DOES PRACTICE MAKE PERFECT IN CHILDREN’S EYEWITNESS IDENTIFICATION ACCURACY?

A Thesis
Submitted to the Faculty of Graduate Studies and Research
In Partial Fulfillment of the Requirements
For the Degree of

Master of Arts
in
Experimental and Applied Psychology
University of Regina

By
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August, 2013

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Natalie Muriel Therrien, candidate for the degree of Master of Arts in Psychology, has presented a thesis titled, *Does Practice Make Perfect in Children's Eyewitness Identification Accuracy?*, in an oral examination held on August 12, 2013. The following committee members have found the thesis acceptable in form and content, and that the candidate demonstrated satisfactory knowledge of the subject material.

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Abstract

Children accurately identify targets out of police lineups at much lower rates than adults. Furthermore, children presented with a target-absent lineup are much less accurate even when compared to their peers who view target-present lineups. Administering practice lineups to children prior to the real, or forensically relevant, lineup has been proposed in the past as a method to improve accuracy, but current literature has produced unsatisfactory results; improvement in target-absent accuracy is often accompanied by a performance cost for those selecting from a target-present lineup. Additionally, previous efforts have constructed practice lineups too obviously different from forensically relevant lineups, and have overlooked theoretical contributions stemming from developmental and cognitive research. The current study addressed these methodological issues. Results garnered suggest that practice lineups do not improve children’s identification accuracy, and that under certain circumstances they actually decrease accuracy. This may be due to practice lineups decreasing children’s decision criterion, or to a limitation children have with regards to this difficult task. Implications and future directions with regards to research are discussed.

**keywords**: eyewitness identification, memory, children, practice
Acknowledgements

I’d like to extend my most earnest thanks to my supervisor, Dr. Heather Price, as well as my committee members, Drs. Chris Oriet and Tom Phenix for their invaluable guidance, reviews, comments and constructive critiques. Funding for this research has been provided by the University of Regina and the Faculty of Graduate Studies and Research through Graduate Studies and Graduate Research Awards, by the Social Sciences and Humanities Research Council of Canada (SSHRC), and by a Natural Sciences and Engineering Research Council Discovery Grant (NSERC; Price).

A number of people were key to the completion of this project, and without them this behemoth would have never seen the light of day. Thank you Dave Taylor and Lindsey Fraser for their multidisciplinary assistance in the literature review. I am also eternally grateful to Ben Freitag and Mark Regnier for their help with the EYES summer camps. Thanks also go to Megan Adams Lebell, Cori Carey, Kirsten Gullickson, Rachelle Jeworski, Kelcie Novak, Jill Price, Sarah Reiser, Sarah Sangster, and Nikolina Vracar for their commitment to interviewing and patience with camp scheduling. Thank you to Brad Sunshine for an excellent set of dogs to work with, and to Caitlin Hunter for being so enthusiastically magical week after week. Thank you Ryan Fitzgerald for being such a tolerant thief; we’re glad no one actually chased after you. And finally, thank you so very much to Brittany Whiting, who was cool as a cucumber as of day one. Thank you.
Post Defense Acknowledgements

I would also like to thank my external examiner, Dr. Hirsch Greenberg, for his insightful feedback and the multidisciplinary lens through which he approached this document.
Dedication

Mes plus grands et sincères remerciements sont dues à mes parents, Raymond Therrien et Laurel Fenton, pour leur support sans limites, à ma soeur Élyse Therrien pour son sens de l’humour, et à Matthew Normand pour tout l’encouragement, les appels tard le soir, les sessions Skype à n’importe quelle heure, et pour notre belle petite maison en Ontario.
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1. Introduction

Children are often the sole source of eyewitness information, particularly in cases of sexual assault and abduction (Gallagher, Bradford, & Pease, 2008; May-Chahal & Cawson, 2005). This makes child eyewitness issues of key interest to the judicial system, particularly because children as young as five years have been requested to provide eyewitness identification evidence (Aguirre, 2008). Although a variety of factors affect adults’ beliefs concerning children’s eyewitness memory (Goodman, Bottoms, Herscovi, & Shaver, 1989; Nunez, Kehn, & Wright, 2011; Ross, Jurden, Lindsay, & Keeney, 2003), adults generally evaluate younger children’s memory as less reliable than older children’s or adults’ memory (Goodman, Golding, Helgeson, Haith, & Michelli, 1987; Wright, Hanoteau, Parkinson, & Tatham, 2010). Similarly, the judicial system has historically regarded children as less reliable and less accurate than their adult counterparts, who have been viewed as superior eyewitnesses (see R. v. W. (R.), 1992).

These issues persist in the area of eyewitness identification accuracy, wherein the witness to a crime must identify the perpetrator from memory and usually from a lineup constructed by law enforcement officers. Despite these often skeptical views of children as eyewitnesses, there is also evidence that under some conditions children may be as accurate as their adult counterparts. For instance, in photographic lineups in which a child is asked to identify a person of interest, the accuracy of children five years and older does not differ significantly from that of adults provided that the target is in fact the perpetrator (Pozzulo & Lindsay, 1998). However, when presented with a lineup from which the perpetrator is absent, children are significantly less accurate than adults across
a variety of conditions, such as variable lineup administration procedures (Humphries, Holliday, & Flowe, 2012; Pozzulo & Lindsay, 1998).

It is clear that under certain circumstances children are capable of performing as well as adults in eyewitness identification tasks. However, there are obvious areas for improvement; should a technique for gathering forensically relevant information adequately meet children’s cognitive and developmental needs, members of this special population should be capable of significantly increasing their accuracy. Given this tension between general views regarding children as eyewitnesses and the legal reality of their necessity, the present study tested the utility of practice lineups as a procedure that may improve children’s eyewitness accuracy. As will be reviewed, practice lineups consider children’s particular developmental and cognitive capabilities. Increases in identification accuracy via practice lineups may also potentially assuage doubts about the practical use, reliability, and credibility of children as eyewitnesses.

1.1 Lineup Presentation Procedures

Photo identification tasks are a commonly used tool in police investigations. A photograph of the suspect is embedded in an array of known innocents, termed foils. In real life applications of this procedure, law enforcement officers have no way of knowing whether their suspect is the true perpetrator, or in fact an innocent suspect. The task of identifying the perpetrator falls to an eyewitness, who must make his or her selection based on memory of the true perpetrator’s face. Should the eyewitness believe the perpetrator’s photograph is not included in the photo array (i.e., that the police suspect is innocent), he or she should then reject the lineup. Laboratory studies are also able to include a foil designated as the innocent suspect, to mimic cases in which an innocent
person has been apprehended. The innocent suspect differs from the foils in that, although laboratory studies can assert the lineup member’s innocence, the purpose of the innocent suspect is to emulate conditions in which the suspect is absent from the lineup (or, is innocent; Clark, Howell, & Davey, 2008). There exists a number of options within lineup administration; some are available to law enforcement (e.g., simultaneous or sequential lineups), whereas others are available to researchers only (e.g., in which the presence of the guilty suspect is manipulated. Discussed herein are the most prevalent presentation procedures, as well as two conditions relevant to empirical research exploring eyewitness issues.

1.1.1 Target-present and target-absent lineups. A target-present (TP) lineup emulates a situation in which the suspect, or target, in the lineup is guilty (Clark et al., 2008), and as such does not contain a designated innocent suspect. Rather, the guilty perpetrator is embedded in an array of foils. The accurate response in a TP lineup is termed a correct identification, as the guilty perpetrator has been correctly identified. Incorrect identifications consist of foil identifications and false rejections (i.e., choosing “Not Here” when the perpetrator is, in fact, present). Target-absent (TA) lineups are the complement to TP lineups. These can be composed either entirely of foils, or can also include an innocent suspect. A correct rejection of the TA lineup is the only accurate response. Incorrect selections for TA lineups can be divided into foil identifications, and innocent suspect identifications if one has been included for that study. Both TP and TA lineups are used in experimental manipulations of eyewitness performance, because the information drawn from only one condition cannot fully lend itself to analysis of correct and incorrect identifications without the other (Malpass & Devine, 1983).
In their recent meta-analysis of eyewitness accuracy, Clark and colleagues (2008) confirmed that adult eyewitnesses make more correct identifications in TP lineups than correct rejections in TA lineups, indicating higher error rates when the perpetrator is absent. The authors also found that the most diagnostic, or meaningful identification made by adult witnesses was the correct identification; that is, a suspect chosen out of a lineup was more likely to be the guilty perpetrator than a suspect not chosen out of a lineup. These conclusions, however, were based on the adult eyewitness literature; the eyewitness accuracy of children has been found to differ substantially from that of adults.

1.1.2 Simultaneous lineups. The most common lineup procedure used by the police is the simultaneous procedure, which involves presenting all photographs in a single photo array concurrently for an eyewitness to view. There are typically six photographs in the array (Clark & Godfrey, 2009; Pozzulo, Dempsey, & Gascoigne, 2009; Pozzulo & Lindsay, 1998). Eyewitnesses are afforded an unrestricted amount of time to examine the lineup, which may or may not include the perpetrator. A “Not Here” option, which can be presented textually or by the addition of a blank box placed above or below the text, may also be available to allow for a more obvious method to reject the lineup.

