Centrality Bias for Rejecting Lineups:

Examining the Impact of Wildcard Positioning on Youth Eyewitness Choosing Behaviour

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Abstract

Eyewitnesses can be extremely important figures in the criminal justice system. However, there are many factors that can affect their abilities to make correct decisions when viewing photographic lineups. The age of an eyewitness can greatly impact their ability to view, comprehend, and ultimately make a decision when viewing a lineup. Zajac and Karageorge (2009) discovered that by placing a wildcard (a salient rejection option) in a lineup, children are more likely to correctly reject target-absent photo arrays. This simple technique allows children to reject a lineup, while still being able to make a choice. The present study focused on the physical location (positioning) of the wildcard in the photo array to determine if the placement of the wildcard impacted youth witness identification decisions. Further, this study sought to examine if older children (aged 11-to-15 years) benefited from the inclusion of the wildcard in a lineup, as younger children have. Participants were recruited from a summer science camp to view a brief video. After a day delay, youths were shown two lineups (one male, and one female). Results demonstrated the salient placement of the wildcard did not have an effect in either lineup, however target presence was a factor in selection rates for the female lineup. In the female lineup, the correct target was selected significantly more often than the innocent suspect, a trend not found with the male lineup.

Keywords: eyewitness, lineup, salient rejection option, wildcard

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Eyewitness identification practices have received a lot of attention over the past few years as a result of the controversy arising from wrongful convictions. In the United States alone, there have been over 300 convictions overturned because DNA evidence has revealed a wrongful conviction. In over 70% of those cases, eyewitness identification error was the main cause (Innocence Project, 2012). As a result, there have been many studies conducted focusing on eyewitness identification and lineup procedures to try to improve the reliability of the procedures police officers use (Lindsay & Wells, 1985; Pozzulo & Lindsay, 1999; Pozzulo & Dempsey, 2006). Many of these procedures focus on instructions and lineups that are given to the eyewitness (Pozzulo & Dempsey, 2006). These lineup procedures can have a large impact on eyewitnesses if they are not conducted or presented properly.

Lineup Formats

There are several ways in which lineups can be presented to an eyewitness but the two most commonly used are the sequential and the simultaneous photo lineups (Steblay, Dysart, & Wells, 2011). The simultaneous lineup was historically the most common method of displaying a photo array. This procedure promotes the use of relative judgement when viewing the lineup. Relative judgement is used when an eyewitness views all of the photos at once, and they are able to compare the photos to one another (Lindsay & Wells, 1985). Some researchers have argued that this lineup type may not elicit accurate decisions since the comparison of lineup members allows eyewitnesses to rely relatively less on memory (Wells, 2006). That is, it may be easier for witnesses to make an incorrect identification if they are comparing the members and choosing the one that looks *most* like their memory of the suspect, rather than who is actually the culprit.

Sequential lineups on the other hand promote the use of absolute judgement (Lindsay & Wells, 1985). Photos are presented one at a time, and the witness must decide if the photo is or is not the suspect before they can move on to view another photo. In most cases the decision is final, and after the photo is put away the witness is not allowed to view it again. Many researchers have concluded that this is the superior lineup procedure since it does not allow the witness to directly compare faces and thus promotes greater reliance on memory (Steblay, Dysart, & Wells, 2011). Although there is a plethora of research that compares the two lineups to determine which should be used, there are still conflicting views on which one is considered "the best" (Mickes, Flowe, & Wixted, 2012; Steblay, Dysart, & Wells, 2011). Importantly, the degree to which any procedure is effective is increasingly understood to depend on the age of the eyewitness (e.g., Bruer & Price, under review; Fitzgerald & Price, 2015).

Eyewitness Age

The age of the eyewitness can be extremely important for several reasons. Throughout the lifespan of an individual there are many cognitive and social aspects that develop and evolve which can affect how one makes lineup choices (Fitzgerald & Price, 2015). First, it has been repeatedly shown that children have a hard time correctly rejecting target-absent lineups (Dunlevy & Cherryman, 2013; Fitzgerald & Price, 2015; Zajac & Karageorge, 2009). Children have difficulty rejecting a simultaneous lineup when the target is not present. There are several possible explanations for this phenomena, but it is still unknown why this poses such a problem for young eyewitnesses. One possibility is that children often have underdeveloped cognitive processes that hinder their choosing abilities (Pozzulo & Dempsey, 2006). For instance, it could be that children have weaker memory traces which results in a greater reliance on relative judgement, instead of choosing the suspect, children may then choose the individual who most

resembles the suspect. If children's memory is not well formed then they could just be guessing

and basing their decision on more specific factors that they remember, and not the suspect

overall. Another theory proposed by Dunlevy and Cherryman (2013) suggests that children may

fail to understand the lineup procedure all together. Though there are instructions usually given

to witnesses that state the suspect may or may not be present in the lineup, children may feel

pressure that they are under an obligation to choose someone (Pozzulo & Lindsay 1999).

