker & Ryan, 1993; Pozzulo & Balfour, 2006) other research has contended that correct identification rates are reduced when employing the sequential lineup procedure (e.g., Clark & Godfrey, 2009; Flowe & Ebbesen, 2007; Palmer & Brewer, 2012). It has been argued that the sequential lineup procedure may increase the level of caution the eyewitness uses when making an identification and thus, the number of correct identifications being made when using this procedure decreases (Humphries et al., 2012).

Steblay and colleagues (2001) took a meta-analytic ($k = 23$) approach to assess differences between the simultaneous and sequential lineups in adult eyewitnesses. When comparing the simultaneous and sequential lineups, Steblay et al. (2001) found higher

rates of correct identification in target-present lineups for the simultaneous lineup procedure. Importantly, however, these results were not as robust when moderator variables such as presentation methodology were controlled (Steblay et al., 2001). For example, live events (i.e., realistic stimuli) rather than static events (i.e., slide presentations) are often associated with a smaller difference in correct identification rates produced by the simultaneous and sequential lineups. Additionally, the researchers indicated correct rejection rates were higher for the sequential lineup in comparison to the simultaneous lineup. The findings of this meta-analysis indicate distinct differences between the successes of both lineup procedures for adult eyewitnesses (i.e., potential higher correct identifications with the simultaneous lineup and lower false positive identifications with the sequential lineup; Steblay et al., 2001). These differences ultimately highlight the importance of lineup procedure, as the results obtained from using one lineup can differ from those found when using another lineup.

More recently, Steblay, Dysart, and Wells (2011) conducted a follow-up meta-analysis comparing the simultaneous and sequential procedures to update their previous findings (k = 72). Overall, their findings echoed those of Steblay et al. (2001); in target-absent lineups, the sequential procedure reduced false positive identifications compared to the simultaneous procedure, and in target-present lineups the simultaneous procedure produced higher correct identifications compared to the sequential procedure. Moreover, the findings indicated that researchers were following a stricter 2 (simultaneous or sequential) x 2 (target-present or target-absent) study design criteria in later studies. Twenty-seven studies matched this criterion and contributed to the finding that there is an 8% difference between the perpetrator identification rates in favor of the simultaneous lineup procedure (in comparison to 15% that was noted in the 2001 meta-analysis).

Simultaneous vs. sequential debate. There has been great debate regarding the superiority of the sequential lineup compared to the simultaneous lineup (Wells, Smalarz, & Smith, 2015). Researchers who analyze their data using Receiver Operating Characteristic (ROC) argue that the simultaneous lineup is superior to the sequential lineup. Receiver Operating Characteristic is a measure of discriminability, that is, a measure of overlap between the target and filler distributions (Wixted & Mickes, 2014). Essentially, ROC analyses plot correct identification rates against false identification rates across the full range of eyewitness confidence (Wixted & Mickes, 2015). When using ROC, researchers have found that by disregarding low-confidence identifications the benefit of this procedure is two-fold. First, ROC analyses allow the researcher to use a more conservative criterion for counting suspect identifications and second, both correct and false identification rates will be lower (Wixted & Mickes, 2015). Moreover, it is argued that ROC analysis is the most effective way of separating innocent and guilty suspects into their correct categories (Wixted & Mickes, 2015). According to Wixted and Mickes (2015) ROC analysis is the only type of analysis that can identify the diagnostically more accurate identification procedure, and when using ROC analysis, the simultaneous procedure appears to be more diagnostic of the suspect's guilt.

Alternatively, some researchers prefer to utilize diagnosticity ratios in their analyses. A diagnosticity ratio is the ratio of the probability of an accurate identification in a target-present lineup to the probability of an incorrect identification of an innocent suspect in a target-absent lineup. Proponents of the diagnosticity ratio analysis argue that lineup identification tasks have a natural 3 x 2 structure because each lineup includes either the guilty suspect (target-present) or an innocent suspect (target-absent) and foils (known innocent suspects; Wells et al., 2015a). This structure allows for one of three

possible responses from the witness – a correct identification, an incorrect identification, or a correct rejection (Wells et al., 2015a). Conversely, ROC analysis utilizes a 2 (signal + noise vs. noise) x 2 (positive vs. negative response) structure that considers all mistaken foil identifications as rejections (Wells et al., 2015a). Wells and colleagues (2015a) argue that by collapsing the 2 x 2 ROC structure onto the 3 x 2 structure of diagnosticity ratios obscures the true effects of what is happening in the data, especially given foil identifications are treated as rejections. When using diagnosticity ratios, researchers conclude that the sequential lineup is better than the simultaneous (Wells, Smith, Smalarz, 2015).

Given that the simultaneous procedure is the most commonly used lineup procedure (Wells, 1993) and the literature remains unclear regarding the best procedure to be used in practice, the current study will examine the simultaneous procedure and use diagnosticity ratios. ROC analysis will not be used as Wells and colleagues (2015) have argued that ROC fails to acknowledge all possible identification decisions (e.g., suspect identifications, filler identifications, and rejections) as it considers filler identifications to be equivalent to rejections. As such, Wells and colleagues (2015) suggest that ROC disregards important diagnostic information about the effectiveness of different lineup procedures. As not all identification errors are treated similarly in the real world (i.e., foil identification vs. false identification), when understanding the influence of an identification procedure it is necessary to be aware of how procedures differ as a function of type of error and this information can best be obtained using diagnosticity ratios.

Elimination lineup. An alternative to the simultaneous and sequential lineup procedures is the elimination lineup procedure developed by Pozzulo and Lindsay (1999) in an attempt to increase children's correct rejection rates in target-absent lineups while

maintaining high rates of correct identification in target-present lineups. The elimination procedure employs a two-step judgment process utilizing the two key components of the simultaneous and sequential lineups – relative and absolute judgments, respectively. The first step of the identification process involves a relative judgment such that when presented with a simultaneous lineup, the eyewitness must select the photograph of the person that looks most like the perpetrator (Pozzulo & Lindsay, 1999). Following this selection all other photographs are removed from view and the eyewitness is tasked with making an absolute judgment by identifying whether the photo they previously chose is, in fact, the perpetrator (Pozzulo & Lindsay, 1999). The first step in the two-step judgment process allows the eyewitness to compare across lineup members and select the person most similar to the perpetrator, while the second step allows the witness to compare the picture they have chosen to their memory of the perpetrator.

The elimination procedure also includes an additional piece of information referred to as the "survival status" of the suspect, that is, the rate at which the suspect survives the first judgment (Pozzulo & Lindsay, 1999). As postulated by Pozzulo and Lindsay (1999), survival status may be a helpful piece of information to be used for investigative purposes. More specifically, if the suspect survives judgment 1, that is, the suspect is selected as looking most like the perpetrator, the likelihood of that person being identified as the guilty suspect increases. Previous research has found that the guilty suspect typically survives judgment 1 at a higher rate than any other lineup members, however, correct identification at judgment 2 (i.e., when the eyewitness is required to make a yes/no judgment) decreases (Humphries et al., 2012; Pozzulo et al., 2008; Pozzulo, Dempsey, Pettalia, 2013). It is critical to note that survival status is not an

identification decision and should not be used as identification evidence. It can, however, be used as an investigative tool.

In the foundational study of the elimination lineup procedure Pozzulo and Lindsay (1999) used two variations of the elimination lineup with children and adults to assess the two-step judgment process: slow versus fast elimination. Children (aged 10- to 14-years-old) and adults were shown a videotape of a male confederate discussing street safety. Following the completion of some filler tasks, participants were shown one of three lineups: simultaneous lineup, fast elimination lineup, or slow elimination lineup. The slow elimination lineup procedure required participants to select, one by one, the picture that looked *least* like the male confederate until only one photo (i.e., the one that looked most similar to the confederate) remained, followed by judgment 2. Conversely, the fast elimination procedure required only one selection for judgment 1 – the participant was required to select the photo that looked *most* similar to the confederate, followed by judgment 2.

The results of this study demonstrated strong support for the elimination lineup. Specifically, children who were shown the elimination lineup made fewer false positives (.27) than when shown the simultaneous lineup (.46; Pozzulo & Lindsay, 1999). Additionally, false positive rates were comparable between the children (.27) and adults (.13) across the elimination procedures. Moreover, the fast elimination lineup, in contrast to the slow elimination lineup, was the most successful. The researchers indicated that a potential explanation for this may be that the slow elimination can be confusing to the participant as a result of the large number of decisions they are required to make (Pozzulo & Lindsay, 1999). Overall, this study provides strong support for the use of the elimination lineup with child eyewitnesses, as it was able to elicit higher rates of correct

rejection for target-absent lineups while maintaining similar rates of correct identification for target-present lineups compared to the traditional simultaneous lineup.

Pozzulo and Lindsay (1999) also analyzed survival status. Their findings indicated that the perpetrator survived judgment 1 at a significantly higher rate than the correct identification rate at judgment 2. As well, the perpetrator survived judgment 1 at higher rate than any other lineup member, again suggesting that the perpetrator is likely to look more like himself/herself than anyone else; thus a relative judgment can be extremely useful. While the elimination lineup was originally designed for the purpose of increasing children's correct identification and rejection rates, this lineup procedure has also been found to be successful with young adults (e.g., Pozzulo, Dempsey, & Clarke, 2010).

Pozzulo and colleagues (2008) were interested in examining if a procedure originally developed for children, the elimination lineup, was effective for adults and how this particular lineup faired against the frequently used simultaneous and sequential procedures. One hundred and sixty-five participants viewed a video of a staged, non-violent theft. Following the video, participants were asked to complete an open-ended description form of the crime and criminal and complete a filler-task for approximately 20 minutes. After the filler task, participants were shown one of three lineup procedures: simultaneous, sequential, or elimination. Results indicated comparable rates of correct identification for target-present lineups across the three lineup procedures (simultaneous = .48; sequential = .40; elimination = .32). Correct rejection rates were significantly different across the three procedures. Higher correct rejection rates were observed for the sequential lineup (.76) and the elimination lineup (.77) compared to the simultaneous lineup (.47).

Survival status also was examined for the elimination lineup (note that survival status and identification rate are the same in simultaneous and sequential lineups). Results indicated the suspect survived at a rate of .56. Additionally, the survival status of the suspect was higher than the survival status of any other lineup member. It is important to note, however, that there was a decrease from the survival status of the suspect (.56) from judgment 1 to the identification rate of the suspect (.32) in judgment 2. As suggested by Pozzulo and colleagues (2008) it is possible that the presence of a second decision in the elimination lineup may explain the decrease in identification. Specifically, participants may have believed that being asked to make a second decision was indicative of their first decision being incorrect. Overall, this study suggests that the elimination lineup may be a useful procedure for adults when they are presented with a target-absent lineup, in comparison to a simultaneous lineup. However, the difficulty then becomes the real-world problem of not knowing whether the suspect is guilty or innocent.

Humphries and colleagues (2012) examined identification rates when using a video lineup procedure (vs. photographic) for the simultaneous, sequential, and elimination lineups in a sample of younger children (age 5- to 6-years-old), older children (age 9- to10-years-old), and adults (age 18- to 49-years-old). Participants viewed a videotaped crime that depicted a young man suspiciously browsing through a clothing store while a young woman browsed another area of the store close by. Results indicated the adults had higher rates of correct identification in the target-present sequential lineup (.83) compared to the simultaneous lineup (.70) and the elimination lineup (.63). The sequential lineup procedure resulted in lower correct identification rates for younger children (.30) and older children (.47). For target-absent lineups, adults' correct rejection rates were highest for the elimination lineup (.80) followed by the sequential lineup (.73)

and the simultaneous lineup (.60). The difference between adults' correct rejection rates for the simultaneous and elimination lineup procedures was marginally significant. For the adult age group, the suspect survived judgment 1 at a rate of .93 and was correctly identified at judgment 2 at a rate of .63. This study provides support for the use of the elimination procedure with adults in addition to providing support for the notion that survival in judgment 1 is indicative of guilt. Furthermore, this study also demonstrates the variability of the elimination procedure, as it can also be effective when presented as a video lineup.

Pozzulo, Dempsey, and Pettalia (2013) further examined the robustness of the elimination lineup by comparing the simultaneous, sequential, and elimination procedures with adolescents and adults. Participants viewed a staged, non-violent theft of a woman's purse. Following a brief delay of approximately 25 minutes, a target-present or –absent lineup was shown using one of the lineup procedures. For target-present lineups presented to the adult participants, results indicated significantly higher rates of correct identification for the simultaneous lineup (.59) compared to the elimination lineup (.47) and the sequential lineup (.44). No significant differences were observed for correct identification rates across the elimination and sequential lineups. As previous research has suggested (e.g., Pozzulo & Lindsay, 1999), the higher rates of correct identification for the simultaneous lineup may be due to the fact that the two-judgment process in the elimination lineup is causing participants to question the accuracy of their initial decision. With target-absent lineups, participants were significantly more likely to make a correct rejection when shown an elimination lineup (.78) compared to a simultaneous lineup (.39). Marginally significant differences were observed between those who saw an

elimination lineup (.78) and those who saw a sequential lineup (.72). Once again, survival status was higher than the correct identification rate.

The findings of this study echo those of Pozzulo and colleagues (2008). Specifically, results indicate the elimination procedure is superior to the simultaneous procedure at increasing correct rejection rates in both adolescent and adult populations. Furthermore, Pozzulo et al. (2013) suggest that the combination of the elimination procedure and survival status creates the potential for the elimination procedure to be superior to the simultaneous or sequential procedures. Specifically, survival status provides information that may be indicative of the suspect's guilt. Therefore, this may be a highly influential piece of information for investigators to use in conjunction with other evidence during the course of their investigation.

Elimination-plus lineup. The elimination-plus lineup (Pica & Pozzulo, 2017) adds a slight modification to the original elimination lineup. This procedure was created to examine what effect, if any, this lineup would have on survival status. The elimination-plus lineup utilizes two confidence ratings rather than the traditional confidence rating at the end of the identification task. In the first step of both the elimination lineup and the elimination-plus lineup, the eyewitness is shown a photo-array simultaneously and asked to choose the photo of the person that they think looks *most* like the criminal. For the elimination-plus lineup, after the first judgment has been made the eyewitness is asked to rate his or her confidence on a scale from zero (*not at all confident*) to 100 (*very confident*) that the photograph selected as looking most like the perpetrator is indeed the perpetrator. Following this, the eyewitness is required to identify whether the photo they have chosen is, in fact, the perpetrator (i.e., judgment 2) and once again, they are required to rate their confidence in the accuracy of that decision. Two studies have examined the

effectiveness of the elimination-plus procedure (i.e., Pica & Pozzulo, 2017; Sheahan, Pica, Pozzulo, & Nastasa, 2017).

Utilizing two confidence ratings can allow for greater predictive accuracy when analyzing identification rates. The elimination-plus procedure was found to significantly predict identification accuracy in target-present lineups for young adults (Pica & Pozzulo, 2017). There were non-significant findings for target-absent lineups. Furthermore, the elimination-plus lineup resulted in a survival status of the guilty suspect comparable to the rate of correct identification in the simultaneous lineup.

Additionally, Sheahan, Pica, Pozzulo, and Nastasa (2017) examined the elimination-plus lineup procedure along with four other types of lineups (i.e., simultaneous, elimination, wildcard, and elimination with wildcard) to ascertain the effectiveness of different variations of the elimination lineup in comparison to more traditional procedures across adolescents and adults. Results indicated that the guilty suspect survived the first judgment of the elimination-plus procedure at a significantly higher rate than any other lineup member. Additionally, confidence ratings after judgment 1 of the elimination-plus lineup predicted accuracy in judgment 2 in target-present lineups.