1.1.3 Sequential lineups. The sequential lineup is an alternative lineup procedure that was proposed by Lindsay and Wells (1985) in an attempt to reduce errors in judgement associated with the simultaneous procedure. The sequential lineup involves presenting eyewitnesses with one photograph of the photo array at a time. An eyewitness is usually unaware of the total number of photographs in the photo array and must make a selection decision (e.g., that the person in the photograph is or is not the perpetrator)
before proceeding to the next photograph. Two comprehensive meta-analyses comparing the simultaneous and sequential procedures have identified an important difference between the two procedures: the simultaneous lineup produces significantly higher rates of correct identifications, whereas the sequential lineup results in a significantly greater rate of correct rejections (Steblay, Dysart, Fulero, & Lindsay, 2001; Steblay, Dysart, & Wells, 2011). In practice, this indicates that eyewitnesses viewing TP simultaneous lineups and those viewing TA sequential lineups are most accurate. Importantly for the present study, Steblay and colleagues reported that these simultaneous-sequential differences did not hold for studies examining children as eyewitnesses, as not only is this distinction understudied in child populations and thus difficult to subject to meta-analyses, but children also tend to be inaccurate in their lineup selection regardless of presentation format.

1.2 Children as Eyewitnesses

That children’s performance on identification tasks is divergent from that of adults has long been an area of study. Indeed, in a meta-analysis comparing children’s performance on eyewitness lineup tasks with adults’, Pozzulo and Lindsay (1998) established several key differences in performance across developmental groups. For TP lineups, their analyses indicated that children’s correct identifications were similar to those of adults by the age of five. It was only the preschool group with a mean age of four years that was significantly less accurate than older participants.

In their examination of TA lineups, results were less promising; all children aged 13 and under made fewer correct rejections when compared to adults, indicating that children were more likely to be “choosers”; that is, they are more likely to make a
selection from a lineup than to not. Given this, Pozzulo and Lindsay (1998) suggested it is important to ensure that the foils included in a TA lineup, including the innocent suspect, adequately match the child’s memory of the perpetrator lest artificially inflated similarities between the innocent foil and the target prompt false positive identifications. The authors also cited children’s relationships with adults as a rationale for why they might be compelled to err when examining a lineup in which the suspect is innocent. An adult prompting a child to select a lineup member might be implicitly indicating to that child that the adult believes the perpetrator is in the lineup. This perceived pressure to choose might persuade a child to make a selection independent of belief in a suspect’s guilt.

The effect of authority on eyewitness behaviour has been directly investigated in adults. Roper and Shewan (2002) recruited young adults who were randomly assigned to two groups, one labelled as “bad eyewitnesses”, the other as “good eyewitnesses”. The labels, made known to participants, bore no relation to their actual performance on an accuracy questionnaire assessing their memory for a staged crime video administered prior to the experimental manipulation, which was also interlaced with leading questions. The authors found that the accuracy scores for participants labelled as good increased following the administration of an additional accuracy questionnaire, whereas they decreased for those labelled as bad. Furthermore, participants labelled as bad eyewitnesses were found to be more vulnerable to leading questions. These results indicate that labels applied by an authority figure can inspire a non-authority figure to appear observant or even helpful if the authority figure behaves in a manner that suggests that the non-authority figure’s performance is subpar. In practice, this may suggest that a
police officer or parent can relatively easily elicit compliant behaviour in child eyewitnesses, because adults represent, by default, an authority figure in the eyes of a child.

Children, particularly younger children, also tend to be more suggestible than adults (Bruck & Ceci, 1995, 1999; Ceci & Bruck, 1993). This may be due to a tendency to comply with the perceived wishes of authority figures, such as adult interviewers or police officers. Lowenstein, Blank, and Sauer (2010) found that children administered a lineup identification task by an adult in uniform demonstrated increased choosing behaviour, lowered accuracy, and increased anxiety when compared to children interviewed by an adult not wearing a uniform, indicating that children were sensitive to a perceived pressure to choose. In other words, symbols of authority such as uniforms appear to create an increased pressure to choose even when the guilty perpetrator is absent from the lineup. Similarly, children have also been found to be less accurate in their descriptions of prior events when reporting in the presence of an actual police officer (Tobey & Goodman, 1992). This pressure to choose represents a genuine problem in conducting forensic investigations with children, given that law enforcement officers often believe that children and youth can be interviewed using the same techniques used with adults (Meyer & Reppucci, 2007). Furthermore, the perceived pressure to choose is perpetuated even if a lineup is being administered by a parent (Ricci, Beal, & Dekle, 1996), an adult with whom most children are more comfortable. Research conducted by Ricci and colleagues has suggested that the presence of a parent does not reduce children’s false positive errors, and that in fact children may be slightly
less accurate when paired with their parent when compared to children who complete a lineup task with a neutral research assistant.

This perceived pressure to choose has been shown to manifest as a propensity to make multiple selections, even when there is only one perpetrator or target. Parker and Carranza (1989) found that their sample of children with a mean age of 9 years was significantly more likely to make several lineup selections when compared to adults. In their study, both adults and children witnessed a staged theft event presented using slides. The results suggested children used a more lax decision criterion and were more likely to guess when compared to adults, due in part to a perceived pressure to choose. This guessing behaviour may be a major contributor to both law enforcement and laypersons’ perceived notions of child eyewitness’ low reliability (Desmarais & Read, 2011).

These findings are supported by figures indicating that rates of correct rejection are approximately 70 percent for adults, whereas that figure drops for children, who correctly reject TA lineups at a rate of approximately 55 percent (Chance & Goldstein, 1984; Pozzulo & Lindsay, 1998). This decrease in accuracy is problematic because it reflects an increase in false accusations. A false positive choice involves either the selection of a known foil, or the selection of an innocent suspect. Increasing children’s eyewitness accuracy in TA conditions would aid in reducing not only meaningless selections (i.e., foil selection), but also in reducing potential false accusations. The primary aim of the present study was to explore an approach that could influence choosing behaviour, grounded in an understanding of children’s particular developmental and cognitive skill levels.
1.3 Response Inhibition

The propensity to choose in children might not reflect only guessing behaviour and compliance with authority, but also an inability to refrain from choosing. When presented with a TA lineup, the accurate response is a rejection. As mentioned, a “Not Here” option can be offered to eyewitnesses, thus providing a form of “no choice” to children. Yet, the mere presence of a lineup may suggest to children that a selection should be made and as such this “no choice” can represent a particularly challenging task for children because it contradicts the anticipated response (i.e., choosing). Moreover, previous research suggests that non-choosing, or response inhibition, is not cognitively accessible to some of these individuals. Children between 6.5 and 8 years of age have been found to outperform younger children aged 3.5 to 6.5 in modified Stroop-like tasks such as the day-night task (McAuley, Christ, & White, 2011). This paradigm, designed by Gerstadt, Hong, and Diamond (1994) involves instructing children to respond to a picture of the sun with “night”, and a picture of the moon with “day” (i.e., incongruous). The development of this cognitive ability may be assessed by comparing response latency across different age groups. The results garnered by McCauley et al. (2011) suggest that younger children are less adept at inhibiting their response tendencies than their older counterparts. Response inhibition is conceptualized as the ability to prevent an otherwise automatic response in situations in which a certain behaviour has become contextually inappropriate (McAuley & White, 2011; Nigg, 2000). Response inhibition is typically measured based on errors committed by children following incongruous stimuli, or by the delay in their response.
Response inhibition appears to mature between the ages of 8 and 10, as the greatest improvements on response inhibition tasks appear to take place at these ages. Brocki and Bohlin (2004) assessed the development of response inhibition in children aged 6 to 13 years, divided into four age groups. Response inhibition was measured based on response latency. Participants in the group aged 9.6 to 11.5 years committed significantly fewer errors compared to their immediate juniors aged 7.6 to 9.5 years. Children’s performance did not vary significantly across the younger age groups (i.e., below the age of 9.5 years), nor did it differ for the older age groups (i.e., above the age of 9.6 years). Researchers also noted that there was little improvement in performance between the older age groups. Williams, Ponesse, Schachar, Logan, and Tannock (1999) found a similar rate of response inhibition maturation in their sample of 275 people ranging in age from 6 to 81 years. The results of this cross-sectional study demonstrated that children between the ages of 9 and 12 years were significantly faster in their responses compared to children between the ages of 6 and 8 years, highlighting the development of response inhibition between these two age groups.

McAuley and White (2011) identified a comparable period of response inhibition development using a response inhibition task similar to Brocki and Bohlin (2004), who also monitored processing speed via response latency. The participants in this study were 6 to 24 years old, and were grouped into four age groups. Response inhibition was found to improve most between the groups of 6- to 8-year-olds and 9- to 12-year olds. However, processing speed accounted for almost 90 percent of the variance in response inhibition performance, suggesting that developments in response inhibition may be due to improvements in children’s processing speeds rather than the maturation of this
cognitive function. This indicated that the examination of performance in response inhibition tasks requires the examination of not only response latency, but also of error rates. It has been suggested that children reach faster processing speeds before they reach more efficient response inhibition skills (Brocki & Bohlin, 2004). As such, examining error rates independently of processing speed will aid in distinguishing the development of children’s response inhibition from the development of processing speed.