Children may assume that because they are being shown a lineup that they must be required to

make a choice or there would be no point in viewing the array.

There has been extensive research conducted with children as eyewitnesses; however the

same attention has not been paid to adolescents. In many studies conducted on child witnesses

the age range can be anywhere from 5-12 years of age, breaking the groups into younger and

older children when needed, as noted by Pozzulo, Dempsey, and Pettalia (2013). Very frequently

young adolescents are put together with children and there is very little research focusing just on

youths ages 11-15. Pozzulo, Dempsey, and Pettalia (2013) examined youths between the ages of

15-17 years old to explore if they differed from adults with respect to their descriptive abilities

and identification accuracy. The researchers found that adolescents' identification accuracy was

comparable to that of adults'. Moreover, they found that adolescents performed the same as

adults on target-absent and present lineups. Pozzulo, Dempsey, and Pettalia (2013) found that

youths 15-17 years old perform similarly to adults on identification procedures. However, it

could be the case that younger adolescents, ages 11-15, perform more similarly to children than

adults. Since there is no known literature on this specific age group (i.e., 11-to-15-years old)

relating to identification practices, it is unknown how this group performs in relation to children

and adults. Focusing specifically on this age range will help to fill in the gaps present in the current literature surrounding adolescents.

Rejection Options: Wildcard

When photo lineups are administered there are often instructions accompanying the procedure. Arguably the most important instruction given to a witness is that the suspect may or may not be present in the lineup. If the lineup being administered is a target-absent lineup, then the only correct option is to reject the lineup. Historically, rejecting a lineup was done verbally, with the witness stating to the lineup administrator that they did not see the suspect. This has shown to be problematic for child witnesses (Zajac & Karageorge, 2009). Since recognition of this problem, researchers began to alter the way in which lineups were presented to children in an attempt to reduce their increased choosing in target-absent arrays. Researchers have found that placing a black silhouette (i.e., the wildcard) in the lineup made it easier for children to correctly reject target-absent lineups (Karageorge & Zajac, 2011; Zajac & Karageorge, 2009). By placing the black figure in the lineup it created a salient rejection option for children to choose. They are able to still make a choice while actually rejecting the lineup if they are unsure about whether the suspect is present or not, or if they are sure that the suspect is not present. This small inclusion drastically improved children's abilities (71% of children correctly rejecting the lineup in the wildcard condition versus only 46% in the control condition), while also maintaining their target-present identification rates.

Simply having a salient rejection option available to children can improve their ability to reject target-absent lineups, however it is unclear whether the type of salient rejection option matters. In Zajac and Karageorge's original study they used a black silhouette with a question mark superimposed. The silhouette resembles a person, but other researchers have used other

salient rejection option images. For instance, Dunlevy and Cherryman (2013) used a tree (implying that the real perpetrator was hiding behind the tree) instead of a silhouette and also found support for the addition of a visual rejection option. Conversely, there have also been studies that suggest the wildcard is only valuable if the silhouette is a plausible representation of a target person (Zajac & Jack, 2015). These conflicting results make it difficult to determine what form the wildcard should be presented in, or if it's physical properties matter.

Having a wildcard in the lineup has been shown to greatly improve children's accuracy for target-absent lineups, and this can be viewed as a form of "good" rejecting (Bruer, Fitzgerald, Therrien, & Price, 2015). These rejection behaviours are considered good because the child is increasingly rejecting the lineup when the target is not present, but do not generalize the rejecting rates to conditions in which the target is still present in the lineup (i.e. they maintain their target-present correct identifications). Although the wildcard has been shown to be beneficial to both child and adult populations, the benefits for adults do not come without costs. Bruer and colleagues (2015) found that high similarity lineups (i.e., lineups in which all lineup members bear strong resemblance) with a wildcard; reduced adult target-absent lineup decisions just like it has for children; however, the cost to correct identifications in the target-present condition was notable. Adult witnesses were 30% more likely to incorrectly reject a target-present lineup when the wildcard was present than when no wildcard was present in the high similarity condition. This is considered a form of "bad" rejecting, since adults are excessively rejecting a lineup in which the target is present. These findings support the difference between child and adult choosing patterns, highlighting that different lineup techniques can affect age groups in unique ways.