Pica and Pozzulo (2017) and Sheahan and colleagues (2017) argue that the findings of their studies provide support for the elimination-plus lineup procedure such that it provides three pieces of valuable information regarding the suspect's guilt: (1) the survival status of the suspect, (2) the confidence of the witness after judgment 1, and (3) the identification decision at judgment 2. Although the elimination-plus procedure is fairly new the results of both of the previously mentioned studies suggest that this lineup

can provide information beyond that of other, more traditional, procedures. As such, it is of interest for the current study to examine this procedure.

Lineup Construction

Fair vs. biased lineups. Doob and Kirshenbaum (1973) describe a fair lineup as one that is sufficient in size and contains foil photographs of individuals similar in appearance to the criminal. More recently, Malpass, Tredoux, and McQuiston-Surrett (2007) identify that a fair lineup should be one in which an innocent person is chosen at a rate no greater than chance. Alternatively, a biased lineup is considered one in which the suspect stands out or is distinctively different from the foil photographs (Brigham & Brandt, 1992). When discussing lineup fairness, Malpass (1981) and Malpass and Devine (1983) propose two criteria. First, the lineup should be sufficient in size. This suggests that the lineup should contain enough photographs such that the likelihood of a chance identification of an innocent suspect is low. Second, there should be the absence of lineup bias (i.e., the suspect should not stand out from the foil photographs).

In 1990, Wells and Luus published an article that made a recommendation regarding lineup construction. That recommendation indicated that when constructing a photographic lineup one should avoid using foil photos that are too similar to the suspected criminal. Ultimately, the justification for such a recommendation was that closely matching photographs would make the correct identification of a suspect too difficult. Since then, this recommendation has been recognized and supported by many others within the field (e.g., Brewer & Palmer, 2010; Malpass et al., 2007; Wells et al., 1998). From this recommendation it follows that the photographs chosen for a lineup should also not be too different to that of the suspect, otherwise the situation would arise in which it becomes too easy to identify the suspect. This scenario becomes most

problematic when the police have apprehended an innocent suspect as they are then chosen from the lineup because they look most like the perpetrator, rather than because they *are* the perpetrator. These lineup construction scenarios (i.e., too hard to identify/too easy to identify) highlight two of three possible lineup categories as suggested by Fitzgerald and colleagues (2015): high similarity lineups and biased lineups, respectively. The third category is referred to as moderate similarity lineups. Moderate similarity lineups contain foils that have a general resemblance to the target but have not been closely matched (Fitzgerald et al., 2015).

While the implications of biased vs. non-biased lineups are not of specific interest for the current study, it is important to understand the role of bias in lineup construction as this can impact foil selection and thus identification accuracy. As such, research has examined the effect of lineup bias on identification accuracy. For example, Pozzulo, Dempsey, and Clarke (2010) were interested in examining the effect of lineup bias on identification accuracy when using the sequential and elimination lineup procedures. All lineups presented were target-absent. In order to manipulate bias amongst the photographs presented, Pozzulo et al. (2010) included a photo in the biased lineup condition of the innocent suspect wearing a sweatshirt similar to the one worn by the criminal in the video of a staged theft. The neutral condition had a photo of the innocent suspect wearing a shirt that was not similar to the one worn by the criminal in the video. Participants were presented with one of four possible lineups (sequential-biased, sequential-neutral, elimination-biased, elimination-neutral) and asked to make an identification decision. Results indicated higher overall correct rejection rates for the elimination procedure (.86) compared to the sequential procedure (.63) when collapsed across lineup bias. When presented with the elimination lineup, clothing bias did not

negatively affect the correct rejection rate (neutral = .84 vs. biased = .88). However, correct rejection rates were impacted when the participants viewed the sequential procedure (neutral = .79 vs. biased = .50).

Research has suggested that the sequential procedure may be best to protect against lineup bias (Lindsay et al., 1991), however, this was not demonstrated by Pozzulo et al. (2010). The elimination procedure produced significantly higher correct rejection rates than the sequential procedure and produced similar correct rejection rates whether the lineup was biased or neutral. These findings indicate the elimination lineup may protect against the influence of clothing bias and may be the superior lineup choice in comparison to the sequential procedure.

While it is possible to conduct empirical research that utilizes biased and non-biased lineups in order to get a better understanding of the underlying effects of lineup similarity on eyewitness identification, it is more effective to utilize lineups which modify the range of foil similarity within the scope of fair, non-biased lineups. As such, the current study constructed two lineups (high similarity vs. low similarity) to assess identification accuracy when foil similarity is manipulated. It is important to note that for the purpose of the current study the low similarity lineup included foils that resembled the target closely enough to avoid being considered a biased lineup, as per Fitzgerald and colleagues' (2015) description of a moderate lineup.

Similarity Manipulations

Throughout the foil similarity literature, two methods for foil selection are commonly discussed: match-to-suspect and match-to-description. The match-to-suspect foil selection method allows researchers (or police officers) to choose foil photographs of individuals who look like the suspect (Tunnicliff & Clark, 2000). Alternatively,

researchers (or police officers) may select foil photographs by using a match-to-description method. Match-to-description selections require the individual constructing the lineup to choose photos based on their match to the description of the perpetrator (Tunnicliff & Clark, 2000). In the current literature there are no recommendations on similarity standards for either match-to-suspect or match-to-description foil selection methods. Additionally, research has suggested there are both benefits and drawbacks to utilizing either strategy.

Match-to-suspect. Clark, Moreland, and Rush (2015) argue that the most intuitive method of foil selection is to match the appearance of the foils to the appearance of the suspect in order to prevent the suspect from standing out. Or, more specifically, foil photographs that share a resemblance with the suspect should be chosen for the lineup. However, two potential problems with this method have been suggested. First, Luus and Wells (1991) identify that there is no standard for similarity. That is, researchers and police officers do not have an objective measure of similarity and therefore, have no idea how similar is similar enough when constructing lineups. For example, if an eyewitness is shown a lineup in which the suspect and foil photographs are too similar then they would likely have difficulty correctly identifying the suspect, even if they have a clear memory of the perpetrator (Clark et al., 2015).

Fitzgerald and colleagues (2015) found support for this argument when they conducted a foil similarity study in which they manipulated similarity levels via morphing software. Undergraduate students ($N = 137$) viewed a six-minute silent video depicting a man and a woman ordering breakfast at a restaurant. Following the video, participants completed a delay task in which they were required to recall everything they could remember from the video. They were then instructed that they would see a lineup

presented on a computer and be required to identify the man from the video. The lineups used in this study were manipulated to depict varying levels of similarity. In total, four lineups were used: moderately high and very high similarity target-present and moderately high and very high similarity target-absent. Moderately high similarity lineups were created by morphing the filler photographs with the culprit to create a new face that was 40% culprit and 60% filler. Fillers in the very high similarity lineups were morphed twice. Faces that were rated as having high similarity to the target were morphed 50% with the original filler faces used for the moderately high lineups. These newly morphed faces were then morphed again, this time with the target in a 40% (target) 60% (filler) split. Results indicated low correct identifications for the very high similarity lineups, suggesting it became more difficult to identify the perpetrator as similarity increased.

The second challenge with the match-to-suspect approach becomes apparent in situations in which an innocent suspect is in the lineup. As previously discussed, in the real-world police do not know whether they have apprehended a guilty or innocent suspect. Clark and colleagues (2015) argue that a match-to-suspect selection method may backfire such that the innocent person in the lineup becomes the person who is most likely to be selected. For example, in a situation wherein the police apprehend an innocent suspect a lineup would be constructed based on the appearance of that innocent person. That is, five foil photographs would be chosen based on their match to the innocent suspect's appearance. It is argued then, that the only person in the lineup that would look most similar to the perpetrator, and therefore be most likely to be selected, would be the innocent suspect.

Match-to-description. In order to combat the problems that arise with the use of a match-to-suspect selection method, researchers have proposed the use of a match-to-description foil selection approach (Luus & Wells, 1991; Navon, 1992). When utilizing this method, foil photographs are chosen for a lineup based on their match to the description of the perpetrator as given by the eyewitness (Clark et al., 2015). This method prevents the witness from relying solely on their description of the perpetrator and creates a lineup in which a non-witness should not be able to assume the identity of the suspect, provided that all of the photographs match the description of the perpetrator that was given by the eyewitness (Clark et al., 2015).

Wells and colleagues (1993) conducted the first experiment comparing the effectiveness of match-to-suspect and match-to-description foil selection. Undergraduate students (N = 252) became witness to a live, staged theft of a cash box from a testing room used by the researchers. Participants were then randomly assigned to a condition; target-present/target-absent match-to-suspect, mismatch-to-description, or match-to-description. In the match-to-suspect lineups, foil photos were chosen based on their resemblance to the suspect. In the mismatch-description conditions, at least one major feature was violated for each foil photograph (e.g., the foil had blonde hair whereas the target was described as having black hair). And in the match-to-description lineups, all photos that violated the description provided were removed from potential selection and the lineup was chosen based on the photos that remained. Based on the description provided by each participant, an individualized lineup was constructed. Participants were then given a binder containing the lineup photographs and were left alone to view the photos and make an identification decision. Results indicated strong support for the match-to-description foil selection strategy. The match-to-description (.68) and

mismatch-to-description (.70) conditions produced higher rates of accurate identification compared to the match-to-suspect condition (.22). False identifications occurred most frequently for the mismatch-to-description (.47) condition compared to the match-to-description (.12) or match-to-suspect (.12) conditions. False identification rates were not significantly different between the match-to-description and match-to-suspect condition. Overall, the results indicated stronger support for the use of match-to-description foil selection as it elicited high rates of correct identification (.68) while suppressing rates of false identification (.12), in comparison to the two other foil selection methods.

The results of Wells et al. (1993) were extremely influential. In fact, the US Department of Justice guidelines were amended largely based on the findings of that study to include the recommendation for foils to be selected based on their match to the description of the suspect (U.S. DOJ, Office of Justice Programs, National Institute of Justice, 1999). However, this recommendation may have been premature, as follow-up studies have failed to replicate these findings.

Lindsay, Martin, and Webber (1994) conducted three studies to evaluate the various components and effectiveness of the match-to-description strategy. The researchers identified a large problem with the match-to-description method as outlined by Wells et al. (1993); namely, Lindsay and colleagues (1994) indicated that innocent suspects may be at risk for identification if the description provided by the eyewitness is vague, incorrect, or lacking in detail. The researchers argue that creating a lineup strictly based off of a free recall description is potentially dangerous, as the eyewitness may not identify what Lindsay and colleagues refer to as *default values*. For example, if a crime is committed in a predominantly White neighborhood the witness may not identify the race of the perpetrator and the investigators may fail to ask. If the police then construct a

lineup based solely on the description provided by the witness, they would have no indicator of the race of the perpetrator and therefore they would be unable to properly construct a lineup. As such, Lindsay and colleagues (1994) caution the use of match-to-description foil selection.

In their first study, Lindsay et al. (1994) sought to examine the level of detail witnesses tend to provide when describing the perpetrator of a crime. Data were examined from previous research wherein participants viewed a staged crime. Data were also gathered from local newspaper accounts of real-world crimes/descriptions of criminals. For the laboratory portion of the study, participants viewed a staged crime and were later asked to provide a written description of the person they saw committing the crime. Additionally, newspaper articles that provided a description of a criminal that had recently committed a crime (i.e., the previous day) were used and coded for descriptors. Results supported the hypothesis that witnesses often provide vague descriptions. Witnesses to the staged crime reported on average 7.35 descriptors while witnesses to real crimes reported on average 3.94 descriptors. Additionally, the most frequently reported descriptor for both in lab and real-world crimes was clothing. As clothing in lineup photographs should not match the clothing description provided by a witness, and because clothing is easily changeable, this finding is unhelpful to police for the purposes of constructing a lineup. Overall, Lindsay et al. (1994) suggested that the match-to-description method is likely not as effective as originally indicated.

Additionally, Lindsay et al. (1994) wanted to replicate the findings of Wells and colleagues (1993) and examine the effect of match-to-description foil selection on correct identification rates and false identification rates. In Study 2, lineups were constructed by compiling the data from the description forms that had been filled out in Study 1 and

matching the overall description to photographs from a photo database (i.e., White male in his early 20's with short, dark hair, not wearing glasses, having no facial hair, and with no other distinguishing features). Of the 726 database photos the description of the target matched 199. These 199 photos were then presented to five raters to assess their level of similarity to the target using a 7-point Likert scale. For the match-to-suspect lineup, the five top rated photos were used as foils. The match-to-description lineup was constructed by choosing photos from the middle of each quintile of the faces ranked by similarity rating. Finally, a biased match-to-description lineup was created by choosing foil photographs that had been ranked the lowest (while still matching the target's description).

Overall, the target was selected least frequently from the match-to-suspect lineup (.66) although this was not significantly different than the likelihood of selecting the target from the match-to-description lineup (.79) or the biased match-to-description lineup (.81). While these results were not statistically significant, nor as robust as those found by Wells and colleagues (1993), they were in the direction that would provide support for the match-to-description method.

Study 3 examined whether it was still possible to create a biased lineup regardless of the detail or depth of the description provided to police. For this study, Lindsay et al. (1994) used the three lineups that were administered for Study 2, however the photo of the target was replaced with a photo of an innocent person whose appearance was considered 'moderately' similar to that of the original target. Additionally, the lineups were presented both simultaneously and sequentially. Participants viewed a staged theft and were asked to complete a description of the criminal. Following the completion of the description, participants were asked to complete the identification task.

When the lineups were presented simultaneously no significant differences were found for correct rejection rates for either the match-to-suspect (.53), match-to-description (.56), or biased match-to-description (.50) foil selection methods. Alternatively, correct rejection rates were significantly higher when lineups were presented sequentially for match-to-suspect (.87), match-to-description (.88), or biased match-to-description (.84) foil selection methods. The biased match-to-description lineup produced the highest rates of selection of the innocent suspect (.50). Additionally, participants who saw the biased match-to-description lineup chose either the innocent suspect or no one. Lindsay et al. (1994) indicated that the danger of this finding is that police may include an innocent suspect that looks moderately similar to the perpetrator in a lineup with foil photographs that do not look as similar to the innocent suspect, resulting in the innocent suspect standing out in the lineup.

Overall, the findings of Lindsay and colleagues (1994) indicate that witnesses often provide vague descriptions of the perpetrator and the match-to-description foil selection method could potentially increase the likelihood of a false identification. Based on this research, Lindsay et al. (1994) caution the use of the match-to-description method and stress the importance of creating non-biased lineups if implementing this foil selection strategy.

More recently, Clark, Rush, and Moreland (2013) examined the results of six studies to evaluate the claim that match-to-description is the best foil selection method. The results of these studies, taken together, show higher rates of correct identification, however they also indicate higher rates of false identification for match-to-description lineups compared to match-to-suspect lineups. Additionally, the average false identification rate was twice as high for description-matched lineups compared to

suspect-matched lineups. Also, in description-matched lineups the probative value of a suspect identification is lower. Ultimately, the research indicates that false identification rates can be exceptionally high if the lineup members do not match the description of the perpetrator, however when the lineup members are better matched, the false identification rates as well as the correct identification rates decrease. Researchers and police are therefore faced with the trade-off between the decrease of correct identifications and the false identifications that are avoided when using better-matched foils (Clark et al., 2013).