These differences in response inhibition abilities across development in children may be the underlying factor that, when combined with a perceived pressure to choose by a proximal authority figure, elicit both guessing and over-choosing behaviour in child eyewitnesses. These factors reveal a salient need to provide children with procedures or techniques that are sensitive to their level of cognitive development which can, in turn, reduce their propensity to guess or over-choose in a forensic context. A reduction in guessing behaviour would increase children’s accuracy in TA lineups, thus decreasing their meaningless selections (e.g., foil selection) and potential for false accusations. Along with reducing over-choosing, improvements in these abilities may increase their credibility in the judicial system. The focus of this research was on providing children the opportunity to practice correctly rejecting a TA lineup and correctly choosing from a TP lineup prior to completing the lineup of interest. It was hoped that this practice may provide a reduction in guessing and over-choosing.

1.4 Practice Techniques

Parker and Ryan (1993) proposed a technique to reduce guessing behaviour and minimize the perceived pressure to choose by offering child eyewitnesses non-forensically relevant lineups (i.e., without perpetrators/suspects) with which to practice
prior to being administered the forensically relevant one. The authors reasoned that this exercise would allow children to understand that in some cases the perpetrator is not present in the lineup whereas in other instances he may be. This procedure required activation of response inhibition, as it was arguably required in order to refrain from choosing in the context of a TA lineup. Children aged 8 to 11 years participated in the Parker and Ryan experiment. The experimental group received two practice lineups; one containing an image of the research assistant’s face as the target and one without, constituting a TP and TA lineup, respectively. An incorrect response prompted research assistants to indicate the correct choice to participants and a correct response was affirmed. Children who completed the practice task made fewer foil or innocent suspect identifications in the forensically relevant lineup. It was possible to examine effects on innocent suspect identifications because the authors included a foil specifically designed to match the actual perpetrator much in the same way an innocent police suspect would match a culprit. Additionally, practice lineups also led to a reduction in over-choosing for children receiving simultaneous lineups when compared to controls. It is interesting to note that the child sample’s mean age corresponded to a developmental period in which response inhibition may not yet be fully developed, suggesting that practice lineups may have primed children’s developing ability to exercise their response inhibition. However, because children below the age of 8 were not tested, this study did not address cognitive capacity across the developmental span and thus did not examine performance in children who have yet to fully develop response inhibition abilities. Additionally, the decrease in foil identification for TA lineups was not statistically significant.
Parker and Ryan’s work was similar to a previously published study by Davies, Stevenson-Robb, and Flinn (1988), who included a practice condition in their study examining children’s eyewitness accuracy across a variety of factors, including perpetrator height and weight. Children between the ages of 7 and 12 years participated in a scripted task involving participation in the set up of an information session at their school. This task was overseen by one of four actors, who each served as the target in interview and lineup tasks administered two weeks later by a research assistant. The participants in the practice condition were shown a three-member lineup of human faces. The first, a TP lineup, contained a photograph of the research assistant. Once the children successfully identified the research assistant from this small lineup, the TP lineup was converted into a TA lineup by the substitution of the research assistant’s photograph with that of an unfamiliar person. Participants were then asked what their selection would be now that the target had been removed, and once a response of “Not Here” was obtained, they proceeded to the forensically relevant lineup task consisting of a 12-person photo array. Researchers found that the administration of practice lineups did not affect accuracy rates in any way, regardless of age.

Several factors might account for this null finding. The first involves the composition of the lineups administered to the children. Not only was the practice lineup too small to adequately simulate a forensically relevant lineup, but the use of a research assistant as the target and the manner in which the TP lineup was converted to a TA lineup may have been problematic. Physically removing the target from the photo array before asking the children to identify it may not adequately prime response inhibition; it simply requires them to report that they have observed that the target has been removed.
As for the task-relevant 12-person photo array lineup, it was longer than lineups typically used in identification tasks (Pozzulo & Lindsay, 1998), and was constructed without the use of objective indicators of size and fairness. This study, like Parker and Ryan’s (1993) study, also excluded younger children from its sample, precluding the analysis of response inhibition development.

A broader sample of adults, older children, and young children participated in a study by Pozzulo and Lindsay (1997) that examined the effects of four techniques designed to improve eyewitness accuracy. These included two practice conditions: video demonstration and visual reference materials. The video demonstration condition used a recording of both a TP and a TA lineup, to which an actor responded correctly. The video demonstrated to children not only why the actor’s responses were accurate, but also that in certain cases a “no choice” was the correct one. Although the authors did not mention it explicitly, the paradigm may have modelled a “no choice” to children, potentially activating their abilities to inhibit the prepotent response of choosing a lineup member. The reference handout condition was comprised of two lineups assembled on pieces of paper that could be distributed to participants. These lineups were constructed using drawings of a variety of animals. The target in the TP lineup was a dog, replaced by a lamb in the TA lineups. These materials were then discussed with the children, who received a demonstration on how to correctly respond to each type of lineup. Following this, participants were told that they were going to undergo a similar process for a forensically relevant lineup comprised of human male faces. Older children of 12 to 14 years of age and younger children of 10 to 11 years of age took part in an information
session about bullying and study recruitment. The session facilitator served as the target in the subsequent lineup identification tasks.

Both the older and younger participant groups demonstrated nominally higher correct identification accuracy rates following video demonstration and visual reference handout when compared to controls receiving no additional lineup instructions. However, changes in identification accuracy between the experimental groups and controls were not statistically significant. Similarly, the correct rejection rates for both older and younger children improved nominally, but the changes in accuracy between groups were not statistically significant. This lack of significance may be due in part to issues with power, as cited by the authors; analyses revealed power levels fluctuating from as low as .18 to as high as .97 across conditions.

Methodological factors may have also influenced the results. The child eyewitnesses in this study were at least 10 years old, suggesting that even participants in the control condition were able to correctly reject from TA lineups at a high enough rate to mask the potential effects of administering practice lineups to children. The inclusion of a younger sample with less developed response inhibition skills might have yielded differences in accuracy rates, because the correct rejection rates for children under the age of 10 are much lower (Pozzulo & Lindsay, 1998). Furthermore, the authors made no mention of any methods employed to prevent order or presentation effects. Thus, it is possible that the effects of practice were masked by the order in which the practice lineups were administered, or in the position of the targets within the forensically relevant lineups.
Researchers have also recruited younger samples that have yet to develop response inhibition. Goodman, Bottoms, and Schwartz-Kenney (1991) tested a sample of exclusively younger children aged 3 to 7 years, examining a variety of factors influencing children’s performance and accuracy as eyewitnesses. The participants were divided into age groups of younger (3 to 4 years) and older (5 to 7 years) children. The practice task included in this study involved three lineups; a TP lineup constructed using pictures of animals, a TP lineup constructed around the appearance of the research assistant administering the lineup task, and an additional TA lineup of women with characteristics matching the children’s own mothers. Children in the practice condition received all three of these practice lineups. Children in the control condition made false identification errors at a higher rate than children in the experimental condition, suggesting practice improved accuracy, but this difference in accuracy was only significant for the older children. As in Pozzulo and Lindsay’s (1997) study, it is possible that an order effect masked any benefits of practice lineups, because Goodman et al. (1991) only varied the order of the last two practice lineups. A set presentation order may incite children to attempt to predict a pattern in target presence or absence and compromise the validity of the data. Rather than reflecting performance on an identification task, results might rather capture children’s ability to complete the perceived pattern. Additionally, although notable in its inclusion of younger children, the study included very young children who have since been empirically demonstrated to be less accurate eyewitnesses even under ideal circumstances (i.e., the culprit is present in the lineup; Pozzulo & Lindsay, 1998). Further, the authors also only administered TA lineups, rendering the analysis incomplete (Malpass & Devine, 1983).
Pozzulo and Lindsay (1998) did not find an effect of practice in their meta-analysis. However, a number of studies published since have revealed results suggesting significant decreases in error and guessing in child eyewitnesses as a result of practice. Nesbitt and Markham (1999) found improvement in eyewitness accuracy overall in their sample of children with a mean age of 4.5 years who were trained in selecting the “Not Here” option when they did not see the suspect in a lineup. Their experimental procedure involved presenting participants in the training groups with instructions via a puppet show in which the central character, a witness to a crime, was instructed by a puppet police officer to only answer questions if they were absolutely sure. Otherwise, they were to respond with “I don’t know.” The consequences of an incorrect answer (i.e., false accusation or conviction) were also explained to participants in the performance. This training procedure significantly reduced false positives in the TA conditions, but at a cost; correct response rates in TP conditions were also lower for the trained groups when compared to controls. Although this type of training was beneficial in reducing guessing behaviour, controversy exists regarding whether or not correct identification rates should be safeguarded while procedures aiming to reduce false positives are being explored (Steblay et al., 2011).