Perceptual Salience

One specific topic that has recently begun receiving more interest with regards to lineups is the physical location of the photographs. The concept of perceptual salience suggests that particular locations in a visual array that may be more likely to draw the attention of the viewer (Dunlosky, Hunt, & Clark, 2000). For instance, in a lineup there could be a specific area that witnesses pay attention to, and a photograph located in that particular area may be more likely to be selected, regardless of whether or not it is the target. Researchers have explored this area and it can be understood that there can be two main types of biases related to perceptual salience. Specifically, there has been research focused on simultaneous lineups showing that there may be a leftward or centrality bias present. More recently there has also been research supporting the concept of edge aversion, which can play a role in how an individual views a lineup (Palmer, Sauer, & Holt, 2017). The conflicting evidence does not make it possible at this time to determine if one of the biases is more prevalent than the other.

Leftward bias. One bias for viewing lineups that has been discovered is the leftward bias (Megreya et al., 2012). This occurs when individuals view a lineup array and focus more on the left side of the lineup. Megreya and colleagues (2012) used an eye-tracker to gain a better understanding of where people focus their attention. By tracking eye movements, they were able to determine how long individuals spent in a certain area of the lineup. The authors found that faces displayed on the left side of the array were viewed most frequently, and that faces displayed on the right side of the array were barely looked at. As a result, there were more false positive identifications elicited on the left side of the lineup. The authors theorized that this could result naturally, considering that when a western individual reads they start from the left and work their way over. This research suggests that individuals may favour one side of a lineup, which can alter their choosing patterns.

Centrality bias. Although Megreya and colleagues (2012) found that individuals favour the left side of a photo lineup, Bindemann (2010) found a central viewing bias. He hypothesized that this could be a result of individuals' tendencies to look forward and then move their gaze based on what they want to see. By starting in the middle of the images, or the middle of a photo array, people often spend more time looking at that spot, which created a centrality bias. It is not yet clear if one bias is more prominent than the other, but the literature indicates that the placement of suspects or fillers in photo arrays could be problematic for the witness without them being consciously aware. Importantly, the work conducted on perceptual salience has only focused on target location – there has been no work on the location of rejection options, such as the wildcard.

Purpose

The current study aims to understand if the placement of the wildcard has an effect on youth rejection behaviour. There is limited research available that focuses on youth specifically, and it is unclear if the wildcard will affect youth in a similar way that it does children or adults. Based on the previous research available, I hypothesize that the more salient the rejection option is, the more likely youths will be to choose the rejection option. I anticipate that when the wildcard is placed in the middle of the photo array (high salience) youths will be more likely to choose it. Thus, the aim of the research is to: 1) explore if the wildcard has an effect on this age group, and 2) examine the location of the wildcard and the extent to which it can affect their choosing behaviours.

Methods

Participants

One hundred twenty-one youths (M_{age} = 12.34, SD = 0.88; range 11-15 years; 22% female) were recruited from a summer science camp. Participants were recruited on the first day of camp, and consent was obtained from parents during the camp registration process. Verbal assent was then obtained from all youth participants, immediately prior to experimental procedures.

Design

Participants were randomly assigned to one of six lineup conditions in a 3 (Rejection Salience: high salience, low salience, control) x 2 (Target Presence: target-present, target-absent) between-subjects design.

Materials

Target event video. Participants viewed a 7-minute video. The video alternated between a woman performing magic tricks and two people reading word lists (one male and one female). The people reading word lists served as the targets and were in view for approximately 2 minutes.