These results directly contradict the justifications used for the US Department of Justice lineup construction guidelines. Moreover, they demonstrate that there is no empirical evidence or support for using match-to-description selection criteria. As such, Clark and colleagues (2013) indicate that the likely solution to this problem would be to use a combination of match-to-description and match-to-suspect selection methods. Specifically, foils should be chosen because they are both similar to the suspect and they match the description provided by the witness. Based on this suggestion, the current study employed both of these criteria when constructing lineups of high and low similarity.

Lineup Presentation and Foil Similarity

Clark, Howell, and Davey (2008) took a meta-analytic approach ($k = 94$) to examine the trends in the eyewitness identification literature. One of their main goals was to assess the simultaneous versus sequential advantage that had recently become of particular interest. Overall, 81 experiments utilized the simultaneous lineup and nine utilized the sequential lineup procedure. Two different analyses were conducted. First, they examined the results of only those studies that directly compared the two lineup procedures. The results of this analysis echoed that of Steblay and colleagues (2001).

Specifically, the sequential lineup had a higher rate of diagnosticity for suspect identifications than did the simultaneous lineup. This indicates that the identification of the suspect was more likely when the suspect actually was the perpetrator then if the suspect was not the perpetrator. Second, the researchers analyzed a larger section of the studies that examined the simultaneous procedure, including those that were not a part of the simultaneous-sequential analysis, and found comparable levels of diagnosticity for each procedure.

Based on these findings the researchers were then interested in determining why the diagnosticity advantage only occurred for the studies that directly compared the two procedures. This final analysis indicated that the target-absent lineups that had been administered in studies that compared the two procedures resulted in higher false identification rates and lower foil identification rates than the target-absent lineups administered in the studies that did not directly compare the two procedures (Clark et al., 2008). In other words, the lineups used in the direct comparison studies appeared to be more biased (Carlson, Gronlund, & Clark, 2008; Clark et al., 2008).

Carlson and colleagues (2008) wanted to test the 'more biased lineup' theory that was found by Clark and colleagues (2008). More specifically, the researchers hypothesized that the sequential lineup advantage may only occur in biased lineups, which may, in turn, result in an increase in false identifications in the simultaneous lineup relative to the sequential lineup (Carlson et al., 2008). The researchers indicated that when the innocent suspect matches the description better than any of the other foils, the innocent suspect might stand out more in a simultaneous lineup, and therefore lead to higher rates of false identification. However, it is suggested that this is likely to occur less frequently when the same lineup is presented sequentially. To test this, the researchers

constructed three lineups that varied in terms of their fairness: biased, intermediate, or fair. Participants (*N* = 42; Study 2, phase 2) were asked to choose lineup photos that were either a good or bad match to the description of the perpetrator. Using the good and bad foils that were selected in this phase, various lineups were constructed. Biased lineups included five bad foils (in addition to the guilty or innocent suspect). Intermediate lineups contained three bad foils and two good foils and the guilty or innocent suspect. Fair lineups contained five good foils in addition to the guilty or innocent suspect. To test the lineup identification task, new participants (*N* = 619; Study 2, phase 4) viewed a video of a staged car-jacking and following the video they completed a time delay task (i.e., word-find). Participants were randomly assigned to a condition and saw either a target-present or target-absent biased/intermediate/fair lineup presented sequentially or simultaneously on a computer.

Overall, the simultaneous lineup was 1.6 times more likely to elicit a correct identification than the sequential lineup. Additionally, correct identification rates increased as the lineup became more biased. An interaction was found between fairness level and lineup procedure such that there was a simultaneous advantage for biased lineups, however no differences were found between simultaneous and sequential lineups for intermediate and fair lineups. With regard to the overall false identification rate, no differences were found between the simultaneous and sequential lineups. False identification rates increased as the lineup became more biased; however, similar to the correct identification data this was qualified by an interaction between fairness level and lineup procedure. The sequential lineup advantage (reduced false identification rate) was only observed for biased lineups. The reduction in false identification rates for the sequential lineups was accompanied by a simultaneous advantage for correct

identifications. Specifically, Carlson et al. (2008) indicated that decision criteria are affected in biased simultaneous lineups such that a witness is more likely to choose. While this is beneficial if the suspect is guilty, it becomes troublesome when the suspect is innocent.

The overall importance of the previously discussed literature is that it highlights the differences between lineup procedures for adult eyewitnesses. Additionally, the construction of these lineups (i.e., fair vs. biased) can also impact the effectiveness of the procedures used. The studies previously mentioned do little to provide any clear direction in regard to the simultaneous versus sequential debate, and unfortunately, examining the effect of foil similarity on the effectiveness of these two procedures remains unclear. Overall, there is a lack of research examining the specific role of foil similarity on eyewitness identification for the simultaneous and sequential procedures and more research in this area is needed to provide a better understanding of how these factors fit together.

More recently, Bruer, Fitzgerald, Therrien, and Price (2015) wanted to examine the effect of a salient rejection option on identification accuracy across lineups varying in foil similarity. To test this, the researchers constructed high and low similarity lineups using similarity ratings provided by judges who were independent of the main study. Judges rated the target photo against 277 potential fillers on an 11-point Likert scale. Fillers in the low similarity condition were less similar to the target (M = 2.63) than those in the high similarity condition (M = 5.40). Lineups were presented either simultaneously with the inclusion of a salient rejection option (i.e., a picture of a blackened silhouette; the wildcard; Zajac & Karageorge, 2009) presented in between the two rows of photographs, or the salient option was absent from the lineup and participants were

instructed to verbally reject the lineup. Participants viewed a video of a staged, non-violent theft. Following the video, participants completed a 20-minute filler task (i.e., rating the similarity between paired women's faces) and a description form of the crime and criminal. Participants then viewed a photographic lineup on a computer monitor and made their identification decision using one of the lineup procedures.

Bruer and colleagues (2015) reported that that foil similarity did influence identification accuracy. Specifically, witnesses were less accurate when the fillers closely resembled the target (i.e., high similarity lineup). False identifications were more likely to occur in the high similarity lineups (.36) compared to low similarity lineups (.12). Correct rejection rates were higher for the low similarity lineup (.82) compared to the high similarity lineup (.59). Furthermore, when the salient rejection option was included in the high similarity lineups there was a 28% increase in correct rejection rates. Alternatively, including the salient rejection option in low similarity lineups only resulted in a 10% increase in correct rejection rates. Therefore, the salient rejection option worked best in high similarity scenarios. The findings indicated that witnesses have greater difficulty at identifying the guilty suspect in lineups that include foil photos that share a high resemblance with the target. Additionally, utilizing a salient rejection option style of lineup has mixed effects depending on the level of similarity between the target and the foil photographs.

Applied Implications

It is critical to understand how variations in lineup construction can impact identification accuracy, given the multitude of methods used in various jurisdictions and countries. There appears to be no agreed upon process or procedure for lineup construction across jurisdictions or countries. Developing protocols for lineup

construction is an essential first step in establishing consistency across jurisdictions. Further, knowing how lineup procedures may interact and potentially protect against less than ideal lineup construction may help reduce wrongful convictions.

Overview of the Current Study

The purpose of the current study was to examine the effect of lineup procedure and foil similarity on identification accuracy. Research examining the effect of foil similarity and lineup procedure on eyewitness identification accuracy has primarily utilized the simultaneous or sequential lineup procedures. However, one study was recently conducted using the wildcard procedure (i.e., a salient rejection option; Bruer et al., 2015). As various other procedures, such as the elimination-plus procedure, have begun to be empirically studied, it is important to further examine the potential effect that these lineups may have in combination with foil similarity on overall identification abilities. The current study will be testing the simultaneous lineup procedure and the elimination-plus lineup procedure. Research of this nature will contribute to the overall understanding of how this aspect of lineup construction can affect identification accuracy.

Hypotheses

1) The elimination-plus lineup will produce higher correct rejection rates while maintaining a comparable rate of correct identification when compared to the simultaneous procedure.
2) High similarity lineups will produce lower correct identifications and lower correct rejections compared to low similarity lineups.
3) Low similarity lineups will produce higher correct identifications and higher correct rejections compared to high similarity lineups.

4) In judgment 1 of the elimination-plus lineup, it is hypothesized that the guilty suspect will survive at a significantly higher rate than any other lineup member regardless of similarity level of the lineup.
5) The survival status of the suspect in the elimination-plus lineup will be comparable to the correct identification rate of the simultaneous lineup.
6) It is hypothesized that confidence will be a better predictor of accuracy with the elimination-plus procedure compared to the simultaneous procedure.

Material Development

Prior to conducting the main study, a pilot study was conducted to rank the level of similarity between the target photo and various foil photos. The information gathered from this pilot study aided in the construction of the high and low similarity lineups that were to be presented to participants in the main study.

Participants

Undergraduate students (N = 39) were recruited from the introductory psychology participant pool at a university in Eastern Ontario, Canada to participate in the pilot study. Their ages ranged from 18 to 25 years (M = 19.36, SD = 1.84) and 61.5% were women (N = 24). The majority of participants self-identified as White/European (33.3%), with smaller numbers identifying as Black/African-Canadian (17.9%), West Asian (12.8%), East Asian (12.8%), South Asian (7.7%), Southeast Asian (2.6%), Latin American (2.6%), and mixed or "other" (10.2%). Participants received course credit for their participation.

Study design. Participants were shown a series of photographs via a PowerPoint slideshow and asked to rate the level of similarity between the target photograph (always presented on the left of the screen) and a foil photograph (always presented on the right

of the screen). In total, each participant saw and rated 50 photographs. All photographs presented to the participants matched a general description of the target photograph (i.e., short brown hair, brown eyes, white skin, in his 20's). Following the study, participants were debriefed and thanked for their time.

Materials

Consent Form. Each participant completed a consent form indicating the purpose of the study and informing them of their compensation for participating (e.g., course credit; Appendix A).

Demographics. Each participant completed a demographics form that requested them to report their age, sex, and ethnicity (Appendix B).

Photo Selection. Fifty photos were pulled from the Child Forensic Psychology Laboratory database to be used as target comparison photos. Each photo matched the description of the target (i.e., short brown hair, brown eyes, white skin, in his 20's; Appendix C).

Similarity Powerpoint. A PowerPoint presentation was constructed for use during the pilot study. Each slide contained a photo of the target (always presented on the left) and a foil photograph (always presented on the right). Above the photos was the statement "On a scale from 1 to 10, please rate how similar picture #(insert photo number) is to Chris (target photograph) and below the photographs was the number of the foil and the name Chris (under the target photograph; Appendix C). The presentation was not timed and the participants would only move on to the next photograph once each person had recorded their similarity rating.

Similarity Rating. Each participant received a paper booklet that contained 50 Likert-type rating scales (Appendix D). Each scale was associated with a photograph that

was presented via PowerPoint on a white screen. Each scale ranged from 1 *(not at all similar)* to 10 *(very similar)*.

Procedure

This pilot study took place in the Laboratory for Child Forensic Psychology at Carleton University. Each testing session lasted approximately 30 minutes. Upon entering the lab, each participant was asked to read the informed consent form outlining the details of the study. The informed consent explained that participants would view a series of photographs and be asked to rate those photographs based on similarity using the scales provided. Upon completion of the study, participants were debriefed on the purpose of the study and thanked for their time.

Results

Similarity Ratings and Photo Selection

Analyses of these data involved averaging the ratings for each photo provided by the participants (see Table 1). Two lineups were constructed using the top 10 highest rated photos and the bottom 10 lowest rated photos. Six of the 10 highest and six of the 10 lowest rated photos were selected to ensure they matched the description of the target in order to create the lineups.

Table 1

Foil Similarity Rating Means (SD).

	Lineup Member					
	1	2	3	4	5	6
High similarity	4.21 (2.00)	4.44 (2.01)	4.08 (2.06)	4.36 (2.33)	5.15 (2.48)	4.69 (2.25)
Low similarity	2.08 (1.18)	1.85 (1.16)	2.00 (1.32)	2.13 (1.54)	2.10 (1.19)	2.03 (1.18)

Main Study

Given the results from the material development, two lineups were constructed for use in the main study. One lineup was used for the high similarity lineup manipulation (i.e., photos that were amongst the highest rated) whereas the other was used for the low similarity lineup manipulation (i.e., photos that were amongst the lowest rated). In addition to the similarity manipulation, the main study also examined lineup procedure and target presence.

Method

Participants

Undergraduate students (*N* = 296) were recruited from the introductory psychology participant pool at a university in Eastern Ontario, Canada. Nine participants were excluded from analyses because they failed the manipulation checks (e.g., they knew one of the lineup members). As such, data from 287 participants were analyzed. Participant ages ranged from 18 to 47 years (*M* = 19.78, *SD* = 2.84) and 62% (*N* = 178) were women. The majority of participants self-identified as White/European (46.3%), with smaller numbers identifying as Black/African-Canadian (12.9%), West Asian (12.9%), East Asian (6.6%), South Asian (5.9%), Southeast Asian (2.8%), Latin American (2.4%), Aboriginal Canadian (2.1%), and mixed or "other" (7.6%). Participants received course credit for their participation.

Design

A 2 (lineup procedure: simultaneous vs. elimination-plus) x 2 (presence of target: target-present vs. target-absent) x 2 (lineup similarity: high similarity vs. low similarity) between subjects factorial design was used. The dependent measure was lineup identification accuracy (i.e., a correct identification in the target present condition and a

correct rejection in the target absent condition). Participants were randomly assigned to each condition.

Materials

Informed consent form. The participant was required to complete and sign two informed consent forms in order to be eligible to participate in the study (Appendix F). The first consent form was deceptive such that the participant was not initially informed that they would become witness to a (mock) crime. The purpose of the deception was to mimic a real-world eyewitness situation as realistically as possible. The second consent form that the participant was required to sign occurred after viewing the mock crime and the secondary consent form indicated the true purpose of the study (Appendix G).

Demographics form. The participant was asked to complete a demographics form (i.e., age, gender, ethnicity, and primary language; Appendix H).

Free recall description form. The participant was asked to complete a description form that included two open-ended questions regarding who and what they saw in the video (i.e., tell me everything you remember about the video; tell me everything you remember about the person in the video; Appendix I).

Video. Participants viewed a previously recorded video of a staged, non-violent theft of a laptop computer in a waiting room. The video began with a male sitting on a waiting room couch reading a book and suspiciously looking around the room and at the unattended computer. After a short time, the man gets up, takes the laptop, and leaves the waiting room. The video was approximately 1 minute in length and included a close-up view of the perpetrator's face that lasted approximately 4-5 seconds.

Lineup

Lineup construction. Two photographic lineups were constructed for the purpose of this study (i.e., low similarity lineup and high similarity lineup). The low similarity lineup consisted of foil photos that had a lower resemblance to the target while the high similarity lineup consisted of foil photos that more closely resembled the target. Each lineup contained six 4 x 6 inch photographs. Five of the photographs were of volunteers resembling the target (i.e., foil photographs). The sixth lineup photograph was either a photograph of the target that was used for the target-present lineups or a replacement photo that was used for target-absent lineups. All photos were colour, head and upper body photographs taken against a white background. The persons photographed adopted a neutral facial expression so that consistency was maintained across the photographs. For every lineup presented the location of the target or replacement photograph was randomly determined. All other photos were displayed in the same order relative to each other.