A similar finding was reported by Beresford and Blades (2006), who also strongly reinforced the possible consequences of inaccurate responses via cautioning instructions across a variety of lineup procedures in their sample of children separated into age groups of 6 to 7 years, and 9 to 10 years. Participants witnessed a video of a staged theft event. In a departure from the previous literature, filmed identification lineups were shown to participants in one experimental group, whereas another was administered photo arrays.
Participants who were administered simultaneous TA lineups plus cautionary instructions committed significantly fewer errors compared to those presented with a simultaneous lineup without instruction. Although these findings are promising in terms of potentially reducing false accusations in children below the age of 10, no effect of age on accuracy was found between the two groups. It is possible that this was due to the divergent lineup presentation mediums employed; the differences in cautioning instructions required for photographic versus video photo arrays may have had a confounding effect on identification accuracy across the two age groups.

Expanding on previous work by Parker and Ryan (1993), Parker and Myers (2001) observed a reduction in guessing coupled with increased accuracy in TA lineups, with only a small cost in TP accuracy. The authors recruited children aged just above 8 years and just below 11 years. Those in the experimental condition were administered one TP lineup constructed of foils matched to the research assistant, who was present, and one TA lineup constructed of foils matched to the child’s mother. The practice task resulted in an almost complete elimination of children’s multiple choosing; only four of 144 children attempted more than one selection. The practice lineups also engendered an increase in accuracy in the TA conditions. Participants in the experimental condition made nominally fewer correct identifications when compared to controls, however this difference was not statistically significant.

1.4.1 Limitations of current practice paradigms. Parker and Myers’ work is well situated in the literature examining the effects of practice on children’s identification accuracy, as their results indicate promising increases in TA accuracy. However, some of
the studies have been low in power, yielding increases that are not statistically
significant, or have used techniques that reduced TP accuracy.

Although improvements have been made in the practice tasks administered to
children to improve their eyewitness accuracy, there are nevertheless a number of
limitations that must be addressed. Research thus far has used undemanding practice
lineups containing targets already very familiar to participants (e.g., research assistants
present during the task, participants’ own mothers). These compromise the ecological
validity of the practice lineups, as forensically relevant lineups are arrays made up of
strangers. Because familiar faces are processed differently than unfamiliar faces (Bruce
& Young, 1986; Johnston & Edmonds, 2009), the use of familiar targets is potentially
problematic; if a child eyewitness was already familiar with the perpetrator, it is unlikely
that he or she would be prompted to identify that individual in a lineup. Furthermore, in
certain circumstances the increased processing fluency associated with a somewhat
familiar person may lead to increases in false positives (e.g., availability heuristic).
Indeed, using practice lineups comprised of human faces may be detrimental to the
purpose of the forensic investigation, because research has shown that viewing many
faces in the context of crime hampers an individual’s memory of the target face
(MacLeod, 2002; Ross, Ceci, Dunning, & Toglia, 1994).

To address these concerns with human faces, a variety of animal species have
been used in practice lineups. Although this prevents competing stimuli from interfering
with the eyewitness’ memory of the target face, it may also result in artificially inflated
differences between lineup members. Research in cognitive psychology has clearly
shown that the fewer features a target item shares with competing distractors, the easier it
is to locate (Neisser, 1964; Treisman & Gelade, 1980). As such, a particular species (e.g., a dog) is easier to find in a lineup comprised of differing species (e.g., a lamb, a lion, and a horse), making it easier for a child to identify the presence or absence of the target species. Practice lineups constructed from varying models of the same animal are more likely to involve the level of difficulty presented by a forensically relevant lineup, and are thus more appropriate for this task. Additionally, practice lineups constructed using animals may mitigate the aversive effects of viewing multiple human faces, as discussed above.

Studies have also rarely recruited participants whose ages adequately span the development of response inhibition, the cognitive ability that is likely involved in children’s apparent inability to consistently reject TA lineups. Order and presentation effects may have also played a role in the results reported above. For instance, systematically presenting practice lineups in the order of TP and TA may create the expectation that the final, forensically relevant lineup will follow and contain the guilty perpetrator. This may confound results, as this expectation might increase the pressure to choose and thus nullify the intended increase in response inhibition. All of these factors must be considered in subsequent investigations examining the possible benefits of practice tasks on children’s eyewitness accuracy.

Given the particular difficulties children have with lineup identification tasks, the development of a simple and logistically realistic procedure is crucial. As simple printed materials that can easily be transmitted electronically to police departments, this procedure’s transition from laboratory to police practice has the potential to be accomplished relatively quickly should this technique be found to improve children’s
identification accuracy. Such efforts may culminate in the development of standardized practice lineups that can be implemented by police departments across a variety of contexts and regions. Additionally, standardized practice lineups could be easily implemented by non-researchers (e.g., police officers) at very low cost.

1.5 Current Study

In this project, I sought to address previously outlined issues by increasing the cognitive demands, and therefore the ecological validity, of practice lineups in an effort to increase accuracy in TA lineups without reducing correct identifications in TP lineups. To achieve this, two distinct sets of practice lineups were used: dog practice lineups and women practice lineups. All children practiced on both a TP and a TA practice lineup in one of the two formats, the order of which was counterbalanced. They were also permitted to make as many attempts as was necessary to respond correctly to their practice lineup before proceeding to the next one. A control condition was also included in which participants did not receive practice, and were instead only administered a forensically relevant lineup (as would typically be the case in a police investigation). Each of these three conditions was divided into TP and TA forensically relevant lineups, such that half of participants in each condition were administered one forensically relevant lineup of one type or the other. Finally, two age groups were tested within each lineup condition in order to compare the accuracy of children who were thought not to have yet developed response inhibition (i.e., 6 to 7 years of age) with those who were developing or had developed this cognitive ability (i.e., 8 to 10 years of age).

In contrast to previous studies using animal lineups, children in the present study were shown lineups with multiple instances of a single type of animal (dog). Prompting a
child to identify a specific dog (e.g., the dog with brown ears) more effectively mimics a lineup constructed from pictures of human faces in that it requires the child to individuate the lineup members and to identify the target based on a specific detail from a series of similar pictures. Although research has indicated that human faces are processed differently than other objects, such as animals, the overarching process of recognition occurs through the synthesis of features into a whole item (Bruce & Young, 1986; Treisman & Gelade, 1980). Accordingly, recognizing and identifying an animal represents a step towards the more subtle and sophisticated task of recognizing and identifying a human face. This fits well into a practice paradigm designed to prime the appropriate mechanisms and responses involved in a lineup identification task prior to introducing children to the more challenging forensically relevant lineup, while avoiding the problem of compromising their memory of the target face by presenting interfering human faces. These intra-species stimuli represent a departure from the previous literature, which has used familiar targets (e.g., research assistants, mothers) or animals of varying species. Order and presentation effects were also controlled for by changing the order in which the practice lineups were presented, and by rotating the position of the target in the photo arrays.

Despite the empirical evidence indicating that eyewitness identification accuracy decreases in multiple perpetrator crimes, that an increase in faces viewed compromises memory for the target face (MacLeod, 2002; Ross et al., 1994), and that identification accuracy has been reported to decrease as the number of faces seen by eyewitnesses increases (Clifford & Hollin, 1981; Godfrey & Clark, 2010), practice lineups comprised of women were also created for this study. Had practicing with dog lineups had no
impact on children’s identification accuracy, it would have remained unclear if this was
due to a lack of practice effect in and of itself, or if it was due to a property inherent to
this particular collection of photographs, or to this particular animal species. It also
stands to reason that practicing with human faces unfamiliar to the child eyewitness may
better prepare them for the forensically relevant lineup compared to practicing with
lineups built from familiar faces, as had been done in previous studies.

The cognitive development of response inhibition was also examined by including
a wider age range in my sample than had previously been considered. The older group of
children, aged 9 to 10 years, encompassed the “sensitive period” in which response
inhibition skills are thought to emerge. Also included was a group of younger children,
aged 6 to 8 years, whose response inhibition skills had not yet, in theory, fully developed.

1.5.1 Hypotheses. I predicted that practice lineups would improve children’s
eyewitness accuracy in TA lineup conditions without incurring a cost in accuracy for TP
lineups. Making lineups more realistic by utilizing the same dog with a varying pattern
of spots was hypothesized to minimize differences between lineup members, which
would better prepare children for the forensically relevant lineup comprised of human
faces. I also expected that, in the control condition, older children would be more
accurate than younger children. Within the practice conditions, I predicted that the
improvement in accuracy would be greater in the younger children than in the older
children. A measure of children’s confidence was also included as part of the procedure,
for which I hypothesized that practice with dogs would increase children’s confidence
significantly relative both to control groups and to the group who practiced with women
lineups. However, because increasing the number of faces viewed has been linked with a
decrease in confidence under certain circumstances (Clifford & Hollin, 1981), I predicted that children who practiced with lineups composed of women would be significantly less confident relative to those who had practiced with dog lineups and those in the control condition.

2. Method

The study was a 2 (age; 6-8 years, 9-10 years) x 3 (practice condition; dog lineup practice, women lineup practice, control) x 2 (lineup type; TP vs. TA) between-subjects design. Identification accuracy on the forensically relevant lineup, confidence for their final selection, and number of attempts until correct on practice lineups were retained as dependent variables.

2.1 Participants

One-hundred and eighty-six children were recruited from a university summer science camp. Of these, 69.4% were male, and ages ranged from 6 to 10 years ($M = 8.31$, $SD = 1.18$). No children were excluded from analysis based on age, gender, or other sociodemographic factors. Participants were randomly assigned to one of six conditions, all counterbalanced by alternating practice condition and lineup type in order to screen for confounds such as presentation effects.