Lineups. All lineups contained eight lineup members, who were presented simultaneously in 2 x 4 array. All lineups were shown in greyscale on paper with each picture approximately 2 x 3 inches in size. Greyscale was used to minimize the likelihood that any particular image stood out due to variation in colour (e.g., picking based on hair colour). The location of the target (suspect) in the lineup was counterbalanced throughout all conditions. Prior to constructing the male lineup, similarity ratings were collected from judges who were otherwise independent from the main experiment. These judges provided pairwise similarity ratings between photographs of the thief and 16 potential fillers on an 11-point Likert scale (0 = not at all similar, 10 = highly similar). Mean ratings for all potential lineup members was 4.86

(SD = 1.73). The mean for all the selected lineup fillers was 6.29 (SD = 0.83; range = 5.5 − 7.75).

The innocent suspect was chosen because he/she was rated as highly similar, but not the most

similar of all fillers (mean rating of the innocent subject was 7.00, SD= 1.41). For the female

lineup a previously created lineup was used (Price & Fitzgerald, 2016) and our female target was

added; however, post-hoc similarity ratings were collected from four independent raters to

properly examine possible difference between targets and their lineups.

Rejection salience manipulation. All lineups contained a salient rejection option (the

wildcard; Zajac & Karageorge, 2009). The location of the wildcard varied depending on which

condition the participant was assigned: the high salience condition (centre of the array), the low

salience condition (beneath the array), and the control condition (absent from the array).

Target presence manipulation. Target-present lineups contained the targets from the

video (one male and one female) and seven fillers. In target-absent lineups, the targets were

replaced with a similar-looking innocent suspect.

Procedure

The youth were shown a video of a man and woman reading word lists. This video

contained four magic trick acts that were briefly interrupted by either a man or a woman reading

lists of words. To encourage children to attend to the targets faces they were advised they must

pay attention in order to be able to recall the words the next day.

One day later, research assistants who were blind to the identity of the target, interviewed

the youth about the target event. Research assistants were trained on how to interact with the

youth (e.g., build rapport, obtain assent). Before the lineup was presented, the research assistants

were instructed to make it clear that the visitors may or may not be present in the lineups. The

research assistants were further instructed to ensure that the youth was able to reject the lineup if

they believed the target was not present (e.g., research assistants specifically telling the youths

that they can choose no one if they did not believe the suspect was present). Once the lineup

decision was made, research assistants recorded the youths' decisions and asked them to make a

confidence rating in their decision (on a scale from 0 - 10). After obtaining that confidence

judgement, participants were thanked for their time and received a small prize.

Results

Lineup identification procedures are often used with eyewitnesses as a way to assess their

memory for faces. To experimentally assess the value of such procedures, target-absent and

target-present lineups are used. Target-present lineups are those that contain the suspect or target

as well as a number of fillers. Target-absent lineups are those that do not contain the suspect or

target. The target is replaced by an innocent suspect and again, fillers complete the lineup. A

correct rejection occurs when a witness views a target-absent lineup and does not choose anyone,

rejecting the lineup. An incorrect rejection occurs when the target is present in the lineup and the

witness fails to identify him/her. Fillers identifications in the lineup are always known errors.

Identification Decisions

Male target. The initial analysis began with a hierarchical log-linear analysis (HILOG)

that included the two manipulated variables with the identification response as the dependent

variable. The 3 (Rejection Salience: high salience, low salience, control) x 2 (Target Presence:

target-present, target-absent) x 3 (Lineup Response: suspect, filler, reject) HILOG revealed no

significant three-way effects, $\chi^2(4) = 0.57$, $p = .97$. It was also found that there were no two-way

effects, $\chi^2(8) = 5.39$, $p = .72$. For the male target lineup, target presence and salience of the

wildcard did not affect lineup responding. (see Table 1)

Diagnosticity ratio. In an ideal lineup procedure, target identification rates would be higher when the target is present (i.e. guilty suspect) than when the target is absent (i.e. innocent suspect). If this were the case, suspect identifications would be indicative of the target's guilt. Often in eyewitness experiments the ratio of guilty-to-innocent suspect identifications is considered indicative of the procedure's diagnosticity (Price & Fitzgerald, 2016).