Simultaneous lineup procedure. The lineup photographs were presented simultaneously in two rows, each of which had three photographs. Participants were provided with the following instructions "*Think back to the video. Think back to what the criminal looks like. I am going to show you some pictures. Please look at the pictures. The criminal's picture may or may not be here. If you see the criminal's picture, please place a check mark in the box corresponding to the criminal's lineup number. If you do not see the criminal's picture, please place a check mark in the box marked not here. Now let's look at the photos."* Following the instructions, the participant was given a response form to be used to indicate their selection and to record their confidence in their decision on a scale of 0 (*not at all confident*) to 100 (*very confident)*.

Elimination-plus lineup procedure. The lineup photographs were presented simultaneously in two rows, each of which had three photographs for judgment 1. Participants were provided with the following instructions prior to viewing the lineup, in order to allow for a relative judgment: "*Think back to the video. Think back to what the criminal looks like. I am going to show you some pictures. Please look at the pictures. The criminal's picture may or may not be here. Now let's look at the photos. To start off, please pick out the person who looks most like the criminal.*" The participant was then given a response form and they made their selection of the photograph they believed looked most like the criminal. Participants were asked to rate their confidence that the photo they selected as looking most like the criminal actually was the criminal on a scale of 0 (*not at all confident*) to 100 (*very confident)*. All other photographs were removed. After providing their confidence rating the following instructions were provided for judgment 2: "*Try to remember what the criminal looks like. Compare your memory of the criminal to the picture you picked. This may or may not be a picture of the criminal. If this is a picture of the criminal, please place a check mark beside 'Yes, this is a picture of the criminal.' If this is a picture of someone else, please place a check mark beside 'No, this is not a picture of the criminal.*" Once the participant had indicated whether they believed the picture they chose was the criminal they were asked to rate their confidence in their decision on a scale of 0 (*not at all confident*) to 100 (*very confident)*.

Procedure

Participants were tested individually in a laboratory. First, they were asked to sign a deceptive consent form indicating the purpose of the study was to assess their decision-making processes. Next, participants were required to watch a staged crime video that depicted the theft of a laptop computer. Following the video, the researcher explained the

true purpose of the study and asked the participant to sign a second consent form to indicate that they understood the true purpose of the study and that they agreed to continue participating. All of the participants agreed to continue with the study. The participants were then asked to fill out a demographics form as well as a video description form in which they were asked to describe everything they could remember about the criminal and the video. Once completed, a fifteen-minute time delay was required before completing the final task. During this time the participants played an online computer game (i.e., Bejeweled).

Participants were randomly assigned to one of eight conditions (i.e., simultaneous lineup-target present-low similarity, simultaneous lineup-target present-high similarity, simultaneous lineup-target absent-low similarity, simultaneous lineup-target absent- high similarity, elimination lineup-target present-low similarity, elimination lineup-target present-high similarity, elimination lineup-target absent-low similarity, or elimination lineup-target absent-high similarity). They completed a lineup identification task where they were asked to identify whether the picture of the criminal was present in the photographs, a similarity rating scale (if they had chosen a photo from the lineup), manipulation checks, and were debriefed.

Results

Data were first analyzed using a sequential logistic regression to determine whether lineup procedure, target presence, and foil similarity level influenced overall identification accuracy. The dependent variable was identification accuracy (i.e., correct, incorrect), and the independent variables were lineup procedure (simultaneous vs. elimination-plus), target presence (present vs. absent) and foil similarity level (high similarity vs. low similarity). The first block included only the main effects, the second

block included the main effects and two-way interactions, and the third block included the main effects, the two-way interactions, and the three-way interaction. The first block including only the main effects was not significant, $\chi^2(3) = 2.51$, $p = .47$. Similarly, block two ($\chi^2(6) = 5.89$, $p = .44$) and block three ($\chi^2(7) = 6.64$, $p = .47$) also were not significant suggesting that neither lineup procedure, target presence, foil similarity level, nor any combination of those variables, influenced overall identification accuracy.

Hypothesis Testing

Identification data were divided into target-present lineup decisions and target-absent lineup decisions to examine whether identification accuracy differed across lineup procedure and foil similarity. Separating the data in this way is beneficial because it has been argued that combining responses from both target-present and target-absent lineups may conceal the true effects of each procedure (Pozzulo et al., 2015). Moreover, response accuracy differs across the two conditions to the extent that one requires making a selection whereas the other requires a rejection of the lineup (Pozzulo & Lindsay, 1998). Additionally, it has been suggested that different factors are at play when making identification decisions. In target-present lineups cognitive factors, more so than social factors, are thought to underlie the identification process such that the person is required to match the photo of the suspect to his or her memory. However, in target-absent lineups, social factors may be more influential because the person is unable to make a memory match as the guilty person is not present, and thus social pressure may be contributing to their identification decision (e.g., Pozzulo et al., 2012).

Target-present lineups. In order to examine whether identification accuracy differed across the two lineup procedures when collapsed across foil similarity, a chi-square was calculated. Results indicated significant differences in accuracy rates between

lineups, $\chi^2(2, N = 143) = 13.64$, $p = .001$, Cramer's $\nu = .31$. Participants were more likely to make a correct identification when presented with the simultaneous lineup (.79) compared with the elimination-plus lineup (.63). Furthermore, the simultaneous lineup elicited fewer false rejections (.06) compared with the elimination-plus lineup (.29).

Target-absent lineups. In order to examine whether identification accuracy differed across the two lineup procedures when collapsed across foil similarity, a chi-square was calculated. Results indicated no significant differences in identification accuracy between the two lineups $\chi^2(1, N = 144) = 1.69$, $p = .19$. Correct rejection rates were comparable between the two procedures (see Table 2).

Table 2

Identification Accuracy as a Function of Lineup Procedure

	Simultaneous	Elimination-Plus
Target-present		
Correct Identification	.79 (54)	.63 (47)
Foil Identification	.15 (10)	.08 (6)
False rejection	.06 (4)	.29 (22)
Target-absent		
Correct rejection	.58 (43)	.69 (48)
False identification	.42 (31)	.31 (22)

A chi-square analysis was conducted to determine whether the high similarity lineups elicited lower rates of correct identification and correct rejection compared to the low similarity lineups. A chi-square analysis determines whether participants were more accurate in their identification decisions for high or low similarity lineups regardless of lineup procedure. No significant differences were found for identification accuracy in target-present ($\chi^2(2, N = 143) = .78, p > .05$) or target-absent ($\chi^2(1, N = 144) = .15, p > .05$) conditions when collapsed across lineup procedure. However, although the results were non-significant, the data does indicate higher rates of correct identification in the low (.73) similarity condition compared to the high (.68) similarity condition. Additionally, correct rejection rates were also higher in the low (.69) similarity condition than the high (.58) similarity condition.

In order to examine whether identification accuracy differed across the two lineup procedures when target presence and foil similarity were taken into account, an additional chi-square was calculated. Results indicated for the low similarity, target-present condition participants were more likely to make a false rejection when presented with an elimination-plus lineup (.30) compared to a simultaneous lineup (.03), $\chi^2(2, N = 71) = 9.82, p = .007$. No significant differences were observed for the target-present high similarity condition ($\chi^2(2, N = 72) = 4.66, p > .05$). Additionally, no significant differences were observed for target-absent lineups when the data were split by target presence and similarity level (high similarity; $\chi^2(1, N = 73) = .78, p > .05$; low similarity; $\chi^2(1, N = 71) = .90, p > .05$). See Table 3 for identification rates as a function of lineup and similarity level.

Table 3

Identification Accuracy as a Function of Lineup Procedure and Similarity Level

	High Similarity		Low Similarity	
	Simultaneous	Elimination-plus	Simultaneous	Elimination-plus
Target-present				
Correct Identification	.76 (26)	.61 (23)	.82 (28)	.65 (24)
Foil Identification	.15 (5)	.11 (4)	.15 (5)	.05 (2)
False rejection	.09 (3)	.29 (11)	.03 (1)	.30 (11)
Target-absent				
Correct rejection	.53 (20)	.63 (22)	.64 (23)	.74 (26)
False Identification	.47 (18)	.37 (13)	.36 (13)	.26 (9)

Survival Status. The survival status is the rate at which each lineup member is selected in the first judgment in the elimination-plus procedure (Pozzulo & Lindsay, 1999). To determine if the guilty suspect survived at a significantly higher rate than any other lineup member, survival status was examined for the high and low similarity conditions. A z-test on two proportions was calculated. In the high similarity condition the guilty suspect survived at a significantly higher rate than any other lineup member combined, $z = 3.36$, $p < .001$. Similarly, in the low similarity condition the guilty suspect survived at a significantly higher rate than any other lineup member combined, $z = 5.09$, $p < .001$. These analyses provide strong support for the use of survival status as an investigative procedure such that regardless of lineup similarity (i.e., high vs. low) the guilty suspect is still being chosen at a higher rate. Additionally, it was of interest to determine if the survival status was comparable to the correct identification rate of the simultaneous lineup. Results indicated survival status was comparable with the correct identification rate for the simultaneous lineup for both high ($z = -0.41$, $p > .05$) and low ($z = -0.38$, $p > .05$) similarity.

Diagnosticity. Diagnosticity ratios (DR) are used to gain an understanding of the likelihood of the guilty suspect being selected versus the likelihood of an innocent suspect being selected (Pozzulo et al., 2015; Wells & Lindsay, 1980). Diagnosticity ratios can be calculated by dividing the number of correct identifications (in target-present conditions) by the number of false identifications (in target-absent conditions). As the current study did not have a designated innocent suspect in target-absent lineups, false identifications were divided by 6 (i.e., the total number of lineup members in the target-absent lineup; Clark et al., 2008). Results indicated that when collapsed across similarity, participants were more likely to select the guilty suspect in the elimination-plus lineup

(DR = 12.81) than they were in the simultaneous lineup (DR = 10.44). When the data were split by similarity level and lineup procedure the diagnosticity ratios for the elimination-plus lineup were 10.60 (high similarity) and 16.00 (low similarity). Across the simultaneous lineup, the diagnosticity ratios were 8.67 (high similarity) and 12.90 (low similarity). These results indicate that when compared to the high similarity condition the guilty suspect was more likely to be selected for both the elimination-plus lineup and the simultaneous lineup in the low similarity condition.

Additionally, relative risk ratios were calculated to compare the diagnosticity of the lineup procedures to determine if they were significantly different from each other. Fitzgerald and Price (2015) suggest that the relative risk ratios are beneficial, as they have known sampling distributions and established methods of computing confidence intervals. The risk ratio was calculated in a similar way to the DR whereby the number of suspect identifications was divided by the total number of identifications (divided by 6, as there was no designated innocent suspect). Results indicated no significant differences between the two lineup types (1.09, 95% CI [0.35, 3.45]).

Confidence

Predictive-utility of confidence. A series of logistic regressions were run to examine whether confidence predicted overall accuracy across the two lineup procedures. Confidence taken after the identification decision significantly predicted overall accuracy in the simultaneous lineup, B = -.04, *SE* = .01, *p* = .001. However, confidence taken after the identification decision did not significantly predict overall accuracy in the elimination-plus lineup, B = -.02, *SE* = .01, *p* = .09. Given that the elimination-plus lineup utilizes two separate confidence ratings, the two ratings were combined to determine whether combined confidence predicted overall accuracy in the elimination-

plus lineup. This combined confidence rating was entered into a logistic regression with overall accuracy as the dependent variable. Combined confidence did not significantly predict overall accuracy, B = -.00, *SE* = .01, *p* = .721.

Target-present lineups. Given that the identification data was split by target presence, the same was done for the predictive utility of confidence. Logistic regressions were run to determine whether confidence predicted accuracy in target-present lineups. Confidence significantly predicted accuracy in the simultaneous lineup, B = -.07, *SE* = .03, *p* = .002, as well as the elimination-plus lineup, B = -.05, *SE* = .02, *p* = .001.

A logistic regression also was run to examine whether participants' confidence at judgment 1 of the elimination-plus procedure significantly predicted accuracy in target-present lineups. Confidence after judgment 1 of the elimination-plus lineup also was found to be a significant predictor of accuracy, B = -.08, *SE* = .02, *p* = .000. Similar to overall accuracy, the confidence ratings after judgment 1 and judgment 2 were averaged to determine if combined confidence predicted accuracy in target-present lineups. Combined confidence significantly predicted accuracy, B = -.08, *SE* = .02, *p* < .001

Target-absent lineups. An additional series of logistic regressions were run to determine whether confidence predicted accuracy in target-absent lineups. Confidence after the identification decision was not found to be a significant predictor of accuracy in the target-absent simultaneous lineup, B = -.02, *SE* = .01, *p* = .09, nor was it found to be a significant predictor of accuracy in the elimination-plus lineup, B = .02, *SE* = .015, *p* = .23. However, confidence was found to be a significant predictor of accuracy after judgment 1 of the elimination-plus lineup, B = .074, *SE* = .02, *p* = .001 and when the judgment 1 and judgment 2 confidence ratings were combined, B = .08, *SE* = .02, *p* < .001.

Choosers vs. non-choosers. Data were then separated into those who chose someone out of the lineup (N =169), regardless of target presence or lineup procedure, and those that did not (N =118). Overall, results indicated that for both choosers ($r(169) = .38$, $p = .000$) and non-choosers ($r(118) = .19$, $p = .04$) there was a significant relationship observed between confidence and identification accuracy.

Data for choosers and non-choosers was then compared across lineup type. For the elimination-plus lineup, a significant confidence-accuracy relationship occurred for choosers, $r(74) = .28$, $p = .02$. A similar trend was observed for the simultaneous lineup, $r(94) = .47$, $p < .001$. Additionally, for the elimination-plus lineup, data was further split across similarity level wherein a significant confidence-accuracy relationship was found for choosers in the high similarity condition, $r(40) = .33$, $p = .04$. A significant relationship was not observed for the low similarity elimination-plus condition, $r(35) = .25$, $p =.15$. For the simultaneous lineup a significant relationship occurred for both high ($r(48) = .53$, $p < .001$) and low ($r(46) = .41$, $p = .004$) similarity choosers.

Discussion

The purpose of this study was to examine whether a modified version of the elimination lineup procedure (i.e., the elimination-plus lineup), as well as the level of similarity between the target and foil photographs, influenced participants' identification accuracy. Two identification procedures (i.e., simultaneous and elimination-plus) and two levels of foil similarity (i.e., high similarity and low similarity) were examined. Previous research examining the effectiveness of the elimination-plus procedure is limited. Additionally, there is a lack of research examining the influence of foil similarity on identification decisions across various lineup procedures. It was of particular interest in

the current study to examine the robustness of the elimination-plus procedure and to contribute to the literature regarding foil similarity.

Identification Procedure

The elimination-plus procedure (Pica & Pozzulo, 2017a) is a newly modified version of the elimination lineup created by Pozzulo and Lindsay (1998). When compared to the simultaneous procedure, the standard elimination lineup has been found to have a higher rate of correct rejections in target-absent lineups, but also a higher rate of false rejections in target-present lineups (e.g., Pozzulo & Balfour, 2006; Pozzulo et al., 2013).