Fewer younger children were enrolled in the science summer camps relative to older children, resulting in an uneven distribution of ages. The distribution of ages is reported in Table 1. Despite this uneven distribution of ages, age was retained in the primary analyses as a group variable.
Table 1.

Descripive Distribution of Children’s Age in Years

<table>
<thead>
<tr>
<th>Child age</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>14 (7.5)</td>
</tr>
<tr>
<td>7</td>
<td>35 (18.8)</td>
</tr>
<tr>
<td>8</td>
<td>50 (26.9)</td>
</tr>
<tr>
<td>9</td>
<td>54 (29.0)</td>
</tr>
<tr>
<td>10</td>
<td>33 (17.7)</td>
</tr>
</tbody>
</table>
2.2 Interviewers

Nine research assistants each interviewed children individually. All research assistants were undergraduates studying at the university level ($M = 4.78$ years, $SD = 1.30$) and were women aged between 21 and 37 years ($M = 25.44$, $SD = 4.61$). Their prior experience ranged from having eight years of formal, professional experience with children, to having had no prior formal or informal experience interacting with children. Overall, interviewers had an average of 2.78 years ($SD = 2.73$) of experience with children. All interviewers participated in comprehensive training sessions instructing them on child interview and lineup administration procedures. For instance, interviewers were trained to always inform children that the target may or may not be in the lineup for both the practice and forensically relevant lineups. They also received instruction on how to prompt and collect children’s lineup responses (see below).

2.3 Measures

2.3.1 Play activity and staged theft event. Children participated in a structured magic show featuring five rehearsed tricks (Activity TV, 2012) performed by a research assistant. The research assistant wore a wizard costume that included a pointed hat, cape, and magic wand. The research assistant demonstrated each trick to the children once and then tutored them on how to reproduce the same feats of magic themselves. This procedure was repeated until the fifth trick, during which the research assistant called for a volunteer at the tutorial phase. The role of volunteer was always fulfilled by a male confederate, who pocketed the magic wand when the research assistant handed it to him. The male confederate later served as the target in the forensically relevant lineups. Following the successful completion of the trick, the male confederate exited the room,
taking the magic wand with him. Each magic show activity session lasted approximately 15 minutes. The male confederate’s role required approximately one minute to complete.

2.3.2 Lineups. All lineups were presented using the simultaneous procedure. Using this type of lineup contributed further ecological validity to the design because it is currently considered the standard in police practice (Clark & Godfrey, 2009). All lineups were assembled using a word processing program, and printed on legal sized paper in full colour. The photographs were positioned in two rows of three, and measured just over eight centimeters each both in length and height. In both TP and TA lineups, the target was systematically rotated across all positions such that the target occurred an equal number of times in each lineup position.

2.3.2.1 Practice lineups. The dog lineups were created by digitally altering the appearance of a white dog such that different spots of the same colour appeared on its body. As a counterbalancing measure, half of the lineups created featured dogs with tan spots (see Appendix A for the array of included lineup members), whereas the other half of the lineup in this condition featured the same dogs with black spots (Appendix B).

To create the women’s lineups, a woman with platinum blonde hair was selected from an extant database of photographed Caucasian women’s faces. This feature was selected because none of the women involved with data collection (e.g., magician or interviewers) had such bright blonde hair. Seven independent raters rated the similarity between this photograph and the rest of the faces in the database on a scale of 0 to 10.
From this, the six blonde women receiving the highest similarity ratings ($M = 5.79$)\(^1\) in addition to the original face were selected to form the lineup (Appendix C).

2.3.2.2 Forensically relevant lineups. These lineups were constructed based on the principles of lineup construction outlined in Brigham, Meissner, and Wasserman (1999). Both lineup size and bias were assessed using Effective Size (ES) and Functional Size (FS; Wells, Lieppe, & Ostrom, 1979) calculations, respectively.

ES assesses whether a lineup is of adequate size by comparing its adjusted nominal size to the adjusted rate at which mock witnesses have selected the given foils. Adjusted nominal size is generated by removing those foils which have not been selected by mock witnesses during a lineup’s pilot phase. This figure determines the rates at which the resulting lineup members will be selected by chance, which is then subtracted from the actual choice frequencies generated by mock witnesses. That difference, in turn, is divided by the adjusted chance selection rate, which is then itself subtracted from the lineup’s adjusted nominal size. If the final figure is equal to or greater than half of the lineup’s original nominal size, then the lineup is deemed fair (Brigham, Ready, & Spier, 1990). Critics of the ES technique suggest that judicial officials or laypersons may have difficulty interpreting the final score as it is several steps removed from the raw data. However, research has identified ES as having improved discrimination between fair lineups and intentionally-created unfair lineups when compared with more straightforward assessments of lineup size (Brigham et al., 1999). FS is a lineup bias assessment technique developed by Wells and colleagues (1979). It is generated by

\(^1\) Although this mean similarity rating appears to be mid-scale, lineup similarity ratings tend to center just above mid-scale (Fitzgerald, Price, Oriet, & Charman, 2013). Given this, labelling this practice lineup as high-similarity is justified.
dividing the total number of mock witnesses recruited during the lineup’s pilot phase by the number of mock witnesses who correctly identified the suspect based on a provided eyewitness description of the perpetrator. Authors have indicated that a lineup receiving an FS score of three or above in its pilot phase is fair (Brigham et al., 1999). Unlike other estimates of lineup bias, FS is not dependent upon sample size. It has also been found to have higher sensitivity rates compared to alternative methods (Brigham et al., 1999).

A total of 161 individuals were recruited online to pilot the forensically relevant lineups. Of these, 57 were asked to pilot the TP lineups and 101 underwent the procedure for the TA lineup (three participants did not complete the survey). In addition, a designated innocent suspect was selected prior to pilot testing based on the responses of 30 independent volunteers. These participants were presented with a set of eight faces that matched the description of the male confederate, and asked to select which face best matched the description provided. The array member who received the most selections was chosen as the innocent suspect.

Both the TP (FS = 3.80) and TA (FS = 33.67) lineups were deemed fair by assessments according to the method outlined by Wells et al. (1979). However, both lineups used were found to be biased according to the method outlined by Brigham et al. (1990), receiving ES scores of 0.00 and -5.34, respectively. Although this would pose a problem in conventional lineups used with adults, issues of lineup bias and similarity are understudied; indeed, recent research has suggested that unbiased, or high-similarity lineups, may be too difficult for children (Fitzgerald, Whiting, Therrien, & Price, 2013). Furthermore, previous studies using child samples have also deliberately retained biased lineups as a means to test their procedure against the most challenging lineup for
eyewitnesses, and worst case scenario for the suspect (Zajac & Karageorge, 2009; Karageorge & Zajac, 2011). As such, despite these potential issues the lineups were retained for use.

2.3.3 Lineup response form. Following an examination of either a practice lineup or the forensically relevant one, a research assistant recorded children’s verbal selection on an interviewer response form. Children’s number of attempts for the first and second practice lineups, response to the forensically relevant lineup, and confidence in the identification decision were recorded.

2.4 Procedure

Children participated in a play session designed to teach children magic tricks (Activity TV, 2012). As previously described, this session concluded after a male confederate left with the magician’s wand. A recorded delay of one or two days then ensued, depending on camp scheduling. This delay length was situated between those retained by previous studies, which ranged from minutes (Parker & Myers, 2001; Parker & Ryan, 1993; Pozzulo & Lindsay, 1997) to several weeks (Davies et al., 1988; Goodman et al., 1991) Children with parental consent (Appendix D) proceeded to the experimental phase, which also included procedures for obtaining verbal assent. Interviews were only initiated with children who had both consent and assent; those who did not assent (n = 3) were given their special prize and returned to the camp group activity.

Interviews began with an overview of child-friendly interview principles as a part of a separate research project. These consisted of informing the children that they were in charge of the interview, that they could refrain from answering any questions without
providing a reason, that they could request clarification if desired, that they must tell the truth, that “I don’t know” was an acceptable response to a question they could not answer, and that they could stop participating at any time without having to provide a reason (Lamb, Orbach, Hershkowitz, Esplin, & Horowitz, 2007). Following this, interviewers engaged in a rapport session and structured interview which required approximately 20 minutes to complete. The interview data were part of a separate research project.

After concluding the interview, the interviewers thanked participants for their answers in the interview, and told participants that they had heard that the magician had lost her wand during the show. A screening question was asked to divide those children who paid attention to the wand’s removal and those that did not: “The magician told me her wand went missing when she came to see you. I wasn’t there, so I’m hoping you can help me figure out what happened. Do you remember the magic wand going missing?” Children continued to participate regardless of their answer; however, their response was retained and coded for later analysis.