Diagnosticity ratios were computed for identification responses pertaining to the guilty suspect identification rate as well as the innocent suspect identification rate as a means to explore the incriminating value of suspect identifications. Diagnosticity of suspect identification obtained from the lineups showed that the male lineup, throughout all salience conditions, produced a diagnosticity ratio of 0.57 (DR = correct ID rate = 0.11/ false ID rate =.19). If a diagnosticity ratio is 1.00, it shows the outcomes are equally likely to occur. The diagnosticity ratio is 0.57 which indicates that the likelihood of a correct suspect identification was similar to the likelihood of the incorrect suspect identification. Diagnosticity ratios were also calculated for each salience condition and indicated that there were no probable differences between the outcomes (high condition = 1.05, low condition = 1.00, control =1.11).

d'. As an alternative option to diagnosticity ratios it has been recommended by Mickes and colleagues to compute a measure derived from signal detection theory (Mickes, Moreland, Clark, & Wixted, 2014). In this calculation the proportion of target identifications in the Target-Present condition are treated as a hit rate, and the proportion of innocent suspect misidentifications in the Target-Absent condition are treated as the *false alarm rate* (Clark, 2012). A misidentification of the innocent suspect is considered a "false alarm", and mistaken filler selections in Target-Absent lineups are therefore treated as a correct response. This is problematic since fillers are known errors and the innocent suspect is used to replace the target in target absent lineups. Since this is problematic, it is suggested that *d'* be interpreted as a signal of how well a procedure distinguished

between guilty and innocent suspects (Wixted & Mickes, 2015). For this lineup the value, $d' = -.35$,

shows that there is little variation between the target absent and target present conditions. Similar to

the diagnosticity ratios, the d' values were similar between the high, low, and control salience

positions. Overall, the wildcard position did not have an effect on selection, all positions were

equally likely to be chosen.

      Female target. Next a similar HILOG was run with the female target. The 3 (Rejection

Salience: high salience, low salience, control) x 2 (Target Presence: target-present, target-absent)

x 3 (Lineup Response: suspect, filler, reject) HILOG revealed no significant three-way effects,

$\chi^2(4) = 2.68$, $p = .61$. There was a trend towards a significant two-way effect, $\chi^2(8) = 13.65$, $p = $

.09. Partial associations analyses indicated that there was an interaction between Target Presence

and Lineup Response $\chi^2(2) = 10.42$, $p = .005$. Follow up tests (with Bonferroni correction—cut

off at .02) revealed that the correct target was selected significantly more than the innocent

suspect, $z = 3.15$, $p < .001$, Cohen's $h = .57$. Filler identification rates were similar regardless of

Target Presence, $z = 1.17$, $p = .12$, Cohen's $h = .21$. Similar rates were also found for correct and

incorrect rejections, $z = 1.64$, $p = .05$, Cohen's $h = .30$. For the female target, salience did not

impact lineup responding while target presence affected target selections, in that the target was

selected more often than the fillers in the target present condition. (see Table 2).

      Diagnosticity ratio and d'. As mentioned in the male lineup section, diagnosticity and d'

calculations were used in order to gain a better understanding of the lineup results. For the

female lineup there was a diagnosticity ratio of 2.92 (DR= correct ID rate= .35/ false ID rate=

.12). Though not greatly further from 1.00, it still shows that the decision to choose the suspect

as opposed to the innocent suspect is not equally likely. A correct identification occurs when the

suspect is chosen, and the false identification is used from the innocent suspect. The d' value

calculated was 0.79, once again indicating that although there is not a large difference, the

decision to choose the suspect versus the innocent suspect are not equally likely. Once again, the wildcard position did not have an effect on selection, all positions were equally likely to be chosen in this lineup.

Discussion

This study attempted to understand how the wildcard (salient rejection option) affected youth choosing behaviours, as well as understand if the salience of the wildcard (i.e., the physical placement within the array) impacted rejection patterns. The initial study that used the salient rejection option did so with a child population, ranging between 8-11 years of age (Zajac & Karageorge, 2009) and a follow up study was conducted with children ages 5-7 (Karageorge & Zajac, 2011). Recently, Bruer and colleagues (2015) used the wildcard with an undergraduate population; however there is still little research done with a youth population. This study found that the salience of the wildcard did not have an effect on youths' rejection behaviour. Salience did not affect how often the wildcard was chosen by the youths, and it did not seem as though the wildcard had an effect on rejection behaviour overall. This could be a result of the small sample size obtained, or that any effect of salience was small or negligible.