In the current study, it was predicted that the elimination-plus procedure would also result in a higher rate of correct rejections in target-absent lineups when compared to the simultaneous procedure. Contrary to the prediction, in target-absent lineups correct rejection rates were not significantly higher for the elimination-plus lineup. This suggests that in target-absent lineups, participants were as likely to make a correct rejection when presented with a simultaneous lineup as they were when presented with an elimination-plus lineup. This result is surprising, given that a number of studies have found that the elimination procedures are extremely beneficial in increasing correct rejections, and therefore reducing false identifications, when compared to more standard lineup procedures (Humphries et al., 2012; Pozzulo & Lindsay, 1999; Pozzulo et al., 2008, 2013, 2015). However, the current study did find a trend in this direction, such that the elimination-plus lineup had a higher rate of correct rejections compared to the simultaneous lineup (.69 vs. .58, respectively). It is possible, perhaps, given that the trend of correct rejection rates was in the predicted direction that the statistical power of the current study was too low to find any significant differences. These findings are similar to

those of previous research that examine the simultaneous and elimination-plus lineups; both Pica and Pozzulo (2017a) and the current study found only trends in the correct rejection rates. Sheahan and colleagues (2017) also examined the utility of the elimination-plus procedure in target-absent lineups when compared to the simultaneous lineup. Interestingly, they found that the elimination-plus procedure resulted in significantly more correct rejections in target-absent lineups when compared to the simultaneous procedure. The results of Sheahan et al. (2017) are comparable to research utilizing the standard elimination lineup, which suggests that the elimination lineup procedure is beneficial in reducing false identifications in target-absent lineups (e.g., Humphries et al., 2012; Pozzulo et al., 2013). For example, Humphries and colleagues (2013) found marginally significant differences amongst the correct rejection rates across the elimination and simultaneous lineups. Similarly, Pozzulo and colleagues (2013) found significant differences in correct rejection rates for the elimination and simultaneous lineups.

Previous research has examined the inclusion of a salient rejection option while implementing the simultaneous lineup (e.g., Bruer et al., 2015). It was of interest in that study to determine if a salient rejection option (i.e., a “not here” card) had any effect on identification accuracy when compared against a verbal rejection option (i.e., verbally stating “not here”). The results of that study indicated the salient rejection option elicited higher rates of correct rejection (.80) compared to the simultaneous lineup with a verbal rejection option (.61; Bruer et al., 2015). Based on these findings, it is possible perhaps that the inclusion of a salient “not here” card with the simultaneous lineup in the current study enhanced the correct rejection rates and made them more comparable to making the absolute judgment in the elimination-plus lineup.

As the elimination-plus procedure is in its infancy, it is difficult to draw conclusions regarding the non-significant differences amongst the correct rejections rates of the two procedures that was found in the current study. Further research examining the elimination-plus procedure will likely provide more reliable information regarding its effect on correct rejection rates.

The results of the current study provide support for previous research that has found eyewitnesses to be more likely to make a correct identification when presented with a simultaneous lineup compared to the elimination-plus lineup (Pica & Pozzulo, 2017a). Additionally, as the only difference between the elimination lineup and the elimination-plus lineup is the second confidence judgment, it could be suggested that the identification rates of the elimination-plus lineup are comparable to the identification rates of the elimination lineup. In this case, the results of the current study support other research that has examined the elimination lineup and the simultaneous lineup (Pozzulo & Lindsay, 1999; Pozzulo et al., 2013) such that the simultaneous lineup elicited higher rates of correct identification and lower rates of false rejections. As suggested by Pozzulo and colleagues (2013) it is possible that the unfamiliarity of the elimination lineup and the two-judgment process may have confused participants and caused them to question their initial decision and this could perhaps be why the elimination-plus lineup produced lower correct identification rates.

Foil Similarity

The current study also examined the role of foil similarity on identification accuracy. Foil similarity is important to consider because research has indicated the need to construct lineups that avoid being too similar and thusly making an identification decision nearly impossible, or not similar enough and thusly making an identification

decision too easy (e.g., Wells & Luus, 1990). Without research examining similarity it becomes difficult to establish an appropriate standard for lineup similarity and calls into question the role this variable is having on real-world eyewitness identifications.

Similarly to the research on the elimination-plus procedure, there also is limited research available that examines the impact of foil similarity on eyewitness identification accuracy. Previous research has found a significant relationship between identification accuracy and similarity level (e.g., Bruer et al., 2015; Clark et al., 2015; Fitzgerald et al., 2013). Specifically, this research has found that as the similarity between the foil and target photographs increases, identification accuracy decreases. In the current study, significant differences were not observed in the identification accuracy rates across the two similarity conditions. Although not significant, the findings indicate a trend in the data that supports the hypothesis that as similarity increases identification accuracy decreases. This finding echoes what has been previously found and suggests that the more similar the suspect is to the foils, the greater difficulty the witness will have when making their identification decision (e.g., Fitzgerald et al., 2013). Ultimately, researchers and investigators should aim to construct lineups that contain photographs that have a moderate, compared to high or low, level of similarity.

One major challenge that has appeared within the foil similarity literature is that researchers seem to be having difficulty conceptualizing what constitutes as high, moderate, and low similarity. It is possible that this challenge is occurring because researchers are trying to take a concept that is measured on a continuum and attempting to break it down into distinct categories (i.e., low vs. high; Fitzgerald et al., 2015). For example, in the current study and in Fitzgerald et al. (2015) the photograph ratings used for the construction of the high similarity lineups had mean similarity ratings around the

mid-point of the similarity scale (current study: $M = 4.49$ on a scale of 1 to 10). So while the high similarity lineup was indeed *higher* similarity in contrast to the low similarity lineup that was used (current study: $M = 2.03$), in the broader scope of this type of research it may not have been as highly similar as is necessary to observe any substantial effects. It may be possible that high similarity lineups need to have average ratings around eight or nine (on a 10 point scale) before any differences arise.

Given that there is no consistency in what constitutes a low, moderate, or high similarity lineup, there is also no clear procedure on how to create lineups that have moderately similar looking foils. The lack of ability to create consistently similar foil lineups means that research findings are difficult to generalize. Moreover, it becomes difficult for researchers to be consistent in knowing the effect of low, moderate, and high similarity lineups. It is also important to consider that similarity levels are relative to the photographs that are chosen for the lineup and therefore change as different photos are added or removed. Additionally, this makes it challenging to advise police agencies on how to construct their lineups and suggests that they do not yet have the proper tools to confidently create fair, moderately similar lineups. Without a proper method for standardizing similarity there is no way of knowing how identification decisions are impacted by this factor.

Other potential problems faced by researchers and police officers include the limited number of photos that can be accessed and used for lineup construction as well as the limited amount of time in which to construct a lineup. The current study utilized photographs from a laboratory database; however, a larger array of photos to choose from could help to provide a more accurate representation of high, moderate, and low similarity. Additionally, the total number of photos required for a lineup also varies

across different jurisdictions and research examining how many foils should be presented has found varied results (Clark et al., 2015). For example, the US Department of Justice Guidelines state a minimum of five foils should be used in addition to the suspect for lineup administration, however, guidelines from the UK indicate lineups can include anywhere from eight foils to 12 foils (Clark et al., 2015; U.S. DOJ, Office of Justice Programs, National Institute of Justice, 1999). However, Brewer and Palmer (2010) have suggested that as a general rule researchers and police officers should use at least three foils in addition to the suspect in the lineup. Vague regulations such as those presented make it especially challenging to construct fair lineups and even more challenging to attempt to standardize research practices.

Based on the challenges presented above, it is evident that there are numerous components to consider when constructing a lineup, and as such, it would be beneficial to create a system in which to regulate these components of lineup construction as the procedures that are currently being used lack consistency. Maclin, Meissner, and Zimmerman (2005) sought to create such a system. Ultimately, the researchers were interested in updating the current methodology used in eyewitness identification studies (i.e., move to computer based lineup administration) and wanted to produce open-source software that would allow researchers and police officers to access and share the same materials, as well as be able to run photographic lineups with more consistency across the globe. As such, the PC_Eyewitness (PCE) software was created. This software was designed in such a way that allows for complete control over all elements of a lineup identification procedure and allows the user to modify any module to suit their individual needs. This program could help facilitate a wider photographic database that could be used to generate lineups that more appropriately fit the high, moderate, and low similarity

conditions. Additionally, although PCE has not been rigorously studied, and it is unclear as to why this particular software has not been implemented, PCE does provide a promising start to foil similarity regulation and could perhaps provide more consistent information regarding the effect of foil similarity on identification accuracy.

Foil Similarity and Identification Accuracy

The main purpose of the current study was to examine what impact, if any, foil similarity had on identification accuracy. Results indicated that in the target-present, low similarity, elimination-plus lineup condition, participants made more false rejections compared to those that were presented with the simultaneous lineup. One potential reason for this finding may be that participants were expecting to be shown a more traditional photo lineup (e.g., simultaneous or sequential) and as they were unfamiliar with the elimination-plus lineup they may have had difficulty understanding the instructions. More specifically, participants may have had difficulty understanding why they would be asked for a second judgment unless they made a mistake at judgment 1. Additionally, it may be possible that the low similarity between the photos, in combination with the unfamiliar lineup procedure, induced skepticism in the participants. It is possible that the participants felt as though they were being "duped" because the first judgment may have seemed unusually easy, as the target may have been easy to pick out in the low similarity condition. Furthermore, after they were asked for their identification decision in judgment 2, they may have become overly cautious in their decision-making (i.e., they may have thought a second judgment was indicative of being incorrect in the first judgment; Humphries et al., 2012; Pozzulo & Lindsay, 1999; Pozzulo et al., 2013).

The issue of the two-judgment process in the elimination procedure has been addressed in another study. Specifically, Pica and Pozzulo (2017a) postulated that the

high false rejection rates found in their study were due to participants' lack of understanding regarding the elimination procedure, specifically concerning judgment 2. As such, Pica and Pozzulo (2017b) examined whether giving explicit instructions regarding the judgment decisions in the elimination lineup procedure would help reduce false rejection rates. Participants were informed that they were going to be asked to make a second judgment regardless of whom they selected at judgment 1 and regardless of the accuracy of their first judgment. Their findings indicated that identification accuracy does not differ when given explicit instructions pertaining to the elimination lineup. Pica and Pozzulo (2017b) suggest that when given instructions regarding the lineup the eyewitnesses are simply shifting their decision criterion, as evidenced by their more liberal decision making, and not their sensitivity or discrimination. That is, it was easier for participants to make their decisions when given instructions. This may indicate that there may be other factors underlying the decision shift during the elimination lineup and possibly the elimination-plus lineup as well.

Survival Status

As mentioned previously, the elimination-plus lineup procedure provides an additional piece of information that may be useful during an investigation, beyond that of an identification: survival status. As a reminder, survival status is the rate at which a lineup member survives (or is chosen at) the first judgment. Pozzulo and colleagues (2015) have suggested that the survival status information compensates for the lower rate of correct identification that is often found with the elimination procedures, as it can be used as an investigative piece of evidence to determine if the police have apprehended a guilty suspect. Specifically, if the suspect is placed in a lineup and is selected by the eyewitness in judgment 1, the likelihood that the suspect is indeed the guilty perpetrator

increases. Alternatively, if a foil is selected in judgment 1 rather than the suspect, the likelihood that the suspect is guilty decreases. Similar to past research (e.g., Pica & Pozzulo, 2017a; Sheahan et al., 2017) the current study found that the guilty suspect survived judgment 1 of the elimination-plus procedure at a higher rate than any other lineup member, which demonstrates that survival status is indicative of guilt. The high rate of survival for the guilty suspect at judgment 1 has also been found when examining the standard elimination procedure (Humphries et al., 2012; Pozzulo et al., 2013; 2015).

In real-world scenarios the police can use the survival status from judgment 1 of the elimination-plus lineup to provide support as to whether they have apprehended the guilty suspect (Pozzulo et al., 2013). If the suspect they have apprehended is placed in a lineup, and selected, the police can use this information to help direct their investigation (Pica & Pozzulo, 2017a). Alternatively, if they place their suspect in the lineup and they are not selected, this can also be used to steer their investigation in a different direction (Pica & Pozzulo, 2017a). It is important to note that regardless of who "survives", it suggests that the person selected bares some physical resemblance to the criminal.

The findings of the current study also indicate that the guilty suspect is surviving at a significantly higher rate than any other lineup member, regardless of foil similarity. This finding supports the robustness of survival status and its' utility as an investigative tool - even when the foils in the lineup are considered to be highly similar. As previously mentioned, however, the range of similarity of the lineups that were used in the current study may not have been as distinctly low or high as was intended. As such, it is necessary in future research to examine whether the guilty suspect would continue to survive judgment 1 at a higher rate than foil lineup members when highly similar foils are used. If differences in the rate of suspect survival are not found amongst genuine high

and low similarity lineups, it would provide strong support for the use of survival status as an indicator of suspect guilt. Furthermore, such a finding would indicate survival status supersedes any potential effect of similarity.

The survival status information is not possible when employing any other type of lineup besides the elimination or elimination-plus procedures, as traditional lineups such as the simultaneous or sequential lineup only employ one decision, and as such, any decision that is made is an identification decision. Furthermore, as previously mentioned, the photos that police departments have available for the use of lineup construction is often limited and they often have to make the best lineup they can under less than ideal circumstances (e.g., small number of photos to choose from, varying levels of similarity; Maclin et al., 2005). Survival status may be additionally helpful in the real world because it provides useful information even when restricted by less than ideal circumstances.

Confidence

The elimination-plus procedure also provides additional confidence information that is not present in the simultaneous or standard elimination procedures. Specifically, the elimination-plus procedure includes the addition of an extra confidence rating after judgment 1 in the procedure, resulting in two distinct confidence ratings from the eyewitness (i.e., after judgment 1 and after judgment 2). Confidence has been listed as one of the factors that jurors should consider when assessing identification accuracy (Neil vs. Biggers, 1972) and has been considered one of the most influential factors in juror decision-making (e.g., Sauer & Brewer, 2015). Research examining the relationship between confidence and accuracy typically finds that those who select a photograph from a lineup, and are highly confident in their choice, are likely to be accurate (e.g., Palmer, Brewer, Weber, & Nagesh, 2013; Sauer & Brewer, 2015; Sauerland & Sporer, 2009;

Sporer, Penrod, Read, & Cutler, 1995; Weber & Brewer, 2004; Wixted, Mickes, Clark, Gronlund, & Roediger, 2015). In the current study, analyses were conducted to examine if confidence was a significant predictor of accuracy. In target-present lineups, confidence ratings after judgment 1, judgment 2, and combined across both judgments significantly predicted accuracy for the elimination-plus lineup. Additionally, confidence after the identification decision for the simultaneous lineup also significantly predicted accuracy. This suggests that when presented with a target-present elimination-plus or simultaneous lineup, the identification decisions of those individuals with high confidence are more likely to be correct. These findings are similar to those found in previous research (e.g., Palmer et al., 2013; Sauer & Brewer, 2015; Saurland & Sporer 2009; Sporer et al., 1995; Pica & Pozzulo, 2017a; Weber & Brewer, 2004; Wixted et al., 2015) emphasizing that accurate witnesses are more likely to have higher confidence. However, as with much of the confidence-accuracy literature, caution should be used when trying to generalize these findings as even the most confident witness can still make mistakes. In a real-world context this type of information should be used to help guide an investigation rather than be used as a conclusive indicator of suspect guilt (Brewer & Wells, 2006).