Following these transitional procedures, children in the practice conditions were administered two practice lineups; either two lineups comprised of dogs, or two lineups comprised of women. Interviewers said that before they asked more about the man who had the wand they wanted to practice their question with dogs or women first. Children were shown a photograph of the woman or dog target for approximately 10 seconds and told that this is the dog or person they should look for in the upcoming lineups. For each practice lineup, the interviewers asked the children to identify the target if they recognized it, or to say “Not Here” if they did not. Children could also point to the words
“Not Here”, which were printed at the bottom of each lineup sheet. The order in which the practice lineups were presented was counterbalanced to control for any order effects, such that half of the participants in the experimental conditions were administered the practice TP lineup prior to the practice TA lineup whereas the other half viewed the TA lineup prior to being administered the TP lineup. Participants only proceeded to the subsequent lineup once a correct identification or rejection was made; those who were incorrect were shown the target photograph again, and permitted to make a new selection. This procedure was repeated until a correct selection was made, and number of attempts until correct was recorded.

After the practice procedure was completed, participants proceeded to the forensically relevant lineup. Those assigned to the control condition continued directly to this procedure. Interviewers reminded participants to think of the man who took the magic wand. Children were informed that he may or may not be present in the lineup and that if they saw him they were to point to the photograph and say, out loud, the number associated with that photograph. If they did not recognize any of the men in the lineup, they were instructed by the interviewer to speak and point to the “Not Here” option.

Finally, confidence ratings were collected. Interviewers instructed children to indicate their confidence on a 3-point thumb scale, which has been successfully used in the past as a measure of children’s confidence following a lineup identification (Fitzgerald, Price, & Connolly, 2012). This scale consisted of thumbs up for “Very Sure”, thumbs middle for “So-So Sure”, and thumbs down for “Not Very Sure”.

Once the interview and lineup portions of the procedure were concluded, participants were thanked for their help in recounting the details of the magic show.
Debriefing consisted of letting participants know that they helped the interviewer learn more about the event, and children were afforded the opportunity to ask any questions they had about the process. Each child was then invited to select a small prize from a box, and returned to the camp group activity.

3. Results

Children’s identification choices in the forensically relevant lineup across all conditions are presented in Table 2. Analyses were conducted separately for those who viewed TP and TA lineups. Overall, children correctly identified the target at a rate of 57.4% when he was present within the lineup. When the target was absent from the lineup, 43.1% of children correctly rejected their administered lineup.

Prior to proceeding to the lineup portion of the procedure, children were prompted to reveal if they remembered that the magic wand went missing. Only 7.57% (n = 14) of children reported that they did not recall this portion of the target memory event. This small minority was relatively evenly distributed across conditions, their removal was not revealed to impact the primary analyses, and the analyses examining the benefits of practice suffered from such low cell sizes that they required the inclusion of this group. As such, these participants were retained in the following analyses.

Children were divided into two age groups; the younger group consisted of children aged 6 to 8 years (n = 99) and the older group included children aged 9 to 10 years (n = 87). This corresponds to a time period during which some authors have indicated response inhibition develops (e.g., Brocki & Bohlin, 2004). To investigate the effects of practice and development of response inhibition on children’s identification accuracy, hierarchical loglinear (HILOG) analyses were conducted. These are followed
Table 2.

Identification rates (n) as a function of target and practice lineup type.

<table>
<thead>
<tr>
<th>Target</th>
<th>Practice lineup</th>
<th>Suspect</th>
<th>Foil</th>
<th>Rejection</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP</td>
<td>Dogs</td>
<td>55.0 (22)</td>
<td>15.4 (6)</td>
<td>27.5 (11)</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>47.2 (17)</td>
<td>21.6 (8)</td>
<td>33.3 (12)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>83.3 (15)</td>
<td>0 (0)</td>
<td>16.7 (3)</td>
</tr>
<tr>
<td>TA</td>
<td>Dogs</td>
<td>0 (0)</td>
<td>59.5 (22)</td>
<td>40.5 (15)</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>2.9 (1)</td>
<td>52.9 (18)</td>
<td>44.1 (15)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>0 (0)</td>
<td>61.9 (13)</td>
<td>38.1 (8)</td>
</tr>
</tbody>
</table>
by an examination of simple effects derived from the accuracy data, as well as analyses examining the confidence-accuracy relation of children’s post-identification feedback. Finally, children’s performance on the practice lineups themselves as well as differences in accuracy on the forensically relevant lineups between the two age groups is examined.

3.1 Analyses of Forensically Relevant Responses

3.1.1 Target-present lineup response. The response variable for children’s accuracy data comprised responses from those who made a suspect identification (i.e., correct identification), those who made a foil selection (i.e., incorrect identification), and those who incorrectly rejected the lineup. These responses, in turn, were entered into a HILOG analysis with the practice condition and age group variables. This did not reveal a significant interaction at the three- or two-way levels; $\chi^2 (4) = 2.48$, $p = .65$ and $\chi^2 (8) = 14.53$, $p = .07$, respectively.

3.1.2 Target-present accuracy. Incorrect identifications and incorrect rejections were collapsed to create a new dichotomous variable termed accuracy (i.e., correct/incorrect) as an alternate way to approach the data. When entered into a HILOG analysis with the age group and lineup condition variables, the three-way interaction was not significant, $\chi^2 (2) = .06$, $p = .97$. However, the two-way interaction was significant, $\chi^2 (5) = 11.62$, $p = .04$. Subsequent partial association analyses revealed a significant interaction between lineup condition and accuracy, $\chi^2 (2) = 7.91$, $p = .02$. This interaction was further examined by collapsing across the age variable to test for simple effects. These analyses revealed a significant difference in correct identifications between children who practiced with women lineups (.47) and controls (.83; $z = 2.33$, $p = .02$). There was also a significant difference between those who practiced with dog
lineups (.55) and controls (z = 2.94, p = .003). This pair of results indicates that children who practiced made significantly fewer correct identifications than controls. This was coupled with a complementary significant difference across foil identifications; both children who practiced with dog (.15) and women lineups (.22) were more likely to make foil identifications relative to controls (.00), z = 2.63, p = .009 and z = 3.15, p = .002, respectively. Calculating the odds ratio to quantify this finding indicated that, contrary to hypotheses, children who did not practice were 3.88 times more likely to correctly identify the target from a lineup compared to those who practiced with lineups composed of dogs and 5.88 times more likely to be correct compared to children who had practiced with women lineups.

3.1.3 Target-absent lineup response. As with the prior lineup response analyses, responses were divided into suspect identification, foil identification, and correct rejection and entered into a HILOG analysis with the age group and lineup condition variables. Neither the three-way interaction, χ² (4) = 3.44, p = .49, nor the two-way interaction were significant, χ² (8) = 7.54, p = .48.

3.1.4 Target-absent accuracy. The response variable was collapsed into a dichotomous accuracy (i.e., correct/incorrect) variable and entered into a HILOG analysis with the age group and lineup condition variables. In this case, neither the three-way interaction, χ² (2) = 3.87, p = .14, nor the two-way interaction, χ² (5) = 3.17, p = .67, were significant.

In summary, children who did any kind of practice were significantly less accurate relative to children only administered a forensically relevant TP lineup. Conversely, practice lineups did not alter children’s TA accuracy. This is contrary to the
hypotheses, which stated that practice would succeed in increasing correct rejections without engendering a change in correct identifications.

3.1.5 Confidence. To examine the impact of children’s identification accuracy on their decision confidence, a 2 (accuracy: correct vs. incorrect) x 3 (practice condition: dogs vs. women vs. controls) factorial ANOVA was performed using confidence as the dependent variable. This relationship was examined separately for TP and TA lineups.

3.1.5.1 Target-present. When the target was present, accuracy, lineup condition, and the interaction between the two did not have a significant effect on confidence: \( p = .25, p = .11 \) and \( p = .22 \), respectively. It was, however, hypothesized that practice would be associated with a positive confidence-accuracy relationship for the dog practice condition, but not for the women practice condition, as an increase in faces seen can reduce post-identification confidence (Clifford & Hollin, 1981). To investigate this, mean confidence ratings were plotted for further visual inspection, and are depicted in Figure 1. Interestingly, confidence nominally increased for children who practiced with dog lineups when they were incorrect compared to when they were correct, though t-tests revealed this difference was not significant \( (p = .57) \). This pattern was also observed with women’s lineups, however it was not significant \( (p = .90) \). Finally, the mean confidence ratings were the same across accuracy for children who did not practice \( (M = 1.33) \), disqualifying this comparison from hypothesis testing. The confidence by practice interaction may have failed to reach significance due to the small range afforded by the three-point confidence scale used. This suggests that a more sensitive measure of children’s post-identification confidence is required, as the interaction may have been observable on a larger scale than was used.
Figure 1. Mean confidence ratings across TP accuracy.
Figure 2. Mean confidence ratings across TA accuracy.
3.1.5.2 Target-absent. When the target was absent, no statistically significant effect of accuracy on children’s confidence was identified ($p = .82$). Similarly, lineup condition did not significantly impact confidence ratings ($p = .84$), nor did the interaction between accuracy and lineup condition ($p = .27$). Further visual inspection of the plotted means (Figure 2) did not indicate a similar potential for interaction as was identified in Figure 1.