Studies previously conducted using a salient rejection option have placed the wildcard in the middle of the photo array (Karageorge & Zajac, 2011; Zajac & Karageorge, 2009). This has generally been the practice for wildcard placements, and there has been little research conducted on rearranging the position of the wildcard. More recently, positioning effects have been studied to try to understand the biases individuals may have when choosing from a lineup array (Palmer et al., 2017). Edge aversion, centrality bias, and leftward bias could all play a role in how individuals view lineups and make their choices. Research has shown that the placement of suspects and fillers in photo arrays could be problematic with these unconscious biases, which

could generalize the placement of the wildcard as well (Bindemann, 2010; Megreya et al., 2012). These biases are prominent with regards to suspect and filler placement, which is why it was anticipated that it may affect the wildcard in a similar way. For these reasons the salience (i.e., placement) of the wildcard was of interest. Bindemann (2010) found that participants were prone to a centrality bias when viewing a lineup, which spurred the assumption that having the wildcard placed in the middle of the photo array could bias individuals to choose it more frequently than when it was placed in a less-salient position (i.e., bottom of the array). This assumption is also validated by Palmer et al., 2017) who observed a trend for edge aversion across multiple studies.

The present study likely did not have enough power to determine if the wildcard and its positioning were factors in youth's choices; however, there was a small trend that indicated salience could play a role. In the female lineup, participants appeared to reject more often with the high salience condition. Although the effect is minimal and not statistically significant, it provides a hint that the more salient the wildcard is, the more likely it will be chosen, at least in the female lineup. Bindemann (2010) indicates that this could be very likely, since participants often exhibit a centrality bias.

The choices participants made when viewing the lineup were found to be dependent on the targets presence in the lineup (whether the target was present or absent) in the female lineup; however this trend was not found in the male lineup. In the male lineup, youths were just as likely to choose the innocent suspect as they were to choose the guilty suspect. The female lineup allowed youths to better discriminate the correct suspect from the fillers as well as the innocent suspect. There could be several reasons for why this occurred, predominantly the lineups themselves. As previously mentioned, the female lineup was previously constructed for a

different study (Price & Fitzgerald, 2015) and the female target for this study replaced the target

from that initial study. After data collection post-hoc similarity ratings were conducted for the

female target and her fillers, but found that she was not rated as highly similar to them as the

male target and his fillers. Since the target was placed in a previously constructed lineup, perhaps

she was perceived as less similar to the fillers. Although this can seem problematic, using a

previously constructed lineup in this study may have been beneficial, since it inadvertently

discovered information about youths choosing abilities with high and low similarity fillers.

      The target for the female lineup had a unique appearance, and although the fillers

resembled her overall appearance, there was more variability in the similarity rating than there

was for the males. Specifically, the innocent suspect was chosen based on her similar but not too

similar likeness to the target since that is considered best; in the sense that low similarity fillers

are considered better for the witnesses (Wells, Rydell, & Seelau, 1993). Research has shown that

having low similarity fillers is beneficial for the witness, in the sense that filler seen as too highly

similar could impede suspect identifications. However some researchers have found that filler

similarity plays a more minor role with an adult population (Fitzgerald, Price, Oriet, & Charman,

2013). Having fillers that are too similar to the target has also been found to be detrimental for

children's identification accuracy as exhibited by Fitzgerald, Whiting, Therrien, and Price

(2014). The researchers discovered that children had more difficulties making a correct

identification when the fillers were rated as more similar to the suspect; however this effect was

not seen with adults and did not show to be detrimental to their correct identification rates.

      The findings from Fitzgerald and colleagues (2014) may indicate that youths are more

similar to children with regards to the influence of similarity in lineups. The youths were better

able to make correct identifications in the female lineup, which may have been a result of the

lower similarity she shared with the fillers. Since our female target had fillers who were not rated as highly similar as the male target did it may have been easier for the youths to discriminate her from the others than it would have been if they were all very similar, like what may have occurred in the male lineup. However, this can lead to the issue of determining how similar is considered too similar, as discussed by Fitzgerald and colleagues (2014). It appears that our female lineup may have contained a grouping of fillers that had low-similarity to the target, which was not the case for the male lineup.

Future Directions. Although salience was not found to have an effect on youths' rejection behaviours, this phenomena should be further explored. More participants should be recruited in order to increase the power of this study, since sample size may have contributed to the lack of an observable effect on youths' choosing behaviour. The increase in participants will also help to determine if the wildcard can be beneficial to youths' rejection behaviours, as it has been shown to be with children. The materials should remain the same since the study would be a continuation of the findings from the past summer. Since this original study should be continued, the future directions aim to generally increase the sample size to determine if there are any effects between salience and youths' rejection behaviours, as well as understand if a salient rejection option is beneficial to youths overall.