In target-absent lineups confidence after judgment 1 and combined confidence from both judgments were significant predictors of accuracy. Confidence after the identification decision, however, was not significant. As mentioned previously, it is possible that participants questioned themselves at the second judgment because they may have associated the second judgment with an indication that they were incorrect after their initial choice (Pozzulo & Lindsay, 1999; Pozzulo et al., 2013). Additionally, the unfamiliarity of the elimination-plus lineup, in combination with the inability to match

the suspect to their memory (as the suspect was not in the lineup) may have elicited higher levels of self-doubt (Pica & Pozzulo, 2017a). Future research may want to examine participants' reasons or justifications for their decision in judgment 2.

In previous research examining the confidence-accuracy relationship when using the elimination-plus procedure, Pica and Pozzulo (2017a) failed to find a significant confidence-accuracy relationship in target-absent lineups across judgment 1, judgment 2, and both judgments combined. The researchers suggest that because confidence is the degree of match between the witness' memory for the perpetrator and the photographs presented it is logical that a confidence-accuracy relationship did not emerge. More specifically, when the perpetrator is not present in a lineup a strong memory match cannot be made between any of the photographs and the witness' memory and this might lead to lower confidence ratings (Pica & Pozzulo, 2017a).

Sporer and colleagues (1995) argue the confidence-accuracy relationship is considerably higher for choosers rather than non-choosers. This was supported in the current study. Choosers in the high similarity, elimination-plus lineup condition, as well as high and low similarity simultaneous lineup conditions had a significant confidence-accuracy relationship. A significant confidence-accuracy relationship was not observed for the low similarity elimination-plus lineup condition.

Overall, while the correlations between confidence and accuracy may be small, they provide yet another piece of valuable information when using the elimination-plus lineup. As suggested by Sauer and Brewer (2015) confidence provides information pertaining to the extent that the witness' memory matches the suspect. This information, taken in conjunction with survival status and the identification decision provides investigators with substantially more knowledge about the guilt of the suspect than

traditional lineup procedures. As indicated by Brewer and Wells (2006) it is important to use this information to help guide investigations rather than as hard and fast proof that confidence is equated with accuracy.

Limitations and Future Directions

There are various methodological limitations in the current study that suggest caution when drawing conclusions as to the findings that have been presented. First, it is important to note that the conditions in which this research took place were not stress inducing. The video the participants saw was shown in a safe environment and depicted a staged, non-violent theft. Furthermore, the conditions in which the participant viewed the video were ideal. They were informed they would be watching a video and during that time there were no distractions. During the commission of a real crime it is unlikely that the witness would not experience various distractions (e.g., fearing for one's life). Additionally, during the identification portion of the study, participants were aware that any decision they make, regardless of accuracy, would not have any real-world implications (i.e., an innocent person would not be sent to jail nor would a guilty person be released into the community) and this may have made them laxer in their decision-making.

Various research has argued that laboratory-based studies lack ecological validity and that this methodology (i.e., live vs. video taped crimes) does not induce the same levels of stress or arousal as would be experienced if witnessing the commission of a real crime (e.g., Malpass, Sporer, & Koehnken, 1996; Tollestrup, Turtle, & Yuille, 1994; Yuille & Wells, 1991). Pozzulo, Crescini, and Panton (2008) examined the effect of target exposure (live vs. video) on identification accuracy. Their findings indicated that the method of target exposure does not greatly influence identification accuracy.

However, degree of arousal, more so than stress, can affect identification rates (Pozzulo et al., 2008). Taking these findings into account, it is important to consider the accuracy rates of the current study, and those of similar studies, may be higher than those that would occur in a real-world identification scenario.

Another limitation of the current study was that the sequential lineup was not included in addition to the simultaneous and elimination-plus lineups. As previously mentioned, there is some debate within the literature regarding whether the simultaneous or sequential lineups are best to be used when examining the effect of foil similarity (e.g., Carlson et al., 2008; Clark et al., 2008). The current study examined the simultaneous lineup as it is the most commonly used lineup procedure (Wells, 1993). Future research should examine the simultaneous lineup in addition to the sequential procedure as to allow for a direct comparison between the two types of lineups and to get a better understanding of the differences between the two procedures while under the same conditions. Additionally, future research should examine a more diverse sample. The current study only tested undergraduate participants and this makes it challenging to generalize any findings.

Finally, as previously mentioned, the level of similarity amongst the high and low similarity lineups may not have been as dramatic as is needed to observe significant differences. As this appears to be a common methodological problem within the literature (e.g., Fitzgerald et al., 2015) it may be necessary to begin working towards more standardized procedures and practices when examining foil similarity. Software such as PCE provides a great starting point for minimizing the discrepancy throughout the literature. Future research should employ a larger number of photographs to be rated before the construction of the lineup in hopes of creating lineups in which the similarity

levels are more varied. Additionally, it may be beneficial for laboratories and police departments to collaborate and create a larger photo database.

Real World Implications

As previously indicated, in real-world eyewitness identification scenarios, the police are unaware as to whether they have indeed apprehended the guilty criminal. This, unfortunately, makes the external validity of research in this area challenging. However, there does appear to be one potential solution to this problem, implementing the elimination or elimination-plus lineup. As the elimination-plus lineup is ultimately a combination of the simultaneous and sequential lineups, its implementation should be easy such that it would require little to no extra training for individuals who are already trained in those lineups. Additionally, survival status has been demonstrated to provide key information as to the guilt of the suspect. This piece of information alone could provide useful information to the investigators.

Conclusions

Overall, the findings of the current study contribute to the current literature regarding lineup procedure and foil similarity. As discussed by Sheahan and colleagues (2017) and Pica and Pozzulo (2017a) the elimination-plus lineup provides information pertaining to the survival status of the suspect, the confidence of the witness following the first judgment, and the identification decision at judgment 2. The elimination-plus lineup is the only lineup to provide additional information regarding the guilt of the suspect. Based solely on the identification data from this study, one would recommend the use of the simultaneous lineup, however, while the identification decisions for the elimination-plus lineup may not be as strong as the simultaneous lineup in the current study, there are clear investigative benefits to using the elimination-plus procedure. As

such, consideration should be given to implementing the elimination-plus procedure given its additional benefit over the simultaneous lineup procedure.

References

Beal, C. R., Schmitt, K. L., & Dekle, D. J. (1995). Eyewitness identification of children: Effects of absolute judgments, nonverbal response options, and event encoding. *Law and Human Behavior*, *19*(2), 197–216. http://doi.org/http://dx.doi.org.proxy.library.carleton.ca/10.1007/BF01499325

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*(4), 178-183.

Bruer, K. C., Fitzgerald, R. J., Therrien, N. M., & Price, H. L. (2015). Line-up member similarity influences the effectiveness of a salient rejection option for eyewitnesses. *Psychiatry, Psychology and Law*, *22*(1), 124-133. doi: 10.1080/13218719.2014.919688

Brewer, N., & Palmer, M. A. (2010). Eyewitness identification tests. *Legal and Criminological Psychology*, *15*(1), 77-96.

Brewer, N., & Wells, G. L. (2006). The confidence-accuracy relationship in eyewitness identification: Effects of lineup instructions, foil similarity, and target-absent base rates. *Journal of Experimental Psychology 12*(1), 11-30. doi: 10.1037/1076-898X.12.1.11

Brigham, J. C., & Brandt, C. C. (1992). Measuring lineup fairness: Mock witness responses versus direct evaluations of lineups. *Law and Human Behavior*, *16*(5), 475.

Carlson, C. A., Gronlund, S. D., & Clark, S. E. (2008). Lineup composition, suspect position, and the sequential lineup advantage. *Journal of Experimental Psychology: Applied*, *14*(2), 118.

Clark, S. E., & Godfrey, R. D. (2009). Eyewitness identification evidence and innocence risk. *Psychonomic Bulletin and Review, 16*(1), 22-42. doi: 10.3758/PBR.16.1.22

Clark, S. E., Howell, R. T., & Davey, S. L. (2008). Regularities in eyewitness identification. *Law and Human Behavior*, *32*(3), 187-218.

Clark, S. E., Moreland, M. B. and Rush, R. A. (2015). Lineup composition and lineup fairness. In Valentine, T., Davis, J. P. (Eds.), *Forensic facial identification: Theory and practice of identification from eyewitnesses, composites and CCTV* (pp. 129-158), New York, NY: Wiley.

Clark, S. E., Rush, R. A., & Moreland, M. B. (2013). Constructing the lineup: Law, reform, theory, and data. In B. Cutler (Ed.), *Reform of eyewitness identification procedures*. Washington, D.C.: American Psychological Association.

Doob, A. N., & Kirshenbaum, H. M. (1973). Bias in police lineups-partial remembering. *Journal of Police Science and Administration*, *1*(3), 287-293.

Fitzgerald, R. J., Oriet, C., & Price, H. L. (2015). Suspect filler similarity in eyewitness lineups: A literature review and a novel methodology. *Law and human behavior*, *39*(1), 62.

Flowe, H. D., & Ebbensen, E. B. (2007). The effect of lineup member similarity on recognition accuracy in simultaneous and sequential lineups. *Law and Human Behaviour, 31*(1), 33-52.

Humphries, J. E., Holliday, R. E., & Flowe, H. D. (2012). Faces in motion: Age-related changes in eyewitness identification performance in simultaneous, sequential, and elimination video lineups. *Applied Cognitive Psychology*, *26*(1), 149–158. http://doi.org/10.1002/acp.1808

Innocence Project. (2015). Retrieved on December 3, 2015, from www.innocenceproject.org

Lindsay, R. C., Martin, R., & Webber, L. (1994). Default values in eyewitness descriptions: A problem for the match-to-description lineup foil selection strategy. *Law and Human Behavior*, *18*(5), 527.

Lindsay, R. C. L., & Wells, G. L. (1980). What Price Justice? Exploring the Relationship of Lineup Fairness to Identification Accuracy. *Law and Human Behavior*, *4*(4), 303–313.

Lindsay, R.C.L., & 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

Luus, C. A., & Wells, G. L. (1991). Eyewitness identification and the selection of distracters for lineups. *Law and Human Behavior*, *15*(1), 43.

Maclin, O. H., Meissner, C. A., & Zimmerman, L. A. (2005). PC_Eyewitness: A computerized framework for the administration and practical application of research in eyewitness psychology. *Behavior Research Methods, 37*(2), 324-334.

Malpass, R. S. (1981). Effective size and defendant bias in eyewitness identification lineups. *Law and Human behavior*, *5*(4), 299-309. doi:10.1007/BF01044945

Malpass, R.S., & Devine, P.G. (1981). Eyewitness identification: Lineup instructions and the absence of the offender. *Journal of Applied Psychology, 66,* 482-489. doi: 10.1037/0021-9010.66.4.482

Malpass, R. S., & Devine, P. G. (1983). Measuring the fairness of eyewitness identification lineups. In S. Lloyd-Bostock & B. R. Clifford (Eds.). *Evaluating witness evidence*. London: John Wiley and Sons.

Malpass, R. S., Sporer, S. L., & Koehnken, G. (1996). Conclusion. In S. L. Sporer, R. S. Malpass, & G. Koehnken (Eds.), *Psychological issues in eyewitness identification* (pp. 295−300). Mahwah, NJ: Lawrence Erlbaum.

Malpass, R. S., Tredoux, C. G., & McQuiston-Surrett, D. (2007). Lineup construction and lineup fairness. In *The handbook of eyewitness psychology, Vol II: Memory for people* (pp. 155-178). Lawrence Erlbaum Mahwah, NJ.

Navon, D. (1992). Selection of lineup foils by similarity to the suspect is likely to misfire. *Law and Human Behavior*, *16*(5), 575-593.

Neil v. Biggers, 409 US 188 (1972).

Palmer, M. A., & Brewer, N. (2012). Sequential lineup presentation promotes less-biased criterion setting but does not improve discriminability. *Law and Human Behaviour, 36*(3), 247-255. doi:10.1037/h0093923

Palmer, M.A., Brewer, N., Weber, N., & Nagesh, A. (2013). The confidence-accuracy relationship for eyewitness identification decisions: Effects of exposure duration, retention interval, and divided attention. *Journal of Experimental Psychology: Applied, 19,* 55-71. doi: 10.1037/a0031602

Parker, J. F., & Ryan, V. (1993). An Attempt to Reduce Guessing Behavior in Children's and Adults' Eyewitness Identifications. *Law and Human Behavior*, *17*(1), 11–26.

Pica, E., & Pozzulo, J. D. (2017a). The elimination-plus lineup: Testing a modified lineup procedure with confidence. *Journal of Investigative Psychology and Offender Profiling.* Advance online publication. doi: 10.1002/jip.1477

Pica, E. (2017b). *Improving eyewitness identification accuracy with a modified lineup procedure* (Doctoral dissertation). Retrieved from https://curve.carleton.ca/system/files/etd/388af243-36fa-4b8e-ad3e-

e108735bb91f/etd_pdf/98b00883e1139b5826b12391d18e54ed/pica-improvingeyewitnessidentificationaccuracy.pdf

Police Executive Research Forum, (2013). *A national survey of eyewitness identification procedures in law enforcement agencies.* National Institute of Justice, Washington, D.C.

Pozzulo, J. D., & Balfour, J. (2006). Children's and adults' eyewitness identification accuracy when a culprit changes his appearance: Comparing simultaneous and elimination lineup procedures. *Legal and Criminological Psychology*, *11*(1), 25–34. http://doi.org/10.1348/135532505X52626

Pozzulo, J. D., Crescini C., & Panton, T. (2008). Does methodology matter in eyewitness identification research?: The effect of live versus video exposure on eyewitness identification accuracy. *International Journal of Law and Psychiatry 31*, 430-437. doi:10.1016/j.ijlp.2008.08.006

Pozzulo, J. D., Dempsey, J., Corey, S., Girardi, A., Lawandi, A., & Aston, C. (2008). Can a lineup procedure designed for child witnesses work for adults? Comparing simultaneous, sequential, and elimination lineup procedures. *Journal of Applied Social Psychology*, *38*(9), 2195–2209. http://doi.org/10.1111/j.1559-1816.2008.00387.x

Pozzulo, J. D., Dempsey, J. & Clarke, C. (2010). Can the elimination lineup procedure overcome lineup bias: Comparison of procedures. *Psychiatry, Psychology, and Law, 17*(1), 32-38. doi: 10.1080/13218710903433956

Pozzulo, J. D., Dempsey, J., & Pettalia, J. (2013). The Z generation: Examining perpetrator descriptions and lineup identification procedures. *Journal of Police and Criminal Psychology, 28*(1), 63-74. doi: 10.1007/s11896-012-9107-5

Pozzulo, J. D., & Lindsay, R. C. L. (1998). Identification accuracy of children versus adults: A meta-analysis. *Law and Human Behavior*, *22*(5), 549–570. http://doi.org/http://dx.doi.org.proxy.library.carleton.ca/10.1023/A:1025739514042

Pozzulo, J. D., & Lindsay, R. C. L. (1999). Elimination lineups: An improved identification procedure for child eyewitnesses. *Journal of Applied Psychology*, *84*(2), 167–176. http://doi.org/http://dx.doi.org.proxy.library.carleton.ca/10.1037/0021-9010.84.2.167

Pozzulo, J. D., Reed, J., Pettalia, D., & Dempsey, J. (2015). Simultaneous, sequential, elimination, and wildcard: A comparison of lineup procedures. *Journal of Police and Criminal Psychology, 31*(1), 71-80. doi: 10.1007/s11896-015-9168-3

Pozzulo, J. D., & Warren, K. L. (2003). Descriptions and identifications of strangers by youth and adult eyewitnesses. *Journal of Applied Psychology*, *88*(2), 315.