3.1.5.3 Excluding “Not Very Sure”. A very small number of participants ($n = 8$) reported being “Not Very Sure” on the confidence scale, which may have compromised the value of treating this variable as continuous. As such, confidence was converted into a dichotomous variable by omitting these responses in order to enter confidence as the dependent variable in a logistic binary regression. Age, accuracy (correct/incorrect), target (TP/TA), and lineup condition (control/dogs/women) were included as the independent variables. This model overall significantly predicted children’s confidence ($\chi^2 [5, N = 177] = 18.22, p < .001$), and accounted for 10% (Cox & Snell $R^2$) and 13% (Nagelkerke $R^2$) of the variance. Results of this analysis are presented in Table 3. Age, accuracy, and target significantly predicted confidence, suggesting that confidence increased with age, that children who were incorrect in their selection were more confident, and that children presented a TA lineup reported lower confidence ratings than children presented with a TP lineup.

3.2 Analysis of Practice Responses

The number of attempts children required before proceeding to the forensically relevant lineup bore investigation, as one set of practice lineups may have posed a greater challenge than the other. Such a difference may have accounted for variation in accuracy
Table 3.

Confidence as a Function of Age, Accuracy, Target, and Practice Condition.

<table>
<thead>
<tr>
<th></th>
<th>$\beta$</th>
<th>S.E.</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>.37</td>
<td>.14</td>
<td>1</td>
<td>.01</td>
</tr>
<tr>
<td>Accuracy</td>
<td>-.75</td>
<td>.34</td>
<td>1</td>
<td>.03</td>
</tr>
<tr>
<td>Target (TP/TA)</td>
<td>-.55</td>
<td>.34</td>
<td>1</td>
<td>.11</td>
</tr>
<tr>
<td>Lineup Condition(1)</td>
<td>-.44</td>
<td>.45</td>
<td>1</td>
<td>.32</td>
</tr>
<tr>
<td>Lineup Condition(2)</td>
<td>.03</td>
<td>.38</td>
<td>1</td>
<td>.94</td>
</tr>
</tbody>
</table>
on the forensically relevant lineup, as a taxing practice phase may have had detrimental effects on final accuracy rates. Of the 147 children administered practice lineups, only 35 required more than one attempt on either practice lineup before proceeding to the forensically relevant lineup. Those who practiced with dog lineups required between 1 and 3 attempts on their first lineup ($M = 1.17, SD = .41$), and between 1 and 3 attempts for their second practice lineup ($M = 1.05, SD = .28$). Children who practiced with women lineups made between 1 and 5 attempts on their first lineup ($M = 1.28, SD = .70$), followed by 1 to 6 ($M = 1.17, SD = .68$) attempts until correct on their second practice lineup.

Children were divided into those who only required one attempt to correctly identify or correctly reject their targets, and those who required more than one attempt on either task. The distribution of these groups is depicted in Table 4. Children in both dog (.80) and women (.72) practice conditions were significantly more likely to require only one rather than multiple attempts on both practice lineups, $z = 7.77, p < .001$ and $z = 4.94, p < .001$, respectively. Despite a nominal difference between the number of children requiring a single attempt on both practice lineups in the dog practice condition and the women practice condition, this difference is not significant ($p = .23$). This suggests that, with regards to number of attempts until correct, practicing with human faces did not differ from practicing with lineups composed of dogs. Children were just as likely to correctly complete either practice condition with only one attempt for each of the TP and TA practice lineups.
Table 4.

Rate of response attempts until correct (n) on practice lineups.

<table>
<thead>
<tr>
<th>Practice Lineup</th>
<th>Single Attempt</th>
<th>Multiple Attempts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dogs</td>
<td>80.3 (61)</td>
<td>19.7 (15)</td>
</tr>
<tr>
<td>Women</td>
<td>71.8 (51)</td>
<td>28.2 (20)</td>
</tr>
</tbody>
</table>
3.3 Benefits of Practice

Analysis of children’s performance on the practice lineups revealed that a majority of participants only required a single attempt to correctly choose the target in their practice lineup and proceed to the forensically relevant lineup. A smaller subset of the sample required more than one attempt on either of their practice lineups before correctly choosing the target and proceeding to the forensically relevant lineup. I hypothesized that younger children would improve more than older children following the administration of practice lineups, as the practice paradigm was designed to prime response inhibition. In essence, younger children had more gains to make by participating in a demonstration enabling them to inhibit a prepotent response, whereas the older children belonged to an age group thought to already be exercising this ability (Brocki & Bohlin, 2004). To assess this, children’s performance on the practice lineups (e.g., single attempt vs. multiple attempts) was entered into a HILOG analysis with the practice condition, age group, and accuracy variables. This analysis assumes that there is a relationship between accuracy on the practice tasks and the forensically relevant task, and as such data from children in the control condition were excluded from analysis. Age, practice lineup performance, and accuracy would have to interact in the model in order to validate this prediction.

Contrary to the hypothesis, when the target was present in the forensically relevant lineup, the analysis did not reveal a significant interaction at the four-way level, \(\chi^2 (4) = .69, p = .95\), nor at any of the subordinate levels. Similarly, the four-way model was not significant for children administered forensically relevant TA lineups, \(\chi^2 (4) = .334, p = .99\), and none of the lower-order interactions were significant. These non-
significant results may suggest a lack of relationship between children’s performance on the practice tasks and the final identification task.

4. Discussion

Consistent with previous literature (Davies et al., 1988; Parker & Myers, 2001; Parker & Ryan, 1993; Pozzulo & Lindsay, 1997), the present study found that practice lineups did not significantly impact children’s identification accuracy. However, in a departure from the previous literature, the obtained results from this study suggest that, under certain circumstances, practice lineups serve to decrease children’s identification accuracy relative to those who did not practice. In addition, this study did not identify any age differences as they relate to response inhibition.

4.1 Identification Accuracy

Contrary to the hypotheses, the methodological improvements applied to prior procedures did not result in a significant increase in accuracy when the target was absent from the lineup, which represents the most difficult identification task for a child (Pozzulo & Lindsay, 1998). Interestingly, children who practiced with dog lineups and those who practiced with women lineups were significantly less accurate when the target was present in the lineup compared to children who did not practice. This unexpected drop in accuracy may be accounted for by a lowered choosing criterion as suggested by Ebbesen and Flowe (2002), who described eyewitness recognition decisions involving an individual threshold that must be crossed in order to prompt an identification. Much like an action potential, a selected face must exceed the set criterion composed of a variety of factors (e.g., the strength of the eyewitnesses’ memory trace, the degree of resemblance between the suspect and the fillers, the representativeness of the suspect’s photograph).
before being selected. If none of the presented faces exceed the threshold, a rejection is made. Ebbesen and Flowe (2002) have suggested that the criteria used by eyewitnesses can be experimentally manipulated. For instance, cautionary instructions that the perpetrator may or may not be present may shift eyewitnesses’ match criterion upwards, requiring a more stringent match for an identification to take place. Indeed, cautionary instructions have been found to increase eyewitnesses’ identification accuracy (Steblay, 1997). The present results suggest that practicing with lineups composed of dogs and of women’s faces may lower children’s selection criteria, and result in a shift towards foil identifications from the suspect in TP lineups. Essentially, it may have been that children’s decision criteria were lowered to the level of “any face will do” following the practice lineups, at the cost of their subsequent identification accuracy.

An alternative explanation for this identification accuracy deficit in children may involve their level of arousal following the administration of a practice lineup. A purpose of the practice paradigm was to decrease the social demands lineups place upon children, which previous research has linked with decreased identification accuracy (Lowenstein et al., 2010; Ricci et al., 1996). Practice lineups may have lowered participants’ level of arousal too much, resulting in a similar “any face will do” response related to a lowered decision criterion. A number of studies have linked the impact of level of adults’ arousal at encoding on later recall (Dutton & Carroll, 2001; Jeong & Biocca, 2012) as well as upon the recall of autobiographical memories (Ford, Addis, & Giovanello, 2012; Talarico, LaBar, & Rubin, 2004); however, further research is required to explore the impact of children’s level of arousal at the retrieval stage.
Children in this study’s control condition also reached an unusually high rate of correct identifications (.83) relative to averages of .47 to .71 identified for this age range by Pozzulo and Lindsay’s (1998) meta-analysis. This discrepancy suggests that the data reported here may differ in some way from materials used in other studies. However, such a discrepancy is not expected to have a differing impact on the two practice conditions, particularly given the results of the analyses examining children’s benefit scores.

4.2 Response Inhibition

Children were divided into two age groups for the primary analyses of this study; those between the ages of 6 and 8 years were considered as the younger group, and those between the ages of 9 and 10 years represented the older group. The older age group corresponded to a developmental period during which response inhibition, the ability to inhibit a previous appropriate or otherwise automatic response, is believed to be nascent, whereas the younger children were hypothesized to not yet have developed response inhibition (Brocki & Bohlin, 2004). Despite this, age was not significant in any of the models generated by the HILOG analyses, indicating no differences in accuracy between these two groups.

It may be that the children included in this sample were not sufficiently advanced with regards to response inhibition to be able to benefit from the practice manipulation. The key studies examining the activation of this cognitive ability included in their older sample children as old as 12 years of age (Brocki & Bohlin, 2004; McAuley & White, 2011; Williams et al., 1999). The response inhibition abilities of 9- and 10-year-olds may be more subtle than those of 11- and 12-year-olds, and thus as a group they may not have
differed sufficiently from the 6- to 8-year old group to make an impact on identification accuracy rates following practice. Future research endeavours would benefit from including children up to the age of 12 years in their older group in order to ascertain whether these more mature children would benefit from practice lineups.