Limitations. Although the future directions for this study are quite simple, there are some limitations present in the study. In many instances, an eyewitness can be exposed to a crime that can be traumatic or at least very stressful. This study was likely not stressful for the youths and no actual crime was witnessed. There was no stress placed on the youths to stimulate a criminal environment and capture their attention. In turn, this may decrease the ecological validity of the results. Participants were encouraged to pay close attention to the targets; however

in a regular, non-stressful environment they may not have been fully engrossed in the video. Moreover, the targets were observed using a video and not a live event. Although it is perfectly acceptable to show targets in video form, participants may be more inclined to pay attention if they are able to interact with the targets in real life.

Another limitation to this study would be the smaller sample size. Since this was a between-subjects design the participants were only placed in one of the combinations of conditions. Since there were six conditions overall the participants were widespread. The sample size, or power, was too small to determine if there was a genuine effect for the salience of the wildcard, although there did appear to be a small trend. Studies that have examined salience, or positioning effects, have had a much higher sample size (n= 908) which enabled them to have larger cell sizes for their conditions, and have found support for positioning effects (Palmer et al., 2017). Studies focusing on the wildcard as a salient rejection option have also had a much high sample, ranging up to 310 participants (Bruer et al., 2015). Overall the lack of power in this study may have resulted in the small to no effects found for salience and the wildcard.

Conclusion

Age of an eyewitness can play a critical role in their ability to make accurate identification decisions (Fitzgerald & Price, 2015). The youth participants (11-to-15- years of age) in this study fall within an age group that is grossly understudied, and there is still much that needs to be explored. There are many factors that need to be considered in eyewitness, and more specifically, lineup research that can influence witness's selections. It appeared that youth choosing behaviour may be impacted by filler similarity, just as children are; indicating that youth perform more like children in this regard. Although the small sample size may have impacted the ability to measure an understanding of how youths are influenced by the wildcard,

this concept should be further explored in future research. Even though the wildcard and the

placement of the wildcard was not found to impact youth's choices, the low power associated

with this study creates a need for continued exploration. It is always beneficial to be cautious

when dealing with eyewitnesses and the many frailties that come with them. By understanding

the many factors that can influence an eyewitness's ability to choose, we can create better

procedure and lineups that tailor to the developmental differences exhibited by children, youths,

and adults.

References

Bindemann, M. (2010). Scene and screen center bias early eye movements in scene

viewing. *Vision Research*, *50*, 2577-2587. doi:10.1016/j.visres.2010.08.016

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, 124-133. doi:10.1080/13218719.2014.919688

Clark, S. E. (2012). Costs and benefits of eyewitness identification reform: Psychological science

and public policy. *Perspectives on Psychological Science, 7*, 238-259. doi:

10.1177/1745691612439584

Dunlevy, J. R., & Cherryman, J. (2013). Target-absent eyewitness identification line-ups: Why

do children like to choose. *Psychiatry, Psychology and Law*, *20*, 284-293.

doi:10.1080/13218719.2012.671584

Dunlosky, J., Hunt, R. R., & Clark, E. (2000). Is perceptual salience needed in explanations of

the isolation effect? *Journal of Experimental Psychology: Learning, Memory, and*

Cognition, 26, 649-657. doi:10.1037//0278-7393.26.3.649

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, 151-164. doi: 10.1037/a0030618

Fitzgerald, R. J., & Price, H. L. (2015). Eyewitness identification across the life span: A meta-

analysis of age differences. *Psychological Bulletin*, *141*, 1228-1265.

doi:10.1037/bul0000013

Fitzgerald, R. J., Whiting, B. F., Therrien, N. M., & Price, H. L. (2014). Lineup member

similarity effects on children's eyewitness identification. *Applied Cognitive Psychology,*

28, 409-418. DOI: 10.1002/acp.3012

Granhag, P. A., Strömwall, L. A., & Hartwig, M. (2005). Eyewitness testimony: Tracing the

beliefs of Swedish legal professionals. *Behavioral Sciences & the Law, 23*, 709-727.

doi:10.1002/bsl.670

Karageorge, A., & Zajac, R. (2011). Exploring the effects of age and delay on children's person

identifications: Verbal descriptions, lineup performance, and the influence of wildcards.