Sheahan, C., Pica, E., Pozzulo, J. D. & Nastasa, C. (2017). *Eyewitness recall and identification abilities of old-adolescent and young-adults.* Manuscript submitted for publication.

Steblay, N., 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 Behaviour, 25*(5), 459-473.

Steblay, N. K., 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*(1), 99.

Sauer, J.D., & Brewer, N. (2015). Confidence and accuracy of eyewitness identification. In T. Valentine & J.P. Davis (Eds.) *Forensic facial identification: Theory and practice of identification from eyewitnesses, composites, and CCTV* (pp. 185-208). Hoboken, NJ: Wiley.

Sauerland, M., & Sporer, S.L. (2009). Fast and confident: Postdicting eyewitness identification accuracy in a field study. *Journal of Experimental Psychology: Applied, 15,* 46-62.

Sporer, S., Penrod, S., Read, D., & Cutler, B. (1995). Choosing, confidence, and accuracy: A meta-analysis of the confidence-accuracy relation in eyewitness identification studies. *Psychological Bulletin, 118,* 315-327.

Tollestrup, P., Turtle, J.W., & Yuille, J. C. (1994). Actual victims and witnesses to robbery and fraud: An archival analysis. In F. D. Ross, J. D. Read, & M. P. Toglia (Eds.), *Adult eyewitness testimony. Current trends and developments* (pp. 144−160). Cambridge: Cambridge University Press.

Tunnicliff, J. L., & Clark, S. E. (2000). Selecting foils for identification lineups: Matching suspects or descriptions? *Law and Human Behavior, 24*(2), 231-258.

Weber, N., & Brewer, N. (2004). Confidence-accuracy calibration in absolute and relative face recognition judgments. *Journal of Experimental Psychology: Applied, 10,* 156-172. doi: 10.1037/1076-898X.10.3.156

Wells, G. L. (1984). The psychology of lineup identifications. *Journal of Applied Social Psychology, 14*(2), 89-103. doi: 10.1111/j.1559-1816.1984.tb02223.x.

Wells, G. L. (1993). What do we know about eyewitness identification? *American Psychologist, 48,* 553-571. doi: 10.1037/0003-066X.48.5.553

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*(6), 603-647.

Wells, G. L., & Luus, C. A. E. (1990). The Diagnosticity of a lineup should not be confused with the diagnostic value of non-lineup evidence. *Journal of Applied Psychology, 75*(5), 511-516.

Wells, G. L., Rydell, S. M., & Seelau, E. P. (1993). The selection of distractors for eyewitness lineups. *Journal of Applied Psychology*, *78*(5), 835–844. http://doi.org/http://dx.doi.org.proxy.library.carleton.ca/10.1037/0021-9010.78.5.835

Wells, G. L., Small, M., Penrod, S. J., Malpass, R. S., Fulero, S. M., & Brimacombe, C. A. E. (1998). Eyewitness identification procedures. Reccomendations for lineups and photospreads. *Law and Human Behaviour, 22*, 603-647.

Wells, G. L., Smalarz, L., & Smith, A. M. (2015). ROC analysis of lineups does not measure underlying discriminability and has limited value. *Journal of Applied Research in Memory and Cognition*, *4*(4), 313-317.

Wells, G. L., Smith, A. M., Smalarz, L. (2015). ROC analysis of lineups obscures information that is critical for theoretical understanding and applied purposes. *Journal of Applied Research in Memory and Cognition, 4*, 324-328. doi: http://dx.doi.org/10.1016/j.jarmac.2015.08.010

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 Behaviour, 39*(1), 1-14. doi: 10.1037/1hb0000096

Wixted. J. T., & Mickes, L. (2014). A signal-detection-based diagnostic-feature model of eyewitness identification. Psychological Review, 121, 262-276. doi: 10.1037/a0035940

Wixted, J. T., & Mickes, L. (2015). Evaluating eyewitness identification procedures: ROC analysis and its misconceptions. *Journal of Applied Research in Memory and Cognition*, *4*(4), 318-323.

Wixted, J.T., Mickes, L., Clark, S.E., Gronlund, S.D., & Roediger, H.L. (2015). Initial eyewitness confidence reliably predicts eyewitness identification accuracy. *American Psychologist, 70,* 515-526. doi: 10.1037/a0039510

Yuille, J. C., & Wells, G. L. (1991). Concerns about the application of research findings: The issue of ecological validity. In J. Doris, (Ed.), *The suggestibility of children's recollections: Implications for eyewitness testimony* (pp.118-128). Washington, DC: American Psychological Association.

Zajac, R., & Karageorge, A. (2009). The wildcard: A simple technique for improving children's target-absent lineup performance. *Applied Cognitive Psychology*, *23*(3), 358–368. http://doi.org/10.1002/acp.1511

Appendices

Appendix A – Pilot Consent Form

Informed Consent Form

The purpose of informed consent is to ensure that you understand the purpose of the study and the nature of your involvement. Informed consent must provide sufficient information such that you have the opportunity to determine whether or not you wish to participate in the study.

Present study: Are they Similar?

Research personnel: The following people will be involved in this research project and may be contacted at any time: Keltie Pratt (Principal Investigator, keltie.pratt@carleton.ca, 613-520-2600, ext. 3695), Chelsea Sheahan (Psychology Department, PhD Student, Research Assistant, chelsea.sheahan@carleton.ca, 613-520-2600, ext. 3695), Emily Pica (Psychology Department, Contract Instructor, Research Assistant, emily.pica@carleton.ca, 613-520-2600, ext. 3695), or Dr. Joanna Pozzulo (Faculty Advisor, joanna.pozzulo@carleton.ca, 613-520-2600, ext. 1412).

Concerns: If you should have any ethical concerns about this study, please contact Dr. Andy Adler (Chair, Carleton University Research Ethics Board-A (by phone: 613-520-2600 ext. 2516 or email: ethics@carleton.ca).

Purpose: The purpose of this study is to examine similarity amongst different people.

Task requirements: You will be asked view a target photograph and compare it to other photographs.

Duration and locale: Testing will take place in Room 111, Social Sciences Research Building, Carleton University. This study will be completed in one testing session. The session will last approximately 60 minutes.

Token for participation: You will receive a 1% increase in your final grade of PSYC 1001, PSYC 1002, PSYC 2001, PSYC 2002, NEUR 2001, or NEUR2002 for participating in this study.

Potential risk/discomfort: There are no potential risks involved in this experiment. Should you experience any unease, you have the right to withdraw from the study and still receive course credit.

Anonymity/Confidentiality: All the information you provide will be strictly confidential. Data will only be used for research at Carleton University. Aggregate data may appear in academic journals. Your answers will NOT be linked to your name or signature (i.e.,

consent form) and your responses will be coded in such a way that you cannot be identified.

Protection of Personal Information: This Informed Consent Form and the data that is collected for this study will be separated and kept in the Lab for five years. It will be placed in a room that has restricted access and is kept locked and closed at all times. At the five-year mark, it will be shredded and disposed of.

Right to withdraw: Your participation is strictly voluntary. At any point during the study you have the right not to complete certain questions or to withdraw from the study and still receive credit. Withdrawal from the study is not permitted after the testing session has been completed. As no identifying information is associated with your data it is not possible to identify which data belongs to which participant.

This study has received clearance by the Carleton University Psychology Research Ethics Board (CUREB-B Clearance #106357).

Signatures: *I have read the above form and hereby consent to participate in this study. The data in this study will be used for research publications and/or teaching purposes. I am aware that the data collected in this study will be kept strictly confidential and anonymous. My signature indicates that I understand the above and wish to participate in this study.*

Participant's Name (print): _____

Participant's Signature: _____

Researcher's Name (print): _____

Researcher's Signature: _____

Date: _____

Appendix B - Participant Demographics Form

Participant Demographics Form:

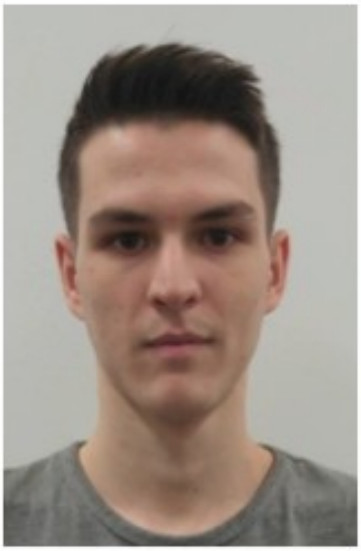
Your age:_____
Your sex:_____
Ethnicity: Please indicate which ethnic group you would consider yourself to belong to by checking the appropriate box (optional):

- o White (e.g., European)
- o Black (e.g., African, African American, African Canadian, Caribbean)
- o East Asian (e.g., Chinese, Japanese, Korean, Polynesian)
- o South Asian (e.g., Indian, Pakistani, Sri Lankan, Bangladeshi)
- o Southeast Asian (e.g., Burmese, Cambodian, Filipino, Laotian, Malaysian, Thai, Vietnamese)
- o West Asian (e.g., Arabian, Armenian, Iranian, Israeli, Lebanese, Palestinian, Syrian, Turkish)
- o Latin American (e.g., Mexican, Indigenous Central, South American)
- o Aboriginal Canadian/Native Canadian/First Nations
- o Mixed origin, please specify:_____
- o Other:_____

Appendix C – Photo Examples

On a scale from 1 to 10 please rate how similar picture #1 is to Chris (Please circle)

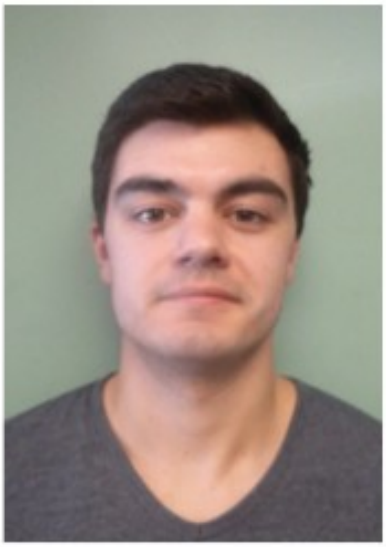
Chris



#1

On a scale from 1 to 10 please rate how similar picture #27 is to Chris (Please circle)

Chris



#27

Appendix D – Similarity Rating Scale

Similarity Rating Scale

On a scale from 1 to 10 please rate how similar picture #1 is to Chris (Please circle)

1. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10
   Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #2 is to Chris (Please circle)

2. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10
   Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #3 is to Chris (Please circle)

3. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10
   Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #4 is to Chris (Please circle)

4. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10
   Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #5 is to Chris (Please circle)

5. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10
   Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #6 is to Chris (Please circle)

6. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10
   Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #7 is to Chris (Please circle)

7. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10
   Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #8 is to Chris (Please circle)

8. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10
   Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #9 is to Chris (Please circle)

9. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10
   Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #10 is to Chris (Please circle)

10. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10
    Not at all Very similar

similar

On a scale from 1 to 10 please rate how similar picture #11 is to Chris (Please circle)

11. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #12 is to Chris (Please circle)

12. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #13 is to Chris (Please circle)

13. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #14 is to Chris (Please circle)

14. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #15 is to Chris (Please circle)

15. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #16 is to Chris (Please circle)

16. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #17 is to Chris (Please circle)

17. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #18 is to Chris (Please circle)

18. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #19 is to Chris (Please circle)

19. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #20 is to Chris (Please circle)

20. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #21 is to Chris (Please circle)

21. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10
Not at all similar — Very similar

On a scale from 1 to 10 please rate how similar picture #22 is to Chris (Please circle)

22. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10
Not at all similar — Very similar

On a scale from 1 to 10 please rate how similar picture #23 is to Chris (Please circle)

23. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10
Not at all similar — Very similar

On a scale from 1 to 10 please rate how similar picture #24 is to Chris (Please circle)

24. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10
Not at all similar — Very similar

On a scale from 1 to 10 please rate how similar picture #25 is to Chris (Please circle)

25. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10
Not at all similar — Very similar

On a scale from 1 to 10 please rate how similar picture #26 is to Chris (Please circle)

26. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10
Not at all similar — Very similar

On a scale from 1 to 10 please rate how similar picture #27 is to Chris (Please circle)

27. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10
Not at all similar — Very similar

On a scale from 1 to 10 please rate how similar picture #28 is to Chris (Please circle)

28. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10
Not at all similar — Very similar

On a scale from 1 to 10 please rate how similar picture #29 is to Chris (Please circle)

29. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10
Not at all similar — Very similar

On a scale from 1 to 10 please rate how similar picture #30 is to Chris (Please circle)

30. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10
Not at all similar — Very similar

On a scale from 1 to 10 please rate how similar picture #31 is to Chris (Please circle)

31. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #32 is to Chris (Please circle)

32. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #33 is to Chris (Please circle)

33. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #34 is to Chris (Please circle)

34. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #35 is to Chris (Please circle)

35. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #36 is to Chris (Please circle)

36. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #37 is to Chris (Please circle)

37. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #38 is to Chris (Please circle)

38. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #39 is to Chris (Please circle)

39. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #40 is to Chris (Please circle)

40. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #41 is to Chris (Please circle)

41. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar Very similar

On a scale from 1 to 10 please rate how similar picture #42 is to Chris (Please circle)

42. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar — Very similar

On a scale from 1 to 10 please rate how similar picture #43 is to Chris (Please circle)

43. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar — Very similar

On a scale from 1 to 10 please rate how similar picture #44 is to Chris (Please circle)

44. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar — Very similar

On a scale from 1 to 10 please rate how similar picture #45 is to Chris (Please circle)

45. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar — Very similar

On a scale from 1 to 10 please rate how similar picture #46 is to Chris (Please circle)

46. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar — Very similar

On a scale from 1 to 10 please rate how similar picture #47 is to Chris (Please circle)

47. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar — Very similar

On a scale from 1 to 10 please rate how similar picture #48 is to Chris (Please circle)

48. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar — Very similar

On a scale from 1 to 10 please rate how similar picture #49 is to Chris (Please circle)

49. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar — Very similar

On a scale from 1 to 10 please rate how similar picture #50 is to Chris (Please circle)

50. 1…..2…..3…..4…..5…..6…..7…..8…..9…..10

Not at all similar — Very similar

Appendix E – Pilot Debriefing Form

Debriefing Form

What are we trying to learn in this research and why is it important to scientists or the general public?
The purpose of this study was to examine the level of similarity between a target photo and multiple other photos. This study is a pilot study, meaning the information gathered from this study will be used to develop materials for another study to be run at a later time. The larger study will use the information from the current study to create photographic lineups to be presented to participants to help facilitate the identification of the perpetrator of a crime. Research has indicated that the degree of similarity between the target and "fillers" (i.e., known innocent people) in photographic lineups can have various implications on identification accuracy (e.g., Fitzgerald, Oriet, & Price, 2015). It is our intention to examine how more-similar or less-similar looking foils impact identification accuracy across different lineup types.

What are our hypotheses and predictions?
It is hypothesized that participants in our main study will be less accurate in their identification decisions when the lineup members are more similar compared to when the lineup members are less similar.

Where can I learn more?
Studies examining foil similarity and identification accuracy:

Fitzgerald, R. J., Oriet, C., & Price, H. L. (2015). Suspect filler similarity in eyewitness lineups: A literature review and a novel methodology. *Law and Human Behavior, 39*(1), 62-74.