4.3 Confidence

Following the practice procedure and administration of the forensically relevant lineup, children were prompted to indicate how confident they were in their decision using a three-point thumb scale that had been used with success in prior research (Fitzgerald et al., 2012). Children’s confidence ratings were markedly different from what had been hypothesized. When the target was absent from the forensically relevant lineup, no confidence-accuracy relationship was identified. Conversely, rather than increasing children’s post-identification confidence, practice with dog lineups only increased confidence for children who made incorrect responses (e.g., foil identifications or rejections) from a TP lineup. This finding is divergent from previous work, which has found that children are more confident in correct, rather than incorrect responses when administered simultaneous lineups (Beresford & Blades, 2006). However, it mimics a pattern identified in deception detection research, whereby the most experienced law enforcement officers reported being most confident in their abilities to detect deception despite the fact that they were no more or less accurate than their less experienced counterparts, or even undergraduate students (DePaulo & Pfeifer, 1996). Furthermore, DePaulo and Pfeifer also found that those with the most training were also the most confident after having acquired some practice with a deception detection task. Although these results were garnered with an older sample than was retained for the present study,
it bears noting that experience and practice with the task inflated confidence, much as practice served to inflate children’s post-identification confidence. Why this effect was strongest in children practicing with dog lineups when incorrect (versus correct) is unclear. It is also unclear why this same pattern was identified in children’s responses following practice with women lineups, though the difference was smaller. Both may be linked to lowered levels of arousal related to the “any face will do” effect described above in that once the end of the procedure has been reached, a child who had chosen any face following a series of practice rounds may have been drawn to giving a thumbs up (or “very sure” on the confidence scale) out of fatigue.

4.4 Implications

A handful of well-designed studies (Davies et al., 1988; Goodman et al., 1991; Parker & Myers, 2001; Parker & Ryan, 1993; Pozzulo & Lindsay, 1997) have tackled the potential of practice lineups as a means to improve children’s identification accuracy, and to specifically increase their rejections under circumstances when the guilty suspect is absent from the lineup. Research from the developmental literature regarding response inhibition indicates that this procedure is an age-appropriate means of effecting this change (Brocki & Bohlin, 2004; McAuley et al., 2011; McAuley & White, 2011; Williams et al., 1999). However, studies examining practice lineups tend towards null results. This is not to say that improvement to children’s identification accuracy is a lost cause; other procedures have engendered meaningful improvements to children’s accuracy. A modification to the forensically relevant lineup itself, called the elimination lineup, has been found to increase children’s correct rejections without impacting their rates of correct identification (Pozzulo & Lindsay, 1999). The authors reasoned that
asking children to select the lineup member that most resembles their memory of the perpetrator from a simultaneous lineup prior to prompting the final identification allowed them to fully utilise their judgments skills, which was the source of the increase in accuracy. Other successful procedures involve adding a salient rejection option to simultaneous lineups in order to allow children to reject by choosing (Dunlevy & Cherryman, 2012; Havard & Memon, 2013; Karageorge & Zajac, 2009; Zajac & Karageorge, 2011), or including explicit cautionary instructions to children emphasizing the consequences of a false accusation (Beresford & Blades, 2006; Parker & Myers, 2001). Practice lineups differ from these procedures in that they are implemented in addition to the typical administration of the forensically relevant lineup, which itself includes a standard set of instructions also present in this study. This may indicate that children have a boundary regarding the challenges involved in lineup identifications, and that adding to those challenges may serve only to further impair their performance, rather than improve it as intended.

4.5 Limitations

There are some statistical limitations associated with this study because there was an uneven distribution of participants borne from a randomization error, which resulted in a smaller control group compared to the two practice groups. In addition, analyses of the confidence scale are limited in that it appeared to not offer a sufficient range of options to meaningfully capture children’s confidence in their identification decision (despite prior evidence of its effectiveness; Fitzgerald et al., 2012), and instead reflect their aversion to rating their performance as “thumbs down.” This is supported by the fact that only a very small number of children chose this option, while the vast majority of them chose to give
a “thumbs up”. This speaks to a need for future research to address the paucity of child-specific measures of confidence, particularly for young children who have not necessarily learned to count through the large ranges used in adults’ confidence scales (e.g., 0 to 100; Fitzgerald et al., 2013).

The results generated are also limited as the lineups were presented exclusively using the simultaneous procedure. The sequential procedure was not used in part because Steblay et al.’s meta-analyses (2001; 2011) reported that differences in performance observed in adults with simultaneous versus sequential lineups did not emerge in studies examining children as eyewitnesses. While only a minority of studies included children in both meta-analyses and it is possible that children’s performance mirrors that of adults, the use of the simultaneous procedure in this case was warranted. Parker and Ryan (1993) directly compared the simultaneous and sequential procedures in the context of administering practice lineups, and found that children made fewer errors with the simultaneous procedure than with the sequential procedure in the practice condition; however the differences in accuracy between groups were not statistically significant. Furthermore, a reduction in children’s over-choosing was observed only in the practice-simultaneous condition, and in fact over-choosing increased in their practice-sequential condition. Additionally, the sequential procedure was designed to reduce errors in TA lineup conditions, which may have confounded any effects induced by the administration of practice lineups. TA lineups have been identified as resulting in the lowest accuracy in children (Pozzulo & Lindsay, 1998), and by using the simultaneous procedure in this design, any increase in TA accuracy would have been attributable to the experimental manipulation rather than to the lineup presentation procedure.
A further shortcoming of the present study regards the generalizability of the sample, which was comprised of children whose parents are able to afford full-day summer camp. As such, the results may not be applicable to samples from different socioeconomic backgrounds. An added concern with regards to the participants themselves involves a potential for contamination, as there was no way to prevent campers from communicating the purpose of the study amongst each other.

Finally, the results of this study are limited by two key assumptions inherent to its design. First, the inclusion of a wider age range than had previously been studied assumed that younger children in this sample would be less capable of inhibiting their responses relative to the older children. However, an objective measure of this ability was not included in this study, and as such it is possible that response inhibition did not influence children’s accuracy on the lineups. The second assumption made both in this study and in the body of literature exploring the effects of practice lineups is this paradigm adequately trains the skill or skills necessary for the successful completion of the forensically relevant lineup task. This study was one of many to find that practice does not benefit children’s identification accuracy. It also failed to find a difference in overall performance between children who successfully completed both practice lineups in a single attempt versus those who required multiple attempts. This may indicate that there is indeed limited transferability between the practice lineup and the forensically relevant one, above and beyond the “any face will do” effect it appears to engender.

4.6 Conclusion

The ultimate purpose of the practice lineups was to develop a procedure which would address the difficulties child eyewitnesses are known to have in making lineup
identifications, such as the propensity to choose (Pozzulo & Lindsay, 1998). Although the materials developed here would be inexpensive to produce and simple for police officers to apply in the field, results suggest that they would not address this issue despite the methodological improvements that were applied (e.g., unfamiliar practice targets, higher similarity practice lineups, age group comparison). This study has contributed a new development in the body of literature examining the effects of practice on children’s eyewitness identification, however a number of issues could be addressed in order to proceed further. Future research endeavours may find success in the application of this procedure in older children or adolescents, who may be more adept at inhibiting their responses and may better respond to this sort of manipulation. As it stands, however, the present work converges with the prior literature indicating that practice lineups are not an effective means to increase children’s identification accuracy.
References


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elimination video lineups. *Applied Cognitive Psychology, 26*, 149-158. doi: 10.1002/acp.1808


Appendix A – Practice lineups: Tan-spotted dogs
Appendix B – Practice lineups: Black-spotted dogs
Appendix C – Practice lineups: Blonde women
Appendix D – Parental Consent Form

PART I
Having read the enclosed materials, I, ___________________ (name of parent/guardian) (Please check one option)
(a) ___ALLOW my child to participate in the memory study
(b) ___Do NOT ALLOW my child to participate
Researchers from the University of Regina will invite my child _____________________
(name of child), date of birth ____________________ to participate in a study that concerns children’s memory. This research will be conducted at ____________________
(name of school/location) under the supervision of Dr. Heather Price of the University of Regina.
Signature of Parent/Guardian: ______________________________
Date: _________________

PART II
We would also like to request permission to use your child’s audio recorded interview in future research studies. If you agree, the audiofile of your child’s conversation would be played for future participants who may evaluate, for example, the quality of the questions and responses. Only anonymous versions of the recorded interview will be played, meaning that all identifying information (e.g., names, locations, etc.) will be removed from the recording. (Please check one option)
(a) ___ALLOW my child’s audio recorded interview to be used in future studies
(b) ___Do NOT ALLOW my child’s audio recorded interview to be used in future studies

PART III
If you would like to receive a summary of the research results, please provide your name and a mailing or e-mail address below.
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

PART IV
We also ask that you indicate whether you would be willing to have us contact you in the future. If so, please provide a phone number, and the best times to reach you in the space provided below.
a) ___YES, please contact me to invite my child to participate in future studies. You can reach me at the following phone number and times:__________________________________________________
b) ___NO, please do not contact me to invite my child to participate in future studies.

****Please return this permission form by _________________