British Journal of Psychology, 102, 161-183. doi:10.1348/000712610x507902

Lindsay, R. C., & Wells, G. L. (1985). Improving eyewitness identifications from lineups:

Simultaneous versus sequential lineup presentation. *Journal of Applied Psychology*, *70*,

556-564. doi: 10.1037/0021-9010.70.3.556

Megreya, A. M., Bindemann, M., Havard, C., & Burton, A. M. (2012). Identity-lineup location

influences target selection: Evidence from eye movements. *Journal of Police and*

Criminal Psychology, *27*, 167-178. doi:10.1007/s11896-011-9098-7

Mickes, L., Flowe, H. D., & Wixted, J. T. (2012). Receiver operating characteristic analysis of

eyewitness memory: comparing the diagnostic accuracy of simultaneous versus

sequential lineups. *Journal of Experimental Psychology: Applied*, *18*, 361-376. doi:

10.1037/a0030609

Mickes, L., Moreland, M. B., Clark, S. E., & Wixted, J. T. (2014). Missing the information need

to perform ROC analysis? Then compute *d'*, not the diagnosticity ratio. *Journal of*

Applied Research in Memory and Cognition, 3, 58-62. doi: 10.1016/j.jarmac.2014.04.007

Palmer, M. A., Sauer, J. D., & Holt, G. A. (2017). Undermining position effects in choices from

arrays, with implications for police lineups. *Journal of Experimental Psychology:*

Applied, 23, 71-84. doi: 10.1037/xap0000109

Pozzulo, J. D., & Dempsey, J. (2006). Biased lineup instructions: Examining the effect of

pressure on children's and adults' eyewitness identification accuracy. *Journal of Applied*

Social Psychology, 36, 1381-1394. doi:10.1111/j.0021-9029.2006.00064.x

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*, 63-74. doi:10.1007/s11896-012-9107-5

Pozzulo, J. D., & Lindsay, R. C. L. (1999). Elimination lineups: An improved identification

procedure for child eyewitnesses. *Journal of Applied Psychology, 84,* 167-176.

Price, H. L., & Fitzgerald, R. J. (2016). Face-off: A new identification procedure for child

eyewitnesses. *Journal of Experimental Psychology: Applied.*

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, 99-139. doi:10.1037/a0021650

The Innocence Project (2012). Understanding the causes: Eyewitness misidentification.

Retrieved August 2012 from: http://www.innocenceproject.org/understand/Eyewitness-

Misidentification.php

Wells, G. L. (2006). Eyewitness identification: Systemic reforms. *Wisconsin Law Review, 2,*

615-643. No doi available.

Wells, G. L., & Lindsay, R. C. L. (1980). On estimating the diagnosticity of eyewitness

nonidentifications. *Psychological Bulletin, 88,* 776–784. doi:10.1037/0033-2909.88.3.776

Wells, G. L., Rydell, S. M., & Seelau, E. P. (1993). The selection of distractors for eyewitness

    lineups. *Journal of Applied Psychology, 78*, 835–844. DOI: 10.1037/0021-9010.78.5.835

Wells, G. L., & Olson, E. A. (2002). Eyewitness identification: Information gain from

    incriminating and exonerating behaviors. *Journal of Experimental Psychology: Applied,

    8,* 155–167. doi: 10.1037/1076-898X.8.3.155

Wixted, J. T., & Mickes, L. (2015). ROC analysis measures objective discriminability for any

    eyewitness identification procedure. *Journal of Applied Research in Memory and

    Cognition, 4*, 329-334. doi: 10.1016/j.jarmac.2015.08.007

Zajac, R., & Karageorge, A. (2009). The wildcard: A simple technique for improving children's

    target-absent lineup performance. *Applied Cognitive Psychology*, *23*, 358-368.

    doi:10.1002/acp.1511

Zajac, R., & Jack, F. (2015). Improving children's performance on photographic line-ups: Do the

    physical properties of a 'wildcard' make a difference?. *Legal and Criminological

    Psychology*, doi: 10.1111/lcrp.12075

Tables

Table 1

Identification response rates for male lineup

Identification Response

Target	Suspect	Filler	Rejection	n
Absence	.19	.288	.525	59
Present	.11	.258	.629	62

Table 2

Identification response rates for female lineup

Identification Response

Target	Suspect	Filler	Rejection	n
Absence	.12	.57	.31	61
Present	.35	.47	.18	60