Fitzgerald, R. J., Price, H. L., Oriet, C., & Charman, S. D. (2013). The effect of suspect-filler similarity on eyewitness identification decisions: A meta-analysis. *Psychology, Public Policy, and Law, 19*(2), 151-164.

What if I feel distress or anxiety after participating in this study?
If you feel any distress or anxiety after participating in this study, please feel free to contact the Carleton University Health and Counseling Services at: 613-520-6674, or the Distress Centre of Ottawa and Region at 613-238-3311 (http://www.dcottawa.on.ca).

What if I have questions later?
If you wish to discuss this research any further feel free to contact any one of the following people: Keltie Pratt (Psychology Department, MA Student, Principal Investigator, keltie.pratt@carleton.ca, 613-520-2600, ext. 3695), Chelsea Sheahan (Psychology Department, PhD Student, Research Assistant, chelsea.sheahan@carleton.ca, 613-520-2600, ext. 3695), Emily Pica (Psychology Department, Contract Instructor, Research Assistant, emily.pica@carleton.ca, 613-520-2600, ext. 3695), or Dr. Joanna Pozzulo (Faculty Advisor, Joanna.pozzulo@carleton.ca, 613-520-2600, ext. 1412).

What if I have concerns?
If you should have any ethical concerns about this study, please contact Dr. Andy Adler (Chair, Carleton University Research Ethics Board-A (by phone: 613-520-2600 ext. 2516 or email: ethics@carleton.ca).
This study has received clearance by the Carleton University Psychology Research Ethics Board (CUREB-B Clearance #106357).

At this time we would like to thank you for taking the time to take part in this study. Your participation has been greatly appreciated!

Appendix F – Informed Consent

Informed Consent Form

The purpose of informed consent is to ensure that you understand the purpose of the study and the nature of your involvement. Informed consent must provide sufficient information such that you have the opportunity to determine whether or not you wish to participate in the study.

Present study: To See or Not to See, that is the Question?

Research personnel: The following people will be involved in this research project and may be contacted at any time: Keltie Pratt (Principal Investigator, keltie.pratt@carleton.ca, 613-520-2600, ext. 3695), Emily Pica (Principal Investigator, emilypica@cmail.carleton.ca, 613-520-2600, ext. 3695), Chelsea Sheahan (Principal Investigator, Chelsea.sheahan@carleton.ca, 613-520-2600, ext. 3695) or Dr. Joanna Pozzulo (Faculty Advisor, joanna.pozzulo@carleton.ca, 613-520-2600, ext. 1412).

Concerns: If you should have any ethical concerns about this study please contact, Dr. Andy Adler (Chair, Carleton University Research Ethics Board-B, ethics@carleton.ca, 613-520-2600, ext. 8785).

Purpose: The purpose of this study is to examine your decision-making processes.

Task requirements: You will be asked view a video and then complete questionnaires regarding that video.

Duration and locale: Testing will take place in Room 111, Social Sciences Research Building, Carleton University. This study will be completed in one testing session that will last approximately 45 minutes.

Token for participation: You will receive a 1% increase in your final grade of PSYC 1001, PSYC 1002, PSYC 2001, or PSYC 2002 for participating in this study.

Potential risk/discomfort: There are no potential risks involved in this experiment. Should you experience any unease, you have the right to withdraw from the study and still receive course credit.

Anonymity/Confidentiality: All the information you provide will be strictly confidential. Data will only be used for research at Carleton University. Your answers will NOT be linked to your name or signature (i.e., consent form) and your responses will be coded in such a way that you cannot be identified.

Protection of Personal Information: This Informed Consent Form will be kept in the Lab for seven years along with your data, kept separately. It will be placed in a room that has

restricted access and is kept locked and closed at all times. At the five-year mark, it will be shredded and disposed of.

Right to withdraw: Your participation is strictly voluntary. At any point during the study you have the right not to complete certain questions or to withdraw from the study without any penalty whatsoever.

This study has received clearance by the Carleton University Research Ethics Board-B (106356).

Signatures: *I have read the above form and hereby consent to participate in this study. The data in this study will be used for research publications and/or teaching purposes. I am aware that the data collected in this study will be kept strictly confidential and anonymous. My signature indicates that I understand the above and wish to participate in this study.*

Participant's Name (print): _____

Participant's Signature: _____

Researcher's Name (print): _____

Researcher's Signature: _____

Date: _____

Appendix G – Secondary Consent Form

Secondary Consent Form

The purpose of informed consent is to ensure that you understand the purpose of the study and the nature of your involvement. Informed consent must provide sufficient information such that you have the opportunity to determine whether or not you wish to participate in the study.

Present study: Does the elimination-plus lineup procedure increase correct identifications and correct rejections?

Research personnel: The following people will be involved in this research project and may be contacted at any time: Keltie Pratt (Principal Investigator, keltie.pratt@carleton.ca, 613-520-2600, ext. 3695), Emily Pica (Principal Investigator, emilypica@cmail.carleton.ca, 613-520-2600, ext. 3695), Chelsea Sheahan (Principal Investigator, Chelsea.sheahan@carleton.ca, 613-520-2600, ext. 3695), or Dr. Joanna Pozzulo (Faculty Advisor, joanna.pozzulo@carleton.ca, 613-520-2600, ext. 1412).

Concerns: If you should have any ethical concerns about this study please contact, Dr. Andy Adler (Chair, Carleton University Research Ethics Board-B, ethics@carleton.ca, 613-520-2600, ext. 8785).

Purpose: The purpose of this study is to examine your accuracy with remembering who and what you saw. You will be asked to describe the video and then you will be shown some photographs. When you signed up for this study you were told that the purpose was to assess your confidence in different decisions; this was deceptive because the true nature of this study is actually eyewitness accuracy. Eyewitnesses are not made aware when a crime will occur; therefore, the purpose of the deception was to mimic a real life situation as much as possible. Had you been aware that you were about to watch a crime you may have attended to the video in a different way and your responses would not be representative of most criminal incidents. You have the opportunity to withdraw your data without penalty. However, if you wish to continue with this study, you can give your consent by signing this informed consent form.

Task requirements: You will be asked to answer a few short questionnaires relating to the video you watched and play a computer game.

Duration and locale: Testing will take place in Room 111, Social Sciences Research Building, Carleton University. This study will be completed in one testing session that will last approximately 45 minutes.

Token for participation: You will receive a 1% increase in your final grade of PSYC 1001, PSYC 1002, PSYC 2001, PSYC 2002, NEUR 2001, or NEUR2002 for participating in this study.

Potential risk/discomfort: There are no potential risks involved in this experiment. Should you experience any unease, you have the right to withdraw from the study without penalty.

Anonymity/Confidentiality: All the information you provide will be strictly confidential. Data will only be used for research at Carleton University. Your answers will NOT be linked to your name or signature (i.e., consent form) and your responses will be coded in such a way that you cannot be identified.

Protection of Personal Information: This Informed Consent Form will be kept in the Lab for seven years, along with your data, kept separately. It will be placed in a room that has restricted access and is kept locked and closed at all times. At the seven year mark, it will be shredded and disposed of.

Right to withdraw: Your participation is strictly voluntary. At any point during the study you have the right not to complete certain questions or to withdraw from the study without any penalty whatsoever.

This study has received clearance by the Carleton University Research Ethics Board-B (106356).

Signatures: *I have read the above form and hereby consent to participate in this study after knowing the true purpose of the study. The data in this study will be used for research publications and/or teaching purposes. I am aware that the data collected in this study will be kept strictly confidential and anonymous. My signature indicates that I understand the above and wish to participate in this study.*

Participant's Name (print): _____

Participant's Signature: _____

Researcher's Name (print): _____

Researcher's Signature: _____

Date: _____

Signatures: *I have read the above form and do not consent to participate in this study after knowing the true purpose of the study. The data in this study will be used for research publications and/or teaching purposes. I am aware that the data collected in this study will be kept strictly confidential and anonymous. My signature indicates that I understand the above and do not wish to participate in this study.*

Participant's Name (print): _____

Participant's Signature: _____

Researcher's Name (print): _____

Researcher's Signature: _____Date: _____

Appendix H – Participant Demographic Form

Demographics Form

Your age:_____

Your sex:_____

Ethnicity: Please indicate which ethnic group you would consider yourself to belong to by checking the appropriate box (optional):

- ☐ White (e.g., European)
- ☐ Black (e.g., African, African American, African Canadian, Caribbean)
- ☐ East Asian (e.g., Chinese, Japanese, Korean, Polynesian)
- ☐ South Asian (e.g., Indian, Pakistani, Sri Lankan, Bangladeshi)
- ☐ Southeast Asian (e.g., Burmese, Cambodian, Filipino, Laotian, Malaysian, Thai, Vietnamese)
- ☐ West Asian (e.g., Arabian, Armenian, Iranian, Israeli, Lebanese, Palestinian, Syrian, Turkish)
- ☐ Latin American (e.g., Mexican, Indigenous Central, South American)
- ☐ Aboriginal Canadian/Native Canadian/First Nations
- ☐ Mixed origin, please specify:_____
- ☐ Other:_____

Appendix I – Free Recall Description Form

Free Recall Description Form

Event Description
Please write down everything that you can remember about the video.

Person Description
Please write down everything you can remember about the criminal.

Appendix J – Simultaneous Lineup Response Form

Simultaneous Lineup Response Form

Think back to the video. Think back to what the criminal looks like. I am going to show you some pictures. Please look at the pictures. The criminal's picture may or may not be here. If you see the criminal's picture, please place a check mark in the box matching the criminal's number. If you do not see the criminal, please place a check mark in the box at the bottom.

☐ Photo 1 ☐ Photo 2 ☐ Photo 3

☐ Photo 4 ☐ Photo 5 ☐ Photo 6

☐ Not Here

Please rate your confidence in the accuracy of your decision using a numerical value between 0 (*not at all confident)* and 100 *(very confident)*: _____

Appendix K – Elimination-Plus Lineup Response Form

Elimination-Plus Lineup Response Form

Think back to the video. Think back to what the criminal looks like. I am going to show you some pictures. Please look at the pictures. The criminal's picture may or may not be here. Now let's look at the photos.

To start off, please pick out the person who looks MOST like the criminal.

Photo 1 Photo 2 Photo 3

Photo 4 Photo 5 Photo 6

Please rate your confidence that the person most similar looking to the criminal is the criminal using a numerical value between 0 (*not at all confident)* and 100 *(very confident)*: _____

This might be a picture of the criminal or it might be a picture of somebody else. Think back to what the criminal looks like. I want you to compare your memory of the criminal to this picture. I would like you to tell me if this is a picture of the criminal or somebody else. If you think this is a picture of the criminal, place a checkmark beside *Yes, this is a picture of the criminal.* If you think this not a picture of the criminal, place a check mark beside *No, this is not a picture of the criminal*.

☐ *Yes, this is a picture of the criminal.*

☐ *No, this is not a picture of the criminal.*

Please rate your confidence in the accuracy of your decision using a numerical value between 0 (*not at all confident)* and 100 *(very confident)*: _____

Appendix L – Similarity Rating Scale

Similarity Rating

On a scale from 1 to 10 please rate how similar the criminal in the video is to the picture that you chose

1……2……3…...4……..5……..6…...7……8……9……10

Not at all Similar Very similar

Appendix M – Manipulation Check

Manipulation Checks

1. Did you know that you would be acting as an eyewitness to a crime before coming to the study session today? Please circle the appropriate response.

   YES NO

2. Did you know anyone from the criminal photo lineup (e.g., one of the males is your friend)?

   YES NO

3. Before today, have you ever completed a photo lineup identification procedure? If yes, please explain.

   YES NO

4. Have you ever taken a class on eyewitness memory?

   YES NO

Appendix N – Debriefing Form

Debriefing Form

What are we trying to learn in this research?

The purpose of the present study is to assess the use various lineup procedures to determine whether one is more effective at increasing identification accuracy. Participants were either shown a lineup procedure known as the elimination-plus lineup where participants are shown a set of photographs and asked to pick out the person that looks most like the criminal and rate their confidence in the accuracy of that decision. Once that photo is selected, the participant is asked if the most similar is in fact the criminal and again asked to rate their confidence. This procedure was compared with simultaneous lineup. The simultaneous lineup involves showing all photographs as well as a "Not Here" card to the participant at one time and asking them to choose the picture of the perpetrator should they be present in the lineup or to choose the "Not Here" card if they do not see a photograph of the perpetrator. Additionally, this research is also assessing identification accuracy across highly similar lineup photographs and less similar lineup photographs.

Why is this important to scientists or to the general public?

This research is important because incorrect eyewitness identifications are one of the leading causes of innocent people being sent to jail. It is important to know if there are differences in identification accuracy across different levels of similarity amongst the lineup photographs. This information can help facilitate proper selection procedures for law enforcement when they are required to construct a lineup.

What are our hypotheses and predictions?

We predict that participants will be less accurate in their identification decisions when the lineup members are more similar compared to when the lineup members are less similar.

Where can I learn more?

Fitzgerald, R. J., Oriet, C., & Price, H. L. (2015). Suspect filler similarity in eyewitness lineups: A literature review and a novel methodology. *Law and Human Behavior, 39*(1), 62-74.

Fitzgerald, R. J., Price, H. L., Oriet, C., & Charman, S. D. (2013). The effect of suspect-filler similarity on eyewitness identification decisions: A meta-analysis. *Psychology, Public Policy, and Law, 19*(2), 151-164.

Pozzulo, J., & Lindsay, R.C.L. (1999). Elimination lineups: An improved identification procedure for child witnesses. *Journal of Applied Psychology, 84,* 167-176.

Why didn't you tell me I was going to watch a video of a crime?

We did not tell you that you would be watching a videotape of a theft because we wanted to mimic real life as much as possible and real life crime happens unexpectedly. Had you been forewarned of the crime aspect of the study, you may have paid attention to the video in a different way and, in turn, this would have influenced your responses to our questions. In this case, your responses would not have been useful to us because they would not be representative of how a real life witness would experience a similar situation.
Note. The video you watched was completely fictional, no crime was actually committed.

What if I feel distress or anxiety after participating in this study?

If you feel any distress or anxiety after participating in this study, please feel free to contact the Carleton University Health and Counseling Services at: 613-520-6674, or the Distress Centre of Ottawa and Region at 613-238-3311 (http://www.dcottawa.on.ca).

What if I have questions later?

If you wish to discuss this research any further feel free to contact any one of the following people: Keltie Pratt (Psychology Department, MA Student, Principal Investigator, keltie.pratt@carleton.ca, 613-520-2600, ext. 3695), Emily Pica (Psychology Department, Contract Instructor, Principal Investigator, emilypica@cmail.carleton.ca, 613-520-2600, ext. 3695), Chelsea Sheahan (Psychology Department, PhD Student, Principal Investigator, Chelsea.sheahan@carleton.ca, 613-520-2600, ext. 3695), or Dr. Joanna Pozzulo (Faculty Advisor, Joanna.pozzulo@carleton.ca, 613-520-2600, ext. 1412).

What if I have concerns?

If you should have any ethical concerns about this study please contact, Dr. Andy Adler (Chair, Carleton University Research Ethics Board-B, ethics@carleton.ca, 613-520-2600, ext. 8785).

At this time we would like to thank you for taking the time to take part in this study. Your participation has been greatly appreciated!